

DOCUMENTED BRIEFING

RAND

Implementing Best Purchasing and Supply Management Practices

*Lessons from Innovative
Commercial Firms*

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*Prepared for the
United States Air Force*

Project AIR FORCE

The research reported here was sponsored by the United States Air Force under Contract F49642-01-C-0003. Further information may be obtained from the Strategic Planning Division, Directorate of Plans, Hq USAF.

ISBN: 0-8330-3007-8

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Published 2002 by RAND
1700 Main Street, P.O. Box 2138, Santa Monica, CA 90407-2138
1200 South Hayes Street, Arlington, VA 22202-5050
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RAND URL: <http://www.rand.org/>

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FOREWORD

Thirty years ago, true supply chain management was almost unknown within American industry. Manufacturers usually made most of the parts that went into their finished products. When they needed to buy materials or services, they relied on purchasing departments that were seen primarily as order takers and order placers. These departments had little visibility, had little perceived value to the bottom line, and enjoyed little respect from other parts of the organization.

That scene has changed dramatically. Although few companies are as strategic as they need to be, and few apply best practices to maximum benefit, almost every company today understands the link between supply management principles and strategic goals.

More and more companies now understand the concept of becoming lean—the ability and competitive necessity of getting waste out of processes. They understand why integrating suppliers into new product development is important. Over time, the tactical purchasing function has given way to supply management processes in which highly trained professionals take a systemic, strategic approach to the drivers of total value.

The reason for the change? A changing world.

As demands increased for better quality, faster delivery, and better overall value, a few visionary leaders began to deliberately distinguish between the things that created value and the things that did not. What they discovered was that the supply chain was a huge opportunity waiting to happen. Their companies adopted best practices such as supplier development, cost management, supplier integration, strategic sourcing themselves and value engineering to stay ahead of competitors and position for future success.

Other companies resisted change too long and were forced to make traumatic adjustments when competitive and economic challenges left them two choices: manage more efficiently or fail. (A burning platform is always an effective catalyst for improvement.)

Whatever the reason for change, companies that implement purchasing and supply management best practices find that they can make their total

dollars go 20 percent to 30 percent further. Imagine saving 20 percent or more of the Air Force's annual purchased costs — that is \$7 billion or more annually to spend on research and development, new systems, human resources, and other areas of vital importance to national defense.

The good news is that supply chain best practices can work for *any* organization that wants to eliminate waste, improve quality, move more quickly, and make dollars go further. One does not have to be in business, nor does one have to wait for a crisis.

Air Force leadership has recognized this by taking several courageous first steps to enhance its purchasing and supply management capabilities. It has further demonstrated its commitment by commissioning RAND to report on the key practices of innovative commercial firms.

Besides the thorough and insightful findings of the report, RAND makes two critical points: First, the Air Force has distinct needs that cannot be satisfied by a one-size-fits-all approach; second, change will be difficult.

We agree wholeheartedly.

No two organizations are alike, and no two organizations will apply purchasing and supply management best practices in exactly the same way. Whether a commercial firm, not-for-profit agency, or government entity, every organization must be guided by its structure, mission, history, culture, and strategic goals.

It is also true that change is seldom easy. Old ways die hard, even when there is wide agreement that change is needed. We have seen organizations struggle helplessly to implement change, and we have seen organizations transformed into powerhouses through their ability to innovate and adapt.

IBM, which spends some \$40 billion a year with suppliers — nearly the same amount as the Air Force — is a good example of the latter.

Until the mid-1990s, IBM made most of the parts used in its finished products. Highly vertical and closely guarded, the company went to great lengths to prevent its own suppliers from knowing how their parts were being used or how they fit into overall business strategies.

This lack of supply chain integration was common within the computer industry during the 1970s. So was the need for top-level secrecy. By the 1990s, however, the game had changed. Most of IBM's competitors were reducing costs by outsourcing and integrating their own capabilities with

the technological expertise that existed among their suppliers. One day, IBM could no longer compete. Hanging onto the old ways had prevented it from leveraging its huge global purchases, from eliminating waste in its processes, and from taking advantage of innovative thinking.

IBM's story has become a textbook example of how purchasing and supply management best practices can change an organization almost overnight. In a few short years, IBM climbed up from a burning platform to a new level – that of a lean, highly integrated company whose hallmarks were speed, efficiency, and innovation. In 1999, the company won *Purchasing* magazine's Medal of Professional Excellence, one of the most respected purchasing awards given.

How did IBM do it? In one word: leadership.

IBM's top leaders had a vision and a commitment to strategic intent, strategic thinking, and complementary actions. IBM's senior leaders hired people who were experts in their fields and gave them the tools they needed to succeed. Leaders understood the link between incentives and success, and they held each decisionmaker accountable for measurable results. They recognized how difficult change would be but never allowed difficulty to become an excuse for inaction.

This description of leadership should sound familiar; it is the model the Air Force has used for decades. This leadership style, along with the Air Force's more centralized command structure, represents a huge advantage in speed and agility over any decentralized commercial entity. Leadership is one reason we believe that the Air Force is well positioned to implement best practices in purchasing and supply chain processes.

In addition, the Air Force has a strength that distinguishes it from any other commercial or government organization: the best capabilities in the world. When it comes to achieving its goals, the Air Force is without peer. There is no doubt that if leadership believes that purchasing and supply management best practices will help achieve strategic goals, best practices will be implemented successfully.

We know from experience that change is most difficult when there is no perceived crisis. We also know from experience that crises arise *only* when change is not made in time.

The Air Force has a window of opportunity to pave the way for the war fighters of the future. A body of knowledge exists in private industry, in government, and within the Air Force's cadre of prime suppliers to

become leaner, more flexible, and more efficient, and to provide new capabilities that today are only dreamed of.

It is a dream worth pursuing.

R. David Nelson (Vice President, Global Purchasing, Delphi Automotive Systems; he was formerly Vice President, Worldwide Supply Management, Deere & Co.)

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PREFACE

The Air Force has been looking for ways to substantially improve the readiness and reliability of its equipment, the responsiveness and quality of services, and the quality of life for its personnel, particularly in the post-Cold War environment. Because of budget pressures, it has also been actively seeking savings, primarily to pay for force modernization.

Our study sponsor, the Deputy Assistant Secretary of the Air Force for Contracting (SAF/AQC), believes that the private-sector revolution in purchasing and supply management (PSM) practices is delivering substantial performance improvements and savings. SAF/AQC also believes that the new freedoms provided by acquisition reform¹ can potentially enable dramatic shifts toward best PSM practices in the Air Force.

SAF/AQC leadership believes that implementation of Performance-Based Services Acquisition (PBSA) [which includes developing output-oriented Performance Work Statements (PWSs), shifting from performance inspection to performance management, and adopting or adapting best commercial PSM practices] will yield substantial performance improvements and savings for the Air Force. SAF/AQC asked RAND to identify how commercial firms, identified by their peers as being best in class, implement such practices and then identify implications for Air Force policy and PBSA and PSM. This documented briefing addresses these questions. It should interest policymakers and analysts who wish to understand recent trends in implementing best commercial practices and policies on purchasing and supply management and their implications for services acquisition in the federal government. Although the study emphasizes the Air Force in its discussion of government implications, almost all of the findings discussed here should interest other parts of the Department of Defense and the federal government in general.

Work on this topic and related implementation, contracting, and outsourcing topics continues in the Resource Management Program of Project AIR FORCE. For additional information, please contact the principal author, Dr. Nancy Moore, at (310) 451-6928 or nancy@rand.org.

¹Acquisition reform was recently renamed acquisition excellence.

Project AIR FORCE

Project AIR FORCE, a division of RAND, is the Air Force federally funded research and development center (FFRDC) for studies and analysis. It provides the Air Force with independent analyses of policy alternatives affecting the development, employment, combat readiness, and support of current and future aerospace forces. Research is performed in four programs: Aerospace Force Development; Manpower, Personnel, and Training; Resource Management; and Strategy and Doctrine.

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SUMMARY

The Air Force is under pressure to maintain or improve performance while reducing costs so that it can pay for new weapon systems, force structure, and personnel retention initiatives (e.g., pay increases). The Air Force spends about one-third of its budget on purchased goods and services.¹ This proportion should increase as the Air Force competitively sources more services. As a result, purchased goods and services offer a large and growing target area in which to seek improved performance and cost savings.²

The Air Force is not the only organization for which purchased goods and services can be a leading performance and cost driver. Purchased goods and services account for 50 to 80 percent of many commercial firms' total expenditures. Purchased goods and services represent such a significant performance lever and powerful competitive weapon that commercial firms are increasingly taking a more strategic approach to purchasing and supply management (PSM).³ Taking such an approach is a powerful way to increase profits by improving performance and reducing costs.

The Air Force recognizes the potential importance of these new purchasing practices and is currently adopting an aggressive new approach of its own. Drawing on the new opportunities created by acquisition reform (recently renamed acquisition excellence) and related initiatives, the Air Force is promoting more proactive use of market research and performance-based services acquisition (PBSA), which includes the use of performance-based statements of work with outcome-

¹Purchased goods and services include purchases other than weapons, such as spare parts; maintenance and support services; automatic data processing software, equipment, and services; and purchases from other government organizations. Weapons expenditures (aircraft, missiles, armaments, etc.) accounted for about 25 percent of the Air Force's Fiscal Year 2000 budget and personnel about 37 percent.

²The size of this target area alone does not ensure that it can benefit from improvements. But it is so large that it invites efforts to find specific opportunities for improvement.

³PSM is broadly defined to be a horizontal, integrated process that encompasses all key areas of spending and all core supplier networks. Internal stakeholders and suppliers work as teams on continuous performance improvements and cost reductions (Chapman et al., 1998).

oriented measures tied to new quality assurance plans and performance incentives.⁴ These practices serve to make it easier for the Air Force to work with a contractor to improve its performance. All of these initiatives are compatible with recent developments in innovative commercial firms.

The Deputy Assistant Secretary of the Air Force for Contracting (SAF/AQC) recognizes the potential policy relevance of the ongoing private-sector revolution in PSM practices. SAF/AQC asked Project AIR FORCE to review best commercial PSM practices and, in particular, to examine how innovative commercial firms implement such practices for the purchase of goods and services. This should support ongoing SAF/AQC efforts to develop a framework for implementing selected best commercial PSM practices, thus improving performance and cost outcomes while being mindful of socioeconomic goals and other Department of Defense regulations.

To assess best commercial PSM practices, we reviewed the available academic and trade literatures on these practices and developed a detailed questionnaire, which we then used to collect primary data from commercial firms identified by their peers as being among the best firms pursuing new PSM practices. The practices we observed are too new and hard to isolate from many other changes under way to evaluate them with quantitative analytic tools. We have relied instead on qualitative data collection methods designed to generate reproducible, internally consistent stories about how individual firms apply best practices. This proved to be the only way at present to collect the information that the Air Force requested; when sufficient experience has accumulated, more quantitative methods will be possible. The nature of our findings reflects this approach.⁵

We report three key findings here. First, an ever-expanding group of innovative commercial firms is shifting from a tactical (i.e., transactional) to a more strategic, goal-oriented approach to PSM. These firms recognize PSM's potential for strategic benefits in terms of substantial performance improvements and cost savings and are taking steps at the highest levels to increase the likelihood of their capture.

⁴PBSA includes adaptations of best commercial PSM practices; it is viewed in the Air Force as having a more narrow focus than PSM.

⁵For details on our methodological approach, see Appendix D.

Second, because implementing new PSM practices requires significant changes throughout an organization, particularly for support services, these firms are learning that they must use formal implementation processes and plans to help ensure successful, permanent changes.

Third, when we compared commercial implementation of best PSM practices with current Air Force practice, we identified a number of specific actions that Air Force leadership might consider that may further improve the implementation of new PBSA and PSM practices within the Air Force. These actions could become part of a more comprehensive implementation framework as Air Force experience in this arena grows.

A STRATEGIC, GOAL-ORIENTED APPROACH TO PURCHASING AND SUPPLY MANAGEMENT

The relative size of purchased goods and services alone has induced an increasing number of firms to link their PSM activities more explicitly to corporate goals. For example, innovative firms state PSM goals in terms of explicit targets for reduction in total ownership cost or improvements in the performance (e.g., quality, responsiveness, and flexibility) of internal production lines. Such goals allow these organizations to identify and track metrics that measure PSM performance over time, compare PSM performance with comparable performance in other firms, measure the performance of individuals and teams working on PSM activities and hold them accountable for this performance, and measure the performance of external sources and hold them accountable. This commitment to strategic goals helps align all players associated with PSM activities with the organization's overall performance and helps reduce or eliminate actions counterproductive to these goals.

As an integral part of such alignment efforts, many innovative commercial firms appoint a high-level chief purchasing officer (CPO). This individual has executive responsibilities to develop and maintain a strategic PSM program. The CPO embodies the senior leadership's continuing support for a strategic approach and acts for the senior leadership, but has the management focus and resources to implement a strategic approach day-to-day. By choosing a CPO with broad management skills and experience, rather than a purchasing or acquisition expert, the senior leadership demonstrates the importance of integrating PSM with the core interests of the firm.

A strategic approach gives more attention to linking and integrating PSM activities with a firm's core concerns and less to planning and managing individual transactions with external sources. The new approach aggregates and stratifies purchases to reflect the size, strategic importance, and risks associated with the purchases. It seeks to simplify the management of less-important, lower-risk, lower-value purchases by automating transactions, issuing purchasing cards to line personnel, or outsourcing the management of these transactions. The new approach then increasingly rationalizes purchases (e.g., consolidation and bundling of requirements/contracts and reductions in the number of suppliers) so that buyer-firms can deal in-depth with a much smaller number of providers, not transaction by transaction. Using fewer suppliers enables the development of customized personnel and technology interfaces to maximize interfirm communication and coordination. Over time, buyers develop increasingly deep, strategic partnerships with providers who supply goods and services on which the buyer spends a significant amount.

Such a strategic approach requires much more cooperation among functional communities and specialties in the buyer firm and much more knowledge of internal spend as well as the external market and supplier costs and performance. Marketing, production engineering, product design, and logistics, for example, must help traditional purchasing experts align purchases and suppliers with the buyer firm's strategic concerns. Technical specialists on supplier costs, processes, technologies, etc. are also needed to ensure that suppliers are the overall best source and to help suppliers continually improve to meet the buyers' evolving strategic needs. One way innovative firms do this is to create new interdisciplinary organizations with broad authority for PSM and link it to line activities in the firm. Another is to rely more heavily on multifunctional teams with members from different departments and sometimes external sources. When firms use teams, they train them in team process, authorize their members to act for their departments, formally recognize and plan for the resource requirements of the teams, and judge the job performance of the members in terms of how their teams promote the goals of the firm as a whole.

This approach requires higher skills in general and higher-level attention to PSM in the organization as a whole. Innovative firms use formal training programs to keep their PSM personnel up to speed on the best PSM methods. Programs often require 40 to 80 hours of training a year for each employee. Innovative firms also create centralized PSM

organizations to link PSM activities to corporate strategy, leverage their spend, and develop sophisticated new relationships with strategic suppliers. They set up PSM offices with highly skilled personnel in regional or line-office locations to manage strategic sources, develop less-sophisticated relationships with other sources, and provide training to local shops. Traditional transactional PSM remains at the local level but relies heavily on automation. Overall, this approach typically requires no increase in the number of purchasing personnel, and may lead to fewer personnel, but requires those who remain to develop and maintain higher skills.

FORMAL IMPLEMENTATION PROGRAMS TO SUPPORT SUCCESSFUL, PERMANENT CHANGE

Significant change is very difficult for most organizations, and many change efforts fail. Consequently, formal change management has become a major industry in its own right. Many handbooks are available and all the major professional services consultancies now offer change management support as a standard part of their slate of services. The general literature on change and our interviews with firms changing their PSM practices reveal a strong consensus about the factors that are important (i.e., often necessary, but not sufficient) to successful change. We have assembled a checklist of factors that organizations that have mastered change management agree are important to success. We summarize the consensus here in the form of a checklist on how to *prepare for, support, and execute* successful organizational changes that implement best PSM practices:⁶

Prepare

- Does the case for change make it clear, from the point of view of the organization as a whole and of each employee who must change his or her behavior on the job, that it is more desirable for the organization to change than to continue its current approach to PSM? If not, the senior leadership cannot effectively support or sell the change. And it will be difficult to combat the incipient resistance in the trenches that naturally rises up against any change in organizational routine.

⁶We first encountered this consensus organized around the points listed here in Kotter (1995). Our own policy analysis built on Kotter's conceptual framework.

- Does the senior leadership relevant to the change visibly and continually support the PSM change? Has the senior leadership formed an effective coalition of the key leaders of employees who must change their behavior on the job, to give visible and continuing support to the change in PSM practices? Is the change scoped appropriately so that this support can be sustained for the life of the implementation? Without this high-level support, the change will lose legitimacy and is likely to give in to the inevitable pockets of resistance that will come to light during implementation.
- Is the vision statement for PSM change sufficiently clear that it can be explained and understood in five minutes or less? Does the vision clearly link the change to specific, measurable targets based on corporate goals? Does it explain clearly how the organization will implement the change? If not, the conflicts that inevitably arise during implementation are likely to move the change away from the original corporate goals or eviscerate the change entirely.
- Does the action or “war plan” for the PSM change identify the key barriers to change and how to overcome them, assign responsibilities to realize these plans, provide resources, track progress in terms of metrics relevant to the organization as a whole, keep the senior leadership and change coalition informed and on-board, and provide a framework for the execution phase to manage the change effort against the plan, with appropriate adjustments as implementation reveals new information? If not, details critical to success can easily fall through the cracks, allowing the change effort to lose critical momentum or veer off course before anyone notices.

Support

- As planning and execution of the PSM change proceed, is everyone informed about its goals and status? Do the leadership, change coalition, and those who must change their behavior on the job know the current status of the implementation, including successes achieved and lessons learned to date? Are the leadership and change coalition continually affirming their support or providing guidance on how to adjust the implementation? Are their day-to-day actions and statements clearly compatible with the change? Have continuing concerns been identified and addressed? Are rumors under control?

All firms agree that, looking back, they should have substantially increased their efforts to promote these communication activities.

- Do those who must change their behavior on the job understand the importance of the new PSM practices, how they work, when to use them, and their own roles and responsibilities in these practices? Do they have the skills that these roles and responsibilities require? If they will work on new teams, have they been trained in team processes? Have they been trained in the skills they will need to facilitate the change itself? Has the delivery of training been tailored to the needs of the people who must change their behavior? People make change happen. Any gap in the training listed here means that the people who must change their behavior are not ready to do so.
- If the people who must change their behavior on the job to make a new PSM practice succeed in fact change their behavior, will they benefit? If they do not change their behavior, will they be punished? An organization can use any combination of monetary inducements, awards, career actions, and other incentives that is compatible with its corporate culture to reward or punish its employees. But if no personal benefit flows from changing their behavior on the job, or the risk of adverse consequences increases, employees see little personal connection to the success of the change. Because it is typically more comfortable to avoid change, they will often choose the status quo.
- Have the resources needed to implement the change been made available to support the PSM change? Do employees have the slack they need to participate effectively in training and planning sessions? Have production scheduling and engineering been adjusted to allow change without compromising ongoing production goals? Have the tools and information sources needed to support the change been acquired and put in place where needed? Are consultants available to support the change where needed? Without these resources, an organization will not be ready for change.

Execute

- Are pilot studies being used to allow effective initial testing and validation of complex new PSM practices in settings that limit risk to the organization as a whole? Have these pilot studies been instrumented to collect baseline and execution data that the senior leadership and change coalition can use to validate the change and

make decisions about further deployment? Without effectively instrumented pilot studies, change efforts do not identify risks safely and easily and, hence, risk failures that can threaten the organization's core activities. Serious failures or inadequate validation of the benefits can easily threaten any further implementation of change.

- Does ongoing monitoring of a new PSM change provide information that keeps the change on track and, in particular, support efforts to refine the change in ways that promote the organization's strategic goals? Does it capture successes and reinforce behaviors to promote continuing success? If not, a change effort may slip off-track or, more subtly, realize only a portion of the benefits available from change.

Experience supports a reasonable expectation that a failure to address any one of these factors can effectively kill a major effort to change an organization. Such failures do not always stop implementation, but they typically require heroic efforts elsewhere to make up for the failure and put the implementation at risk. They also raise premature doubts about a new practice that can discourage an organization from pursuing it aggressively and thereby realizing all the benefits it offers. Broad experience strongly indicates that a balanced consideration of all these factors is most likely to lead to successful change. That experience comes from many efforts to change organizations and is validated by our interviews and the literature on specific efforts to implement new PSM practices. The experience suggests that this approach may apply to government organizations as well as to commercial firms; no factor identified here is peculiar to a commercial firm.

FINDINGS RELEVANT TO THE AIR FORCE

Because purchased goods and services account for an increasing share of the Air Force budget (already over half), they become more and more important to the basic performance and total ownership cost that the Air Force achieves. They become increasingly important to the Air Force's core, strategic management concerns, increasing the relative importance of PBSA and PSM, more broadly. Thus, while our focus was on implementation of best commercial sector practices, our findings have relevance to the Air Force.

To find how the Air Force might benefit from emulating many best commercial PSM practices, we treat these commercial practices as stretch goals and ask how far the Air Force might want to reach toward these

goals. We ask where the Air Force's goals differ from commercial goals and where the Air Force may want to move in a different direction. We ask how Air Force policies and practices that are already in place constrain or complement the commercial practices described above and how the Air Force can manage the constraints and build on those complementarities. By asking similar questions about specific PSM practices, the Air Force can build its own innovative approach.

The Air Force already has in place an active program in acquisition reform. That effort has set the stage for successful implementation of simplified acquisition of goods and services and the extensive use of purchase cards. Upcoming are efforts to use market research aggressively to discover best commercial practices; to use performance-based acquisition to align external providers' incentives with ultimate customers' needs; to use best-value competitions to move away from low-cost providers; and to use new forms of quality assurance that move away from simple checklists to mutual, ongoing efforts to improve processes.

These will be more challenging than the efforts to date and will benefit from greater attention to formal implementation strategies. The points above on preparing for, supporting, and executing change provide a useful checklist for structuring formal implementations to increase the likelihood of success.

As the Air Force pursues new PSM practices, it should recognize that the relatively short tenure of many civilian and military Air Force executives, and the strong functional structure of the Air Force, combined with PSM's need for close cooperation among all key stakeholders, could complicate change. The Air Force may need to develop strategies to sustain continuity of support in all key functions for serious PSM change from one leadership team to the next. An important element of such an effort would be to state the benefits of change clearly in terms of the Air Force's broad goals for improvements in performance and cost and to measure those improvements carefully as they accrue. Such measurements would help each leadership team to validate initiatives started in the past and to invest in new initiatives that may yield meaningful outcomes only after they leave office.

The Air Force can also take advantage of its extensive experience managing technological change in the development of new weapon systems and apply that experience to the management of organizational change. Many of the same principles apply. The Air Force should

recognize that it has a strong set of incentives in place today that can be used to align the interests of those who must change their behavior on the job for change to succeed and the interests of the Air Force as a whole. The Air Force can use the careful measurements of the benefits of change discussed above to provide inputs to individuals' performance reviews and career assignments, to competitions for awards, and so on. And, like the innovative commercial firms, the Air Force can give more systematic attention to gathering information on best commercial PSM practices in other organizations and adapting them to its own setting. By becoming more knowledgeable about ideas from the commercial sector and elsewhere, and by tracking them as they continue to advance over time, personnel throughout the Air Force can better understand the opportunities that exist today and build a case for change in the Air Force based on these opportunities.

As the Air Force moves to rationalize its supply base, it must remember that it has socioeconomic goals that most commercial firms do not. Under legislation, and its interpretation of that legislation, the Air Force has important commitments to small, minority, and disadvantaged businesses. Evidence from best commercial practice indicates that many opportunities exist to fulfill this commitment in the context of best PSM practice. Perhaps the best approach is to ensure that small, minority, and disadvantaged businesses have opportunities as prime or second-tier suppliers to the Air Force. The Air Force is pursuing such a strategy today, but it needs a better way to track firms in the second tier.

Within the Air Force, the contracting community currently has the primary responsibility to implement acquisition reforms such as PBSA and PSM. Commercial experience makes it clear that contracting cannot do this alone. To succeed, contracting must find new ways to work with the ultimate customers of the goods and services it helps buy – the warfighters and the military members and dependents who consume base services – and with the functional communities in the Air Force that determine the requirements for these goods and services and monitor their delivery. It will be easier for contracting to open a dialogue with these groups and sell them on new purchasing practices if it measures its own performance with metrics these groups understand – metrics relevant to final performance and cost outcomes (e.g., quality improvements, reduced or more reliable cycle time, or cost savings) rather than processes internal to contracting [e.g., the number of Federal Acquisition Regulations (FAR) Part 12 contracts executed].

As contracting succeeds in introducing new PSM practices, it may increasingly see itself as only one part of a broader, integrated team. Its perspective is likely to become more strategic, and its visibility in the Air Force as a whole is likely to rise. Contracting personnel may require significant new training to prepare for this new perspective. Training is typically most effective if it occurs with the other functions relevant to the teams that implement these new forms of PSM.

Looking further into the future, contracting could build on its tiered system of offices to centralize more strategic aspects of designing and managing strategic relationships and training the personnel that remain at the base level. The Air Force could well decide to follow the best commercial practice and embed most contracting personnel in new cross-functional organizations with broad responsibility for PSM processes.

Non-contracting functionals are likely to have far larger roles in new acquisition reforms such as PBSA and PSM than they currently recognize. Until they develop a more outcome-oriented approach to developing requirements and overseeing contractor performance, PBSA and PSM cannot move forward. To move toward an outcome-oriented approach, these functionals will have to reassess their Air Force instructions and the role of these instructions in service acquisition. Commercial practice suggests that the best way to do this is to initiate aggressive new market research and benchmarking efforts. Currently, contracting has sought the lead in these activities and the other functionals have yielded the way. They may want to take more interest to ensure that all relevant market research and benchmarking benefit from their technical expertise.

As PSM advances in the Air Force, functionals such as logistics, civil engineering, services, and communications may take on more active roles in the integration and closer coupling of supply chains that include organic and contractor activities. They can provide the technical expertise within the Air Force that supports continuous improvement of engineering and management processes.

Non-contracting personnel may require extensive new training to take on the new responsibilities waiting for them. Research suggests that this training works best if received in the same cross-functional teams that will execute the new practices together.

For all of this to work, the Air Force may need to adjust its use of incentives to align the individuals in each function in a supply chain with the goals of the supply chain as a whole—that is, of the Air Force as a

whole. The Air Force may need to develop strategies that overcome the natural tendency of individuals to protect their own functions and reward them for activities on cross-functional teams that promote the goals of the Air Force as a whole. Commercial experience tells us that it will be hard for the Air Force to do this, but that PBSA and PSM initiatives may fail otherwise.

New practices demand significant changes in the way the Air Force thinks about its structure and the way it manages its resources from day to day. Change is important because, if current commercial efforts to alter their PSM activities work as expected, significant opportunities are available to the Air Force – opportunities that can dramatically improve performance and reduce costs. In 1985, Peter Drucker told the leaders of the commercial community: “New opportunities rarely fit the way an industry has always approached the market, defined it, or organized to serve it” (Drucker, 1985). They listened and proved him right on a variety of different processes. Now the Air Force has the potential to benefit from the lessons commercial firms have learned – and continue to learn – about best PSM processes.

ACRONYMS

| Symbol | Definition |
|---------------|------------------------------------|
| AAC | Air Armament Center |
| ABC | Activity-Based Costing |
| ACC | Air Combat Command |
| AETC | Air Education and Training Command |
| AFIs | Air Force Instructions |
| AFMC | Air Force Material Command |
| AR | Acquisition Reform |
| ASC | Aeronautical Systems Center |
| BHAG | Big, Hairy, Audacious Goals |
| BMS | Bristol-Myers Squibb |
| CEO | Chief Executive Officer |
| CFO | Chief Financial Officer |
| CICA | Competition in Contracting Act |
| CINC | Commander-in-Chief |
| CLS | Contractor Logistics Support |
| CPM | Certified Purchasing Manager |
| CPO | Chief Purchasing Officer |
| DAU | Defense Acquisition University |
| DBOF | Defense Business Operating Fund |
| DLA | Defense Logistics Agency |
| DoD | Department of Defense |
| DVD | Direct Vendor Delivery |

| | |
|--------|--------------------------------------------------|
| EDI | Electronic Data Interchange |
| ESC | Electronics Systems Center |
| FAR | Federal Acquisition Regulations |
| FFRDC | Federally Funded Research and Development Center |
| GE | General Electric |
| HAM | Honda of America |
| IPT | Integrated Product Team |
| ISD | Integrated Supplier Development |
| ISM | Institute for Supply Management |
| LTL | Less-Than-Truckload |
| MAJCOM | Major Command |
| MIS | Management Information System |
| NAPM | National Association of Purchasing Management |
| PBSA | Performance-Based Services Acquisition |
| PBSC | Performance-Based Services Contracts |
| PM | Purchased Material |
| PPI | Producer Price Index |
| PPM | Parts per Million |
| PSM | Purchasing and Supply Management |
| PWS | Performance Work Statement |
| QAE | Quality Assurance Evaluators |
| SAF | Secretary of the Air Force |
| SBA | Small Business Administration |
| SBRA | Small Business Reauthorization Act |
| SCM | Supply Chain Management |
| SCORE | Supplier Cost Reduction Effort |

| | |
|------|----------------------------------|
| SDB | Small and Disadvantaged Business |
| SMC | Space and Missile Systems Center |
| SOO | Statement of Objectives |
| SPC | Statistical Process Control |
| SPO | System Program Office |
| TARS | Tethered Aerostat Radar System |
| TQM | Total Quality Management |
| WIP | Work in Process |

ACKNOWLEDGMENTS

Although the material presented here is the responsibility of the authors, we wish to acknowledge the many people and innovative companies who graciously donated their time to share how they successfully changed their purchasing and supply management practices and organizations. For confidentiality reasons, we cannot identify them by name, but without their cooperation this document would not have been possible.

In SAF/AQC, we wish to thank BGen Frank J. Anderson, who sponsored this study and encouraged us to focus on implementing best PSM practices; Col Mary Kringer, our action officer, and her staff; and Col Terry Raney, Col Barry S. Wilson, Kathy Boockholdt, and their staffs. All provided important inputs.

We wish to thank Mr. Steven R. Cohen, in the OSD Office of the Director of Defense Procurement (Contract Policy and Administration), who gave us insight into the motivations behind current DoD policy.

We also wish to thank RAND for the opportunity to present an earlier version of this briefing at a “One RAND” Colloquium, where we received feedback from our colleagues and RAND management. We are grateful to Brent Keltner for the opportunity to present an earlier version to a RAND Graduate School course, where we also received comments and feedback.

We benefited from continuing discussions with RAND colleagues working on related topics, including John Ausink, Charles Cannon, Mary Chenoweth, Carl Dahlman, Cynthia Huger, Jeff Drezner, Ed Keating, Sheila Kirby, Beth Lachman, Jeff Luck, Ellen Pint, Susan Resetar, Ken Reynolds, Bob Roll, Hy Shulman, and Giles Smith. We particularly wish to thank our colleague, James Dertouzos, for his thoughtful review of this document.

Last, we wish to thank Patricia Bedrosian and Jeanne Heller for thorough edits and Regina Sandberg, Carol Zaremba, and Eric Christie for their invaluable help in revising this document for publication.

1. INTRODUCTION



Without superior suppliers—and without superior purchasing – no supply chain can successfully compete in today’s industrial marketplace.

(Fitzgerald, 2000a)

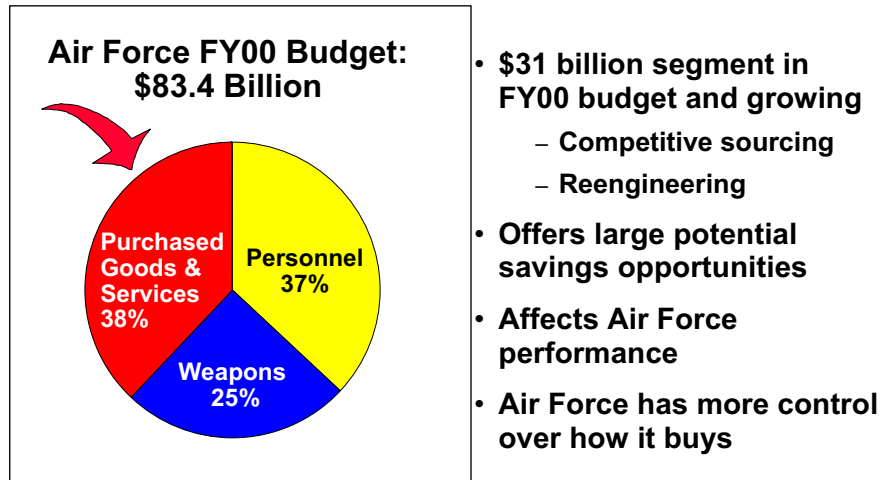
The Air Force is under a great deal of pressure to maintain or improve performance while reducing its infrastructure costs to pay for new weapon systems, force structure, and personnel retention initiatives (e.g., pay increases). New purchasing and supply management (PSM) practices in the commercial sector have been reported to substantially improve performance and reduce the costs of purchased goods and services. The Air Force is aware of many of these “best” practices and because of their potential to help the Air Force meet its strategic goals, it asked RAND to identify how commercial firms implement these practices and then identify relevant implications for Air Force policy.

In this documented briefing, we summarize what we have learned about implementing PSM practices in the commercial sector. We also suggest ways that the Air Force can improve its implementation of PSM and other best practices to enhance its performance and reduce its costs. However, implementation of best PSM practices in the Air Force is the topic of ongoing analysis and is not specifically addressed in this report.

To assess best commercial PSM practices, we reviewed the academic and trade literatures and developed a detailed questionnaire, which we then used to collect primary data from commercial firms identified by their peers as being among the best firms pursuing new PSM practices. The practices we observed are too new and difficult to isolate from other changes under way to evaluate them with quantitative analytic tools. We have relied instead on qualitative data-collection methods designed to generate reproducible, internally consistent stories about how individual firms apply best practices. This proved to be the only way at present to collect the information that the Air Force requested; when sufficient experience has accumulated more quantitative methods will be possible.¹ The nature of our findings reflects this approach. Appendix D explains in detail the methodological approach we used to organize the study.

¹The Air Force will have to decide whether to wait until there is auditable evidence of the expected rewards and risks of best PSM practices before adopting them or to proceed on the available evidence presented here.

Air Force's Biggest Opportunities to Cut Cost Lie in Purchased Goods and Services



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Budget and Personnel: United States Air Force Statistical Digest, FY00 Tables C-3, C-6 (\$83.4B, \$30.5B=Mil+Civ) ²
 Weapons: DD350 contracting actions, FY 00 for AFMC/AAC, ASC, ESC, and SMC (\$20.7B) 4-Apr-02

When we examine Air Force budget expenditures for Fiscal Year 2000 (FY00) (see the figure above),² we find that the category of purchased goods and services stands out as the biggest share of any activity in the budget – 38 percent of \$83.4 billion.³ Further, we expect Air Force

²The personnel category includes military (active, reserve, and guard) and civilian [including Department of Defense (DoD) working capital fund] personnel from United States Air Force *Statistical Digest* (2000), Table C-6. The weapons category includes Fiscal Year 2000 DD350 contracting actions for the Air Force Material Command's (AFMC's) Air Armament Center (AAC), Aeronautical Systems Center (ASC), Electronics Systems Center (ESC), and Space and Missile Systems Center (SMC). The purchased goods and services category includes everything else in the Air Force budget, such as purchases of spare parts, repair, maintenance, base operating support services, and goods and services provided by other DoD and federal organizations.

³The actual amount of potential savings for the various goods and services the Air Force purchases will vary by commodity/industry group depending on the structure of the market, the nature of the intermediate and final goods or services, and the extent to which the Air Force already benefits from PSM practices. For example, the federal government has bundled its passenger air travel purchases into very large contracts with

spending on purchased goods and services to grow, as the Air Force implements plans to competitively source⁴ many commercial activities and reengineers internal processes to make them more efficient.

Purchasing outcomes can also directly affect several dimensions of performance and, thus, the Air Force's ability to perform its mission (i.e., outcomes can directly affect training, deployment, and responsiveness). The Air Force must be careful when changing the way it purchases goods and services to improve performance or generate savings. As an example, poor grounds maintenance, a service seemingly far removed from the Air Force's primary mission, can actually affect a squadron's ability to train and deploy. If grass grows too tall near a runway because of a delinquent contractor or a poorly written statement of work, birds might gather to feed on the grass seed, creating flight hazards in the form of bird strikes.

The Air Force is not the only organization for which purchased goods and services account for a large portion of total costs. Purchased goods and services account for 50 to 80 percent of many commercial firms' total expenditures. Purchased goods and services represent 85 percent of computer/electronics and retail firms' total costs, 80 percent of automotive firms' total costs, and 60 percent of utilities' total costs (Chapman et al., 1998, p. 65). For example, 50 percent of the cost of every Boeing-nameplate jetliner is spent on purchased materials, parts, components, and systems (Stundza, 2000b). These firms are beginning to realize that reducing the costs of purchased goods and services is one of the most powerful tools they can use to increase profits. Once they understand the strategic nature of purchasing, firms often embark on a purchasing improvement program.

For a firm to deliver maximum value to its customers, it must receive maximum value from all its suppliers in the supply chain. Commercial firms are increasingly concluding that, working alone, they cannot have the lowest costs, best quality, or shortest cycle times in their industries if their suppliers do not (Lewis, 1995, p. 5). For example, Intel concluded that it could not improve the quality of its products if it did not improve

major airlines. It is very unlikely that the Air Force could save any additional monies on its air travel expenditures by applying PSM practices.

⁴The Air Force currently plans to competitively source less than 9 percent of its personnel billets. Assuming 20 percent savings and that the cost of an average civilian and active military billet is \$75,000 per year, the expected savings from competitive sourcing is likely to be less than 1 percent of the Air Force budget and only about one-third of the Air Force's 1997 Quadrennial Defense Review savings goal of \$1.8 billion.

the quality of its suppliers (Morgan, 1990). Sun concluded that it could not be more responsive to its customers unless its suppliers were more responsive (Carbone, 1996). As we will discuss, many firms report that implementing best PSM practices has delivered large savings and significant performance improvements.

Firms Are Changing Their Purchasing and Supply Management (PSM) Practices

- Conduct firm-wide spend analyses**
- Rationalize supply base, consolidate contracts**
- Establish long-term partnerships with best suppliers**
- Help key suppliers improve quality, cost, service**
- Integrate key suppliers into organization**

SOURCE: Adapted from Cessna Supplier Conference 2000 as published in "Cessna Charts a Supply Chain Flight Strategy," by James P. Morgan *Purchasing*, September 7 2000.
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Once firms recognize the strategic importance of purchasing to improving their performance and profit as well as integrating their supply chains, they typically change their PSM practices to improve their competitiveness.⁵ Through our recent strategic sourcing and contracting research, we have learned how innovative commercial firms purchase goods and services. What we have observed appears to be the beginning of a revolution in PSM practices.⁶ For example, Bensaou (1999) notes that in the automotive sector, all three U.S. manufacturers and most of their European competitors have launched programs to decrease their level of vertical integration, reduce their total number of direct suppliers, and

⁵For example, Stundza (2000a) reports that to support lean manufacturing, aerospace companies are involved in programs to standardize parts, collect and analyze supplier performance data, develop cross-functional purchasing teams, consolidate the supply base and forge stronger relationships with suppliers, and integrate the supply chain with internal partners such as sales, engineering, manufacturing, and accounting. They are also involving first-tier suppliers in new-product development, expanding their outsourcing programs for major subassemblies, and creating long-term commodity contracts that guarantee stable future supply at low prices.

⁶For an overview of this and additional examples see Tang (1999).

move toward publicly declared strategic partnerships.⁷ In the aerospace sector, manufacturers are making strategic efforts to consolidate their supply base and forge stronger relationships with remaining suppliers (Stundza, 1999). For example, Boeing has consolidated and standardized its supply contracts and plans to reduce its number of suppliers from 3,100 to 2,700 (Stundza, 2000b). Bowman (1998) notes that within the last year in the logistics industry shippers are increasingly bidding at the corporate level. More of them are making decisions by committee, whittling down their international provider base to a bare minimum. For example, he notes that about 40 percent of the global accounts of APL Ltd., a worldwide logistics provider, had some type of logistics council or centralized body for purchasing, strategizing, and decision making.⁸ To set the stage for PSM change, innovative customers are conducting comprehensive, corporate-wide spend analyses⁹ to better understand their primary sources of expenditures and to then target their PSM improvement initiatives (e.g., quality, speed, or cost effectiveness) on those goods and services that represent their largest and most strategic expenditures (see Owens et al., 1998, and Laseter, 1998).¹⁰ Customers are also stratifying their supply base by effect on results and level of strategic risk and then matching the specific management approach and type of relationship formed with particular suppliers to market and supplier conditions for the product or service.¹¹

The typical large commercial firm has many suppliers and multiple contracts with individual suppliers who supply the raw materials, logistics services, and different business units within the firm's

⁷Liker and Wu (2000) compared the same supplier performance for different automakers and showed that buyers' supply-chain management policies (e.g., scheduling and shipping, lean manufacturing, and lean transportation practices) significantly affect multiple dimensions of supplier performance.

⁸However, Bowman (1998) also notes that rarely do shippers settle on a single provider unless the decision comes from high in the executive suite.

⁹Dun & Bradstreet has trademarked the *D&B Spend Analysis* as a tool to help firms identify supplier redundancies, benchmark suppliers, and reduce their supply base. Dun & Bradstreet claims that their spend analyses have helped many customers save an average of 5 to 15 percent.

¹⁰Appendix C provides, as an example, the results of a spend analysis and PSM improvement initiative conducted at Bristol-Meyers Squibb.

¹¹Appendix A provides, as an example, John Deere's portfolio of supplier management strategies for different types of products, services, and markets. See also Goldfeld (1999) for a methodology for selecting PSM strategies for different types of goods and services.

organization (e.g., raw materials, logistics services, and office supplies). Thus, one initial practice many firms adopt to reduce the costs of purchased goods and services is to increase leverage within their existing supplier base by consolidating multiple contracts they have with the same supplier.¹²

Second, innovative firms reduce the size of their supply base, selecting a few of the best suppliers to provide key products and services.¹³ Trent (2001) argues that one of the fastest ways to achieve higher supply chain quality is through supply base rationalization – the process of determining the right mix and number of suppliers for a given purchase category or commodity. This usually results in a drastic reduction in the total number of suppliers. Maintaining a large supply base naturally results in increased variability (e.g., in lead times, material consistency, interpretation of specifications and requirements, transportation and delivery, and the quality of relationships) which is the greatest enemy of supply chain quality. For example, Lockheed Martin Aeronautics reports that it has recently reduced its supply base by 40 percent (Stundza, 2000a).¹⁴ Firms typically choose one or more current providers, particularly those committed to continuous improvement of the quality, reliability, responsiveness, innovation, flexibility, tailoring, cost effectiveness, etc., of their goods or services. In addition, some buyers bundle a number of related products or services into a single contract,

¹²The Department of Defense's corporate contracts are examples of this practice.

¹³According to a 1999 *Purchasing* magazine survey of readers, "Eighty percent of purchasers say they are taking steps to consolidate their purchases with fewer suppliers" (Fitzgerald, 1999b, p. 79). A 1999 cross-industry survey of supply base changes over the previous two years found that 42 percent of responding companies had trimmed their supplier base by zero to 20 percent, 13 percent had supply base reductions of 20 percent to 60 percent, 37 percent of respondents increased their supply base by up to 20 percent, and 6 percent had supply base growth of 20 to 40 percent. More important, 75 percent of respondents indicated that they made 80 percent of their purchases from fewer than 100 suppliers (KPMG Consulting, 1999). See also Chapman et al. (1998, pp. 66-67) and Latamore (1999). Some firms such as Honda of America are comfortable with a single supplier of a key good or service (Nelson et al., 1998, note that Honda does require that its single-source suppliers have dual capability to reduce risks for its just-in-time supply chain performance). Licker and Wu (2000) show that Honda of America gets better performance from the same suppliers than do U.S. automakers. Other firms, such as Intel (Morgan, 1995a), prefer multiple suppliers whenever possible.

¹⁴See Appendix E for more examples of firms that have dramatically reduced their supply base. See also Goldfeld (1999) for additional examples of supply base reductions as well as a methodology for putting together a supplier reduction plan.

thus providing a single “belly-button” or point of communication and thereby reducing the coordination costs associated with working with many different providers and allowing economies of scope and scale.¹⁵ For example, Microsoft recently bundled multiple individual facility support services contracts for buildings on its main campus into a single large contract for the whole campus with a single, large, full-service provider (Ouellette and Pittinger, 1997).¹⁶ Manufacturing programs with low annual dollar value or unit volume, high product mix, or variable demand (e.g., many DoD weapons support programs) are often particularly difficult to source.¹⁷ A purchasing manager at BASF gets around these difficulties by awarding manufacturers a combination of large, medium-sized, and small programs. He claims that the promise of good programs ensures that manufacturers accept the less attractive ones (Porter, 2000). To make sure that semiconductor companies continue to make needed old technology [e.g., 16 Mb extended data out (EDO) Dynamic Random Access Memory (DRAM)], even though the industry is moving to higher density (e.g., 64 Mb and 128 Mb synchronous DRAM), Cisco Systems Inc. is rewarding selected suppliers who agree to continue to make the old technology with other business (Carbone, 2000a). Some shippers have worked with their logistics providers to develop capabilities in new markets where the shippers are expanding their business.¹⁸ For example, when it needed someone to coordinate trucking and materials flow in Europe, Case Corp. hired Schneider Logistics Inc., an American company with no prior experience in that location. Schneider is one of Case’s three strategic logistics services providers (Bowman, 1999).

¹⁵The Small Business Reauthorization Act of 1997 allows a federal agency to bundle two or more contracts into a single solicitation that is inappropriate for award to small businesses *only if* the benefits associated with the bundle are measurably substantial relative to the unbundled baseline.

¹⁶The Defense Logistics Agency’s Prime Vendor program bundles the distribution of groups of related products such as medical supplies or food into regional contracts with one distributor.

¹⁷Robert Fried, president of Contract Manufacturing Consultants, claims that for manufacturing programs that vary along too many dimensions, it can be very difficult to find a contract manufacturer who can consistently do a good job (Porter, 2000, p. 44).

¹⁸However, if an examination of the market uncovers another provider with superior performance or capabilities, the buyer may change providers, particularly if there is uncertainty about whether current providers can quickly attain the new level of performance and acquire the new capabilities.

Third, firms lengthen the terms of contracts they have with existing suppliers who have demonstrated quality performance.¹⁹ Trent (2001) argues that longer-term agreements can promote continuous improvement. For example, since 1989 Chrysler has increased the average length of contracts with its suppliers in the LH program²⁰ from 2.1 to 4.4 years (Dyer, 1996, p. 56). However, contract continuation, renewal, or extension is tightly linked to performance.

Fourth, some innovative buyers have teams trained in performance improvement tools and techniques such as statistical process control (SPC), cellular and pull production,²¹ kaizen events,²² and Six Sigma²³ quality that they send to their suppliers' production sites to help key suppliers improve internal processes.²⁴

¹⁹Trent and Monczka (1998) predict that both long-term contracts as a percentage of total contracts and the dollar values of these contracts as a percentage of the total value of purchases will grow in the future. In fact, between 1990 and 1997, long-term contracts grew 50 percent, and the dollar value of these contracts increased 47 percent for the firms that they studied.

²⁰LH is the name of the base car platform for the Chrysler Concord, Eagle Vision, and Dodge Intrepid.

²¹In "cellular production," machines are arranged on a part or product basis rather than grouped on a process basis. Single parts move short distances in a straight line or U-shaped cell, going immediately from tool to tool. This reduces work-in-progress (WIP) inventory and cycle times and makes quality problems caused by one machine immediately evident. This contrasts to an approach where large batches of parts move from area to area within the plant, characterized by long cycle times, high WIP, and much non-value-added work. "Pull production" aligns production decisions with actual demand or current information on expected demand rather than coordinating them to optimize the efficiency of production against a planned level of production. Close alignment with actual demand compensates for any loss of local efficiency in production. In both cases, basic production processes are adjusted to accommodate the new alignment to the product and customer.

²²Kaizen events are short-term (generally one week) efforts at process improvement.

²³Six Sigma is a statistical term that measures how much a process varies (i.e., the number of standard deviations) from perfection. Achieving Six Sigma means no more than 3.4 defects per million opportunities, which effectively drives all variance out of a process.

²⁴Patterson and Nelson (1999) describe how one industrial equipment manufacturer's Integrated Supplier Development group worked with selected suppliers to reduce lead times by 74 percent to 94 percent and generated annual savings of \$77,000 to \$164,000. The firm provided the supplier 3 week development services at no cost and split any cost savings with them. Staff time for each project ranged from 11 to 80 days and estimated savings per staff day were \$2,050 to \$12,495. Because of these types of reported cost

Finally, customers form strategic partnerships with their key suppliers to both integrate and drive continuous improvement throughout the supply chain.²⁵ Trent and Monczka (1998, pp. 8-9) note that these close relationships are not possible without some reduction in the size of the supply base.²⁶ As strategic partners, buyers and suppliers openly share information and communicate frequently. For example, manufacturers and retailers share customer order, production, and planning information with their key suppliers.²⁷ They also align their efforts by measuring progress toward meeting jointly agreed-upon goals.²⁸ Strategic partners may collaborate on mutually beneficial projects. For example, Pratt & Whitney now brings suppliers into the design process very early to ensure that designs take into account the cost of manufacturing (Fitzgerald, 1999a). Innovative buyers and key suppliers sometimes form joint teams to pursue improvements throughout the supply chain. Partners also share personnel across their contractual boundaries. Some suppliers are invited to place personnel at buyer locations (e.g., to work with product design teams, to place orders as needed, or to manage supplier inventory at the buyer's location). For example, Motorola has an engineering exchange program through which supplier personnel literally take up residence at

savings and performance improvements, Trent and Monczka (1998, pp. 8-9) predict that firms will be increasingly willing to undertake supplier development activities.

²⁵Supply chain management (SCM) integrates purchasing, materials management, quality management, demand management, distribution planning, and manufacturing planning (Wisner and Tan, 2000)

²⁶“One of the main drivers of the current trend observable in many industries towards reducing the supplier base is the recognition that high-intensity relationships can only be managed with a limited supplier and customer base” (Christopher, 1998, p. 283). These relationships require a considerable investment in time and attention by managers at the customer firm. It also takes time and resources to establish all the personal and technical data communication links required for a close working relationship. Trent (2001) argues that it is easier to pursue value-added activities with 100 suppliers than 1,500. With thousands of suppliers, the best a company can hope to do is to manage transactions efficiently.

²⁷This can be done only in an atmosphere of mutual trust, which is typically built over time.

²⁸For example, Intel needed highly reliable fabrication equipment to get sufficient yield from its chip manufacturing process. Before the alignment of incentives, its suppliers were rewarded if equipment performed poorly, because Intel would have to order more equipment, and punished if it worked better than expected, because new orders would be cancelled. Now, Intel's suppliers reside on-site and are responsible for servicing their own equipment, and the more running time posted on their equipment (above an agreed upon target window) the more they are paid (Morgan, 1995a).

the Motorola plant (Raia, 1991, pp. 49-50). Last, innovative buyers and key suppliers often share the rewards from cost savings and product, service, or supply chain innovations with key staff and each other. For example, Chrysler's Supplier Cost Reduction Effort (SCORE) program seeks cost-reduction suggestions from suppliers and shares any resulting savings (Stallkamp, 1998).

Best PSM Practices Can Produce Substantial New and Ongoing Savings

| Company | Time Frame | PSM Savings |
|-------------------|-------------------|---------------------------------------|
| Ford Motor | 1997 | 3% / 1yr* |
| AMR | 1993-1997 | 20% / 5yrs** |
| Honda | 1994-1997 | 17% / 4yrs** |
| Chrysler | 1990-1995 1998 | \$1.7B / 6yrs*** 4% / 1yr (\$1.5B) |

* Purchased material (PM)
** PM PPI increase - savings

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*** Total annual savings from SCORE
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Anecdotal evidence suggests that as leading firms implement these new PSM practices they are reporting substantial short- and long-term savings.²⁹ In many cases, implementing best PSM practices appears to allow the total cost of procured goods and services to be reduced by more than 15 percent over time (Owens et al., 1998, p.286). Further, continuous improvement in best PSM practices generates ongoing savings. As a result, 55 percent of respondents to a 1997 survey of executive managers expect annual material costs to decrease an average of 2 to 3 percent.³⁰

²⁹Although Liker and Wu (2000) do not quantify total cost savings from each practice, they show substantial differences in performance indicators related to costs such as inventory turns, work-in-progress, and finished goods inventory in storage and throughout the supply chain, and emergency shipping costs suggesting real buyer cost savings associated with different practices.

³⁰Michigan State's Eli Broad Graduate School of Management conducts an annual five-day seminar attended by executive managers representing a wide range of industries and locations. Before each year's seminar, attendees are asked to complete the Purchasing and Sourcing Executive Research Survey, which covers a wide range of PSM issues. See Trent and Monczka (1998).

The table above summarizes self-reported PSM savings for four major companies.³¹ IBM's Global Services division reports that in 1998 it saved over \$1.5 billion on \$21 billion they spent or a 7 percent savings (Carbone, 1999, pp. 38-62). Ford Motor Company used best PSM practices to reduce purchased material costs by 3 percent in 1997 (Wincel, 1998, pp. 56-64). The parent company of American Airlines, AMR, experienced a net 20 percent total savings between 1993 and 1997 through a decrease of 5 percent in its supplier prices while its PPI increased 15 percent (Avery, 1998). Honda of America's material costs dropped by 12 percent between 1994 and 1997 while its PPI rose by five percent, representing a 17 percent overall savings (Nelson, 1998). As of December 1995, Chrysler's SCORE program had generated more than \$1.7 billion in annual savings over its first six years by implementing 5,300 supplier ideas (Dyer, 1996). Chrysler further notes that its experience has been one of increasing rather than decreasing returns from PSM. Chrysler estimates of the SCORE program's new savings have continually met or surpassed annual goals, which grew from \$250 million per year in 1990 to \$1.5 billion per year for the 1998 model year. In the 1998 model year, Chrysler experienced an additional 4 percent reduction in its purchased material expenses (Stallkamp, 1998, p. 19). Chrysler reports 1999 SCORE savings of \$2.3 billion and projected \$2.4 billion in savings for 2000 (McCormick, 2000).

Although the Air Force has different objectives and is subject to different rules and regulations than private firms, it has reported similar types of savings using PSM practices. When the Air Combat Command (ACC) inherited the Tethered Aerostat Radar System (TARS) for counter drug interdiction, it bundled a number of separate operations, maintenance, and support contracts at different ground stations into one overarching support contract. ACC reports that total annual costs dropped by 50 percent. ACC invested some of the initial savings from contract bundling into equipment upgrades and modernization. It partnered with its new provider to standardize equipment and operations and shared the cost savings and cost avoidance through manpower reductions. As a result,

³¹We have not independently verified any of the claims in the table. Participants may have a stake in justifying their PSM investments *ex post*. However, as we discuss below, significant portions of key participants' salaries were linked to actual PSM benefits. Hence, many firms have developed systems to accurately collect and aggregate PSM savings. Further, because many PSM savings are based on pre- and post-contract payments (adjusted for inflation and changes in the PPI for the specific bundle of goods and services), they are in principle much easier to quantify than savings from other types of improvement initiatives such as process reengineering.

ACC reports that TARS support costs dropped an additional 25 percent (McFadden, 1996). We did not independently verify these reports.

Best PSM Practices Can Also Produce Performance Improvements

- **Quality (e.g. 10-13% / yr)***
 - Reduction or elimination of inspections and rejections
- **Delivery responsiveness (e.g. 7-10% / yr)* / reliability**
 - Inventory reductions
- **Product development capability / innovation**
 - Faster (e.g. 22% / 8 yrs)* & cheaper
 - Product improvements
- **Value / supply chain integration**
 - Reduced transactions costs

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* Source: Robert J. Trent and Robert M. Monczka, "Purchasing and Supply Management Trends and Changes Throughout the 1990s" *International Journal of Purchasing and Materials Management*, Fall 1998, p. 3-4. 5 11/05/97 06:29 PM

"Managing supplier quality is not only desirable, it is a strategic necessity."

(Trent, 2001, p. 71)

Short- and long-term cost savings are not the only benefits firms are experiencing from successfully adopting new PSM practices. While their costs continue to fall, these firms often also realize improvements in quality, delivery performance, product development, and value/supply chain integration and management.

Trent and Monczka (1998) report that more than 92 percent of firms surveyed on new PSM practices expect average, annual product quality improvements of 10 to 13 percent. Quality improvements from adopting these new PSM practices lead to benefits in the form of reduction or elimination of inspections, rejections, repairs, and rework as well as operational downtime; such improvements obviously also affect cost. For example, by working with suppliers, Honda of America Manufacturing, Inc. (HAM) claims that it dramatically improved supplier quality levels from 7,000 defective parts per million (ppm) in 1985 to between 100 and 200 ppm in 1995. For newly designed parts, HAM initially inspects supplier production processes to ensure that, if operated to its standards,

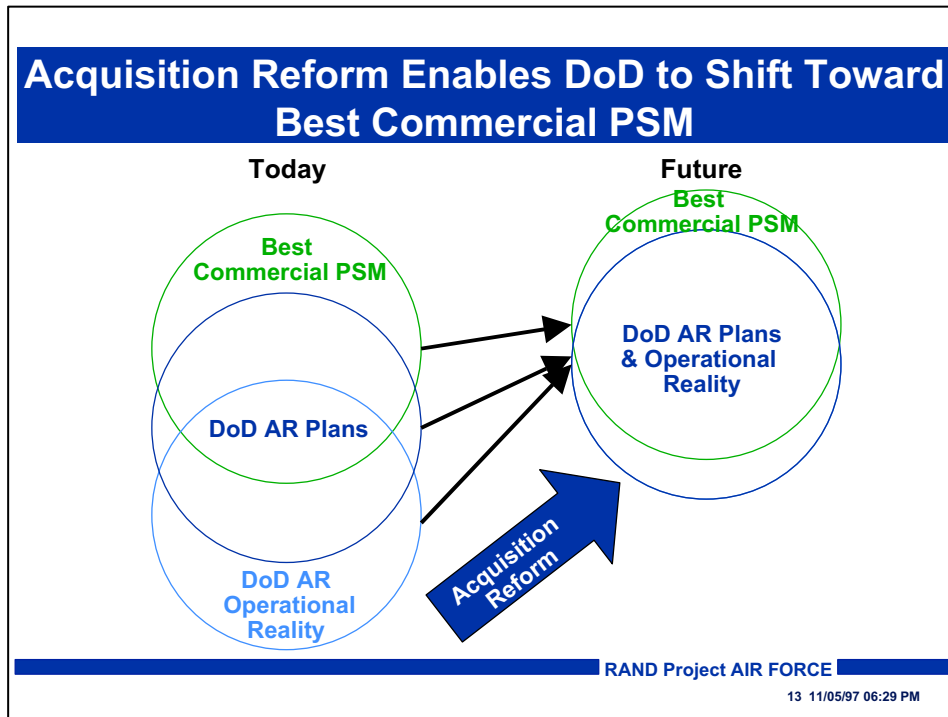
the parts will meet HAM's quality standards every time. Then no incoming inspection is performed at the HAM facility (Fitzgerald, 1995, pp. 32-40). Similarly, AlliedSignal said that it eliminated poor performing suppliers and trained remaining supplier partners in techniques such as SPC, Six Sigma, and other manufacturing best practices. AlliedSignal claims that these actions reduced the overall defect rate of incoming parts and materials from 35,000 ppm in 1992 to 1,902 ppm in 1996. This was projected to save the company over \$1.2 billion over three years. One AlliedSignal supplier, EG&G Sealol, completely eliminated defects in 1997, compared to 9,871 defective ppm in 1996 (Minahan, 1997, pp. 38, 45).

Delivery performance improvements from adopting PSM, which include improved supplier responsiveness and reliability, allow firms to reduce their inventory levels. For example, the purchasing department at AMR worked with aircraft fuel suppliers to increase dependability of fuel delivery to planes. AMR reports that this has helped them reduce fuel inventory by more than 20 percent since 1994 and achieve near Five Sigma quality. AMR also worked with an integrated parts supplier to improve service levels approaching a 97 percent fill rate (delivery within eight hours), a reduction in part and material unit cost of about 19 percent, and a decrease of 16 percent in purchase volume. As a result, use of ground equipment increased and out-of-service equipment decreased (Avery, 1998). Trent and Monczka (1998) report that more generally approximately 90 percent of the firms in a PSM survey expect to annually improve their average delivery performance between 7 and 10 percent.

Improved capabilities for product development and innovation from adopting new PSM practices are leading to less-expensive new-product development and more innovative product improvements with faster cycle times. For example, Chrysler said it has reduced its new vehicle development cycle from an average of 234 weeks during the 1980s to about 160 weeks. In addition, the development costs for new vehicles have dropped an estimated 20 to 40 percent (See Dyer, 1996). In another example, by working with a supplier of galley carts for a new aircraft, AMR's purchasing department reports that it helped achieve a 21 percent unit-price decrease for an 8-lb lighter cart that attendants prefer to the old carts. Fuel savings for the lighter cart are reportedly about \$300,000 per cart per year (Avery, 1998). More generally, Trent and Monczka (1998) report that the average product development cycle time has dropped over 20 percent from 1990 to 1997. Further, most business units expect a 40 to 45 percent reduction over the next several years.

Adopting PSM practices also appears to enable better value/supply chain integration and improvement (e.g., eliminating steps and substantially reducing time and transactions). For example, since 1988, when Chrysler began to reduce its supply base, it reports that it has reduced the number of buyers by 30 percent and sharply increased the dollar value of goods procured by each buyer (Dyer, 1996, p. 47). As discussed above, it is very difficult to implement the close relationships required for supply-chain integration and realize all of its prospective benefits of fast, reliable, and low-cost support (e.g., inventory, warehousing, transportation, and overhead/administration) without reducing the supply base (Chapman et al., 1998, and Christopher, 1998).

Many PSM initiatives reportedly produce both cost savings and performance improvements. For example, Patterson and Nelson (1999) report that one U.S.-based industrial equipment manufacturer's various Integrated Supplier Development (ISD) projects have resulted in price reductions of up to 15 percent, lead time reductions of 75 to 95 percent, ppm defects reduction from 14,400 to 300, on-time delivery improvement from 74 to 99 percent, increases in effective capacity by 25 percent, reduction in Occupational Safety and Health Administration (OSHA) reportable accidents by 90 percent, reduction in work-in-progress inventories by 67 percent, reductions in factory floor space by 45 percent, and reduction in rework by 37 percent. Lockheed Martin reports that under its recently retired vice president, material management purchasing costs were reduced \$410 million, parts acceptance quality improved by 48 percent, shortages were reduced by 60 percent, and inventory turns improved by 38 percent (Stundza, 2000a).



Currently, there are considerable differences between the best commercial PSM practices and typical Air Force operational contracting practices,³² particularly when purchasing services. Traditional Air Force practices have grown from the complex federal acquisition regulations (FARs) that have encouraged arms-length, adversarial relationships with low-cost vendors. However, recent acquisition reform (AR) legislation that has led to major changes in the FAR enable all DoD contracting organizations to take advantage of many of the best commercial PSM practices. And although the promise of acquisition reform has not yet been fully realized,³³ as the DoD gains more experience with it, there is likely to be

³²To be fair, as mentioned above, there are also significant disparities between the most innovative commercial PSM practices and the typical. In addition, the Air Force and DoD have not tried to follow best commercial PSM practices, nor is it obvious that they should try to do everything commercial firms do.

³³One firm we interviewed that supplies the DoD as well as commercial and defense firms noted that government employees were initially slow to adopt acquisition reforms such as dropping military specifications. However, government employees are now aggressively adopting acquisition reform, while defense firms have been slower to change their purchasing practices.

additional acquisition reform legislation enabling further movement toward the best PSM practices.

A primary area in which current legislation potentially limits the ability of the DoD to take advantage of new PSM practices is in supply base reduction/management and contract bundling. Congress is a strong proponent of competition and fostering the well-being of small business concerns through participation in government contracting opportunities.

The Competition in Contracting Act of 1984, which requires “full and open competition,” may limit the ability of federal agencies to bundle requirements and reduce the supply base if bundling limits the pool of bidders so that the requirement cannot be filled at the lowest possible price. However, firms can form teams to bid for large contracts and recent acquisition reform legislation allows the down selection of suppliers based on their qualifications to perform the required work to specifications.

The Small Business Reauthorization Act (SBRA) of 1997 (Public Law 105-135, 1997) introduced new policy for federal agencies that wish to consolidate (bundle) requirements for goods and services. If a consolidated workload is likely to be unsuitable for direct award to a small business concern, an agency must now demonstrate that the consolidation is necessary and justified, based on measurably substantial benefits to the federal government.³⁴ These benefits can be broadly defined to include cost savings, quality improvements, reduction in acquisition cycle times, better terms and conditions, or any other benefit. The Small Business Administration (SBA) has recently issued final regulations that spell out the criteria necessary to demonstrate “measurably substantial benefits.”³⁵

³⁴Much of the relevant legislation allows for small business participation through both prime and subcontracts. However, some in the small business community (including government small business advocates) and more recently Congress strongly favor giving small businesses prime contract opportunities.

³⁵See Baldwin et al. (2001) for a detailed discussion of the SBRA and SBA final rule.

RAND Project AIR FORCE Approach

RAND Tasks

- Reviewed literature and attended conferences on innovative PSM and implementing change
- Reviewed Air Force/DoD acquisition reform publications
- Developed a prototype implementation framework and interview questions
- Interviewed selected private sector purchasing organizations implementing best PSM practices to identify methods and organizational structures
- Interviewed Air Force contracting organizations on implementation of acquisition reform and PBSA
- Identified ways the Air Force can improve its implementation of best PSM/PBSA practices

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We began this research by reviewing the academic and business literatures and attending conferences on best PSM practices³⁶ and successful implementation of change. We also reviewed Air Force and DoD acquisition reform laws, regulations, publications, and briefings to better understand what the Air Force is allowed and not allowed to do. From the information we gathered on leading PSM practices and key ingredients of successful change, we developed a prototype implementation framework and questionnaires for structured interviews. See Appendix F for our interview questions.

³⁶Because PSM encompasses a number of synergistically interrelated practices, it is difficult to perform rigorous empirical analysis to test the value firms receive from specific implementations. Indeed, Ellram and Carr (1994) report that much of the purchasing strategy literature is either conceptual or based on a small number of case studies. Some studies do base their findings on data gathered from a large number of firms, but most do not report the use of statistical analysis to support the findings of the research. That said, PSM is internally consistent and consistent with Total Quality Management (TQM), which does have some empirical support. For more on TQM, see Fernandez (1995) and George and Weimerskirch (1994). See also Liker and Wu (2000) for recent empirical evidence of the effect of buyer practices on supplier performance.

From the literature, conference presentations, and discussions with practitioners, we identified a number of private-sector purchasing organizations at large firms that had recently implemented, or were in the process of implementing, best PSM practices. We focused on those purchasing organizations recognized by their peers for their success with these PSM practices.³⁷ We set up structured interviews with some of these firms to identify the methods and organizational structures they used that were successful or unsuccessful and the challenges and problems they encountered in implementing best PSM practices.³⁸ To elicit accurate and sometimes sensitive data, we agreed not to identify the firms that shared information with us.³⁹ The eight firms that we interviewed regarding PSM implementation represent a wide variety of markets and industries, including heavy equipment, metals, pharmaceuticals, aerospace, electronics, and automotive.⁴⁰ Appendix D contains a detailed explanation of our approach to developing and using information about best commercial practices.

We developed a separate interview questionnaire for Air Force contracting organizations and interviewed a number of major command (MAJCOM) headquarters' contracting organizations as well as special and operational contracting squadrons implementing acquisition reform and Performance-Based Services Acquisition (PBSA).⁴¹ From these interviews, we gathered information on the status of implementation of PBSA as well as on successes and problems encountered.

³⁷Successful PSM typically occurs in firms facing crisis and in larger firms with successful TQM experience and a successful TQM culture that values the kinds of things that PSM seeks.

³⁸We talked with firms that were early implementers (i.e., first movers) to understand what was possible. We did not talk with firms that did not change their behavior or firms that tried to implement PSM and failed, although additional analysis of these firms would increase confidence in our findings.

³⁹With few exceptions, we cite specific firms only when we can document their behavior with information from the open literature. We are grateful to the firms who agreed to let us share materials from some of their internal documents here.

⁴⁰Three of the firms are in the Fortune 50, seven are in the Fortune 500, all are within the Fortune 1000. We got additional information about PSM implementation from over 40 firms we interviewed for related research on outsourcing and best commercial PSM practices.

⁴¹An operational contracting squadron at an installation typically handles contracts for that installation only. A special contracting squadron within a major command typically handles large, complex contractual arrangements that concern one or more installations within that command (or sometimes across commands).

Our model for implementing successful change derives from these interviews and from literature on change management in organizations. The organizations we interviewed were selected because of peer recognition for their PSM practices. Issues about their change practices were not part of the selection process, and we have no reason to believe that their change management methods were driven by or related to the specific PSM practices adopted. Hence, the lessons we have derived from these interviews about successful change implementation are not subject to a selection bias related to “selecting on the dependent variable.” We selected the firms for their particular practices, not for their methods for change, and identified much of commonality in the change strategies used by these organizations. We believe that our model of change is robust and can be used by organizations to implement a variety of change efforts above and beyond the move toward best PSM practices.

Key Findings

- **Innovative commercial firms are taking a more strategic, goal-oriented approach to PSM**
- **Innovative commercial firms use formal implementation processes and plans to help drive successful, permanent change**
- **Air Force can significantly improve implementation of new PSM/PBSA practices**

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We report three key findings here. First, an ever-expanding group of innovative commercial firms is shifting from a tactical to a more strategic, goal-oriented approach to PSM. These firms recognize PSM's potential for performance improvements and cost savings and are taking steps at the highest levels to increase the use of this approach.⁴²

Second, because implementing new PSM practices requires significant changes throughout the organization, these firms are learning that a formal implementation process and plan helps ensure successful, permanent changes.

Last, we identified a number of specific actions that the Air Force might take to significantly improve the implementation of new PBSA and PSM

⁴²Kraljic (1983), one of the early proponents of PSM, argues that the risks and complexities of global sourcing and the need to cope with uncertainties and supply or price disruptions call for a total change of perspective: from purchasing (an operating function) to supply management (a strategic function). He further argues that concrete changes in the organization will be required to establish effective organizational relations, provide adequate systems support, and meet the new staff and skills requirements.

practices within the Air Force. If commercial PSM practices work as well as their advocates expect, these actions could help the Air Force more fully capture the promised benefits of best PSM practices to ensure successful, permanent change.

Outline

- **Innovative commercial firms are taking a more strategic, goal-oriented approach to PSM**
- **Innovative commercial firms use formal implementation processes and plans to help drive successful, permanent change**
- **Summary of findings relevant to the Air Force**

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This documented briefing is organized around our three key findings. In the next section, we discuss how innovative commercial firms are moving toward a more strategic, goal-oriented approach to PSM. After that, we lay out a formal implementation process and plan that reflect that many of these firms are institutionalizing the shift to new PSM practices. In the last section, we summarize our findings relevant to the Air Force and suggest specific actions it could take to improve the implementation of PBSA and PSM practices.

2. A STRATEGIC, GOAL-ORIENTED APPROACH TO PURCHASING AND SUPPLY MANAGEMENT

Innovative Commercial Firms Are Taking A More Strategic, Goal-Oriented Approach to PSM

Motivators:

- Purchased goods, services take large share of budget
- PSM practices offer large prospective benefits
- PSM process and outcomes include and affect entire organization

Actions:

- Establish measurable, corporatewide strategic goals for PSM that are linked to high-level corporate goals
- Assign responsibility and accountability for meeting goals
- Integrate PSM into highest levels of decisionmaking

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Adopting the new [PSM] model requires widespread change – in processes, the organization, and even the supporting infrastructure. First, the focus of purchasing processes must shift from transactional to strategic management.

(Laseter, 1998, pp. 19-20)

When firms recognize the significant portion of their budget affected by purchasing outcomes (as much as 50 to 80 percent),¹ the large potential

¹David Nelson, vice president of worldwide supply management for Deere & Co. (now vice president for global purchasing, Delphi Automotive Systems), notes that 20 years ago, 70 percent of a typical manufacturing company's spend was for direct labor and other in-house costs and 30 percent was for purchased goods and services. In the past decade or two, this ratio has reversed for many firms as they focus more on where they can add the most value and outsource tasks that are not part of their core competencies

benefits from implementing PSM, and the fact that PSM processes and outcomes draw on and affect the entire firm,² they often begin to shift their view of the purchasing function from that of a tactical support organization to a strategic capability.³ For example, Motorola's Space and Systems Technology Group recently identified supply management as a core operating process (Ostroff, 1999). Similarly, Larry Bossidy, former Chief Executive Officer (CEO) of AlliedSignal, believed that for AlliedSignal to accomplish its goals, it needed the most talented materials management group in the industry (Minahan, 1997).

The first step firms often take toward a more strategic approach to PSM activities is to establish measurable, corporate-wide PSM goals⁴ that map directly to high-level corporate goals.⁵ These goals may arise from benchmarking exercises, internal analyses, or analyses performed by an

(Atkinson, 2000, p. 51). For example, Pratt & Whitney used to do everything involved with the design and production of its jet engines; now two-thirds of the engine is purchased (Fitzgerald, 1999a, p. 51).

²The PSM process involves developing a business plan/strategy, defining requirements, performing market research, deciding how to bundle requirements, soliciting offers, selecting sources, integrating sources into operations, measuring and managing performance, and working with suppliers to continually reduce costs and improve performance throughout the value chain. Thus, PSM stakeholders are *all* those who are affected by the PSM outcomes or who participate in the process including internal customers (e.g., business units), technical functions (e.g., manufacturing, logistics, engineering), and supporting functions (e.g., purchasing, legal, human resources, finance quality). Such a broad range of skills and personnel requires broad, organization-wide coordination and cooperation for successful PSM outcomes.

³For a systematic, 30-year review of the purchasing strategy literature, see Ellram and Carr (1994). See also Ciancarelli (1999) and Laseter (1998).

⁴Typical goals include ongoing cost-reduction targets (e.g., \$200M/year, 6 percent/year); quality-improvement targets (e.g., 50 percent reduction in ppm defects/year); design-cycle-time targets (e.g., 50-75 percent reduction); increased operating flexibility, which in some firms has yielded an economic lot size of one – the ultimate in flexible manufacturing; more value for the customer's customers (e.g., 10 percent increase in customer satisfaction); enhanced leverage with technology, including earlier access to new concepts and more control over technological change; and more powerful competitive strategies, gained when a customer adds its supplier's expertise to its own (Lewis, 1995, pp. 3-4).

⁵Because firms' strategic goals vary (see Porter, 1996, for an excellent discussion of different strategies), their PSM goals will also vary (e.g., cost reduction, quality improvement, improved responsiveness) and hence the PSM practices used will also vary in their mix and intensity. For example, in the late 1980s Intel's highest priority for its suppliers was quality (Morgan, 1990). In the mid 1990s Sun sought responsiveness from its suppliers (Carbone, 1996).

outside consultant. For example, one firm we interviewed used a consultant to identify the level of savings that might be achieved through the shift to new PSM practices.⁶

The metrics used to track progress toward meeting these PSM goals are outcome-based, such as total cost reduction, supplier quality improvements, or number of preferred suppliers rather than function-, process-, or tool-based metrics that are purely internal to the purchasing function, such as the number of contracts and/or purchase orders processed per year or number of electronic orders.⁷ However, merely establishing goals and identifying corresponding metrics alone is not sufficient to make the transition to a strategic approach to PSM.

The firms that have been most successful in implementing best PSM practices also assign responsibility and accountability for meeting the PSM goals, beginning with high-level PSM stakeholders (e.g., savings performance goals for the head of the PSM organization, business unit heads). One firm that we interviewed gave PSM savings goals to the head of the PSM organization and then provided mirror-image goals to the heads of the business units, whose cooperation was crucial to meeting the goals.⁸ Further, responsibility and accountability for meeting the goals is parsed and flows down to all key participants within the stakeholder organizations, including senior, middle, lower, and line management.⁹ For example, MKS Instruments currently measures individual buyer-planners on purchase price variation and informally measures them on inventory turns, supplier kanban¹⁰ implementation rates, supplier quality,

⁶Laseter (1998) suggests that these goals should be aggressive enough to lead to the necessary PSM changes and should represent both short- and long-term PSM objectives.

⁷Local purchasing process- and tool-based metrics are not eliminated. They can be valuable for identifying root causes of poor performance and improving the internal functioning of the process. However, care must be taken to ensure that they are aligned with overall PSM goals. See Morgan (2000b) for the results of a recent survey and interviews with purchasing executives indicating how traditional PSM metrics are changing.

⁸This firm has a culture of strong, autonomous business units that might not have cooperated with the new PSM practices otherwise.

⁹The results of a recent *Purchasing* magazine salary survey indicate that 83 percent of purchasing vice presidents receive a bonus, which averages about 25 percent of their base salary whereas only 34 percent of buyers receive a bonus, which averages almost 7 percent of their base salary (*Purchasing*, 2000c, p. 56). See also Easton et al. (1998).

¹⁰Kanban is an automatic system for pulling materials from suppliers direct to the factory floor.

and on-time performance (Porter, 1999a). Not surprisingly, once many firms link PSM organizational and personal accountability and responsibility to attaining specific performance goals (e.g., savings, quality, or responsiveness), purchasing organizations quickly develop systems to accurately measure and track their performance over time.

As a final step toward adopting a more strategic approach to PSM, firms are integrating the PSM organization and considerations into the highest levels of internal decisionmaking. For example, top management at Intel now recognizes purchasing as strategically co-equal with design and manufacturing (Morgan, 1995a). From 1990 to 1996, supply management (which included purchasing) at Sun evolved, and its status was elevated because of its supplier strategies and the resulting contribution to Sun's.¹¹ In fact, there are more supply management personnel in Sun's director positions than probably any other function within operations (Carbone, 1996).

¹¹Because spending represents between 70 percent and 80 percent of the standard cost of Sun's products, purchasing represents the area with the most potential to create improved performance and profitability. As a result, the contribution of supply management at Sun is valued and recognized as a core competency (Carbone, 1996).

Creation, Empowerment of Chief Purchasing Officer (CPO) Signals Elevation of Importance

- **CPO is the champion for PSM**
 - **Creates and articulates vision for PSM**
 - **Organizes and manages all corporate activities relevant to PSM**
 - **Provides a single point of contact**
 - **Launches systematic efforts to implement changes in practices and align all PSM-related activities with corporate goals**
- **CPO's goals and incentives are directly linked to corporate strategic goals**

Demonstrates CEO and senior leadership's (1) commitment to a more strategic approach to PSM and (2) expectations for success

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As discussed above, a key step toward moving from a tactical approach to a strategic approach to PSM is to integrate PSM into the highest levels of decision making within the firm. Many firms accomplish this by creating a chief purchasing officer (CPO) position that elevates the head of PSM activities to the executive level (generally, the corporate vice president level)(Atkinson, 2000).^{12,13} For example, in 1991 Lawrence Bossidy, then CEO of AlliedSignal, consolidated procurement into a single materials

¹²The exact title varies from vice president to senior vice president and from purchasing, to materials, supply, or supply chain management.

¹³In their 1988 and 1995 surveys of U.S. and Canadian firms (not necessarily selected for their best PSM practices), Fearon and Leenders (1995) found that 66 percent of the 118 U.S. firms participating in both surveys had changed the reporting line for the head of purchasing between 1995 and 1998 and 59 percent of these firms had changed the title of the head of purchasing. In their 1995 survey, the authors found that the purchasing function reports directly to the president in 16 percent of the firms, to the executive vice president in 15 percent, and to the senior/group vice president in 19 percent. In 1995, 37 percent of the firms' CPOs had the title of vice president. See also Smeltzer (1998).

management organization and elevated the function to executive status.¹⁴ In 1995, Harley Davidson hired a new director for its purchasing organization and in 1997 promoted that director to vice president (see Davidson, 1997). AMR hired a new vice president of purchasing and elevated the position to only one level removed from the chairman of the company (Avery, 1998). In 1998, to resolve problems in purchasing Boeing Commercial Airplane Group brought in a new vice president and general manager of what is now its supply Management and Procurement Division (Stundza, 2000b). One firm we interviewed assigned the leadership of global strategic sourcing to its former chief financial officer (CFO), who had previously been in operations at one of the firm's business units. The CPO is given goals for savings and performance improvements that are tied to corporate strategic goals and also the resources to meet those goals.

Establishment of a CPO accomplishes three objectives. First, it signals that PSM is viewed as a strategic activity within the firm (see Laseter, 1998). The major financial commitment that comes with establishment of such a position¹⁵ indicates that PSM has the support of the highest levels of leadership within the firm¹⁶ and emphasizes that new expectations have been established.¹⁷ For example, the goals given to the CPO reflect the benefits that corporate leadership expects to receive from implementation of the new PSM practices. The actions also indicate that PSM input is important for many future strategic corporate decisions. At AMR, the CPO attends executive planning meetings for the corporation and participates in discussions of issues that go beyond the scope of PSM.

¹⁴Bossidy also promoted some key materials management players to the front office (Minahan, 1997).

¹⁵Salaries for the most talented PSM executives are climbing and are currently in the neighborhood of \$200,000 per year with 20 to 40 percent of their compensation linked to performance much like a general manager running a business. See Chapman et al. (1998).

¹⁶Chapman et al. (1998, p. 71) note that "[t]he challenge of executing a multi-year program cannot be underestimated; those few companies that have successfully transformed their PSM capabilities all had commitments from their senior managers." Smeltzer (1998) finds that firms with greater executive leadership support for new PSM practices experience greater and more successful PSM change.

¹⁷AlliedSignal's elevation of procurement to executive status was meant to send a clear message to suppliers and AlliedSignal personnel that from then on, AlliedSignal was going to take materials management very seriously (Minahan, 1997). See also Smeltzer (1998).

Through these discussions, the CPO gains a better understanding of the broader corporate concerns, increasing opportunities for PSM to add value.¹⁸

Second, establishment of a CPO enables the changes that are necessary to implement best PSM practices. The CPO becomes the champion for implementation of the new practices throughout the firm with the responsibility and resources to create and communicate broadly throughout the firm a new, holistic vision for PSM that is aligned with the corporate strategic goals, to develop a plan for making the new vision a reality, and to implement the necessary changes. A senior PSM executive we interviewed said, “Most of my job is selling the change.”

Third, the CPO title helps with supplier negotiations and communications by providing clear leadership and coordination of all purchasing activities and, when necessary, one voice and one point of contact. It is especially helpful when putting together strategic alliances because it gives suppliers the assurance that they are dealing with a person with decisionmaking authority (Atkinson, 2000).¹⁹

Placing the CPO on the same level with the leadership of the other key stakeholder divisions and functions, such as the business units and technical experts, promotes visibility of PSM considerations in decision making, enables the CPO to effectively sell the value of purchasing across the organization, and provides opportunities for the CPO to obtain the cooperation necessary to meet PSM goals.²⁰ One firm that we interviewed

¹⁸AMR’s chairman, president, and chief executive officer, Donald J. Carey, noted that for the first time in his history with the company, user departments clearly see purchasing as value added (Avery, 1998).

¹⁹This may be particularly important for the DoD as it moves toward more strategic partnerships with leading commercial firms. For example, many Air Force and DoD suppliers have multiple sole source contracts (Honeywell had 154 sole-source “contracts” with the Air Force; 29 were purchase orders and 396 sole-source “contracts” with the DoD in Fiscal Year 2000, according to the DoD-wide DD350 contract database). Resistance by some of these suppliers to consolidating their sole-source contracts into fewer corporate contracts may suggest the need for high-level involvement. An anecdotal example is DoD contracting personnel in one organization negotiating an innovative major contract using standard commercial pricing clauses only to have contract management personnel in another organization balk at enforcement of the new terms and conditions. This suggests the need for a single high-level voice when dealing with suppliers.

²⁰Wincel (1998) notes that because purchasing goals of controlling total costs and making the supply chain operate more efficiently cut across the entire firm, turf battles between

took this a step further and elevated the CPO from a management level equal to the heads of the business units (production plants) to one level above them to promote coordination across the business units. This change was necessary because of the strong organizational culture of powerful, independent business units. In fact, the president of this firm offered his direct assistance to help overcome stakeholder resistance to working toward the new PSM goals.

In many cases, when the CPO position is created, a new person is brought into the organization to manage the shift to strategic PSM activities.²¹ Often this person has an MBA or other master's-level degree.²² However, many new CPOs have little career experience in the purchasing field.²³ Instead, CPOs often are hired for their management expertise, including their experience in successfully implementing major organizational change.²⁴

the CPO and PSM stakeholders are likely. Thus, high-level leadership's support of the PSM goals is critical to settling these disputes. One CPO interviewed by Smeltzer (1998) indicated that one of the greatest barriers to change he encountered was convincing others in his company that the PSM changes would be good for the firm.

²¹AMR hired Navistar International's head of purchasing to be its new VP of purchasing (Avery, 1998). John Deere hired the head of purchasing from Honda of America to lead its new PSM activities (Nelson, 1998). IBM's CEO, Louis Gerstner, Jr., realized in the early 1990s that to revamp IBM's Global Procurement operations he had to find the very best purchasing executive. He hired a new vice president and chief purchasing officer, Gene Richter, who twice (when he headed purchasing at Hewlett-Packard and also Black and Decker) won *Purchasing* magazine's Medal of Professional Excellence (Fitzgerald, 2000a).

²²In its 1995 survey, CAPS (1996) found that 39 percent of the respondent firms' CPOs had advanced degrees. Of these 70 percent had MBAs, 12 percent had masters in management degrees, and 6 percent had Ph.D.s.

²³Some firms, such as Chrysler and Delta Airlines, are strategically moving functional heads within the company to enhance their executive teams (Ciancarelli, 1999). None of the CPOs interviewed by Smeltzer (1998) had received formal purchasing training.

²⁴Ciancarelli (1999) notes that the ideal candidate for a purchasing executive job has management experience in nonpurchasing areas, experience with global operations (or at least a global perspective), computer and Internet skills related to supply management, and the ability to change and to manage people who are experiencing change.

Purchasing Organizations and Career Field Shift from Transactional to Strategic Perspective

- **Purchasing activities expanded to include**
 - **Development and negotiation of contracts**
 - **Market research and intelligence**
 - **Assistance with supplier management**
 - **Management/integration of supply base/chain**
 - **Supplier development**
 - **Implementation of Internet based e-commerce**
- **Purchasing personnel include experts on**
 - **Contracting**
 - **Provider industries**
 - **Internal and supplier technical, functional issues**

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The shift toward more strategic PSM requires that purchasing be expanded beyond the traditional transactional approach to include more sophisticated and more strategic purchasing activities. An initial step in this direction is to move from processing purchase orders²⁵ and recompeting existing contracts “as is” to the development and negotiation of more flexible, higher-dollar contracts that encompass larger groups of goods and services. Bethlehem Steel found that over 80 percent of its professional purchasing staff time was consumed by tactical activities with less than 20 percent of their time focused on strategic activities (Rudzki, 2001). A second step is to incorporate market research into the purchasing function to learn which goods and services best meet internal customer needs, the innovative providers of those products and services,

²⁵Many firms have computerized (Giunipero and Percy, 2000) and are now shifting to the Internet most of the traditional, clerical purchasing activities. Indeed, “[as] companies accelerate implementation of e-procurement programs, lower-level purchasing jobs are being removed through attrition and replaced with higher-level professionals who develop long-term strategic relationships with a reduced number of key suppliers” (*Purchasing*, 2000c, p. 50).

the best way to purchase them, suppliers' major cost drivers, supply market conditions, effective ways to measure performance and provide incentives, what new technologies are expected in the near future, and so forth.²⁶

The more-sophisticated PSM groups strive to better manage and integrate the corporate supply base and supply chain. They analyze corporate spending patterns and study the relative importance of purchased goods and services to the firm's core processes to determine the optimal acquisition strategy.²⁷ As one senior PSM leader we interviewed said, "Data is key to our management process. Once you have the data, you have the ability to cut better deals." They expanded their PSM activities to include supplier management, i.e., managing performance of suppliers and tailoring supplier relationships to the types of goods and services procured. These sophisticated PSM groups also invest in strategic partnerships and intensive supplier development activities (e.g., training in quality management and process control techniques) for a small number of their key suppliers critical to operations or competitive positioning (for example, see Nelson, 1998).²⁸

As firms begin to implement these new, sophisticated PSM practices, they are discovering that the depth and breadth of the expertise of their existing purchasing personnel is often inadequate. One firm that we interviewed likened the change in demands on PSM staff to moving from an amateur sports league to a professional one.

Whereas many traditional purchasing organizations consist primarily of clerical staff trained to process simple transactions,²⁹ execution of new

²⁶Laseter (1998) notes that the market research questions should be tailored to each industry (e.g., based on its degree of globalization, vertical integration, and other relevant measures).

²⁷Appendix A illustrates how John Deere manages this more sophisticated approach to supply management.

²⁸A recent *Purchasing* magazine (2000a) reader survey found that 53 percent of responding companies pursue supplier development activities, 20 percent say that they sometimes provide financial support for suppliers' plants, equipment, and other operations; 14 percent place their own employees on-site at suppliers' facilities for some length of time; 11 percent give suppliers opportunities to learn and improve by becoming residents at customer facilities; and 1 percent have formal policies and procedures for supplier development.

²⁹Koumantzelis (1997) argues that as purchasing evolves from a tactical transaction-based process into a strategic focus on supply-chain management, the traditional entry-

PSM practices requires interdisciplinary organizations and teams consisting of professionals with advanced interpersonal, analytic, and computer skills. For example, PSM professionals are expected to be able to communicate, build consensus, work well in a team environment, and negotiate.³⁰ Smeltzer (1998) adds that the ability to learn, adapt, and change are also critical to the success of new PSM professionals. When conducting market research and intelligence, PSM staff members determine supplier cost structures, estimate supply market conditions, and analyze financial statements. In addition, internal spend analyses require that PSM professionals estimate the total ownership costs associated with purchasing goods and services and the cost of poor quality. As an example, AMR's new CPO has hired commodity managers, supplier quality specialists, cost analysts, financial analysts, and systems analysts (see Avery, 1998). Most innovative purchasing organizations include supplier development activities, which require expertise in process reengineering, lean production techniques, the theory of constraints, and statistical process control.³¹ Perhaps the greatest new challenges for PSM professionals are associated with the very recent and rapid implementation of e-commerce on the Internet.³²

As a result of these new skill requirements, many firms are seeking staff with bachelor's and master's degrees from schools that have purchasing and supply-chain management programs.³³ One firm we spoke with uses

level buyer position is becoming obsolete. Purchasing professionals now need a broad skill base and an in-depth knowledge of the supply chain, how it works, and how its value can be maximized.

³⁰One firm that we interviewed said that performance of some of their purchasing teams had been adversely affected by strong-willed, uncompromising team members who communicate poorly. These people were eventually removed from the teams.

³¹Appendix B offers more detail on the key PSM skills identified by Harley Davidson, Bristol-Myers Squibb, and Bethlehem Steel, three firms known for their best PSM programs.

³²Belyea (2000) suggests that skills and traits of new purchasing professionals include the ability to grasp the total value of the supply chain and the roles of its various links, technical know-how (especially in manufacturing industries), analytical abilities, ability to work with new information technology (especially the Internet), a global perspective, and interpersonal skills.

³³Through a combination of interviews and other sources (e.g., Avery, 1998), we learned that Michigan State University, Bowling Green State University, Arizona State University, the University of Tennessee, Western Michigan University, Western Illinois University, Florida A&M University, and the University of San Diego offer undergraduate business programs with supply management specialties. Corresponding

its summer intern program to locate and secure talented people enrolled in these PSM programs at the beginning of their careers (see also Chapman et al., 1998, and Kolchin and Giunipero, 1993). Some firms stress the need for professional certification, such as Certified Purchasing Manager (CPM) status.³⁴ Between 1992 and 1998, AMR increased its PSM staff with college degrees from 55 percent to 90 percent, and its PSM staff with advanced degrees from 5 percent to 21 percent (see Avery, 1998). One firm we interviewed is in the process of restructuring its PSM organization.³⁵ At the time of our interview, 70 percent of this firm's PSM staff had college degrees (33 percent of these are from technical or business programs). Twenty percent also had MBAs or other graduate degrees and 15 percent were CPMs. This firm was planning to hire an additional group of staff members to undertake supplier development activities. The education distribution of the new staff will be skewed toward MBAs, CPMs, accountants, and engineers. The vice president for materials and services at Intel Corp. describes the ideal purchasing candidate as having an MBA with a technical undergraduate degree. He claims that commercial skills can be taught but not technical ability (Koumantzelis, 1997). Indeed, many entering purchasing today have significant education in strategic supply management, manufacturing operations, engineering, marketing, and finance and many hold MBAs (Smock, 2000). Firms are also seeking experienced personnel from other parts of their organizations – e.g., technical experts from their business units and other internal functions – from their competitors and from firms in other industries.³⁶ For example, General Electric requires that

to these higher skills requirements is an increase in the average salaries of purchasing professionals at a rate that is more than twice the Consumer Price Index for the period measured (*Purchasing*, 2000c).

³⁴CPM status is achieved through a combination of the CPM exam (which consists of four modules); five years of experience (three years if the applicant has at least a four-year degree) in purchasing and materials management; academic courses in purchasing, materials management, or core business areas; seminars and continuing education; and professional contributions such as published journal articles. Recertification is required every five years (National Association of Purchasing Management (NAPM) website at <http://napm.org>. Note that this organization changed its name recently to Institute for Supply Management (ISM).)

³⁵Fifty percent of the purchasing staff employed before the shift to strategic PSM practices will become eligible for retirement within five years, creating the opportunity to shift toward a more professional organization.

³⁶A 1999 *Purchasing* magazine survey of readers found that “[m]ore companies are shifting people from other functions into purchasing. Nearly half of survey respondents,

personnel in its manufacturing management program spend about six months in purchasing (Morgan, 1995b, p. 21). AMR's CPO recruited PSM professionals from GE, Xerox, IBM, Motorola, AlliedSignal, and Honda (see Avery, 1998).

To hire and retain these PSM professionals, many firms have upgraded their purchasing salary grade levels and increased opportunities for PSM staff to earn bonuses for meeting goals.³⁷ One firm that we interviewed has already raised its PSM salary grades by at least one level and plans to upgrade them again soon.

Generally, the percentage of compensation that is tied to performance increases with the level of responsibility. At one firm that we interviewed, nonmanagement PSM staff are eligible for up to a 12 percent bonus that is tied to the return on assets/investments for their factory, business unit, and the firm. Up to 70 percent of mid-level management's compensation is tied to return on assets and PSM goals. Upper management personnel have more than 70 percent of their compensation tied to PSM goals.

47%, indicate that they're working in purchasing as a result of a company assignment, rather than as a deliberate career choice" (Fitzgerald, 1999b, p. 74).

³⁷One firm we interviewed indicated that new MBAs in PSM are earning around \$65,000 a year, and new college graduates are earning around \$40,000 a year in PSM positions. A *Supplier Selection and Management Report* survey of purchasing managers indicated that the average salary for purchasing managers in the United States was \$64,600 in 1998 (Mazel, 1998). Over half the respondents received a bonus in 1998, and the bonuses equaled an average 11.4 percent of the managers' base salaries. A more recent *Purchasing* magazine (2000c) salary survey reports average annual salaries ranging from about \$40,000 for buyers to \$128,000 for the vice presidents of purchasing, with the highest reported salary of \$510,00 for a purchasing executive. Some purchasing professionals (about 5 percent of buyers to 33 percent of vice presidents for purchasing) also get stock options whose average value ranges from almost \$14,000 for buyers to \$145,000 for vice presidents of purchasing. Average bonuses as a percentage of base salary range from 6 to 7 percent for buyers and purchasing agents to almost 25 percent for vice presidents of purchasing.

Complex Purchasing Activities Require Effective Cross-Functional Teams

- **Tailor membership to the assigned activity**
 - The right people with the right skills, experience, training
- **Guide efforts with performance measures, goals**
- **Provide needed organizational investments**
 - Time, budget
- **Grant authority to control internal activities and make substantive decisions**
 - Increase with experience and success
- **Appoint a formal team leader**
 - Not necessarily from the PSM organization
- **Link members' performance evaluations and compensations to team performance**

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As noted above, many of the new best PSM practices require input from personnel with a wide variety of skills and the buy-in of diverse stakeholder groups within a firm. This is particularly true for the process of setting up strategic partnerships with providers and creating and managing complex contractual relationships with them. To facilitate these activities, many firms have placed PSM decisions in the hands of cross-functional teams.³⁸ These teams may be permanent or temporary, depending on the nature of the task.³⁹

For example, Steelcase used a cross-functional team to develop a new supplier performance reporting system to facilitate better performance management of its providers across the corporation (see Erba, 1998). The key stakeholders in this process were the PSM organization (supplier development), internal customer organizations, and the information

³⁸Stundza (2000a) reports that the Center for Advanced Purchasing Studies recently surveyed four-dozen aerospace-product manufacturing firms and found that 91 percent now use multifunctional procurement teams that include purchasing, engineering, manufacturing, quality, finance, logistics, customer support, and supplier-relations executives.

³⁹For a nice characterization of the strengths and weaknesses of four different team structures observed in development projects, see Clark and Wheelwright (1992).

systems function. Thus, the cross-functional team included representatives or experts from each of these stakeholder groups.

In the past, AMR used a simple, transactional process to purchase the furnishings for the interiors of its aircraft. Marketing would decide which components to purchase, with input from engineering on whether the components would meet FAA requirements, and then purchasing would write the purchase order. Now, AMR uses cross-functional teams to strategically source and design the interior components of its aircraft. The core team includes representatives from engineering, marketing, purchasing, and production (see Avery, 1998). Commodity teams at AlliedSignal, which handled the sourcing decisions and managed supplier relations, included purchasing experts, financial analysts, and engineers who specialized in design, quality, and manufacturing (see Minahan, 1997).

Trent (1998) reports that executive procurement managers in attendance at the 1997 Purchasing and Supply Chain Management Executive Seminar at Michigan State University indicated that his/her firm uses cross-functional teams in some capacity to make PSM decisions. Unfortunately, every manager also expressed frustration that these teams were not as effective as they could be.⁴⁰ Monczka and Trent (1993) and Trent (1998) recommend steps that firms can take to improve the effectiveness of their cross-functional PSM teams.

The first and perhaps most important step is to tailor the team membership to the decision at hand. Team members should embody the skills, knowledge, and abilities required to make the best PSM decision for the firm. Training should be provided when necessary skills are not readily available. For example, an automotive manufacturer that plans to outsource key components of a new engine for an existing car might put together a PSM team that consists of contract specialists, financial experts knowledgeable about the cost structure and dynamics of the key engine components' industries, technical experts who are designing the new

⁴⁰Note that the attendance of these managers at the conference means that they work in firms that place at least some importance on strategic PSM and hence probably are more likely to have teams than the average firm.

engine, technicians knowledgeable about related automotive subsystems, and representatives of the car model's program management team.⁴¹

When facing a problem that may benefit from close interaction with existing supplier firms such as inventory reduction efforts, representatives of supplier firms should be included as formal members of the PSM teams. When they are included, PSM teams tend to operate more effectively, with greater effort put forth by the team members, higher satisfaction, and fewer coordination problems, and thus achieved greater improvements in performance (see Trent and Monczka, 1998).⁴²

In addition to having substantive knowledge about their areas of expertise, team members should possess the strong interpersonal and team-building skills, such as group problem solving, that are necessary for close collaboration.⁴³ This is especially important for teams that bring together personnel not acquainted with one another because they come from different parts of the firm or from different geographical locations.⁴⁴ Team members should also be able to relate the task at hand to the broad interests of the firm, rather than taking a narrow, functional perspective.

The size of the team is another dimension that should be tailored to the purchasing challenge. Teams should include in their core membership only those people required to support the specific task. For example, AlliedSignal's centralized commodity teams included a purchasing specialist, a finance analyst, and engineers from design, manufacturing, and quality focused on supplier management, benchmarking, and performance measurement. They also worked with local plant materials teams to establish long-term agreements with suppliers and to push corporate initiatives and training programs. Its plant materials teams

⁴¹Firms told the General Accounting Office (GAO) that greater breadth of knowledge on integrated product teams not only speeds the pace of development but also the amount of innovation (GAO, 2001).

⁴²Including individuals from external organizations on PSM teams such as the firm's major customers or suppliers can raise management challenges, such as concerns about proprietary data or intellectual property.

⁴³Belyea (2000) argues that the broad use of cross-functional teams combined with purchasing's elevation into strategic issues has made the ability to work with other people critical to success in supply management.

⁴⁴GAO notes that collocated teams can raise issues earlier, perform tasks faster, and reach decisions quicker than when members are geographically dispersed. Collocated teams are also better able to build trust, which can improve their effectiveness (GAO, 2001).

were in charge of managing the tactical, day-to-day buying activities and included a buyer, a material analyst, and an inventory and transportation specialist (Minahan, 1997). The addition of other members decreases the ease of coordination and dilutes opportunities for individual members to make the significant contributions necessary for members to gain personal satisfaction.

Cross-functional PSM teams need explicit, outcome-oriented goals and objectives to guide their efforts and to evaluate team progress. These goals and objectives should be linked to the corporate PSM goals to maximize the effectiveness of team activities. Furthermore, member participation in the goal-setting process often leads to more-aggressive goals and higher productivity (Monczka and Trent, 1993).

Another step toward creating effective cross-functional teams is to provide the organizational resources necessary to help them meet their objectives. Team members should be provided adequate time to participate in team activities. The regular functional responsibilities of those members not devoting their full time to the team should be adjusted to reflect the members' time commitments to team activities. Teams require budgetary support, especially if travel is needed, and occasionally the support of auxiliary experts not part of the core team. As we will discuss in the next section, another key resource is the commitment of high-level corporate leadership to the team-based management approach.

A team can accomplish its goals more quickly and effectively and team members are more likely to devote effort to their responsibilities if they have increased decision making authority.⁴⁵ Executives can quickly erode team morale and effort if they dismiss, overrule, or ignore team decisions. However, because of the dangers associated with empowering a team that is not qualified to make certain decisions or to take on certain tasks, a team should be empowered gradually over time as it gains experience and demonstrates success.⁴⁶

The most effective and successful cross-functional teams have a strong, formal leader who is responsible for and has the time to devote to

⁴⁵Trent (1998) outlines the four dimensions of team authority: the ability to schedule meetings and activities, select a team leader and new members as needed, control internal team processes and activities, and make decisions without the approval of others outside the team.

⁴⁶The practice of incremental empowerment of teams was affirmed during our interviews.

activities such as working with the members to establish team performance goals, encouraging active participation by all members, and negotiating time away from the members' regular duties. Choosing the appropriate representative to serve as leader is critical. Firms should think carefully before choosing a PSM representative as the team leader because of the danger of sending a signal that the team's activities are primarily purchasing activities, requiring only limited contributions from the other members.⁴⁷

Finally, tying the evaluation of team members' performance to their team activities and outcomes can dramatically increase the effectiveness of cross-functional teams.⁴⁸ The most innovative firms are beginning to restructure their personnel evaluation structures and compensation systems to reflect participation on teams. Ideally, team members should be rewarded for team performance as well as for their individual contributions to the team. As an example, an early adapter of team participation in personnel evaluations asks team members to evaluate the effectiveness of the participation of each of their peers along several dimensions, including personal integrity, work ethics, ability to communicate, expertise, and leadership ability. The firm then bases 40 percent of individuals' performance evaluations on these survey results. At Motorola, teams are evaluated on how well they use information, training, authority, and motivation to achieve objectives and continually improve their performance.⁴⁹ The focus is always on enhancing personal growth and development, as well as on specific individual behaviors deemed important to the team's high level of performance (Ostroff, 1999). The firms that do reward personnel for successful participation on teams primarily do so through four channels: (1) bonuses for meeting or

⁴⁷"Perhaps the greatest challenge confronting cross-functional sourcing teams has been getting non-purchasing members and functions to support team tasks" (Trent and Monczka, 1998, p. 6).

⁴⁸Monczka and Trent (1993) find that the closer the link between team members' performance appraisals with individual contributions and team performance, the more time the members will devote to team activities and, in turn, the more successful the teams will be.

Firms told GAO that capturing an individual's performance on a team helped create acceptance of the team approach (GAO, 2001).

⁴⁹Motorola's Space and Systems Technology Group Supply Management team performance measures include defect rates, delivery requirements (on-time delivery), cycle time, and costs. Teams are also given a roster of strategies and specific actions that need to be accomplished by predetermined completion dates (Ostroff, 1999).

exceeding team goals (e.g., tied to documented PSM savings), (2) recognition by corporate executives (e.g., plaque, write-up in company newsletter), (3) other nonmonetary awards such as company-sponsored parties or gift certificates, and (4) merit raises.⁵⁰ Incorporation of team goals into the personnel performance evaluation process is one form of monitoring and feedback that can be used to promote continuous improvement of team performance.

⁵⁰AlliedSignal encouraged teams to perform well through a wide range of rewards, including a pat on the back, financial awards, and corporate stock (Minahan, 1997).

Upgraded, Multi-Tier Purchasing Organizations Address More Diverse Needs



- **Top-tier, centralized organization(s) set up large, complex, strategic partnerships (e.g., national, regional, complex facility management), and provide support to local organizations**
 - Top talent with extensive knowledge and experience using discretion with difficult contracts
- **Mid-tier, local organizations execute large, complex, and creative contracts, and provide local training**
 - Experts with skills in contract management
- **Lower-tier, local organizations set up lower priority, simpler, local contracts**
 - Junior personnel with fewer skills learn with simple transactions

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As customer firms begin to implement best PSM practices, many are discovering that their prior PSM organizational structure is no longer adequate to support the new kinds of activities and more-sophisticated personnel. For example, IBM's new CPO took action and reshaped purchasing from a scattered collection of divisional purchasing groups into a solid centralized structure (Fitzgerald, 2000a). Boeing has recently reorganized and combined all its commercial airplane supply management and procurement into a single organization (Stundza, 2000b). In response to its new CEO's reinvention initiative, Hewlett-Packard's Operations Procurement created a global, web-centric culture, climate, and work-process environment to converge a previously distributed procurement function into a single global function (see Peterson, 2000). Principal Financial Group merged buying activities and created a corporate strategic sourcing organization to consolidate purchases, standardize the process across the organization, and show one face to their supplier community (Avery, 2000b).

As noted, the complexity of the most-sophisticated PSM activities is increasing, as well as the range of complexity across PSM activities. In addition, customer firms are discovering the need to provide a dynamic new career path to grow and retain their most-talented staff. To address

these new needs, many companies are turning from a predominately decentralized organizational structure for purchasing to a hybrid PSM organization with elements of both centralization⁵¹ and decentralization (Owens et al., 1998).⁵² For example, Pratt & Whitney reshaped purchasing into two groups: supply management, which focuses on the tactical aspects of purchasing, and commodity management, which handles strategic activities such as long-term supplier agreements and joint ventures (Fitzgerald, 1999a). Through our research and interviews, we found that although there was some variation in the detailed structure of PSM organizations across firms because of their different strategies, goals, and cultures, we discerned a trend toward tiered PSM organizations. The top tier of the PSM organization is generally a centralized group that focuses on the most-strategic PSM activities, such as linking PSM strategy, goals, objectives, and targets to their corporate counterparts; analyzing corporate spend patterns; creating strategic partnerships; and setting up complex contracts.⁵³ This organization can also maintain an analytic center of excellence that conducts high-level market research, benchmarking studies, and other efforts to track the best-available strategic PSM practices. To accomplish these activities, this top tier is staffed with the most-talented personnel who have the experience and expertise needed to exercise appropriate discretion.

The centralized top-tier organization(s) may be located at corporate headquarters or in business units associated with the different commodity groups. At AMR, each part of the business has a managing director of purchasing responsible for sourcing all of the goods and services needed

⁵¹Porter (1999b) notes that leverage of buying power is the most frequently cited benefit of greater purchasing centralization. Other perceived benefits include greater opportunity for integrated supply chain management; more rapid decision making; consistency of quality, delivery, and other supplier performance gauges; paperwork reductions; common measurement capabilities; greater opportunities for specialization among purchasing personnel; better use of purchasing talent and expertise; greater opportunity for systems integration; ease of implementing e-commerce solutions; product standardization; more influence with key suppliers (better problem solving); elimination of redundant activities; lower freight costs; and greater control. However, centralized buying can lead to a reduced ability to meet specific site service needs.

⁵²In its 1995 survey, CAPS (1996) found that 65 percent of respondents had hybrid purchasing organizations, with purchasing split between corporate headquarters and major operating divisions or plants, 23 percent were centralized, and only 12 percent had decentralized purchasing organizations.

⁵³Sometimes firms create several centralized PSM groups, each of which focuses on a major commodity category.

to support it. In many cases, this director is co-located physically next to the internal customers. For example, responsibility for purchasing aircraft maintenance parts and supplies rests with the PSM organization at the company's aircraft maintenance center in Tulsa, Oklahoma. The organization responsible for purchasing PCs and desktop software is located next to the AMR corporate headquarters in Dallas/Ft. Worth (see Avery, 1998). At AlliedSignal, centralized commodity teams were typically located at the business sector with the most strategic need for the commodity.

The middle tier of the PSM organization consists of decentralized groups associated with internal customer organizations that focus on the *execution* of large complex contracts, interactions with *existing* strategic partners, and creation of any complex contracts at the middle-tier level.⁵⁴ An example was AlliedSignal's plant materials teams. Although these activities do not require the same level of expertise as those that take place in the top tier of the organization, firms are discovering that staff members at the middle-tier level need to be experts in contract management. One firm we interviewed said that when it changed the structure of its PSM organization, it consolidated its expertise in the top-tier groups. However, it quickly realized that knowledgeable staff members are needed in the local organizations to manage the complex contracts that are created in the top tier. This firm is now in the process of upgrading staff skills in its middle-tier PSM groups. The relative sizes of the centralized top-tier and the decentralized middle-tier groups appear to be linked to the power and independence of the business unit leadership relative to that of the corporate management. Strong independent business units and plants prefer to control the more-strategic PSM activities; thus, their firms place more of these activities in the decentralized middle-tier PSM groups. At Motorola, the general managers of the business divisions were originally against any centralization of purchasing. However, after a few notable successes, the centralized purchasing organization won their support for further corporate-wide contracts (Raia, 1991).

Finally, the lower tier of the PSM organizations consists of decentralized groups that create and set up the simpler, local contracts and manage the

⁵⁴For firms with a centralized top-tier organization at the headquarters level, the middle-tier organizations may reside in the business units. For firms that have centralized top-tier commodity-based organizations within the associated business units, the middle-tier organizations may reside at different corporate locations or plants within that unit.

transactional purchasing activities, e.g., purchase cards. These tasks can be accomplished with relatively inexperienced, less-knowledgeable staff.

Although this tiered structure for PSM organizations is still being tested in firms that are changing their PSM practices, it has the potential to provide the basis for a new, more-effective career path for the more-sophisticated PSM personnel currently being sought by these firms. Relatively inexperienced personnel, such as new college graduates from supply management programs, can begin creating and managing simpler contracts in the lower-tier organizations and learning how to work with more-complex contracts from the middle-tier personnel. Once middle-tier personnel gain experience and expertise managing complex contracts with strategic partners, they can move into the top-tier centralized organization and take on new challenges associated with creating strategic partnerships.⁵⁵ Such a career path that spans from entry level to the highest corporate management levels can potentially help firms create and maintain a more stable PSM workforce.

⁵⁵As noted earlier, a number of firms rotate people in and out of their multidisciplinary purchasing organization. For example, some personnel trained in manufacturing will rotate into purchasing for several years while those trained in purchasing rotate into manufacturing to gain broader corporate perspectives. This type of career broadening approach provides a career path that zigzags laterally as well as upward as personnel gain more knowledge for more sophisticated purchases.

3. FORMAL IMPLEMENTATION PROGRAMS TO SUPPORT SUCCESSFUL, PERMANENT CHANGE

Outline

- **Innovative commercial firms are taking a more strategic, goal-oriented approach to PSM**
- **Innovative commercial firms use formal implementation processes and plans to help drive successful, permanent change**
- **Summary of findings relevant to the Air Force**

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Challenges occur in any organizational change movement aimed at making deep changes in systems and practices, and in people's attitudes and behavior.

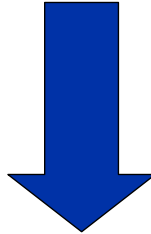
(Senge et al., 1999, p. 30)

Successful, permanent change rarely happens by fiat. Research suggests that major change is very difficult and is likely to meet substantial resistance from those who are content with the status quo and are threatened by the impending disruption. Senge et al. (1999, p. 26) assert that "The fundamental flaw in most innovator's strategies is that they focus on their innovation, on what they are trying to do – rather than on

understanding how the larger culture, structures, and norms will react to their efforts.” In this section, we discuss what we learned about how firms are using formal implementation processes and plans to help drive successful, permanent change throughout their organizations.

Successful, Significant Change Is Hard

**Very threatening to personnel
Organizational resistance is natural**



**Requires a systematic approach to counter
resistance and manage the permanent transition**

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Nothing is certain but death, taxes, and resistance to change.

(Spencer, 1996, p. 90)

Recent studies indicate that from 50 to 70 percent of all corporate change efforts fail.¹ Successful PSM change, particularly discontinuous change, is difficult for a number of reasons.²

¹Schiemann (1992) notes that fewer than half of the respondents to a survey of senior executives in Fortune 500 companies reported that their organization's major change initiatives were successful (i.e., met the change objectives). The primary barrier cited to success was employee resistance to doing things in new ways.

²Strebel (1996, p. 86) argues that a common root of difficulties with change is that managers and employees view change differently. "Top-level managers see change as an opportunity to strengthen the business by aligning operations with strategy, to take on new professional challenges and risks, and to advance their career. For many employees, however, including middle managers, change is neither sought after nor welcomed. It is disruptive and intrusive. It upsets the balance."

First, change is often very threatening to personnel. Barker (1993) notes that “When a paradigm shifts, everyone goes back to zero.” That is, the current knowledge and skills of personnel may be worth less or even be worthless in the new system. “People, groups, and whole organizations not only have to learn new ways of thinking, working, and acting, but they also have to ‘unlearn’ the habits, orientations, assumptions, and routines that have been baked into the enterprise over time” (Nadler et al., 1995). Further, “Unlearning is emotionally difficult because the old way of doing things, after all, has worked for a while and become embedded” (Schein, 1993). It goes against many individuals’ desires for risk minimization to abandon something that appears to work, even when something new has the potential to offer greater benefits.³

Second, resistance is a natural reaction to a perceived threat from change.⁴ And resistance kills change (Mauer, 1996). Resistance to change may result from self-interest, misunderstanding, or inherent limited tolerance for change (Kotter and Schlesinger, 1979).⁵ And it is not just those who are at the lower levels of the organization who object to change. Even people in power often work toward maintaining the status quo (Smith, 1982). The types of resistance include confusion, immediate criticism, malicious compliance, sabotage, easy agreement, deflection, silence, and in-your-face criticism (Mauer, 1996). The level of enthusiasm for new initiatives varies from person to person and from hierarchical level to hierarchical level (Reichers et al., 1997).⁶ One firm uses a rule of thumb that about 20 percent of personnel enthusiastically embrace a change, about 20 percent resist the change (sometimes actively), and about 60 percent are somewhere in the neutral middle.⁷ Organizational culture also affects the

³*Fast Company* (1999) asserts that most people want leaders to insulate them from change rather than mobilize them to face it.

⁴This is not irrational resistance on the part of stakeholders. “The conversion to supply alliances often permits a large reduction in the number of buying positions, which can make purchasing organizations major barriers to change” (Lewis, 1995).

⁵Dubrin and Ireland (1993) attribute resistance to change to three main factors: people’s fear of poor outcomes (e.g., that they might earn less money, be personally inconvenienced, or be required to perform more work), people’s fear of the unknown, and workers’ realization of faults with change overlooked by management and their fear of resulting problems.

⁶The employees most upset over a change will leave (Dubrin and Ireland, 1993).

⁷Cooper and Markus (1995) cite a Japanese firm using the same 20:20:60 rule for the typical group reaction to change. Everett (1995, p. 260) finds that research on diffusion of innovation suggests that adapter distributions follow a bell-shaped curve over time and

readiness and acceptance of change. For example, many firms have unsuccessfully tried to use a Six Sigma quality program as a change tool. On the other hand, General Electric (GE) CEO Jack Welch's Six Sigma quality program has achieved success because he changed GE's culture before adopting it (Melymuka, 1998).⁸ Therefore, strategies for overcoming resistance to change must be tailored to the intended change. For example, if the change will result in the loss of status or jobs, then strategies must be developed to deal with the loss (Dent and Goldberg, 1999).

Third, if there has been an organizational history of change attempts that have not been entirely or clearly successful, cynicism—a real loss of faith in the leaders of change—can arise despite the best intentions of those responsible. This holds true even if the current leadership is not responsible for the failed efforts. And cynicism about organizational change can become a self-fulfilling prophecy if cynics refuse to support the change (Reichers et al., 1997).

Fourth, major change efforts take time to successfully imbed in an organization, particularly changes of the breadth and depth of those required to shift to best PSM practices. Major change efforts can take anywhere from three to seven years to accomplish depending upon the nature of the change and size and complexity of the organization (Nadler et al., 1995). Indeed, Cessna Aircraft Co., which manufactures small aircraft and is much smaller than the Air Force, recently reported it was about two and a half years into a five-year program to make numerous and substantial changes in everything involved in purchasing, sourcing, and supply chain management (Morgan, 2000a). Bethlehem Steel has been engaged in an ambitious initiative for more than five years to transform its procurement from a tactical “back-end” activity to a strategic supply chain process that enhances corporate performance (Rudzki, 2001).

approach normality. The most widely used categorization method for adopters of innovation is that the first 2.5 percent to adopt an innovation are called *innovators*. The next 3.5 percent to adopt a new idea are called the *early adopters*. The following 34 percent of adopters are called the *early majority*. The subsequent 34 percent of adopters are called the *late majority* and the last 16 percent of adopters are called *laggards*.

⁸“He cleaned up his portfolio, got the business focused, got good players in place, did Work Out [a companywide exercise in boundaryless thinking], changed all the management processes, then came along with Six Sigma on top of that” (Noel, Tichy as quoted by Melymuka, 1998, pp. 64-65). See also Senge et al. (1999), pp. 74-82 for a summary of the evolution of change at GE.

By identifying and supporting the embracers of change, organizations can use these innovators to help shift the vast majority of neutrals to accept and even embrace the change.⁹ By identifying the resisters of change who are waiting to sabotage or undo the change as soon as leadership support weakens, organizations can neutralize their ability to shift those in the neutral middle into resisters of change.

Because of these problems associated with implementing successful, permanent change, change typically does not happen by command.¹⁰ Significant change usually requires a systematic approach to counter the resistance,¹¹ manage cynicism,¹² and enable the permanent transition.¹³

⁹Everett (1995) notes that early adopters are often sought by change agents as local missionaries for speeding the diffusion process.

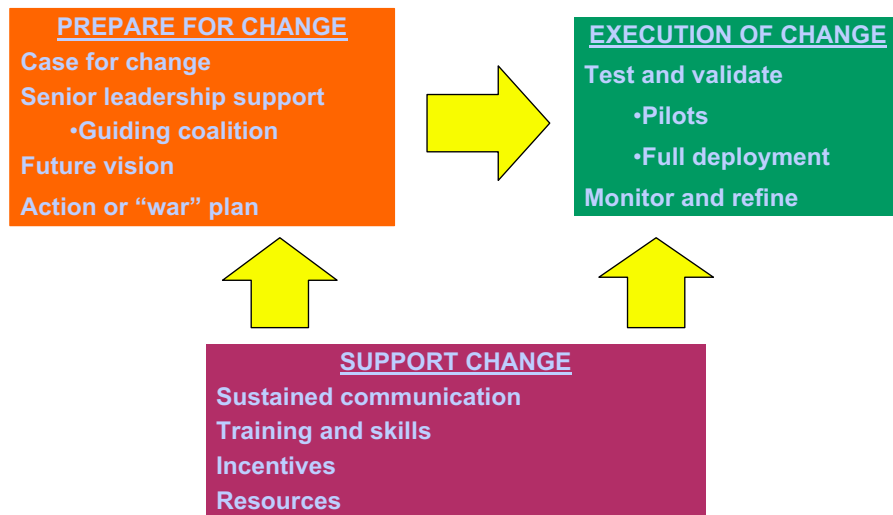
¹⁰Easton, Brown, and Armitage (1998) argue that people provide the critical path to effective and sustainable strategic change. They point out that for successful change, pragmatic change leaders have to move beyond proficiency in the hard areas of cost, time, benefits, and quality to become proficient in managing stakeholders and their emotions, team building, communicating, commitment building, risk management, and people development.

¹¹Suggested strategies for dealing with generalized resistance to change include negotiation, manipulation, cooptation, and coercion (Kotter and Schlesinger, 1979). However, others argue that common reactions to resistance such as use of power, manipulation, force of reason, ignoring resistance, playing off relationships, making deals, killing the messenger, and giving in too soon almost always increase opposition to change (Mauer, 1996).

¹²Strategies to manage and minimize cynicism about organizational change include keeping people involved in making decisions that affect them; emphasizing (and rewarding) relationship-oriented behavior for supervisors; keeping people informed of aspects of ongoing changes, including when, why, and how; enhancing the effectiveness of timing; keeping surprising changes to a minimum; enhancing credibility by using spokespersons who are liked, trusted, and credible; using positive messages that appeal to logic and consistency; using multiple channels and repetition; dealing with the past; acknowledging mistakes, apologizing, and making amends; publicizing successful changes; using two-way communication to see change from the employees' perspective; and providing opportunities for employees to express feelings, receive validation, and be reassured (Reichers et al., 1997).

¹³Schiemann (1992) observes that change is frequently derailed by incomplete followthrough. He argues that organizations favor activity but not change, and unless otherwise disturbed, they strive to protect the status quo.

Three Key Components of a Formal, Systematic Change Implementation Process



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Even successful change efforts are messy and full of surprises . . . a vision of the change process can reduce the error rate.

(Kotter, 1995)

Change implementation typically requires careful planning, close monitoring, and constant management because no single isolated effort is likely to change a large, complex organization. But coordinated change can. "Too often, managers proceed in a hit-or-miss fashion, implementing the most visible bits and pieces of a complex new system, while missing the hidden but critical interconnections" (Brynjolfsson et al., 1997). Effective change management (i.e., permanent, successful change throughout the entire organization) involves developing an understanding of the current state, articulating a clear vision of the future state, and guiding the organization through a delicate transition period. More organizations fail because of poor implementation than because of design faults (Nadler et al., 1997). That is, the transition often proves more difficult than people had anticipated. "Trouble starts when managers fail

to identify negative feedback systems that push business units back toward old ways of doing business or when they miss synergy that would strengthen the new and better ways they wish to establish” (Brynjolfsson et al., 1997).

A formal change implementation process enables a systematic approach to lasting, successful change and increases the chances of successful, permanent change.¹⁴ A senior PSM leader we interviewed said that to sustain change “You have to create a process. Processes don’t depend on people, they depend on execution. Processes have to be embedded.” The change implementation process summarized in the chart above reflects what we have learned from the change and business literature and our interviews with innovative commercial firms.¹⁵ It has three key components: prepare for change, support change, and execute change.

Preparing for change includes making a case by articulating the pressure and urgency for change; generating senior leadership support for change and putting in place a guiding coalition of key stakeholders to oversee the change; developing a short- and long-range vision of the future after the change;¹⁶ and outlining an action or “War Plan” for how to move to the future.

Support or capacity for change includes sustained communication about the need for and progress of change; training and skills both to make the change and to perform the new task required by the change; incentives for personnel to make and sustain the change; and resources to make the change transition.

Execution of change includes initial tests and validation using pilot studies, then full deployment, and continual monitoring and refinement to take advantage of learning during the implementation of the change.

In the remainder of this section, we discuss each of the key components and subcomponents of this change implementation process in more detail.

¹⁴Russo (1997) argues that a common methodology for managing change is key to internalizing the process.

¹⁵Note the change process, which is largely based on research by Kotter (1995, 1996), has much in common with TQM practices. See for example Fernandez (1995) and George and Weimerskirch (1994). Note that it also has a lot in common with how DoD prepares support and executes a war plan. Rudzki (2001) notes that Bethlehem Steel also used the leadership process from “The Leadership Challenge by Kovzes and Posner.”

¹⁶“Where there is no vision the people perish” (Proverbs 29:18).

We conclude the section with a summary of the effects of omitting any one of these key components.

Prepare for Change - Build a Case for Change That Supports New PSM Practices

Outline pressure and great sense of urgency for changing PSM practices

- Describe performance and cost gaps in terms of operational requirements and current performance

Work with leadership to turn crisis into productive change

Manage the anxieties of change**

- Disconfirm the current ways of doing things
- Create the desire to change
 - “Make the [organization’s] status quo seem more dangerous than launching into the unknown” *
- Create a psychological safety net - a path, direction, and first steps

* Kotter, 1995 **Schein, 1993

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PREPARE FOR CHANGE

Successful change begins with careful, systematic preparation.

The first step in preparing for any successful PSM change is to develop a compelling case that supports the shift to the new PSM practices. Indeed, “The most successful change programmes begin when there is a compelling need or pressure that provides incentive and motivation for change. To be effective the pressure must be well documented and researched and must convince virtually everyone in the organization” (Easton et al., 1998, p. 449). Some organizations have gone as far as to create a crisis to motivate change.

The case for PSM change comes from a rigorous analysis of customer needs and the organization’s competitive situation and financial performance, as well as an estimation of the potential payoff of implementing the new practices (Easton et al., 1998). It should frankly describe any PSM performance and cost gaps in terms of customer

requirements and current performance.¹⁷ It should make everyone understand that “the changes required by the welfare of the business become everybody’s business and get made” (Marrow, 1957). Because there seems to be an almost universal tendency to shoot the bearer of bad news, many organizations rely on outsiders to bring the unwanted information (Kotter, 1995). One firm we interviewed used a structured learning tool specifically tailored to the organization and its environment to help personnel at all levels come to their own conclusions regarding the need for change. All employees at another firm attended a one-day course where they were given training on reading and understanding financial balance sheets followed by exercises to build their awareness of the need to improve the firm’s financial balance sheet. This exercise has evolved into a customized board game where players run a manufacturing company. The case for PSM change is often developed by the PSM organization, which then works with top leadership to channel the newly identified crisis into productive change.

The case for change must also manage the inevitable anxieties associated with the identification of a crisis and need for change. Schein (1993) outlines three ways to do this. First, the case for change must disconfirm the current way of doing things. For example, it should explicitly show how current PSM practices will not effectively deal with the crisis or achieve the needed objectives and how the new PSM practices will.

Second, the case must create a desire or incentives among all key stakeholders involved in the PSM process to embark on the threatening and sometimes painful process of change. One way to do this is to make “the [organization’s] status quo seem more dangerous than launching into the unknown” (Kotter, 1995, p. 60). For example, management and human resources personnel at Harley-Davidson met with PSM personnel and discussed whether they were comfortable learning the new PSM practices. If they were not, an offer was made to assist them in exploring other opportunities (Greenfield, 1998). Some firms may attempt to create guilt and anxiety over not changing (Schein, 1993).

Third, the case for change must create a psychological safety net for key personnel to change by outlining a path, a direction, and first steps in the

¹⁷“A positive approach that emphasizes benefits is preferred to a negative approach that emphasizes dire consequences. Logical appeals, rather than emotional appeals that play on fears or insecurities, are desirable” (McGuire, 1985, as referenced in Reichers et al., 1997). Schein’s (1993) “guilt and anxiety” is a different perspective.

change initiative. In addition, all participants in the PSM process need to feel that they can try the new practices and not be afraid to fail. Change cannot effectively occur unless participants know that failure will not result in adverse consequences to them or their careers.

Because change managers must be well prepared to answer the inevitable questions regarding the usefulness and relevance of the changes they are about to implement (Greenfield, 1998), it is important to document the case for change so that the answers are consistent and complete.

Kotter (1995) argues that the urgency rate is high enough when about 75 percent of the organization's management is honestly convinced that business-as-usual is totally unacceptable. He further emphasizes: "Never underestimate the magnitude of the forces that reinforce complacency and that help maintain the status quo" (1996, p. 42).

Prepare for Change - Obtain Senior Leadership Support and Create a Guiding Coalition

Build an effective coalition of key stakeholders that supports changes in PSM practices

- **Work with customers to sustain support at the operating level**
- **Provide a supportive environment and resources for change execution**
- **Enable necessary changes in incentives, processes, regulations, guidance, organizational structure**

If necessary, proceed incrementally to build and sustain support of key stakeholders

Work with coalition to break change into integrated blocks and validate each one.

Purchasing cannot do this alone

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It is much more difficult to create change from the bottom up.

(Dubrin and Ireland, 1993, p. 583)

Senior leadership support is critical to the success of any major change program, particularly one that affects and involves as many parts of an organization as PSM.¹⁸ “Change, by definition, requires creating a new system, which in turn always demands leadership”¹⁹ (Kotter, 1995). Chapman et al. (1998) argue that CEOs must do three things to initiate changes in PSM: first, establish the PSM program on senior management’s agenda; second, establish aggressive targets (e.g., total cost

¹⁸As noted earlier, one principal reason for the failure of strategic planning is the lack of real management support from the top down. “When purchasing holistically focuses on total cost control and overall supply chain efficiency, turf battles will invariably ensue. Only top management’s involvement can quell these skirmishes” (Wincel, 1998).

¹⁹Barker (1993) defines a leader as a person you will follow to a place you would not go by yourself.

reduction sought over a given number of years and the spend-productivity improvement desired); third, carefully select the PSM improvement leader. For example, at AMR, “top management is truly committed to deploying strategic supply management to all areas of the company’s operations” (Avery, 1998, p. 1 of online version).

Because significant, permanent change in PSM practices takes considerable time to implement in a large organization, senior leadership support is needed not just at the launch but throughout the change process. Senior leadership articulates the compelling need for change. The leadership formally initiates the change effort, sets the broad long- and short-term goals and parameters for change, provides the resources to support the change effort, and reviews progress against goals and adjusts the plan as needed.²⁰ Not only must the most senior leader of the organization and the CPO support the change to new PSM practices, but those below who are in key stakeholder leadership positions must also support it.²¹ Broad leadership support across stakeholder functions is necessary for lasting change in purchasing practices.

Establishing a powerful guiding coalition or steering committee that can direct the PSM change effort is one way to gain broad leadership support.²² The coalition/committee should include senior members with enough power, broad expertise (i.e., represent key stakeholders), and high credibility to lead the change. Kotter (1996) argues that the PSM coalition/committee needs both leadership and management skills—the first to drive the change and the second to keep the process under control.²³ Leadership establishes direction, aligns people, and motivates

²⁰Middle managers who were encountering obstacles to successful reengineering told Champy (1995, p. 29) “We don’t have a management here that has the fortitude and focus to make the tough decisions and sustain us through change.”

²¹Dunphy and Stace’s (1993) model suggests that for most organizations undergoing transformational change at the corporate level, a directive management style is needed to begin the process of repositioning the organization. It also suggests that once organizational renewal is in place, if the change program is to be successful, there must also be a predominance of consultative practices at the business unit level to win commitment at that level to the implementation of change.

²² “The learning [change] process will not spread across the entire organization unless a transition group is created that will be accountable for the organizational learning [change] process” (Schein, 1993).

²³Kotter (1995) argues that a paralyzed senior management often comes from having too many managers and not enough leaders. Barker (1993) asserts that you manage within a paradigm and you lead between paradigms.

and inspires the change²⁴ whereas management does the planning and budgeting, organizing and staffing, and controlling and problem-solving. For example, Bethlehem Steel established a Procurement Course composed of managers from around the organization, and made part of its role to actively lead the change initiative (Rudzki, 2001).

The coalition/committee typically operates outside the normal hierarchy. It develops the knowledge of and support for changes; diagnoses organizational needs to implement change such as skills and training, resources, and incentives; plans and designs the action/war plan; creates specific change initiatives/pilot studies/tests; maintains communication; and institutionalizes continuous improvement in PSM practices (Kotter, 1995). Schein (1993) suggests that participants on these steering committees should spend at least half to three-quarters of their time focused on the change work, to speed up the learning process.

Members of the coalition/committee work with key internal or external customers to sustain support at the operational level. They provide a supportive environment and resources for change execution. They also work to enable the necessary changes in incentives, processes, regulations, guidance, and organizational structure to support the new PSM practices.

One firm we interviewed has established a supplier management council composed of the CPO, four plant managers, and three regional directors who provide senior management leadership and executive involvement in PSM. The council was given goals and resources to drive change throughout the firm. It will also set the firm's PSM strategy and get buy-in for the new PSM practices throughout the firm. Another firm created a high-level productivity steering committee to oversee 12 productivity initiatives, one of which was purchasing. The committee included presidents of major business units and the CFO.

Because new PSM practices require substantial changes throughout the organization, it may be necessary to proceed incrementally to build and sustain the support of key stakeholders (e.g., one or a few business units/major customers at a time). Senior leadership may also need to work with the coalition to break the change into integrated/coordinated

²⁴*Fast Company* (1999) reports that leaders make change and stand for values that do not change. They provide direction, which is different from providing answers. Leaders help people identify what habits and assumptions must change for the company [organization] to prosper. They protect their people from danger and expose them to reality.

blocks (e.g., commodity groups and corporate contracts) and validate the prospective changes before moving forward to full deployment. See Appendix C for an example of how Bristol-Myers Squibb broke its PSM change up into a series of pilot studies within waves of change.

One thing is clear. A permanent, successful shift to best PSM practices requires leadership and involvement of all key stakeholders. The purchasing function generally does not have the power to convince the rest of the organization that a change is necessary. Laseter (1998) argues that purchasing-led programs are unlikely to be adequate. Senior leadership must get involved to enable the change process.

Prepare for Change - Develop and Articulate a Future Vision That Addresses Need for Change

Set near- and long-term targets for the organization

- **Establish measurable goals for performance e.g.,**
 - **Increased quality**
 - **Cost savings**
 - **Reductions in supply base, number of suppliers**
 - **Personnel capabilities and numbers**

Explain new PSM practices

Link benefits of PSM practices to corporate goals

Outline a strategy to get to target

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Any company that drives forward while looking out the rear-view mirror will, sooner or later, run into a brick wall.

(Hamel and Prahalad, 1994, p. 76)

Organizations need to know their direction and an appropriate strategy to get there. Therefore, the senior leadership must create an effective vision²⁵ of the future that addresses the need for change and a strategy for how to turn that vision into reality.²⁶ The vision must also be one that is shared

²⁵Kotter (1996) outlines the characteristics of an effective vision as imaginable, desirable, feasible, focused, flexible, and communicable. He also offers “A useful rule of thumb: if you can’t communicate the vision to someone in five minutes or less and get a reaction that signifies both understanding and interest, you are not yet done with this phase of the transformation process” (Kotter, 1995, p. 63).

²⁶The role of senior leadership is to produce a real vision of what the organization will become to sustain a competitive advantage in the future. Leadership must “clearly describe those aspects of the current organization that are strengths, and will be

and supported by the key leadership and management personnel who will lead and manage the change throughout the organization.²⁷ For example, Bethlehem Steel had a corporate vision to become “the premier steel company” (Rudzki, 2001). Harley-Davidson had a PSM vision of integrated resource management that specified increased efficiency, flexibility, and control over product lines. It reorganized its Parts and Accessories Divisions and combined purchasing and inventory management functions into one group, Supply Management (Greenfield, 1998). The vision must be translated into near- and long-term PSM target goals, which are linked to the firm’s overall strategic goals.²⁸ To assess progress, an organization needs measurable PSM target goals. Examples are an increase in quality, total cost savings, reductions in the supply base (i.e., number of suppliers), and personnel capabilities and numbers.²⁹ For example, AlliedSignal set lofty goals of Six Sigma quality, lean manufacturing, and documented 7 percent year-over-year productivity improvement (Minahan, 1997). Bethlehem Steel incorporated concepts from *Built to Last* by Collins and Porras and set Big Hairy Audacious Goals to achieve \$175 million of annual sustainable total cost reductions vs. 1995 baseline while reinforcing Bethlehem’s corporate values and to contribute to a companywide culture change to a “boundaryless organization” that worked cross-functionally (Rudzki, 2001). Management must also set an aggressive timetable for achieving the goals.³⁰

sustained, and those that will necessarily be left behind in making the transition” (Nadler et al., 1995, p. 74).

²⁷Schiemann (1992) notes that a lack of management agreement on business strategy was a key barrier to successful change.

²⁸“Setting aggressive goals for improving purchasing performance. . . . provides the initial stimulus . . . goals should be aggressive enough to force major change, incorporate both near-term and long-term objectives, and hold business managers accountable, not the functional managers” (Laseter, 1998, p. 27).

²⁹Bartlett and Ghoshal (1995) observed that organizational transparency supplemented and reduced dependence on formal control systems. That is, when people in the organization clearly understand corporate objectives, they measure their own performance against those objectives.

³⁰“[M]anagers need to set a stringent timetable for steps along the path . . . the greatest difference between those organizations that have done a lot and those that have accomplished little or nothing is that the high achievers set specific timetables to accomplish seemingly impossible tasks and then routinely met or exceeded them” (Womack and Jones, 1996, p. 95).

Because at least some personnel will want to resist the new vision,³¹ it is important to explain the new PSM practices and link the benefits of changing to the new PSM practices to meeting corporate goals. To overcome anxiety about the change it is also important to outline a reasonable strategy to get to the target. For example, AlliedSignal's strategy in 1993 was to prune the supply base, create centralized, team-based commodity management, develop long-term contracts and business alliances, require extensive supplier involvement, and provide ongoing training of materials staff (Minahan, 1993).

³¹The three most common defenses to new visions are to not hear the message in the first place, to deny the message applies, or to rationalize that leaders do not understand the situation (Schein, 1993).

Prepare for Change - Build an Action or “War” Plan for Phased Execution of PSM Changes

CPO organizes and sustains change effort, with support of senior leadership and relevant customers & stakeholders

For each change:

- **Set empirically measurable goals & milestones**
 - Tie to corporate goals
- **Specify pilots, tests, initiatives to meet goals**
- **Assign roles, responsibilities, and accountability**
- **Identify and prepare key stakeholders for changes**
- **Identify and acquire necessary resources**
- **Identify barriers and develop plans to overcome them**

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Once senior leadership has set the overarching goals of the PSM changes and outlined a strategy to attain them, the CPO and the Guiding Coalition or Steering Committee build an Action Plan that develops specific steps and timetables to implement the strategies and achieve the goals. Note that the plan should not be expected to offer a fixed, permanent vision that stands for all time. The initial plan must recognize that uncertainty about the future is both inevitable and no excuse for not planning and must include a sufficiently flexible process so that the plan can respond to uncertainty in the future.

This plan is designed to do what a war plan or plan to develop a new weapon system does. It identifies the key measures of success. It identifies the key barriers to realizing success.³² It identifies specific steps required to overcome each barrier. It assigns roles and responsibilities to

³²Barriers can include organizational structure, compensation or performance-appraisal systems, and managers who refuse to change and make inconsistent demands with the overall change effort. “No organization has the momentum, power, or time to get rid of all obstacles. But the big ones must be confronted and removed” (Kotter, 1995, p. 65).

overcome each barrier and identifies the resources that those responsible will need to address each barrier. It uses relevant measures of success to track progress and hold those responsible for change accountable for achieving progress.

If the change is complicated enough, an action plan breaks the change into pieces with their own subplans.³³ Plans for PSM change often start with pilot studies and proceed to broader implementation. For example, Harley-Davidson developed a 40-page strategic plan that outlined its supply management strategy and clearly linked it to Harley's values, "Plan 2003" objectives, and primary business strategy. The document was used as a communication tool to help internal and supplier personnel understand where supply management is going at Harley and why (see Davidson, 1997).

Aligning an ongoing change with an organization's strategic goals is an integral function of any action plan. The TQM practice of *hoshin kanri* or "policy deployment" can help an organization structure an action plan that maintains this alignment. This method translates strategic objectives into specific resource-related plans. It then establishes clearly measurable targets against which to measure progress on a regular basis (Womack and Jones, 1996).

Anyone familiar with a war plan or system development plan knows that things rarely go as planned. Those plans ideally provide a framework for reacting to surprises as they arise and keeping the overall effort on track to succeed. The same logic applies here. An action plan for PSM change anticipates resistance and knows that that resistance will take unexpected forms. It provides a carefully structured framework to meet that resistance and deal with it in a way that continues to promote strategic goals as the change proceeds.

³³Womack and Jones (1996) argue that the general principle of doing one thing at a time and working on it continuously until completion applies to improvement activities with the same force as it applies to design, order-taking, and production activities. They recommend forming a vision, selecting the two or three most important steps to get there, and deferring other steps until later.

Support / Capacity for Change - Provide Sustained Communication in All Directions

- **Communication must continue throughout the change process**
 - **Top down: Case for change, vision, goals, on-going guidance**
 - **Bottom up: Current status, incremental successes**
 - **Side to side: Lessons learned, rumor control**
- **There's no such thing as too much communication**
 - **Speeches, meetings, electronic bulletin boards, newsletters**
- **Senior leadership must "walk the talk"**
 - **Actions must always be consistent with goals**

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SUPPORT AND CAPACITY FOR CHANGE

As preparation for an organizational change begins, efforts to support and develop capacity for the change also get under way. This support effort is a conscious form of "scaffolding"³⁴ that surrounds the change effort and ensures that the change effort itself gets special attention until its job is complete. Its job is complete only when the change is incorporated as a normal practice in the organization. When that point is reached, the scaffolding comes down and, with luck, the organization no longer thinks consciously of the change itself as something separate from normal operations.

Central to any such scaffolding effort is communication. The change and purchasing literatures and the firms we interviewed repeatedly stressed the importance³⁵ of effective, sustained communications in all directions

³⁴See Gilmore and Krantz (1997) for more on scaffolding.

³⁵For example, Caplan and Teese (1997) find that poor communication is the most important reason for poor implementation.

throughout the change implementation process.³⁶ Each stakeholder in the PSM process must be able to make a case for change within his or her own circumstance.³⁷ That is, stakeholders must relate the overall reasons for organizational change to reasons why they must change the specific practices they employ.

“Information minimizes employees’ opportunities to fill in the blanks of missing information, and makes it difficult to conclude that most or all changes have been failures (unless, of course, this is the actual outcome of change attempts)” (Reichers et al., 1997). Ongoing communication reinforces the necessity of change and the commitment of leadership to the change. When asked what they would do differently the next time, many firms we interviewed said they would communicate more, and more frequently.³⁸

Not only must communications continue throughout the PSM change implementation process (i.e., before, during, and after), the communication of the commitment to change must come from all levels of management (i.e., top, middle, and line management). Communication needs to move in all directions throughout the organization.³⁹ Communication of the case for change, vision, goals, how the new practices and processes support the vision and goals, and ongoing guidance need to flow from the top down.⁴⁰ Communication of incremental successes (and failures) and the status of the PSM change tests and prototypes and full deployment need to flow from the bottom up to

³⁶“People need to be fully informed and educated about the necessity for change, the progress and problems associated with ongoing change processes, and the results of change programs” (Reichers et al., 1997).

³⁷Kotter (1996) lists the following key elements of effective communication of vision: simplicity, metaphor, analogy, example, multiple forums, repetition, leadership by example, explanation of seeming inconsistencies, and give-and-take.

³⁸“Not communicating to employees during major organizational change is the worst mistake a company can make” (Larkin and Larkin, 1996, p. 97). Uncertainty is more painful than bad news. That is, in periods of high stress and uncertainty, people fill communication voids with rumors that often attribute the worst possible motives to those in control. Communication lowers stress and anxiety even when the news is bad.

³⁹Larkin and Larkin (1996) recommend spending 80 percent of communication time, money, and effort on supervisors, who are critical to the success of any change effort.

⁴⁰“[T]he first words frontline employees hear about a change should come from the person to who they are the closest: their supervisor” (Larkin and Larkin, 1996, p. 101). Supervisors who are given information, influence, and thereby increased power and status are more likely to help implement change.

the top. And, lessons learned and rumor control need to flow from side to side, throughout the organization. For example, if quality was to become a new language at Motorola, every top manager had to speak it like a native (Wiggenhorn, 1990).

Further, we repeatedly heard that there is no such thing as too much communication when it comes to change. Not only do messages need to be repeated, they also need to come in different modes because different people process and access information differently.⁴¹ Thus, messages need to be oral (e.g., speeches, meetings, and videos),⁴² written (e.g., memos and newsletters),⁴³ and electronic (e.g., e-mail, bulletin boards, and internal web pages). Leaders need to use every available forum to support the change implementation. One way to do this is to recognize and celebrate successes along the way.

Last, “communication comes in both words and deeds, and the latter are often the most powerful form. Nothing undermines change more than behavior by important individuals that is inconsistent with their words” (Kotter, 1995). “Consistency in words and deeds is important . . .” (Reichers et al., 1997). Leadership actions must *always* be consistent with the change implementation goals.⁴⁴ That is, leaders must “walk the talk” and become a living symbol of the new corporate culture (Kotter, 1995). For example, at Motorola, senior managers quickly grasped new quality systems and believed in their importance, but they initially did not change their behavior. That made it very difficult for middle managers to support

⁴¹“We know based on research that people remember about 10% of what they hear, 20% of what they see, 40% of what they discuss and 90% of what they do.” Adam Urbanski, vice president of the American Federation of Teachers as quoted in Osborne and Gaebler (1992), p. 315.

⁴²Larkin and Larkin (1996) note that the majority of employees prefer face-to-face communication. They argue that as individuals, workers are reasonable and cooperative but in groups a different mind-set can prevail. Therefore, to be most effective, Larkin and Larkin suggest that face-to-face communication should not be in large groups. Rather, they suggest that the most effective way to communicate is informally, face-to-face, one-on-one.

⁴³Although most of the literature stresses all forms of communication, Larkin and Larkin (1996) argue that at their best, publications can guide informal face-to-face discussions.

⁴⁴“Alignment between a company’s statements and management’s behavior is the key to creating a context that evokes employees’ commitment. It is often the dimension of a personal compact that is undermined most in a change initiative when conflicts arise and communication breaks down . . . it is the dimension along which management’s credibility, once lost, is most difficult to recover” (Strebel, 1996, p. 88).

change at the operational level, while senior management placed its highest priorities on other goals (Wiggenhorn, 1990). And, at Phillips Electronics, two seasoned professional managers in the 1980s understood the problems the company was facing with a changing competitive environment. They articulated change plans and undertook initiatives, yet failed to redirect the company because widespread employee support was missing. This was because there was little alignment between senior management's statements and the practices and attitudes of lower-level managers and their subordinates (Strebel, 1996).

Support/Capacity for Change - Provide Tailored Training and Guidance for All Key Stakeholders

- **New PSM practices create demands for new skills and expertise**
 - When and how to execute new practices
 - How to tailor new practices to circumstances
- **Training should be customized to participant's roles in the process**
 - Amount, timing, depth, breadth, and goals
 - For purchasing, legal, technical experts, customers, suppliers, etc.
- **Many training opportunities on best practices**
 - Institute for Supply Management (ISM) (formerly National Association of Purchasing Management), academic, commercial, and other trade courses, conferences

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As discussed above, the radical shift from more tactical purchasing activities such as order processing and servicing internal customers to strategic PSM practices such as deciding upon the type of relationships to build with key suppliers and the optimum number of suppliers creates demands for new knowledge, behavior, skills,⁴⁵ and attitudes for the PSM staff and other key stakeholders, including supplier personnel. For example, personnel in Harley-Davidson's Supply Management Group identified 28 skills necessary to perform the new PSM practices.⁴⁶ Harley-Davidson then set up an education team to make sure that all the skills were in place among the people involved (Greenfield, 1998). Organizations making the shift to more strategic PSM practices need to

⁴⁵The top ten skills identified by 88 respondents to a survey of 136 purchasing professionals as most important were (1) interpersonal communication, (2) ability to make decisions, (3) ability to work in teams, (4) analytical, (5) negotiation, (6) managing change, (7) customer focus, (8) influencing and persuasion, (9) strategic, and (10) understanding business conditions (Giunipero and Percy, 2000).

⁴⁶They are listed in Appendix B.

carefully think through what new knowledge,⁴⁷ behavior, skills, and attitudes PSM personnel and other key stakeholders require. They then need to carefully craft training programs to address the kind and amount of education and training required to learn the new behavior, skills, and attitudes.⁴⁸ Motorola's senior executives stopped seeing education as a cost and began to accept it as an indispensable investment (Wiggenhorn, 1990). One firm we interviewed identified its PSM skills needs and regularly assesses employees against those needs. Attempts are made to fill skills gaps with training.

First, PSM stakeholders must understand *how* to effectively execute the new practices. For example, what are the most effective ways to perform market research, and what are the best sources of information for a particular type of commodity or service? How can information collected about the market for a particular service or commodity be used to determine the cost structure of suppliers? How can the information be used to determine how much market power the customer firm possesses? How much should the supply base be consolidated?⁴⁹

Once PSM stakeholders understand how to apply the new practices, they must learn *when* to apply them. Part of the motivation for the shift to a more professional PSM organization is the need for staff to use discretion when applying these practices. For example, in the case of market research, the PSM professional must decide at what point the information collected is sufficient to proceed with the next step in the sourcing process. Choosing a source of supply that offers the highest total value for the product or service, rather than lowest price, requires PSM professionals to use discretion in valuing different product attributes. Purchasing professionals need to understand the synergies between certain PSM practices such as supply base rationalization and direct vendor delivery so that they can maximize the rewards of their application and minimize the

⁴⁷One purchasing consultant notes that knowledge is largely developed through education and experience, which typically takes much more time than skills training programs. Some companies choose to educate their existing personnel and others decide to bring new people into the sourcing organization (Smock, 2000).

⁴⁸Lange and Vavruska (1998) argue that training needs to be customized to meet specific needs and situations.

⁴⁹A recent *Supplier Selection and Management Report* survey of purchasing professionals and executives indicated that improving computer skills such as use of the Internet and conducting electronic commerce was critical to learning how to execute new PSM practices. See Mazel (1998).

risks. They must also understand the difference between real and perceived barriers to application.

Next, PSM stakeholders must learn how to *tailor* the new practices to the specific circumstances of the relevant decision. As we discussed in the previous section, the membership of cross-functional sourcing teams is adapted to the decision or activity that the team must accomplish. For example, for a major commodity group, if the spend/value and risks are low, purchases are probably best made electronically, by credit card. On the other hand, if the spend/value and risks are high, purchases are probably best made with a few key suppliers through long-term supplier partnerships. Similarly, supplier development activities such as process reengineering should be tailored to the supplier and processes that most directly serve the needs of the customer firm. For example, if responsiveness is most important to the buyer, the team might focus on taking time out of the process. On the other hand, if quality is most important, the team might focus on improving quality throughout the process.⁵⁰

Firms that have been executing training programs long enough to monitor their effectiveness have learned that training should be customized to the extent possible to reflect the specific needs, problems, and different roles that participants in the PSM process play.⁵¹ Depending on whether the student is part of the PSM organization, a functional consultant to the process (e.g., corporate lawyer, finance), a technical expert, a representative of an internal customer organization, or a representative of a supplier organization,⁵² the depth of training for specific PSM practices, the breadth of training across different PSM practices, and the goals of the training will vary. For example, representatives of internal customer organizations and technical experts may need the most in-depth training in constructing a statement of objectives (SOO) that simply states customer needs in outcome-oriented terms. By contrast, the goals of this training for PSM professionals might be to quantify the benefits of using

⁵⁰For examples of such decisions, see Appendix A.

⁵¹Lange and Vavruska (1998, p. 37) recommend that training provide “the right content for the right people.”

⁵²In a 1993 survey, 36 percent of CPOs reported that their firms offer training to personnel outside their PSM organization, and 17 percent reported that their firms offer training to their suppliers. These percentages were expected to increase in the future to 58 percent and 49 percent, respectively. See Kolchin and Guinipero (1993).

an outcome-oriented SOO to the customer organization and to recognize whether the customer has succeeded in constructing one.

When firms first begin the transition to strategic PSM, the expertise generally does not exist in-house to provide the needed training.⁵³ These firms often draw upon the training opportunities available from a wide variety of sources, including professional associations such as ISM,⁵⁴ academic courses such as those associated with PSM programs, and commercial conferences.⁵⁵ Several of the firms we interviewed eventually tailored these generic courses to more directly relate to and support their values, organizational goals, corporate culture, and mission. They then provided initial and continuing training in-house to all personnel involved in PSM activities.⁵⁶ One firm that we interviewed has a purchasing education steering committee, made up of purchasing personnel from the headquarters, international divisions, and factories, which designs its internal training curriculum. The extreme of this is Motorola University, which was created to train Motorola's employees and has a corporate vice president for training and education (Wiggenhorn, 1990). "To prepare supply management employees for cross-functional decision making and empowered problem solving, Motorola gives each of its teams a tool kit that includes the Ishikawa 'fish-bone' diagrams, and it trains them in areas such as cost-risk assessment, setting objectives, and problem-solving methodologies" (Ostroff, 1999, pp. 93-94).

⁵³In a 1993 survey, CPOs reported that PSM professionals in the 21st century will need the following training courses (in order of importance) to successfully implement new PSM practices: total cost analysis, negotiation strategies and techniques, supplier-partnership management, ethical conduct, supplier evaluation, quality techniques, purchasing strategy and planning, price/cost analysis, electronic data interchange (EDI), and interpersonal communication. See Kolchin and Giunipero (1993).

⁵⁴The Institute for Supply Management (formerly NAPM) offers seminars throughout the year on subjects such as price/cost analysis, implementation of TQM, benchmarking, performance measurement, and ISO9000 certification programs. (Source: <http://www.catalog.com.napmsv>.)

⁵⁵Some firms contract training out to consultants. See Kolchin and Giunipero (1993). Some of the firms we interviewed participate in conferences on a variety of purchasing topics offered by the Institute for International Research.

⁵⁶For example, one firm we interviewed provides 50 to 100 hours of PSM training per year. AMR provides 40 hours of training a year to each of its purchasing professionals (Avery, 1998). Motorola requires 40 hours of training a year for team members and leaders (Ostroff, 1999).

These firms often encourage their PSM personnel to bring representatives of their key suppliers to attend the in-house classes, especially those courses in quality techniques such as TQM and SPC. One of the firms we interviewed offers classes to supplier personnel for only the cost of the materials, that is, textbooks and lunch.⁵⁷

⁵⁷In 1990, Motorola University was open to the employees of its suppliers, principal customers, and educational partners in addition to Motorola employees, with plans to open it up further to others beyond those listed above (Wiggenhorn, 1990).

Support/Capacity for Change - All Training Is Not Equally Effective

- **Training is most effective when**
 - **Provided by professionals with practical experience**
 - **Designed around relevant case studies**
 - **Conducted in an interactive environment**
 - **Conducted away from office to avoid time conflicts**
 - **Provided “just-in-time”**
- **Video, CD-ROM, and web-based training can be effective for reinforcing training, less so for initial learning**

**Measure effectiveness of training
as well as hours trained**

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We learned from the literature and interviews that the most effective forms of training have five common characteristics. First, the instructors are professionals with practical PSM experience.⁵⁸ Sometimes “academic” instructors are paired with practitioners from the firm to illustrate principles.⁵⁹ Second, the principles and ideas are introduced or reinforced with real-life case studies, often from the firm’s experiences.⁶⁰ Third, the training occurs in an interactive environment in which students can easily ask questions of the instructor and of the other students and participation

⁵⁸For example, when analyzing implementation of acquisition reform in the Army, Dertouzos et al. (1998, p. 30) found that Integrated Product Team (IPT) training provided by an outside consultant was the most effective in increasing the belief that IPTs improve work processes and program outcomes and that internal training was substantially less effective, Defense Acquisition University (DAU) training was somewhat less effective, and contractor-provided training was the least effective.

⁵⁹Wiggenhorn (1990) notes that instructors at Motorola University have staff positions that they leave for two or three years to devote themselves to educational activities.

⁶⁰At Motorola University, instructors try to make education relevant to the corporation, to the job, and to the individual (Wiggenhorn, 1990).

in the dialogue is available to all.⁶¹ Fourth, training is conducted away from the participants' offices so that they can concentrate on the new ideas without being pulled away to perform their normal duties.⁶² And fifth, the training is provided "just in time" so that students are learning new ideas when they have a need and opportunity to apply them.⁶³ In addition, students need a safety net to allow them to practice and fail without jeopardizing their careers.

Although it is quite difficult, firms have learned which forms of training are most cost-effective through measurement of the success of their training programs.⁶⁴ Bristol-Myers Squibb provides 12-week training programs for its PSM staff members who work at individual sites. The program consists of two weeks of classroom study, followed by a small project that the student performs with the help of a mentor to put the new ideas and principles to use. The student then reports back on the success of the project, and the student's boss is informed of his/her performance (see Leclere, 1998).

Because such training is costly in terms of money, time, and facilities, some organizations have tried to train large numbers of PSM students through web-based courses, videos, or CD-ROMs. However, many have learned that these venues are much less effective for initial training in new ideas than they are for reinforcing previous classroom training, in part because they do not allow two-way dialog.⁶⁵ Many employers are finding they need a mix of old-style training and new, online training (Eure, 2001).

⁶¹At Phillips Electronics, employees at all levels talked about the consequences and objectives of change at workshops and training programs (Strebel, 1996).

⁶²Motorola found that its workers prefer a change of scenery and the social interaction with others in class to sitting at their desks for web-based training (Eure, 2001).

⁶³Motorola learned not to train workers too far ahead. Instead, they had to anticipate, plan curricula, then train separately for each incremental change (Wiggenhorn, 1990).

⁶⁴Lange and Vavruska (1998) recommend validating training three to six months after the fact to determine the return on investment, including whether personnel are using what they learned, whether it is improving performance, and if not, why not.

⁶⁵"Learning needs to be tested on a continuous basis to determine if what is being taught is being learned. Feedback techniques include tests and questionnaires, asking open questions to determine understanding, having participants apply what they learned, and practice sessions in breakout groups to use newly learned skills and receive coaching feedback from instructors/facilitators and peers" (Lange and Vavruska, 1998).

Support/Capacity for Change - Use Incentives to Align Each Stakeholder's Interests with Goals

Measure performance of PSM participants/stakeholders

- **Customer/outcome focused**
- **Aligned with strategic and tactical goals**

Tie PSM performance to:

- **Recognition—Awards aligned with new behaviors**
- **Compensation**
 - **Match grades to new skills & responsibilities**
 - **Match pay awards to adoption of new behaviors**
- **Promotion**
 - **Next managers personify the new approach**
 - **Do not punish failure of reasonable innovation**

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Tell me how you measure me and I will tell you how I will behave. If you measure me in an illogical way, do not complain about illogical behavior.

(Eliyahu Goldratt, 1990)

Incentives⁶⁶ largely flow from the organization's culture and related human resources practices including performance appraisals, compensation, promotions, and succession planning.⁶⁷ As discussed above, people resist change when they perceive that the change is not in their best interest. If PSM participants or stakeholders'⁶⁸ current

⁶⁶Incentives can be carrots or sticks, although carrots are preferred.

⁶⁷Wiggenhorn (1990) notes that Motorola had to motivate people to want to learn, and that meant overcoming complacency. Motorola let people know that "poor performance" included an unwillingness to change.

⁶⁸Key PSM stakeholders beyond purchasing personnel include business units/plant managers (i.e., MAJCOMs and Wing Commanders), functional personnel for material or services being purchased (e.g., logistics, civil engineers, systems engineers, services,

incentives are at serious odds with the new PSM vision and desired new behaviors, they will have to choose between the new vision and their own self-interest. Therefore, change managers need to make sure that all key stakeholders and their organizations have the proper incentives for the new PSM behaviors.⁶⁹ For example, Bethlehem Steel shifted from traditional PSM performance measures that included unit price paid and purchase orders processed to new PSM performance measures of total business impact (price and non-price) and partnerships designed and initiated, and made it clear that not being on board with the change process would mean no longer being on board with the company (Rudzki, 2001). To develop commitment to change, senior managers at Phillips Electronics negotiated contracts with their business unit directors, who then negotiated contracts with those below them. Those who did not meet the terms of their contracts are no longer at the firm (Strebel, 1996). As discussed above, key PSM stakeholder organizations at several firms we interviewed had overall savings goals, as well as particular goals for managers and buyers within the PSM organization. Not surprisingly, as a result, these PSM organizations were able to document savings, quality, and other improvements. One firm's employees also had short-term incentives based on sales, growth, and other measures, which vary yearly based on the firm's overall strategic goals.⁷⁰ For example, Bethlehem Steel developed a comprehensive performance-tracking system to measure and report on its new performance measures (Rudzki, 2001).

Measuring performance and aligning the incentives of each PSM participant's or stakeholder's interest with corporate-wide PSM goals reduces resistance and increases support for the change.⁷¹ Incentives can be measured and aligned in two ways:

information technology, and communications), suppliers, and customers (e.g., Commanders-in-Chief (CINCs), Air Force personnel).

⁶⁹"Unless managers define new terms [for personal compacts] and persuade employees to accept them, it is unrealistic for managers to expect employees to fully buy into changes that alter the status quo" (Strebel, 1996, p. 87). Personal compacts are reciprocal obligations and mutual commitments between organizations and employees.

⁷⁰As mentioned above, see Morgan (2000b) for examples of how the metrics for supply/purchasing departments are changing as companies clarify their supply-chain objectives.

⁷¹For a discussion of the dynamics of assessment and measurement in change initiatives, see Senge et al. (1999), pp. 281-318.

- When stakeholders benefit directly from the new PSM practices that promote corporate-wide goals, make the case with metrics and measure outcomes relevant to each stakeholder so that he or she knows;
- If stakeholders do not directly benefit from new PSM practices, link their performance evaluation to metrics relevant to corporate-wide goals. Identify the metrics and support their use in performance review.⁷²

Unfortunately, if neither is possible, success is unlikely.

The performance measurement of all PSM participants or stakeholders needs to be directly tied to their recognition, compensation, or promotion. Recognition, such as selection for awards, needs to be linked to the successful mastery and application of the new PSM behaviors and skills. Compensation needs to be adjusted so that personnel pay grades match the new skills required and responsibilities shouldered. Bethlehem Steel drove its cost reduction and avoidance performance measures down to the individual employee's annual performance review (Rudzki, 2001). In addition, pay awards need to be directly linked to adoption and successful use of the new practices and behaviors. Promotion criteria need to include the new PSM skills and behaviors and new managers need to embrace and personify the new PSM approach (Kotter, 1995). Last, to encourage the use and innovation of the new PSM practices, the careers of personnel who take reasonable risks in applying them should not be adversely affected if they fail. For example, to encourage employees to take risks, Remedy Corporation issues each new employee a "Take a Chance" card that entitles them to create new strategies and ways of doing business. If the new strategy or idea does not work, the card is handed to a manager, the "why this did not work" is discussed, and the card is usually reissued to the employee to use again (Kooker, 2000). Bethlehem

⁷²For example, when GE launched its Six Sigma quality program, 40 percent of GE executives' bonuses depended on implementation of the program. Further, young managers were told that they would not have much of a future at GE unless they were selected to become Black Belts in Six Sigma, received training in statistical and other quality-enhancing methods, and spent full time setting up quality improvement projects (Carley, 1997). The DoD did something similar to improve the quality of personnel in joint organizations. It established a requirement for a tour in a joint assignment for promotion to general officer.

Steel gave employees permission to fail, learn, and move forward (Rudzki, 2001).

Note the variety of options available for linking performance to incentives. An “incentive” need not be directly monetary, like a bonus or profit sharing. The cultures of different companies emphasize different ways of rewarding people for good performance. One senior PSM leader we interviewed said, “We’re not in the plaque business.” Instead they reward performance with stock options, cash, and a “nice letter.” Other corporate cultures focus on rewarding teams rather than individuals.⁷³ Even if all firms used exactly the same metrics to measure their PSM performance (and they do not), the literature and our interviews reveal that they could easily use very different incentives to reward that performance. But all of the successful firms we have seen or read about find clearly articulated and understood mechanisms for rewarding PSM activities that promote strategic goals.

⁷³Schrage (1995) argues that to get collaboration among individuals and work groups, companies need to recognize and reward successful collaboration as clearly and unambiguously as they have traditionally celebrated individual achievement.

Support/Capacity for Change - Invest in Resources Required to Enable Change

Time

- **Learn new PSM practices**
- **Plan changes**
- **Execute changes**

Budget

- **Hire consultants**
- **Travel for market research, benchmarking**
- **Attend courses, conferences**

Access to internal experts

Senior management time

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A desk is a dangerous place from which to view the world.

(John Le Carré)

In addition to sustained communication, training and skills, and incentives, successful change also requires an investment in the resources needed to enable the change. That is, “in return for the commitment to perform, managers convey the authority and resources each individual needs to do his or her job” (Strebel, 1996, p. 87).

First, the PSM change leadership team, participants, and stakeholders need time away from their usual obligations. The PSM change leadership team personnel require time to analyze data and develop the case for change, plan the PSM changes, and oversee execution. Other PSM participants and stakeholders need to learn and internalize the case for change, learn the new PSM practices, and make the appropriate changes in their behavior. At one firm we interviewed, three PSM people were working nearly full time on implementing changes.

Second, the PSM change leadership team, participants, and stakeholders need funds budgeted for planning and execution of the change. They need a budget to cover the cost of hiring any consultants to help with data analysis, communication, and other aspects of the PSM implementation, the cost of travel for market research, benchmarking, and the cost of travel and registration for training courses and conferences. One firm we interviewed had an external change management consultant working with the change team.

Third, the PSM change leadership team, participants, and stakeholders need access to any internal experts needed to help with the implementation. For example, one firm had three people from the information systems department also working on PSM changes.

Last, they all need senior management time to communicate progress and problems with the change implementation and to get guidance on how to deal with obstacles and unplanned challenges.

Execution of Change - Test and Validate Major Changes

Use pilot studies to test implementation of PSM practices

- **Identify unintended consequences**
- **Evaluate successes and failures**
- **Verify new practices, as implemented, produce results consistent with strategic goals**
- **Develop effective lessons learned**
- **Refine and expand deployment**

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Even if you're on the right track, you'll get run over if you just sit there.

(Will Rogers)

EXECUTION OF CHANGE

After the way has been prepared and a support structure is in place, execution begins. Large organizational changes are complicated and never go exactly as planned. Execution is an intricate dance that supports ongoing learning even as real, operational requirements persist and demand some resolution. It seeks and recognizes each incremental success, detects failures before they get out of hand and learns from them, and keeps everyone in the coalition aligned with their joint strategic goals, even as execution itself reveals new, unexpected conflicts among their individual interests. To deal with all of these issues early on in a local, controlled environment, large organizational changes typically start with

one or more pilots.⁷⁴ For example, Patterson and Nelson (1999) report that one U.S.-based industrial equipment manufacturer began its supplier development program with 16 separate supplier pilot study projects. After the success of these, it established a permanent, seven-member ISD group to assist suppliers by providing in-house resources and engineering expertise in implementing manufacturing cost and cycle time improvement projects.

Pilot studies and tests at the beginning of any significant change help validate major changes.⁷⁵ These studies are often specified in the Action Plan, which was discussed above. They should demonstrate that PSM goals can be achieved, identify any unintended consequences, and verify that the new PSM practices, as implemented, produce results that are consistent with the organization's strategic goals. When they do this successfully, pilot studies offer valuable short-term wins that help create and sustain support for change. For example, at Intel, corporate purchasing for non-traditional services plans to start with small projects and use successful results to gain support of the internal customer (Avery, 2000a).

Kotter (1996) argues that short-term wins provide evidence that the sacrifices are worth it, reward change agents with a pat on the back, help fine-tune the vision and strategy, undermine cynics and self-serving resisters, keep senior management on board, and build momentum. Pilot studies and tests also develop "lessons learned" that can be shared throughout the organization with others who will be implementing the changes. They can also be used to refine and expand the full deployment of the new PSM practices. Laseter (1998) recommends that pilot studies should be true cross-functional efforts – not just purchasing programs that lack senior management sponsorship. For example, buyers at a division of Brunswick Corporation consolidated services purchases⁷⁶ and reduced buying costs by \$2.7 million on a \$22 million annual spend for 1997 – a 12

⁷⁴The senior vice president for procurement, information technology, and logistics at Bethlehem Steel Corp. recommends a "launch and learn" mentality as the best way organizations can prepare for the e-commerce revolution. That is, pick an appropriately-sized initiative in the e-commerce arena and learn from the experience (Belyea, 2000).

⁷⁵One firm we interviewed did not use pilot projects as part of their change process. Instead, strong senior leadership at the company developed and enacted a complete change program.

⁷⁶These included temporary staffing, copiers, waste management, security, telecommunications, and information technology.

percent savings. This success helped revitalize Brunswick's purchasing council, which had previously worked (1994-1995) to consolidate direct materials purchases. With newly generated corporate sponsorship, Brunswick Divisions became excited about opportunities to leverage nontraditional purchasing (Morgan, 1999).

Examples of potentially useful purchasing pilot studies (Laseter, 1998) include

- modeling total cost for selected commodities,⁷⁷
- creating sourcing strategies for two or three commodity groups,⁷⁸
- structuring several new supplier relationships or restructuring existing relationships with a few key suppliers,
- launching a supplier development program with a few key suppliers,
- integrating key suppliers with specific customers or locations, and
- evolving the supply base in selected regions.

Pilot studies typically work best when conducted in activities that pose limited risks to an organization's core interests. This allows more risk-taking and hence more effective learning. This is true because negative effects of failures are easier to control and the demand for quick completion and implementation of an operational system is not so pressing. It is harder to draw senior leadership interest and hence resources to pilot studies operating away from the organization's core. However, demonstrated success of a pilot study conducted in a non-core area will typically increase the leadership's willingness to take risks and commit the limited resources of its core activities when the time comes to diffuse the lessons of the pilot study throughout the organization.

To support learning relevant to the organization as a whole and to help demonstrate the success that builds support for continuing change, all

⁷⁷"Without a solid understanding of the drivers of total material cost, none of the other capability-building pilots will truly succeed" (Laseter, 1998).

⁷⁸"Booz-Allen's client experience indicates that a three-month pilot with a full-time, multifunctional team of three to five people provides the time and resources to develop a sufficiently rigorous commodity business plan" (Laseter, 1998).

pilot study efforts should give special attention to collecting information that documents their performance. That information should focus on tangible, measurable results on a real product. Pilot studies with unclear goals or an overly narrow functional scope will not build institutional support for full deployment and should be avoided. That information should also document the baseline before the pilot study began so that the incremental effects of the change are clear.

Execution of Change - Monitor and Refine Action or “War” Plan

Measure, monitor, and track implementation of PSM practices against goals and milestones

- **Tests and pilots**
- **Phased execution**
- **Full deployment**

Provide feedback on progress, lessons learned; use to

- **Maintain momentum**
- **Refine action or “war” plan to reflect lessons learned**

Reinforce new practices and change process

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As the overall action or war plan unfolds, its execution needs to be carefully monitored so that both positive and negative feedback can be used to refine the plan. Throughout the whole PSM change implementation process, from tests and pilot studies through phased execution, to full deployment, performance needs to be measured, monitored, and tracked against goals and milestones. This measurement provides valuable feedback on the progress of the implementation. As noted above, such measurement supports learning that can be used to refine the change and the action plan itself. It helps maintain momentum throughout a long change process. And it can be used to reinforce the new practices and the change process.⁷⁹

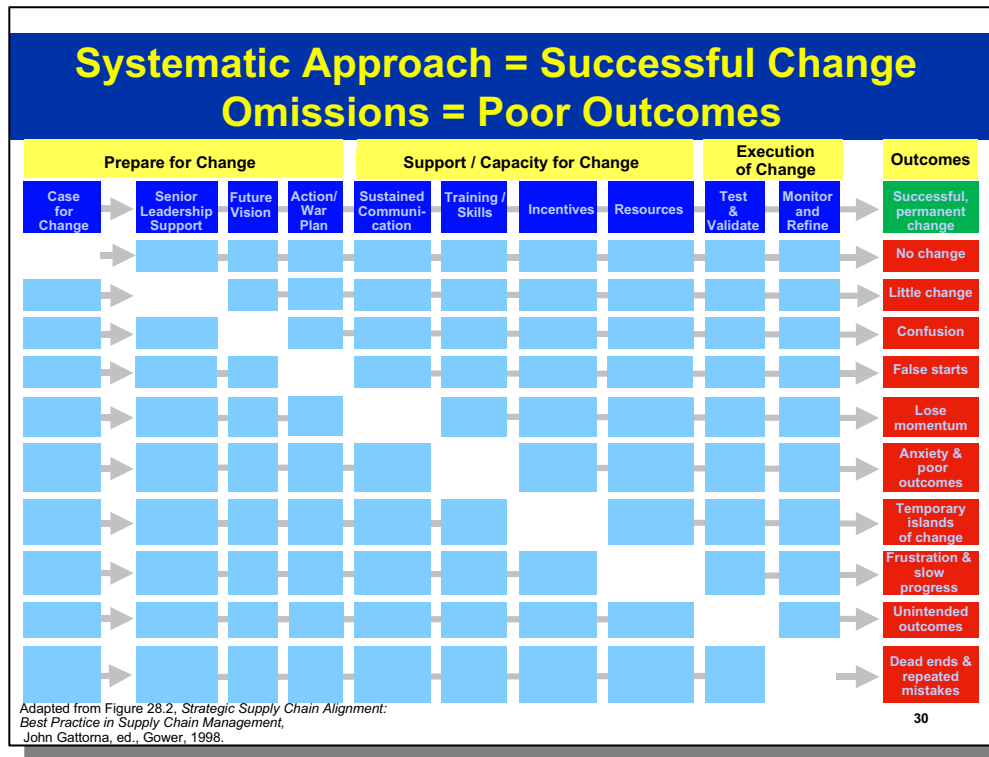
Kotter (1995) notes that leaders of successful change efforts use the credibility afforded by short-term wins to tackle even bigger problems. These change leaders confront systems and structures that are not

⁷⁹Kotter (1996) argues that anchoring change in the culture comes last, not first, depends on clear results, requires a lot of communication linking performance improvements to new practices, may involve personnel turnover, and makes decisions on succession crucial.

consistent with the transformation vision. And they pay great attention to who is promoted, who is hired, and how people are developed.⁸⁰ He later (1996) observed that as the change implementation progresses, there will be more, larger change initiatives. They will require more personnel to help with the changes. They will require more senior leadership support to maintain focus and momentum. And, they will require more leadership and project management at the execution level. For example, according to Byrne (1998) Jack Welch, CEO of GE, launched his Six Sigma quality program in late 1995 with 200 projects and intensive training. GE added 3,000 projects and more training in 1996. In 1997, GE undertook 6,000 projects and still more training.

Kotter (1995, p. 67) warns that “[u]ntil new behaviors are rooted in social norms and shared values, they are subject to degradation as soon as the pressure for change is removed.”

⁸⁰Schiemann (1992) notes that executives involved in successful change are more likely to develop a mission or culture statement and to focus on promoting employees who espouse the new values. They also have a greater tendency to assess their culture through employee focus groups and culture surveys. For example, Jack Welch, CEO of GE, and arguably one of the most successful corporate change leaders, has created a passion for leadership development at GE (Stewart, 1999). He spends more than 50 percent of his time on people issues (Byrne, 1998).



Unless . . . change is coordinated throughout the entire company, it is bound to fail.

(Schiemann, 1992)

We have discussed each of the key components of the change implementation process. The chart above⁸¹ summarizes what change experts have learned in their research.⁸² Successful, permanent change requires a systematic approach that addresses all of these key components. Senge et al. (1999) argue that the challenges of initiating change are fundamentally interdependent, although the symptoms may

⁸¹Adapted from Barry Newland, "HP way," as referenced in Easton et al. (1998), p. 448.

⁸²"The most general lesson to be learned . . . is that the change process goes through a series of phases that, in total, usually require a considerable length of time. Skipping steps creates only the illusion of speed and never produces a satisfying result. A second very general lesson is that critical mistakes in any of the phases can have a devastating effect, slowing momentum and negating hard-won gains" (Kotter, 1995, pp. 59-60).

appear isolated from one another, and that success in one challenge may make it easier, or harder, to deal with others. Although some firms with very strong, sustained senior leadership support have successfully skipped one or more key components, such as creating a guiding coalition or pilot studies and tests, in general, the omission of any one component can adversely affect the outcome of the whole change effort.⁸³ Including all of them may not be absolutely necessary in every case, but a carefully developed formal implementation plan that covers all the bases is more likely to succeed.⁸⁴

- Without a strong case for change (pressure and urgency), there is likely to be no change.
- Without senior leadership support, there is likely to be little change.
- Without a future vision, there is likely to be confusion over where the change effort is going.⁸⁵
- Without an action or war plan, there is likely to be false starts as efforts are launched, but not coordinated.⁸⁶

⁸³Although no single path for fast and effective change management holds in all situations, research and experience indicate that there are certain prerequisites. Although each prerequisite can be examined individually, they are mutually supporting. That is, if any one element is missing, change is likely to fail (Easton et al., 1998).

⁸⁴Senge et al. (1999) assert that the larger the change initiative, the stronger the challenges seem to be and that the earlier and more clearly organizations anticipate these challenges, the easier it becomes to deal with them. Indeed, the required investments of time and energy may not be possible when the problem has to be confronted directly without preparation.

⁸⁵In the early 1990s then Defense Logistics Agency (DLA) Commander, VADM Straw, launched a Direct Vendor Delivery (DVD) initiative (one of 30 such initiatives) with a goal of 50 percent of sales (less fuels) to be delivered to the customer directly from suppliers (vendors) by Fiscal Year 1997 (DLA briefing, n.d.). DLA staff met that goal and the amount of inventory stocked in DLA depots went down. However, a recent audit report found that the average Fiscal Year 1997 consumable hardware processing times averaged 8.3 days for planned DVD items and only 2.2 days for items stocked in DLA depots (Office of Inspector General, 1999). Had it been made clear to staff implementing these DVD contracts that the overall vision was to reduce DLA's depot stocks without increasing customer wait time, they might have negotiated different contracts. Instead, customers' retail stocks for these DVD items went up to compensate for the longer DVD response times.

- Without sustained communication, there is likely to be a loss of momentum, which can either drag out the change effort or lead to its abandonment.⁸⁷
- Without the required training and skills, PSM stakeholders and participants will have anxiety over execution and are more likely to resist or make more mistakes, which lead to poor outcomes.⁸⁸
- Without incentives to permanently change, there are likely to be temporary islands of change that will revert back to the old ways when local sponsors move on.⁸⁹
- Without the time and budget resources to execute the change, there is likely to be frustration and slow progress because the change has to be implemented by personnel in their “spare” time.⁹⁰
- Without test and validation of the new PSM practices, the implementation is likely to have unintended consequences.⁹¹
- Last, without a formal monitoring and refining process, which catches problems and shares lessons learned, change implementation is likely to lead to dead ends and repeated mistakes.

⁸⁶Coordination is particularly important for PSM initiatives because of their close relationship to supply-chain integration and management and business-to-business e-commerce initiatives that may emerge from different functional communities (e.g., logistics and purchasing).

⁸⁷The Air Force has launched many initiatives with great fanfare and momentum such as TQM. Unfortunately, as management attention fades and other initiatives are launched, progress often slows, benefits take longer to realize and are lower than promised, and pressures rise to abandon the effort before implementation is complete.

⁸⁸Schiemann (1992) states that successful change is more likely to include improvements in teamwork, increased understanding of organizational needs, and an increased focus on human resource training and development.

⁸⁹“[U]nless the revision of personal compacts is treated as integral to the change process, companies will not accomplish their goals” (Strebel, 1996, p. 92).

⁹⁰Continuing personnel and budget reductions combined with a high level of operations has left few Air Force personnel with much, if any, “spare” time.

⁹¹For example, implementation of Defense Business Operating Fund (DBOF) full-cost recovery policy presented the fund’s DoD customers with a marginal costs choice to obtain a good or service in an alternative way. This led to a situation where DBOF customers chose what they thought was a cheaper alternative to the DBOF, which was, in fact, more expensive for the service and the DoD as a whole. See Baldwin and Gotz (1998) for a discussion of how DBOF pricing can affect incentives.

The change process many firms use to improve the success of their major change efforts is a lot like how DoD approaches war. All of these steps are usually necessary for successful warfighting. They are also usually necessary for successful change, yet, unlike warfighting, the DoD does not typically use a formal process to increase the likelihood of success of its major changes.

4. FINDINGS RELEVANT TO THE AIR FORCE

The slide features a blue header with the word "Outline" in white. Below the header, there are three bullet points. The first two are in the main text area, and the third is enclosed in a white box with a black border. At the bottom right, there is a blue footer bar containing the text "RAND Project AIR FORCE" and a timestamp "25 11/07/99 10:00 AM".

Outline

- Innovative commercial firms are taking a more strategic, goal-oriented approach to PSM
- Innovative commercial firms use formal implementation processes and plans to help drive successful, permanent change
- Summary of findings relevant to the Air Force

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[T]he only competitive advantage the company of the future will have is its managers' ability to learn faster than their competitors.

(Arie de Geus, 1988)

Our analysis of the experiences of innovative commercial firms that are successfully implementing PSM and major change yields a number of findings that suggests ways the Air Force might improve its implementation of PBSA and relevant PSM practices. First, *sourcing has strategic importance for the Air Force*. Purchased goods and services make up the largest portion of the Air Force budget and affect all areas of operational performance and quality of life. Best PSM practices could result in improved performance and lower costs across the entire Air

Force, in all of its areas of operations that use purchased goods and services. Thus, implementing these practices may result in improvements across the service.

Second, as it moves toward PBSA and best practices in PSM, the Air Force faces a number of important risks. In particular, unless the change is done carefully and thoughtfully, it will likely fail.¹ Failure will make it much more difficult for the Air Force to capture the performance improvements and cost savings that best PSM offers in the future. A formal change management plan, based on the experiences of the companies reviewed above, could increase the likelihood of success.

Third, as it moves toward best practices in purchasing and supply management, the Air Force should remember that these practices must serve its needs and that these needs differ from those of the innovative commercial firms where we have observed these practices. The Air Force must adapt these practices to serve its own needs. How that occurs will depend on the details of which practice the Air Force considers and where it considers using it.

This final section provides broad guidance on how the Air Force might benefit from emulating best commercial PSM practices. As a basic operating principle, we use the commercial practices as stretch goals and ask how far the Air Force could stretch toward these goals. We ask where the Air Force's goals differ from commercial goals and where the Air Force may want to stretch in a different direction. And we ask how current Air Force policies and practices complement the commercial practices described above and how the Air Force could build on those complementarities. By asking similar questions about specific PSM practices, the Air Force can develop its own innovative approach to these practices.

¹See Schmidt (2000) for a discussion of why the Army encountered difficulties implementing the 1994 "Perry Initiatives" for acquisition reform and ways to improve implementation of MilSpec and standards reform.

Air Force Is in the Midst of an Active Program to Improve Services Acquisition

- **Has already successfully introduced forms of simplified acquisition and purchase cards**
- **Planning to introduce additional new practices**
 - **Better market research to discover best commercial practice**
 - **More and better performance-based contracts**
 - **More and better best-value competitions**
 - **Quality assurance that drives continuous improvement**
- **Additional practices identified here offer new opportunities for the Air Force to stretch**

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The Air Force has been successful in introducing forms of acquisition reform associated with simplified acquisition and purchase cards. These have succeeded in large part because they were fairly straightforward and easy to explain and because they offered immediate benefits to the personnel who had to change their behavior to make the changes occur. Both reforms have significantly reduced contracting administrative burdens at a time when resources were shrinking and the personnel needed to administer contracting transactions were becoming scarcer.²

The next round of current changes includes efforts such as using market research aggressively to discover best commercial practices and practitioners; using performance-based acquisition to give external providers the flexibility to innovate and to align provider incentives with ultimate customer needs using best-value competitions to move away from poor performing providers selected on a low cost basis; and using

²However, the requirement for 100 percent audit of purchase card transactions added an administrative burden to users.

new forms of quality assurance that move away from simple checklists to mutual, ongoing efforts to measure outputs and improve processes. These initiatives are more challenging to implement than those in the past. Because they are more complex, they often require additional training and resources to support. They may also require additional investments of scarce time and resources early in an acquisition to yield higher performance levels and lower operating costs later in the acquisition. These benefits could easily accrue to parts of the Air Force other than the organizations that make the initial investments. The complexity of these initiatives means that more parts of the Air Force will need to be involved throughout the acquisition process, increasing the need for cross-functional and cross-organizational cooperation;³ metrics to align all functions to common, Air Force-wide goals; and support from a set of leaders who represent all the functions and organizations that must cooperate to make the changes work. No one function alone can make these new changes occur.

Looking beyond these changes, best commercial practice offers additional opportunities that the Air Force can consider. These include higher-level, more strategic planning for the acquisition of services; establishment of an effective chief procurement officer who oversees all functions relevant to services acquisition, not just acquisition itself; development of new organizational services acquisition structures that include specialists from all the relevant specialties; more strategic management of the supply base that rationalizes sources, ensures critical production capabilities, and develops supplier relationships appropriate to the services being acquired; and new skill sets and career management plans to support these changes. Efforts to adapt practices of this kind will be even more challenging. To succeed they are likely to require more senior-level support, more cross-functional cooperation, and hence more formal planning.

³A recent attempt to develop a regional refuse collection contract in Colorado at Peterson AFB, Schreiver AFB, the Air Force Academy, Ft. Carson (a local Army base), and Cheyenne Mountain fell apart in part because it did not support the diverse needs of all participants. For example, the Air Force Academy needs weekend refuse collection for special programs on Saturdays.

When It Plans a New Change, the Air Force Can Test It Against a Checklist

Prepare

- Case for change?
- Support of appropriate leadership?
- Clear, simple vision?
- Detailed action or war plan?

Execute

- Appropriate tests and validation?
- Effective monitoring and refinement?

Support

- Sustained communication?
- Effective training?
- Incentives aligned with the goals of change?
- Adequate resources?

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As the Air Force considers more challenging forms of innovation in services acquisition, a formal change management approach such as the one described in Section 3 is likely to become more important to success. That approach provides the basis for a simple checklist of the following kind.

Prepare

- Does the case for change make it clear, from the point of view of the organization as a whole and of each employee who must change his or her behavior on the job, that it is more desirable for the organization to change than to continue its current approach to PSM?
- Does the senior leadership relevant to the change visibly and continually support the PSM change? Has the senior leadership formed an effective coalition of the key leaders of employees who must change their behavior on the job, to give visible and continuing support to the change in PSM practice? Is the change scoped

appropriately so that this support can be sustained for the life of the implementation?

- Can the vision statement for PSM change be explained and understood in five minutes or less? Does the vision clearly link the change to specific, measurable targets based on corporate goals? Does it explain clearly how the organization will implement the change?
- Does the action or war plan for the PSM change identify the key barriers to change and plans to overcome them, assign responsibilities to realize these plans, provide resources required, track progress in terms of metrics relevant to the organization as a whole, keep the senior leadership and change coalition informed and on board, and provide a framework for the execution phase to manage the change effort against the plan, with appropriate adjustments as implementation reveals new information?

Support

- As planning and execution of the PSM change proceed, is everyone informed about its goals and status? Do the leadership, change coalition, and those who must change their behavior on the job know the current status of the implementation, including successes achieved and lessons learned to date? Are the leadership and change coalition continually affirming their support or providing guidance on how to adjust the implementation? Are their day-to-day actions and statements clearly compatible with the change? Have continuing concerns been identified and addressed? Are rumors under control?
- Do those who must change their behavior on the job understand the importance of the new PSM practices, how they work, and their own roles and responsibilities in these practices? Do they have the knowledge and skills that these roles and responsibilities require? If they will work on new teams, have they been trained in team process? Have they been trained in the skills they will need to facilitate the change itself? Has the delivery of training been tailored to the needs of the people who must change their behavior?
- If the people who must change their behavior on the job to make a new PSM practice succeed in fact change their behavior, will they benefit? If they do not change their behavior, will they be punished? The Air Force can use any combination of monetary inducements, awards,

career actions, and other incentives that it feels is compatible with its corporate culture to reward and punish its personnel.

- Have the resources needed to implement the change been made available to support the PSM change? Do personnel have the slack they need to participate effectively in training and planning sessions? Have production scheduling and engineering been adjusted to allow change without compromising ongoing production goals? Have the tools and information sources needed to support the change been acquired and put in place where needed? Are travel funds adequate to support market research activities and training? Are consultants available to support the change where needed?

Execute

- Are pilot studies being used to allow effective initial testing and validation of complex new PSM practices in a setting that limits risk to the organization as a whole? Have these studies been instrumented to collect baseline and execution data that the senior leadership and change coalition can use to validate the change and make decisions about further deployment?
- Does ongoing monitoring of a new PSM change provide information that keeps the change effort on track and, in particular, support efforts to refine the change in ways that promote the organization's strategic goals? Does it capture successes and reinforce behaviors to promote continuing success?

This checklist can be tailored to any particular change effort. For example, the Air Force could develop more detailed checklists that address each of the elements above to ensure that each has been adequately addressed. Or if the change is directed at the development of training or alignment of change with Air Force incentives, these elements can be explored and addressed in closer detail to show how each element listed here applies when initiating efforts to introduce any one of them.

Moving the Air Force Toward Strategic PSM Requires Many Actions

- **Visible, sustained senior leadership support for change and communication of the need for change**
 - Coalition of key stakeholders
- **War plan for action that sets milestones, identifies barriers, assigns roles and responsibilities, monitors and communicates progress against goals and milestones**
- **Performance, accountability linked to incentives system**
 - Measurable, goal-oriented metrics aligned with Air Force strategic goals
- **Training and market research investments**
- **Pilots, tests to validate PSM practice, implementation**
- **Ongoing monitoring of best commercial PSM practices**

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A number of the factors discussed here raise somewhat different issues in an Air Force context than they do in a commercial environment. The Air Force should keep this in mind as it learns more about best commercial PSM practices and seeks to adapt them.

The leadership relevant to major changes is likely to have a different face in commercial firms than in the Air Force. The Air Force remains a more functionally oriented organization than the innovative commercial firms we studied. Hence it will probably have to expend more effort to bring relevant functions into an effective coalition for change and sustain their cooperation for the duration of the change. But the senior leadership of the Air Force also has a shorter tenure than that typical in commercial firms. Military and civilian executives move in and out of their positions faster than most commercial executives do.⁴ Senior Air Force leadership

⁴Today, the most common tenure for the most senior DoD political appointees ranges between 11 and 20 months with positions vacant some 20 percent of the time (Marcum et al., 2001). Average tour lengths for general or flag officers who changed positions or assignments in FY95 ranged from 1.2 to 2.3 years for grade O-7, 1.7 to 2.8 years for grade

will likely have to seek ways to sustain support for change from one leadership group to the next. Two responses are possible.

The first reduces the size or complexity of changes attempted. That way, fewer functions need be involved, allowing quicker development and execution of change efforts. Each leadership team can see progress against its own initiatives during its tenure. To date, many Air Force changes in services acquisition practice have had this character.⁵ Contracting has taken the lead on these initiatives and executed them quickly with limited involvement of other functions.

The second emphasizes procedural initiatives that a leadership team can put in place during its tenure but that will likely yield substantive improvements in acquisition practice only under future regimes. This approach could create new organizations and new policies that empower these organizations and others to pursue the change agenda. Acquisition reform itself is an example of this approach. On a more limited scale, the new Air Force Instruction 63-124 introduces a new policy that makes a profound philosophical change in the way that work statements will be framed (U.S. Air Force, 1999a). The details of how to implement this change in specific circumstances remain to be worked out. Introduction of a CPO with true cross-functional authority, new cross-functional services acquisition organizations, or broad new policies to rationalize the supply base would also be examples.

The creation of a CPO with true cross-functional authority deserves special attention in the Air Force. Although such an office would challenge the primacy of the functions in Air Force organization, the authority and independence of the functions actually heighten the value of an office that could take a cross-functional view and help the leadership develop and sustain coalitions for PSM improvements across functions. Such a CPO would reinforce the strategic importance of PSM initiatives, provide a single point of responsibility for PSM within the organization, align PSM goals throughout the Air Force with the overall strategic goals of the Air Force, and, perhaps most important, develop and sustain a PSM implementation plan on a day-to-day basis.

O-8, 1.4 to 2.9 years for grade O-9, and 1.0 to 4.0 years for grade O-10 (military services, as summarized in Appendix B of Thie et al., unpublished).

⁵See <http://www.safaq.hq.mil/contracting/> for descriptions of Air Force Lightning Bolt acquisition initiatives.

In the end, the challenge for successful implementation of meaningful PSM initiatives is to translate a set of organizational and procedural changes, each of which an individual leadership team can initiate, into a set of concrete changes in services acquisition policies, each sponsored by a leadership team for the duration of the change. Because most major changes take time to fully implement⁶ and frequent leadership changes are a deep part of DoD culture, such an implementation plan would require a strategic vision that persists through many leadership teams. The Air Force would need to build such a policy that supports the degree of organizational patience required to see this series of changes through to successful improvements in performance and cost.

Commercial experience with change management indicates that one of the best ways to sustain this kind of support for change over time is to document incremental successes on a continuing basis and use clear, empirical evidence of past successes to sustain interest in future initiatives. The evidence should address “success” in terms of outputs relevant to the Air Force as a whole—improved performance such as quality, responsiveness, or personnel retention or reduced total ownership cost. It should be documented to show the difference between a baseline and the new practice. If possible, the evidence should be simple enough so that it can sustain a case for change without complex manipulation in sophisticated simulations or accounting systems (Gormley and Weimer, 1999; and Hatry with Wholey, 1999). To generate such information on a continuing basis, the Air Force would need to identify metrics of success relevant to the Air Force as a whole and maintain an ongoing process that extracts information on these metrics as a normal part of implementing specific changes. Properly instrumented pilot studies could play an integral role in the development of this information.

Such documentation would allow each new leadership team to associate itself with the reported improvements in performance and cost that their predecessors made possible during the new team’s tenure. It would also help them understand why they need to invest resources during their tenure to realize further benefits in the future. It could help them take ownership of an ongoing process and justify the resources required over time to sustain that process. The better the documentation, the better the leadership’s decisions are likely to be about continuing to invest. That is not to say that such documentation will guarantee that one team after

⁶Major organizational change often takes three to seven years or more to complete.

another will continue to take a longer-term perspective. But without such documentation, no team has a compelling motivation to continue such an effort.

Such documentation would also provide clear, simple examples that the Air Force could use to train its personnel about the value of best PSM practices at every level. Real examples are likely to be more meaningful to Air Force personnel, who draw heavily on their own experience to support decisions, than theoretical arguments, particularly arguments with words like “commercial,” “business case,” or “quality” in them.⁷ Examples from Air Force experience tend to speak for themselves. Training based on these examples is likely to be most persuasive if personnel at all levels – from the Secretary and Chief down – learn of these examples and emphasize their relevance in their statements and decisions.

One company that we interviewed suggested that setting very large, clearly defined, and easily explainable goals gets the attention of everyone in the organization and can generate excitement and support. Collins and Porras (1996, 1994) recommend developing these types of “Big, Hairy, Audacious Goals” as a way to help generate buy-in to the change. Empirical documentation of performance against such goals is critical to the success of such an approach. For the Air Force, stretch goals such as having no flying days lost to problems with contractors, or making all stakeholders (members and their families) more satisfied with relevant Air Force services (i.e., by resolving problems with base housing within 24 hours), or saving a big percentage on recontracts could be used to rally participants and develop their commitment to the effort. The goals should be simple and easy to understand, should speak to stakeholders’ direct interests, and should be obviously tied to the mission of the Air Force as a whole.

At a more tactical level, the checklist described above raises additional issues in an Air Force setting. For example, the Air Force has extensive experience developing action plans in its system program offices (SPOs) that implement the development of weapon systems.⁸ The Air Force could profitably bring that experience to bear here. The implementation

⁷For a useful discussion on how military culture affects planning and decisionmaking, see Builder (1989).

⁸See Camm (1993) for a discussion of the management of technology insertion in the F-16 SPO.

challenges associated with managing technological change are strikingly similar to those associated with managing organizational change.⁹ The important differences flow from differences in changing technology and changing behavior; the *management* of these change efforts raises very similar issues.

In its past change efforts, the Air Force has been reluctant to invest resources, including the time of its military and civilian employees, to generate change, especially when change focuses on reducing costs. It bristles at the old saw that “it takes money to make money.” The commercial experience could not be clearer about the validity of this cliché. By documenting the benefits that innovation yields, as suggested above, the Air Force could build a case for the desirability of using money to make – or save – money. If it can do that, it should reflect this commitment in its action plans. This thinking affects investments in communication, training, and all other activities that support change during implementation.

Many in the Air Force share the point of view that, because the Air Force does not rely on monetary metrics and incentives as heavily as commercial firms do, it should not rely as heavily on incentives to promote change. A better way to reflect the difference between commercial and government settings is to verify that the government cannot easily use serious profit-sharing, gain-sharing, and other incentives that reward people if and only if they generate tangible monetary gains for their employer. But such gain sharing is only one incentive that commercial firms use, and the Air Force culture recognizes many other incentives that induce its personnel to perform well.¹⁰ Inputs to promotion and career management decisions, awards and other non-monetary honors, and programs that benefit their units or organizations have historically helped align personal interests with the Air Force’s interests day-to-day, throughout the Air Force. These incentives are available today to apply to change efforts that improve Air Force performance and costs. Again, careful empirical measurements of the

⁹For details on the similarity between managing technological change and managing organizational change see Leonard-Barton (1996).

¹⁰Dertouzos et al. (1998, p. 11) found that personal incentives are valued more highly by Army civilian employees and that programmatic incentives are viewed as important by both civilian and military Army personnel.

effects of change could provide inputs for the Air Force to use in its personnel assessment processes.¹¹

The traditional Air Force perspective, like that of most commercial firms in the past, relies on stable, fixed standards – measures of quality performance – to understand and manage its activities. If a budget cut occurs, the traditional Air Force reaction is that fixed manpower standards translate that cut into a reduction in output. Cuts in inventories translate into a reduction in supply effectiveness.¹² Production processes are stable now, as they have been in the past, and a good manager seeks to use the existing processes as effectively as possible. However, innovative commercial firms no longer think this way; neither should the Air Force.

In the new business world, firms expect improvements in their internal processes and in the performance and cost of their external suppliers. Change is the expected norm; paradoxically, change is a stable part of the current commercial landscape. The innovative commercial firms manage this new landscape by opening themselves to it and gathering as much information as possible about the potential opportunities offered in the world around them. Market research and benchmarking are integral, ongoing parts of all processes, and especially of PSM processes. The Air Force can benefit from assuming a similar, externally oriented perspective. The perspective can improve the performance and price the Air Force receives from its external providers. This perspective can also affect the PSM processes the Air Force uses in-house to deal with those providers.

¹¹Operational and functional Air Force commanders are not routinely judged today on their efforts to improve performance or save money for the Air Force. In fact, they may even be “punished” for it, when cost reductions this fiscal year lead to budget reductions next fiscal year. More careful attention to the link between performance improvements and cost reductions on the one hand and personnel performance assessment on the other can help overcome the disincentives to change in the personnel and financial management systems today.

¹²Osborne and Gaebler (1992, p. 23) vividly make this point with the comment that “our governments are like fat people who must lose weight. They need to eat less and exercise more; instead, when money is tight, they cut off a few fingers and toes.”

Air Force Will Sustain Its Socioeconomic Objectives

- **Monitor primes' use of subcontractors**
 - **Percent of business for small or disadvantaged businesses**
 - **Treatment of subcontractors**
- **Mentor and grow small or disadvantaged businesses**
- **Set aside work for small or disadvantaged businesses**

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One key dimension of best PSM practices is rationalization of the supply base, which strategically reduces the number of suppliers. This practice presents special challenges for the Air Force and the firms that provide goods and services to it, because of federally mandated socioeconomic programs designed to foster direct government support of small and disadvantaged businesses (SDBs).¹³ However, socioeconomic objectives are not unique to government organizations, and many firms that are successfully implementing new PSM practices have discovered ways to reduce the number of suppliers they purchase from while still providing opportunities for SDBs to benefit from these purchases.¹⁴ The Air Force can learn from them to pursue best PSM practices without compromising its socioeconomic objectives for SDBs.

¹³The Competition in Contracting Act (CICA) can also become an issue if the bundle gets so large that it inhibits competition by reducing the bidder pool to very few bidders. However, because bidders can form alliances of several smaller, specialty firms to bid for work that is beyond the capabilities of any one of them, bundles do not necessarily have to conform to the capabilities of individual firms.

¹⁴A useful discussion appears in Milligan (1999).

Many customer firms that have socioeconomic objectives satisfy them through subcontracting arrangements with their primary providers. For example, customer firms may include goals for subcontracting with SDBs in their source selection criteria and then tie incentive fees to the providers' success in meeting those goals. Several customer firms told us that their key providers were able to find more and better opportunities for SDBs because these providers know which goods and services SDBs can best provide and which firms performed well. Customer firms may also specify that certain services be subcontracted to SDBs. Some customer firms go so far as to put parameters on the way their prime providers interact with SDB subcontractors, e.g., require establishment of or participation in mentor/protégé programs.

Many large Air Force weapon system and subsystem contracts stipulate subcontracting programs of this kind. The primary barrier to using this approach more extensively to meet the Air Force's socioeconomic goals is the challenge of verifying that the Air Force has in fact protected the interests of SDBs operating in the second tier. Centralized monitoring processes today document only SDBs in the first tier. This is true even though the Air Force routinely requires many prime contractors to set and meet targets for SDB subcontractors. The Air Force monitors compliance with such requirements but does not collect data from such monitoring in a central location in a way that would facilitate reporting to Congress and the Small Business Administration. Several efforts are currently under way to identify and give the Air Force credit for all SDBs in their first and second tiers of contractors.¹⁵ These efforts are likely to succeed.

In an alternative approach, the Air Force could sign contracts with SDBs but use larger prime contractors to manage these contractors because of their subcontractor management expertise and the benefits of coordinating related parts of processes. This is a common practice in the commercial real estate management market. Some commercial firms even allow their largest primes to choose the SDBs these buyer firms will contract with and then pay them for their services. Federal regulations would make it hard for the Air Force to follow suit. Getting credit for contractors in the second tier is likely to be a simpler approach for the Air Force.¹⁶

¹⁵For example, Air Education and Training Command (AETC) was looking at how to get credit for the 30 percent subcontracting goal for its Base Operating Support competition at Maxwell AFB.

¹⁶One facility management services provider we interviewed said that they prefer to hold the SDB contracts themselves because this increases their flexibility to meet

Alternatively, customer firms may set aside a group of goods or services to be purchased directly from SDBs. This strategy may be particularly attractive to firms that purchase goods and services from industries that are dominated by small, agile firms (e.g., those producing high-tech electronics equipment). This, of course, is a standard part of Air Force practice today.

In any case, there are sufficient instances of innovative commercial firms' managing diversity in their supplier base to lead us to believe that the Air Force need not worry about PSM practices eliminating SDBs from the competitions. In one example, Ford's core purchasing activity has reduced its number of stamping suppliers from 150 to eleven. Seven of those eleven are minority owned, which helps Ford continue to support its supplier diversity efforts (Wincel, 1998, p. 59).

customer needs effectively and efficiently and they can get a better price because the threat of self-providing is real.

SAF/AQC Can Help Improve Air Force Implementation of Best PSM Practices

- **Work with customers to build a coalition for change**
- **Help build integrated, systematic “war plans” for change that address key barriers; monitor execution**
- **Develop outcome-oriented PBSA metrics specifically linked to customers’ needs (e.g., cost, quality, responsiveness), not tools or processes**
 - **Align personnel incentives with PBSA goals**
- **Encourage greater integration across functions in teams, organizations, training, and career management**
- **Build more sophisticated organizations and skills to pursue PBSA**
 - **Provide resources to successfully execute**
- **Continue to monitor and share best commercial practices**

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We need to think about procurement as a continuum that is embedded inside the supply chain itself – both the sell side and the buy side.

(Thomas J. Conarty, Jr.,
Senior Vice President Procurement, Information Technology, and
Logistics, Bethlehem Steel Corp. cited in Belyea, 2000)

Our main message to Air Force contracting personnel is that although the Air Force has given them primary responsibility for implementing new acquisition reforms such as PBSA and PSM practices, they cannot do this alone. Their successes to date have been impressive, but further progress raises qualitatively new kinds of challenges. To continue to succeed, Air Force contracting must demonstrate the value of new practices to its ultimate customers – the warfighters and the military members and dependents using base services. The easiest way to do that is to translate improvements allowed by these new acquisition reforms into metrics that these customers will understand and value. If commercial experience is any indication, performance improvements almost always derive from the

needs of a customer. If a customer does not demand or respond favorably to changes that purchasing personnel think are “improvements,” the improvements are unlikely to be sustainable. To implement many PBSA and PSM changes that, in fact, could improve circumstances for its ultimate customers, Air Force contracting will also need to attract the interest and commitment of other functions, especially logistics, civil engineering, services, communications, financial management, small business advocates, and personnel. Outside the Air Force, contracting will need increasing help from the Defense Logistics Agency, the General Services Administration, and, in particular, the Defense Contract Management Command. The contracting community is likely to find it easier to work with its ultimate customers and other functions in the Air Force and elsewhere if it rethinks how it measures its own performance.

Traditional contracting metrics focus on internal processes and outputs. Tool-oriented metrics, such as measuring the percentages of fixed-price versus cost-based contracts, particulars of training, or percentages of transactions occurring on the web, encourage tool application. These tool-oriented metrics may be useful measures of internal efficiency, but they do not help focus people’s attention on change and improvement that benefit internal Air Force customers. Process-oriented metrics, such as savings from combined solicitations, promote process execution. The incentives of contracting specialists should be tied to larger stretch goals that can be linked to external customer metrics. For example, tying their performance expectations and reviews to total cost savings or increases in performance by providers directly encourages attention to these issues.¹⁷

That is not to say that contracting is likely to lose a lead role in the pursuit of improved PBSA and PSM practices. Quite the contrary, contracting has a natural role to play as the Air Force’s in-house expert on improved PBSA and PSM practices and, in particular, as an advisor to the rest of the Air Force on PBSA and PSM-related issues. But effective PSM ultimately seeks to integrate the supply chain between an organization’s customers and its suppliers. In the Air Force context, an integrated supply chain links ultimate customers such as the warfighter and military members and their families consuming goods and services on a base to the first and

¹⁷One company we interviewed described how they awarded credit for savings. At first, there was some argument over who should receive credit for any given savings or performance improvement. The company resolved the problem by giving credit to everybody who participated in an initiative. The Air Force could certainly follow this model in assessing performance and rewards.

second tiers of the supply base. The functionals will play a far more central role in such integration than contracting. The term “business advisor” is useful to keep in mind.

That said, as PBSA and PSM take hold and the Air Force’s supply chains do in fact tighten up, external sources are likely to become a more integral part of Air Force operations. As experts on many of the PBSA and PSM practices that make this possible, contracting personnel are also likely to become more important to the Air Force as a whole. Their professional concerns are likely to give more attention to the Air Force’s strategic goals, and operational contracting is likely to receive more visibility throughout the Air Force. With increased visibility and increased responsibility for the success of the Air Force’s core missions will likely come requirements to understand those missions better and to help the Air Force as a whole understand how to get as much as possible from the external providers who support these missions.

Air Force contracting will likely become more strategically oriented and less focused on administering transactions. With the success of simplified acquisition and purchase cards, this is already happening. A work force that has traditionally managed many simple tasks will require new training and experience to prepare for its new strategic responsibilities. Current plans in Air Force contracting anticipate these changes. Commercial experience confirms the importance and wisdom of these changes and offers pointers on how to implement them, noted above.

Contracting personnel are likely to become more expert about a number of new practices and tools enabled by acquisition reform. These include market research, outreach to best practice firms, using past performance in sourcing decisions, bundling individual contracts into larger groups, streamlined acquisition, best-value versus low-cost sourcing, issuing outcome-oriented statements of objectives rather than process-oriented statements of work, using commercial pricing, using new forms of performance measurement and management, getting commercial-style warranties, and shifting procurement to the Web. Exploiting the tools that AR makes available requires the exercise of more discretion. It also requires that contracting personnel work much more closely with other functions.

Contracting experts will need relevant, timely, and comprehensive education and training on how to use these new tools and clear guidance on when to use them. That training should reflect as closely as possible

the environment in which contracting personnel use their expanded discretion to apply these new tools and approaches. Training should help contracting work with relevant functionals to do whatever it takes to develop approaches to acquisition that enhance the performance of the Air Force as a whole. Such training is likely to revolve around real-world examples, formal case studies such as those traditionally used in management education, and circumstances as close as possible to those where these personnel will apply this training. Current training videos and CD-ROMs do not adequately address these issues. Continuing learning on the job is likely to become even more important than it is today.

Looking further into the future, contracting personnel may want to explore the possibility of organizing differently to enhance the application of best PSM methods in the Air Force. One option is to build on its existing tiered contracting structure to move more toward best commercial practice. The Air Force placement of contracting offices in the Pentagon, at MAJCOM headquarters, and at individual bases is similar to the three-tiered placement we see in many commercial firms. The Air Force could potentially build on this structure to reduce low-skilled personnel as transactional responsibilities continue to fall and enhance the higher-level organizations in ways that help them design better PSM strategy, implement more strategic relationships with key suppliers, and train low-skilled personnel in the new PSM methods.

More aggressively, contracting personnel could anticipate broader, cross-functional PSM organizations in which contracting personnel work with other functionals to design and manage a more strategic approach to PSM activities across the board. Such organizations are likely to be difficult to coordinate with the Air Force's dominant functional structure. But they offer such large benefits in the commercial sector that they deserve closer attention in the Air Force. Such organizations would facilitate efforts for the Air Force to conduct comprehensive spend analyses, rationalize the supply base, design a comprehensive supply management plan, collect and analyze information on supplier processes and costs, and coordinate efforts to improve supplier and supply-chain performance.

Functionals Can Also Help Improve Air Force Implementation of PSM Practices

Develop dynamic knowledge base of best commercial practices and innovative buyer and provider firms, e.g.:

- **Bundles of services, contract terms and conditions**
- **Develop expertise in performance, risk management**
- **Specify requirements in terms of outcomes/outputs**

Review and rewrite AFIs to reflect and support best commercial practices

Benchmark internal & external providers' performance

- **Quality, responsiveness, flexibility, reliability, cost**

Participate actively on services acquisition teams

Train personnel with innovative commercial firms

RAND Project AIR FORCE

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Our main message to Air Force functionals other than contracting is that, although the Air Force has given contracting primary responsibility for implementing PBSA and PSM practices, other functionals have key roles to play. At a minimum, functionals such as logistics, civil engineering, services, and communications currently write the requirements that contracting uses to prepare performance-oriented acquisition plans. If the requirements are not performance-oriented, no acquisition plan can be performance-oriented. The functionals also provide the quality assurance evaluators (QAEs) for most operational contracts. Unless those functionals know how to work with contractors in the new PBSA and PSM paradigms, their QAEs cannot manage performance in a way that encourages improving performance over time.

Today, most functionals rely heavily on carefully documented Air Force Instructions (AFIs) to define the worksopes for acquisition plans. These instructions typically explain not so much what outcomes are expected as how precisely to execute each task covered. QAEs then can use these AFIs to monitor exactly how a contractor executes a task and to document the extent of compliance with the instructions. This approach is obviously not compatible with PBSA and many PSM practices. But it is thoroughly

compatible with the AFI-driven perspectives of each of the functionals in question.

To take full advantage of PBSA and new PSM practices, the functionals must work with contracting to understand what leading commercial providers typically expect a buyer to ask for and to seek ways to reconcile this commercial approach with the original intent of their AFIs, which was to ensure reliable provision of service to the ultimate customers in the Air Force. A functional AFI tends to take the perspective of the responsible functional and may often optimize performance more relevant to the function – for example, efficient use of the function’s delivery capacity – rather than the functional’s customers, who seek efficiency and effectiveness from a broader Air Force perspective. Only when the functionals reassess their AFIs in the light of current customer needs and commercial opportunities are they likely to participate naturally in broader Air Force efforts to implement PBSA and PSM.

To understand best commercial practice, the functionals will need to make market research and benchmarking a regular part of their activities. Contracting currently seeks a position as the lead function performing market research in the Air Force, with no apparent opposition. But contracting personnel rarely have the training and experience required to conduct in-depth technical market research or benchmarking relevant to the specific processes that other functionals routinely oversee and manage. For example, civil engineers understand and can assess the processes of building contractors by drawing directly on a knowledge base that is not easily accessible to contracting professionals. At a minimum, other functionals should participate in any contracting-initiated market research efforts. Even better, other functionals should see market research and benchmarking as opportunities to become externally aware of processes relevant to their organic and contracting responsibilities. Such a perspective will likely initiate forms of market research and benchmarking that contracting would never have considered independently.

Looking ahead, more effective supply chain integration, induced by effective PSM practices, will create new responsibilities for functional experts. Supply-chain integration depends on exchanges of data and technical capabilities to promote mutual goals between a buyer and seller. Only with such exchanges can buyer and seller work together to improve the supply chain as a whole and thereby improve the performance and cost levels that the Air Force and its suppliers experience together.

Functional experts are the logical Air Force personnel to help design and participate in such exchanges. Such exchanges are likely to occur in the context of cross-functional teams and, looking further ahead, perhaps cross-functional organizations. To operate in these new contexts, functional personnel will need to develop new skills.

These functionals can best develop these skills in the same ways that contracting personnel do, as described above. In fact, training in a cross-functional setting, focused on real-life examples and formal case studies, and in circumstances very much like those where Air Force personnel will pursue new PSM practices in the future, makes as much sense for non-contracting personnel as for contracting personnel.¹⁸

The commercial sector itself may provide the best place to get this training. Year-long tours of duty at innovative commercial firms, as exchange personnel, could help functionals of all kinds accumulate experience with new PSM methods and arrangements. More formal training could occur in the courses that commercial firms often use to train their own personnel. The Air Force should remain cognizant, of course, that such pure commercial training will not accurately reflect the environment in which the Air Force acquires services today or will in the distant future. In the end, all Air Force personnel must remember the differences between the Air Force and pure commercial contexts and their implications for shaping specific PSM practices in each setting.

PBSA and acquisition reforms such as best PSM practices call for a significant expansion of the roles and tasks of functional experts. To implement these practices, the Air Force will need people with broader vision, who can participate effectively in cross-functional services acquisition efforts. Current incentive systems in the Air Force do not reward such behavior effectively; rather, they tend to reward behavior that preserves the primacy of functional stovepipes. For example, new outsourcing itself, even when it benefits the Air Force as a whole, can threaten many individual billets in, and the overall importance of, those

¹⁸A recent report, developed under the auspices of the Section 912(c) study, concluded that the new training requirements most important to the implementation of new PBSA policies apply to functionals outside the traditional acquisition workforce—the functionals discussed here. The study concluded that these functional personnel should be trained using case-study methods in cross-functional settings with contracting personnel. But the non-contracting functionals would likely dominate the membership in these classes because so much of the new approach depends on their capabilities. See Anderson (1999).

functional career fields with close commercial analogs. Setting outsourcing aside, integrating the total supply chain, including contractor and organic activities, typically elevates Air Force-wide goals at the expense of the goals of the functionals in the supply chain.

To encourage its personnel in all functions to work together for the success of the Air Force as a whole, the Air Force will have to revisit the incentives created by each individual functional career area and ensure that individuals in each career field are rewarded for promoting the goals of the Air Force and punished for promoting goals not consistent with Air Force goals, even if they protect traditional views of functional goals. Aligning incentives throughout the Air Force in this way will require persistent effort at the very highest levels of the Air Force and a sense of good will and openness to productive change in every function affected. Commercial experience warns us that such alignment will not be easy and will not occur overnight. But without it, PBSA and PSM will fail.

“New opportunities rarely fit the way an industry has always approached the market, defined it, or organized to serve it.”

Peter Drucker
“The Discipline of Innovation”
Harvard Business Review
May-June 1985

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The Air Force has entered a period of unprecedented change. Not since its founding in the wake of World War II has the Air Force faced so many persistent questions about its mission, structure, and day-to-day operations. Despite over a decade of turbulence on all fronts, no end is in sight. In fact, the persistent presence of change and a need to lead the force through it effectively are among the most important attributes of the new era that the Air Force has entered. The Air Force cannot expect to address its current challenges in some final way and return to what we now recall as the remarkable stability of the Cold War period. The world has changed. And change is here to stay.

All of these statements are true of services acquisition, but they are true of every other aspect of the Air Force today as well. PBSA and PSM must share the leadership's attention with the new Expeditionary Air Force, the need to integrate air and space aspects of the Air Force, the increasing importance of joint operations and command, the growing importance of information and asymmetric warfare, the need to modernize the force, and the need to attract and retain the kind of talent the Air Force requires to meet all of these challenges.

So much change at one time can seem overwhelming, but it can also remind us that the Air Force is recreating itself as we speak. When Peter Drucker wrote the words in the chart above, he was thinking primarily about circumstances in commercial firms, which since the 1980s have faced a challenging environment. But his words also speak directly to the Air Force. The world is not what it once was. By opening up to the opportunities that acquisition reforms such as PBSA and best PSM practices offer, the Air Force can potentially enhance its performance and reduce its costs in ways that, ultimately, make it easier to deal with all the other challenges it faces. Bringing the commercial revolution in business affairs home to its own processes and those of its contractors is an integral part of the total challenge the Air Force faces and offers as many opportunities as any other part of that challenge.

APPENDIX

A. SUPPLY MANAGEMENT AT JOHN DEERE



Many innovative firms are pursuing PSM programs that strategically rationalize their relationships with their suppliers, setting up relationships with their suppliers that are appropriate to the characteristics of the products that these firms buy.¹ John Deere is a leader in this kind of PSM practice. This appendix illustrates briefly Deere's approach to supplier

¹For the purposes of this discussion, a "product" might be a physical item, material, or service. See, for example, Bensaou (1999), Tang (1999), and Goldfeld (1999).

management. This approach is similar to those we have observed in other companies less willing to publicize the details of their approaches.

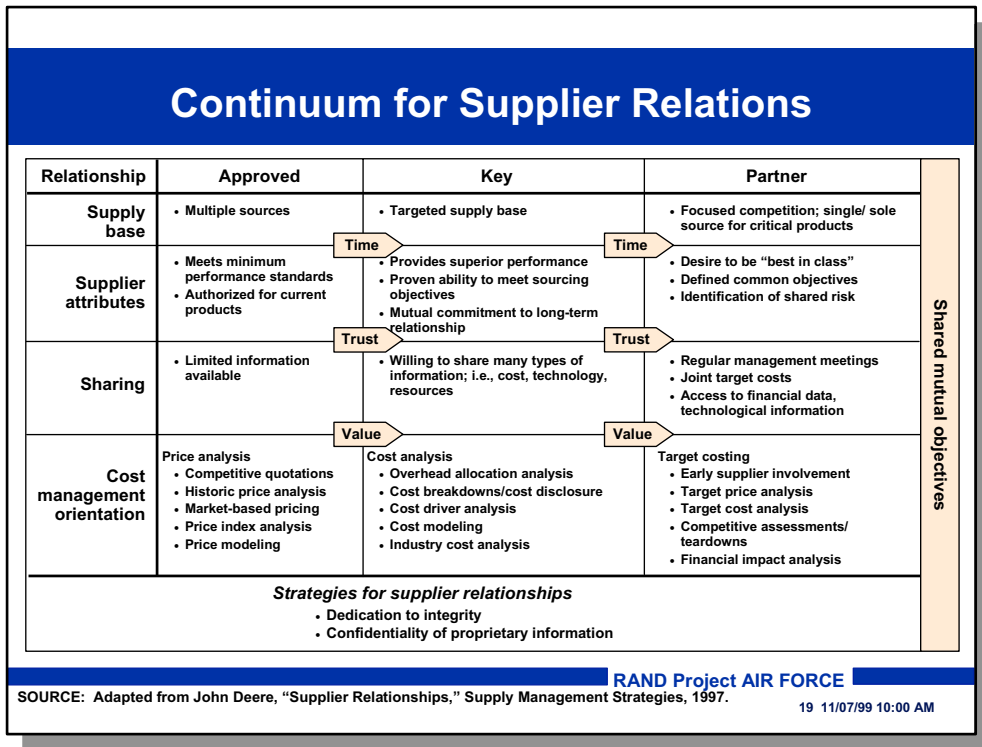
John Deere has developed a sophisticated method for assigning the products that it buys to classes that suggest how it should buy these products. Two variables are important to this approach. The first, shown on the vertical axis in the chart above, measures risks associated with the importance of source availability, responsiveness, and quality. When these risks are high, Deere pays more attention to planning how it buys products than when these risks are low. The second variable, shown on the horizontal axis in the chart above, measures value to Deere as reflected in cost, service, innovation, and administration. When such aspects of value are significant, Deere pays more attention to planning how it buys products than when they are not significant.

Using these variables to distinguish among the products it buys yields four classes of products. Deere approaches the acquisition of each type of product differently.

- It classifies low-risk, low-value products as “generics.” It seeks to minimize the transaction costs associated with simple generics by standardizing them where possible, automating transactions, and using simple source selections to govern relatively short contracts. It tends to maintain a traditional, arms-length relationship with the suppliers of these products.
- Low-risk, high-value products are “commodities.” Deere seeks to rationalize the supply base for these products to leverage its spending. It spends more time screening these suppliers and writes longer contracts but still tries to keep things simple. Limiting the number of suppliers allows deeper relationships, setting the stage for sharing some cost information.
- High-risk, low-value products are “unique.” Deere is uncomfortable in this setting and seeks to reduce its reliance on unique products where it can. Where it cannot, it wants closer relationships with these suppliers to help manage the risks associated with them. Closer relationships offer the opportunity for more information exchange, which in turn promotes mutual investments in processes and product design. To support such efforts, Deere seeks longer-term contracts.

- High-risk, high-value products are “critical.” They significantly affect Deere’s operations in terms of both the exposure Deere feels to the risks they pose and the amount of money Deere spends on them. To deal with both factors, Deere invests heavily in its approach to purchasing these products. It severely limits the number of providers for each product, sometimes moving to sole sources. It lengthens contracts to support a mutual commitment to its relationships with these sources. It pursues extensive data exchange and devolves considerable responsibility to these sources. This whole pattern is the epitome of a strategic alliance. That is the kind of relationship that Deere seeks to purchase products in this class.

Clearly, Deere expects more and more from its suppliers as it moves from one class to the next. And, as the next chart shows, it manages its suppliers to ensure that it gets what it expects.



Deere assigns its providers to four classes: non-preferred, approved, key, and partner. It manages suppliers in each class differently and allows each class to provide only certain kinds of products.

Until a supplier can demonstrate otherwise, Deere manages it as non-preferred. Deere will buy generic products from a non-preferred provider for a limited time as a test. If the provider cannot demonstrate that it should be upgraded, Deere removes the provider from its qualified list.

Deere's approaches to the three preferred classes are summarized in columns in the chart above. Deere's long-term goal is to mature its providers over time. As buyer and seller accumulate experience with one another, Deere seeks to migrate its providers from "approved" to "key" to "partner" status. This takes time. If things go well, trust accumulates between buyer and seller and they can enter into a deeper relationship that generates more value for both of them. Value flows from increasing data exchange and joint work to improve the performance and cost of products and processes.

As a provider moves up through these classes, Deere looks for ways to give the provider responsibility for higher-risk and higher-value products. This approach does two related things for Deere. First, it helps Deere exchange information with a provider over time in a way that allows Deere to assess the reliability of the provider. This process trains providers in Deere's culture, making it increasingly easy for them to respond to Deere's needs in a reliable way. So Deere uses the process to develop and sort suppliers. Second, as this occurs, Deere has available qualified suppliers suitable to each type of product that it buys. So the maturation and sorting process basically feeds providers into each pool of products Deere needs to buy. This approach gives Deere access to just the kind of providers it seeks for each class of product.

Over time, Deere is using this approach to mature and improve the providers available for each class of products that it buys. And, over time, as it learns more about its providers and they learn more about how to meet Deere's needs, Deere expects to develop closer and more productive relationships with providers for all of the products it buys.

B. SKILLS THAT EFFECTIVE PURCHASING AND SUPPLY MANAGEMENT PERSONNEL NEED

As explained in Section 2, the new approach to PSM calls for a new set of skills. These skills are both higher-level and broader than those typically associated with a traditional purchasing organization. Skills identified by three firms with best PSM programs illustrate the change.

HARLEY DAVIDSON'S BUYER PLANNER POSITIONS

(Greenfield, 1998, p. 45)

- Development and application of bills of materials
- Capacity determination
- Capacity utilization
- Contract administration
- Inventory planning
- ABC development, analysis, and utilization
- Economic planning
- Knowledge of environmental regulations
- Forecasting methodologies
- Input/output analysis
- Just-in-time planning techniques
- Master scheduling techniques
- Material handling concepts
- Material resource planning techniques and planning
- Negotiating
- Order quantity determination
- Procurement analysis
- Production activity control methods
- Proposal evaluation

- Quality concepts
- Safety stock determination
- Supplier analysis
- Supply management analysis
- Systems integration/project management
- Distribution Resource Planning (DRP) utilization

BRISTOL-MYERS SQUIBB COMPANY PSM SKILLS

(Adapted from Leclere, 1998)

Bristol-Myers Squibb associates the skills it requires with particular PSM activities:

Profile of the Bristol-Myers Squibb Buy

- Quantitative analysis
- Organizational sensitivity
- Data collection/analysis
- Communication
- Teaming
- Project management

Supplier/Market Analysis

- Quantitative analysis
- Market research
- Industry/category expertise
- Interviewing
- Organizational sensitivity
- Teaming

Development of the Sourcing Strategy

- Analytic frameworks
- Process frameworks
- Strategic mind-set
- Industry knowledge
- Organizational sensitivity
- Communication
- Teaming
- Project management

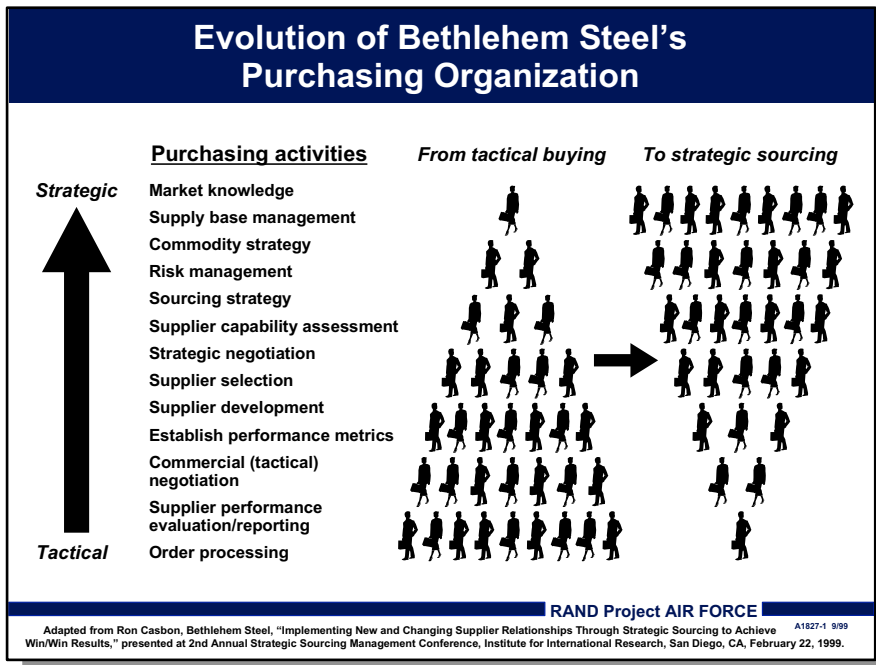
Request for Proposal and Negotiation

- Negotiations experience
- Data analysis
- Interviewing
- Industry knowledge
- Organizational sensitivity
- Teaming
- Project management

Implementation

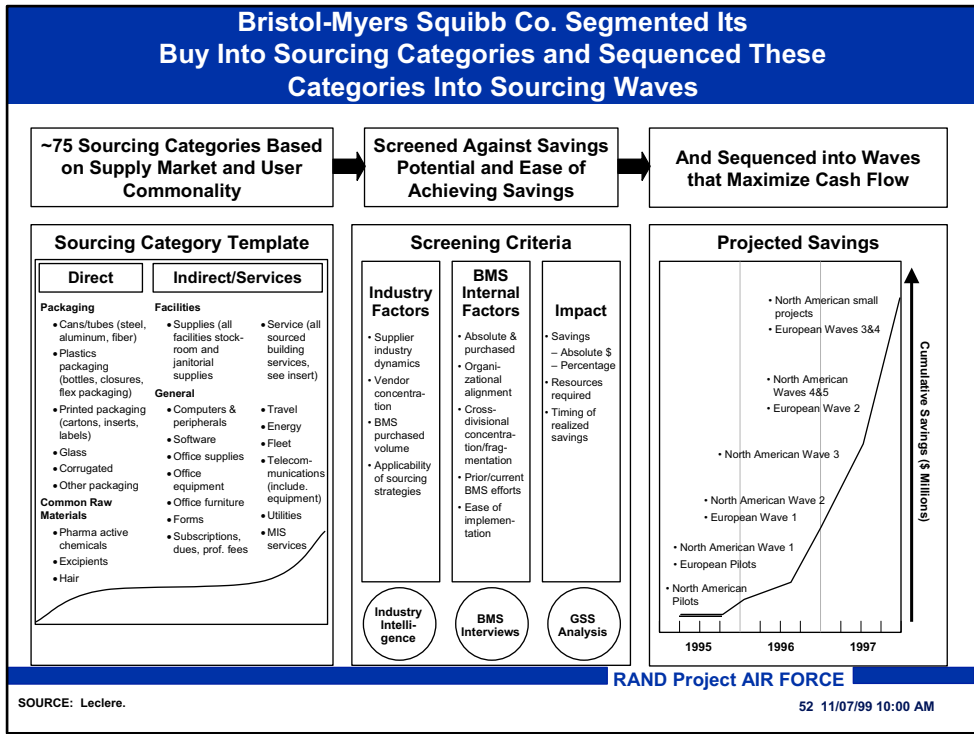
- Implementation planning
- Process frameworks
- Resource planning
- Organizational sensitivity
- Quantitative analysis
- Benchmarking
- Communication
- Teaming

BETHLEHEM STEEL CORPORATION PSM SKILLS AND SKILLS MIX



To shift its purchasing and transportation organization from traditional tactical buying to strategic sourcing, Bethlehem Steel identified the mix of people and skills it had and the mix of people and skills it needed. It then changed job titles, descriptions, and compensation to match the desired organizational structure. Some purchasing personnel received further training in required skills, some moved to other parts of the company, and others volunteered to leave or retire. A few who resisted change were let go. The new organization was then augmented by new hires from outside the organization as well as transfers of technical personnel from within Bethlehem Steel.

C. BRISTOL-MYERS SQUIBB PURCHASING INITIATIVES



The above chart illustrates how Bristol-Myers Squibb Co. (BMS) categorized its spend on goods and services into about 75 categories based on supply market and user commonality. It shows how BMS screened each category by industry, internal factors, and effect to estimate savings potential and ease of achieving savings for targeting of the order of PSM initiatives. BMS began its PSM change implementation with projects that were likely to be quick, executable, and offering significant savings. Last, it illustrates how BMS broke its purchasing initiative into pilot studies and then waves for execution.

D. GENERAL BACKGROUND ON DEVELOPING AND USING INFORMATION ABOUT BEST COMMERCIAL PRACTICES¹

Over the past few years, we have interviewed 40 specially selected commercial buyers and providers of services to identify the best purchasing and supply management practices in the private sector. In this appendix, we describe the philosophy underlying this research and our general methodology.

Broadly speaking, what is your basic analytic approach? We monitor new purchasing and supply management practices of selected commercial firms to identify opportunities for innovation in Air Force purchasing and supply management. We define “commercial” firms to be firms that operate primarily outside the traditional defense-industrial base. We select firms recognized by their peers as excelling in particular activities relevant to purchasing and supply management.

Why is this approach relevant to the Air Force? Best commercial practices and policies relevant to the Air Force appear to benefit the companies involved. The Air Force should understand these practices and policies for two reasons:

1. Many of these practices and policies may offer useful lessons for the Air Force itself. They may suggest practices or policies that the Air Force could successfully adapt to its own setting.
2. If the Air Force wants to do business with the commercial firms using these new practices, it must understand what they expect from a buyer. Best commercial practice can help the Air Force understand how it needs to change its service acquisition policies and practices to participate in the new commercial approach to purchasing and supply management.

¹For further discussion of the issues raised here, see Camm (1999).

If new Air Force purchasing and supply management practices gain better access to good providers, the Air Force also gains a window to learn about a broader range of commercial innovations at these same firms.

Why focus only on best *commercial* practice? Best government practice is useful to monitor as well. The Air Force already has a strong tradition of monitoring best government practice; other organizations are helping it do this now. The Air Force is less familiar with commercial practices outside the traditional defense-industrial base. Our work emphasizes this potential new source of insight. Further, as noted above, to the extent that the Air Force wants to reach beyond the traditional defense-industrial base for goods and services, it must understand what is happening in the commercial mainstream.

The commercial sector of the economy is over 20 times as big as the traditional defense sector.² If innovations are equally likely to occur anywhere in the economy, they are 20 times as likely to occur in the mainstream commercial sector as in the traditional defense-industrial base. Where the commercial sector is more innovative than the defense sector, the odds go even higher. The commercial sector is likely to be more innovative in activities of core competence that lie primarily outside the defense-industrial sector. These include many support services that the Air Force buys from outside sources, such as facility management, generic business services, personal services, and much of logistics.

What exactly is a “best commercial practice”? The trade literature and trade conferences relevant to particular industries or functional communities routinely identify exemplar activities that firms in those industries or with these functions recognize as exceptional. These exemplar activities are typically concrete examples of efforts to implement broader management principles that these industries and functions value. They demonstrate, potentially in great detail, how to apply these principles in particular circumstances. For example, Caterpillar has been broadly recognized for the exceptional global supply effectiveness of its materiel support activities. L. L. Bean has been broadly recognized for the satisfaction of its retail customers. Toyota has been broadly recognized

²The U.S. Bureau of Economic Activity (1999) reports that U.S. gross domestic product was \$8510.7 billion in 1998, and spending on national defense was \$340.0 billion (*Survey of Current Business*, Vol. 79, March 1999: D-2, D-10). Using DoD military outlays for 1998, estimated by the Office of Management and Budget as \$264.1 billion, leads to an even lower share of 3.1 percent (U.S. Department of Commerce, 1998, p. 339).

for its effective management of suppliers. Xerox has been broadly recognized for its efforts to design equipment that simplifies recycling at end of life. Looking at each of these firms can provide a great deal of practical detail about how they do what they do well.

A common characteristic of many firms recognized as best in class for a particular activity has been their use of total quality management principles to solve specific business problems.³ TQM in effect identifies a firm's key customers and their needs, maps the processes the firm uses to serve these customers, and then continuously improves the firm's knowledge of its customers and the processes it uses to serve them. TQM explicitly recognizes the importance of motivating people to change their behavior on the job to execute these tasks and involving all of the people relevant to each task. Broadly stated in these terms, TQM sounds like common sense. Specific examples of best commercial practices very often provide practical information about how specific firms have successfully applied these broad quality principles in specific circumstances.

Firms value information about best commercial practices first as a kind of existence proof; these practices demonstrate that certain ideas they may be thinking about can in fact work in practice. Specific examples of these practices then provide concrete information that can help these firms think about how to adapt these practices to their own organizations. Firms differ significantly in the ways that they implement particular best practices, such as shortening process cycles or making measures of cost more inclusive. Firms viewing information about best commercial practice know that they can rarely simply transfer a practice from another organization to their own. But viewing a practice in another setting helps them think about how they might emulate such a practice in their own setting.

The best commercial firms do not all use the same best commercial practices. In a market where innovation is active, it is common to observe many experiments in progress at the same time. In effect, the marketplace is testing alternative practices all the time. As particular practices stand

³TQM is more pervasive in corporate suites than might first appear. In many firms, TQM has become such an integral part of day-to-day business that they do not recognize it as a distinct program. Others maintain specific quality-oriented initiatives but do not identify them as TQM. Motorola, General Electric, and Honeywell, for example, all continue to run Six Sigma programs that have much in common with the principles of TQM.

out in this competition, they become the best commercial practices of the moment. As innovation and competition persist, these best practices may mutate or be displaced by other practices that survive the ongoing competition more successfully. Best practices that succeed in one setting may not do so well elsewhere, allowing many different best practices to co-exist. Each organization seeks the practices that give it the best performance possible. An important element of assessing best commercial practices is to understand enough about the context in which they operate to understand why they succeed there and whether they could succeed elsewhere.

How does assessment of best commercial practices relate to benchmarking? As described above, assessment of best commercial practices is one important form of benchmarking. Such “high-level” benchmarking is often the first step toward a more thorough understanding of practices in another organization. The second step of “quantitative” benchmarking identifies performance metrics relevant to the activities in question and collects information across organizations on these metrics. Such information sharpens the nature of observed differences in performance and helps the observing organization understand where it should focus its attention as it prepares to adapt practices, policies, or other lessons learned from an observed organization. Such assessment prepares the way for a third step of “practitioner” benchmarking in which relevant personnel from the observing organization spend time with their counterparts in the observed organization to gather more detailed information – much of it often latent – on sources of observed differences in the application and performance of observed practices.

In sum, the information we develop on best commercial practices can prepare the way for more quantitative, detailed, and in-depth benchmarking efforts. As the efforts proceed, the Air Force must be prepared to play an increasingly important role in the development and assessment of relevant data. The Air Force can then apply these data to make specific design decisions about changes in Air Force practice or policy.

How can you stop there? This study addresses implementation, too, does it not? This study seeks information about best commercial implementation practices relevant to purchasing and supply management. It does not address how to implement any particular change in the Air Force itself. Put another way, the study recognizes that most of the best

commercial purchasing and supply management practices it identifies are new not only to the Air Force but to the firms where these practices currently exist. So it is natural to ask not only how these firms exercise each practice but also how they executed the organizational changes required to put these practices in place. These implementation practices themselves have implications for the Air Force that are often as important as the implications of the purchasing and supply management practices they support. We focus on best commercial examples of implementation practices, not Air Force implementation of best commercial purchasing and supply management practices.

How important is the Air Force's ability to adapt and transfer a best practice? Very important. It is one thing to identify a potentially useful practice and another to adapt and transfer it successfully to a new setting. New practices are more interesting, other things equal, if they are likely to be easier to adapt and transfer.

This raises a profound challenge with regard to the Air Force. In many ways, it is not like the commercial firms that currently benefit most from monitoring best commercial practices. It does not use TQM as a routine, operational part of its management activities in the same way that these firms do. By opening itself to "best commercial practices," it can become more like them and hence, over time, benefit more from monitoring best commercial practice. Each additional best practice contributes to an institutional base or infrastructure that values operational TQM in the Air Force; as this base grows, each additional step gets easier. But for now, the Air Force is not likely to benefit as much from understanding a new practice as a commercial firm already familiar with seeking out and adapting new ideas. Quality begets quality; an inherent aspect of operational TQM is an outward perspective throughout an organization that supports emulation of best practices observed elsewhere.

The Air Force faces a chicken-and-egg problem. Until it becomes more familiar with how the real commercial sector works, it will have difficulty contacting that sector and learning from it. One response is to conclude that best practices closer to home are easier to adapt and hence more appropriate to monitor. That is how some justify a focus on best government practice. This approach permanently excludes the Air Force from the large commercial sector where so much innovation is occurring. Only by observing that sector, despite the current difficulties of adapting the practices observed, can the Air Force begin the process of reducing its isolation. Only by proceeding now, despite current difficulties with

adapting and transferring commercial practices observed, will the Air Force improve its ability to adapt and transfer these practices in the future.

TQM is qualitatively different from traditional management. How can incremental changes help the Air Force introduce TQM-based innovation?

Analysts have long understood that successful implementation of operational TQM requires coordinated changes on many fronts.⁴ Making only a few incremental changes relevant to TQM can actually make things worse rather than providing a smooth transition toward full implementation. For success, new performance metrics must be linked to new incentive systems. New information flows, often supported by formal new management systems and structures, must replace old formal and informal information flows. The leadership must hold the coalition of all affected parties together as it seeks the new optimum or pattern of work. All affected parties must ultimately change their behavior on the job in a coordinated fashion; some of this change must be worked out along the way. And so on. Failure to go all the way causes confusion and misdirection that allow the inertia that is natural in most organizations to overwhelm any attempted change; the confusion degrades current performance and feeds longer-term cynicism about productive change. Conclusion: Small changes will not do; the Air Force cannot get there from here without committing itself to massive cultural change.

This observation has two implications for our work.

1. It is critical to understand all of the different things that must change for a TQM-related change to succeed. Studies suggest that 50-70 percent of recent major change efforts in corporations have failed (Mauer, 1996, p. 18). Many problems with reengineering in the commercial sector can probably be traced to failures to recognize a fairly short list of factors, discussed in the text, relevant to implementing significant changes of any kind. Careful assessments of difficulties with acquisition reform in the DoD

⁴Technically speaking, TQM creates basic nonconvexities or complementarities in a production function that in turn yield a nonconvex profit function. In this setting, small departures from a non-TQM optimum degrade performance; large departures are required to reach a section of the profit function where incremental adjustments finally lead to a better TQM-related optimum. For a rigorous discussion of such “supermodularity,” see Milgrom and Roberts (1990).

would probably reveal a similar pattern.⁵ In our analysis, we seek to identify all of the things that must change for a particular practice or policy change to succeed. We seek to understand what is necessary for success, even if we cannot identify factors that guarantee success.

2. Any particular implementation effort must always proceed in steps to remain manageable. The concerns about nonconvexities in footnote 4 tell us that each step must be complete enough to allow all of the changes relevant to its success. We are not designing particular implementation efforts, but we are discussing how best commercial firms approach implementation. In this context, a pilot study illustrates the challenge of significant organizational change. Each pilot must be complete enough to be self-sustaining. It must include not only the change at hand but all the relevant supporting institutional factors, from leadership to incentives to training and so on. Pilots can actually make it easier to do this by providing a well-defined arena in which to apply waivers to current policies and to apply other qualitative changes. Of course such pilot design does not simply happen; it must be carefully planned and executed.⁶ More difficult is moving from one pilot study to total institutionalization – removing the “scaffolding” from the site of the pilot study itself and transferring its lessons learned to other parts of the organization. As noted above, we are not designing particular ways to do this; we are seeking examples of commercial success.

How do you know that best commercial practice is helping the companies involved? This question can be addressed on two different levels: Why should we think that TQM-related practices and policies are successful? Why should we think that any particular practice or policy observed is successful?

⁵For an example of such an assessment, see Dertouzos et al (1998).

⁶For example, General Motors initiated its move toward global adoption of the ISO-14001 environmental quality management standard by proving the concept in pilots at five qualitatively different kinds of manufacturing plants. Each pilot incorporated all the changes required to sustain ISO 14001 at that site. An external certification process helped verify this. Once this proof of concept was complete, General Motors used lessons learned in these pilots rapidly to complete implementation of ISO 14001 at its manufacturing plants worldwide.

Four arguments can be made in favor of TQM-derived practices and policies.

1. These ideas appeal to basic logic and common sense. The basic tenets of TQM link each activity in an organization to a final purpose and then seek to tighten that linkage. They formally recognize the role of people in these linkages and the importance of motivating these people to do the right thing. They are formally compatible with the basic tenets of the microeconomic theories of the firm, of the behavior of individuals within a firm, and of transactions between organizations. They are formally compatible with the basic tenets of industrial engineering approaches to designing and managing processes. They are formally compatible with the findings of organization science on designing organizations and motivating the people in them.
2. Organizations that practice operational TQM appear to benefit from it. Exactly “what TQM is” has always been an issue of contention. One broadly accepted definition links it to the Deming and Baldrige Awards given to a select few organizations in Japan and the United States. The criteria used to make these awards offer attractive, operational definitions of TQM. Empirical evidence suggests that firms that apply for the Baldrige Award tend to perform better, financially, than firms that do not. Firms that win the Baldrige Award tend to perform better, financially, than those that simply apply (Juran, 1994, p. 24). Do good firms pursue the award, or does choosing to pursue the award improve performance? Opinions differ; organizations that have pursued the award agree that doing so improved their performance and offer examples that support their beliefs (see, for example, Junkins, 1994, p. 57).
3. The use of a TQM-based management standard, the ISO 9000 series, has expanded rapidly since its introduction in 1987, as a key criterion in the qualification of suppliers. In many industries, firms without an appropriate ISO 9000 certification can no longer compete as mainstream providers. ISO registrations are now prominently featured in the advertising in trade magazines. In a leading trade magazine on TQM itself, *Quality Progress*, the number of firms listing ISO 9000 registration in its annual special issue rose

from 23 percent in 1992 to 41 percent in 1994 (Stratton, 1994, p. 5). The American automobile industry recently used ISO 9000 as the basis for a new supply qualification system; the American aerospace industry is in the process of doing the same thing (Perry Johnson, Inc., 1995). This very broad voluntary acceptance of a TQM-derived management standard speaks to the confidence that buyers in the markets affected have in the practices that this standard certifies.

4. Many point to recent macroeconomic trends as evidence of the value of TQM in the American economy. For example, they point to a recent marked reduction in inventories relative to economic activity. TQM practices systematically reduce the optimal level of inventories; observers take the recent reduction as a proxy for the broad acceptance of and effect of TQM practices that could reduce inventory levels. Similarly, they point to the ongoing period of economic expansion, the longest in U.S. history. Many factors contribute to this, but systematic productivity gains are a key part of it. Effective investments in information technology did their part; according to this perspective, they both facilitated application of a TQM emphasis on integration and data-sharing, and benefited from TQM perspectives that qualitatively changed the way U.S. industry applies information technologies.

Although these broad statements all have their detractors, they underlie a wide and growing consensus in corporate America that operational TQM policies and practices add value. Skeptics can argue that the principles of TQM are so broad that the real test of what works depends on the particulars of a specific innovation. Does the innovation produce results or not?

This brings us to the second level of inquiry. Why should we think that any particular practice or policy observed is successful? Developing an unequivocal, quantitative answer to this question is difficult for several reasons.

1. The changes that interest us are all recent. Not enough time has elapsed to reveal the long-term effects of individual changes.
2. Individual changes rarely occur in isolation. In an increasingly turbulent marketplace, change is the norm. Simultaneous

initiatives within one firm affect another, and the effects are hard to sort out formally. Often, one change sets the stage for realizing the full benefits of another change.⁷

3. Even if these problems could be solved, changes are specific to individual locations and tailored to individual cultures, strategies, priorities, and capabilities. These characteristics complicate efforts to conduct cross-sectional statistical tests of the effects of initiatives started either in formal experiments or in the normal course of business.
4. These changes lie at the cutting edge of the strategies of the firms involved. Although firms have been generous in their willingness to provide access to personnel and many documents associated with these changes, they have not provided access to proprietary data that might be used to test all public statements about these changes.

What is an appropriate analytic response to these circumstances? Keep in mind that we are engaged in the first stage of benchmarking the identification of high-level targets of opportunity that deserve further quantitative and participant benchmarking. For this, we do the following.

1. We use a number of analytic paradigms that help us predict the effects of changes in policies and practices, including microeconomics, industrial engineering, organization science, and the management consulting literature on operational TQM and change management, to develop formal data-collection instruments.
2. We use these instruments to structure data searches and, in particular, elite interviews with multiple participants in a relationship. We gather as many empirical data, qualitative and

⁷For example, direct vendor delivery (DVD) agreements can improve final mission performance and cut total ownership costs by aligning the materiel management process more effectively. The improvements will likely be even larger if a buyer first rationalizes its supply base and focuses its DVD agreements on a small set of providers. The size of net benefits from using DVD agreements appears to depend significantly on the extent of supply-base rationalization.

quantitative, as buyer and seller in a particular relationship will provide.

3. We seek to use these data and qualitative research methods, such as triangulation,⁸ to construct a story of the relationship relevant to each purchasing and supply management change we examine. We seek a story that is internally consistent with all the facts that we can collect. We seek a story that is consistent with microeconomics, industrial engineering, organization science, and the management consulting literature on operational TQM and change management. These paradigms help ensure that the internally consistent story we have constructed makes sense in a broader context; it is “robust” across different disciplinary perspectives, and it is consistent with our understanding of cause and effect for changes of this kind.
4. We use the resulting story to ask whether a particular change is likely to yield net benefits. Is it structured in a way that is likely to yield net benefits? Is it compatible with the organization’s broader strategy? Is the institutional support being provided for the change likely to support continuing success?⁹

This last step sets the stage for asking if an analogous change could benefit the Air Force. The questions above extract points from our story that are directly relevant to the potential that a particular change offers the Air Force. Is it compatible with Air Force basic strategy to improve military capability, safety of flight, quality of life, and the level of total ownership costs, while complying with administrative law? Can it be structured in a way that is likely to yield such net benefits in the Air Force setting? What

⁸Triangulation is a formal method for seeking evidence for the hypotheses that form a story from multiple, independent sources and piecing this evidence together into a coherent story that draws on all the sources. The journalistic standard of seeking two independent sources for factual statements before publishing is a well-known variation on this approach. Triangulation uses several points of reference to nail down a single “fact.” It involves an active process of comparing data about a specific point, identifying additional data that would help clarify that point, seeking those data, and continuing until a useful story emerges.

⁹The Air Force increasingly addresses this question by asking if Air Force “culture” is compatible with a change. We capture cultural factors in our description of the context of a change. We try to do this by asking specific questions about metrics, incentives, information flow, training, roles and responsibilities, oversight, and so on, that help spotlight what aspects of a corporate culture are important to success in a particular circumstance.

institutional support must the Air Force provide to adapt and transfer such a change? Our analytic mission is not to answer these questions, but to identify commercial practices that look promising enough for the Air Force to seek answers to these questions.

If best commercial practice is such a good thing, why aren't more firms using it? Or more bluntly, from an economist's point of view, how can any but best commercial practices survive in the marketplace? Isn't the simple survival of any practice or policy in a competitive market place evidence of its efficacy? The survivor principle is central to an economist's understanding of how to compare alternatives in a competitive marketplace. Our work suggests that two factors help explain why only a few firms use the practices that interest us.

1. Different organizations operate in different environments and hence have different strategies for success. Strategies suited to a quiet environment, in which technology and organizational forms are quiescent and production and market patterns are well established, are not well suited to a dynamic environment, in which technology and organizational forms are in flux and players are competing aggressively to exploit this flux. The Air Force is now experiencing two profound changes in its environment. It is moving from a Cold War environment in which the threat was fairly stable to a boiling peace environment in which the threat is in continuous flux. Simultaneously, it is moving from an economic environment in which arrangements in potential commercial support markets such as logistics and facility management were quiet, to a qualitatively different, quality-driven environment in which potential commercial support markets are roiling with technological and organization experimentation and change. Taken together, these changes call for basic changes in Air Force strategies relevant to its mission and the support of its mission. To reflect this situation, we have focused on best commercial practices relevant to a dynamic environment. These differ from practices Air Force personnel may have observed in Air Force support markets in the past and certainly differ from practices in quieter commercial markets today.
2. We observe rapid diffusion of many of the ideas we examine. Trend data in logistics, facility management, and information

services show that, over time, a growing number of firms are adapting comparable practices. Firms increasingly participate in quantitative benchmarking networks to compare notes. They explicitly identify exemplar firms that they are emulating. They explicitly target personnel in exemplar firms to hire away. Such diffusion takes time. It takes time for people in firms to internalize the importance of changing to ensure their future survival. It takes time to convince senior leadership and initiate change. And it takes time to implement and institutionalize change. From this perspective, we understand that much of the diversity we observe in business practices in dynamic markets is evidence that diffusion is not complete. When it is, only firms using these new best commercial practices will remain in these dynamic markets. That said, change is endemic in dynamic markets; diversity will persist as waves of diffused innovation wash through the population of surviving firms in these markets. In fact, this is probably the situation we observe today.

Why focus on best practices? What about poor practices that should be avoided? This question can be phrased in two different ways, both relevant here.

1. Not all prescribed innovations work as expected. For example, as noted above, many recent corporate efforts to make major changes have failed. Objective observers generally agree that acquisition reform in DoD is not achieving all of the benefits expected of it. Apparently worthwhile initiatives sometimes succeed and sometimes fail. This perspective asks why we do not structure analysis around experiments, either formal or natural, which examine a number of organizations that initiate a single, well-defined change, and ask (1) how often the change succeeds and (2) what factors contribute to its success. As noted above, we have not taken this approach because we could not develop a large enough matched set of changes and track it for long enough to develop statistically significant measures of efficacy. The specificity of individual changes and their relationships to the contexts in which they occur, the turmoil in the markets that currently interest us, and the range of changes under way in individual organizations do not lend themselves to such analysis.

2. As much can be learned from failure as from success; in fact, it is always preferable to learn from another's failures rather than your own. Why restrict the inquiry to success? We favor successes for two reasons.
 - a. To be blunt, private organizations are more likely to share information about successes than failures. As we have constructed stories about these organizations, we have learned a great deal about their difficulties along the way. As we have worked with them over time, enough trust has developed for us to learn more about such difficulties; we hope to continue learning about problems as the work and our relationships mature. Pursuit of success has opened doors for us; trying to understand success has led us to many interim failures and the strategies these successful firms used to overcome these problems. Ultimately, these are the lessons about failure that interest the Air Force most – what works in the end? That brings us to our second reason for favoring successes.
 - b. Our work is effectively the first step in a longer-term benchmarking activity that the Air Force must ultimately take up itself to succeed. Activities most appropriate to such benchmarking are successes, not failures. We are seeking potentials that the Air Force can exploit in its own setting. The Air Force needs to understand when such potentials are likely to work and when they might fail. For reasons explained above, we have not sought to track the good and bad outcomes of specific changes made in different places. Instead, we have used instances that resulted in success to understand how that success occurred. The story we develop for each relationship invariably identifies “do’s and don’ts” relevant to any change in the relationship.

We definitely do not claim that success in one setting guarantees success elsewhere. Quite the contrary; we seek the factors that appear to support success so that we can increase its likelihood in an Air Force setting.

TQM focuses on internal processes. How can it inform purchasing and supply management practices and policies? TQM initially focused on

internal processes. The idea of identifying customers and the processes that serve them and then improving the understanding of these customers and the processes that serve them is easiest to apply when all of these factors can be addressed in one organization. That is true whether that organization is one site location in a corporation, one function in a corporation, a single corporation, or a set of partners in a supply chain. Over time, organizations have learned to apply the basic principles of TQM in broader and broader contexts. Speaking broadly, most of the efforts underway today to integrate value chains that involve many organizations can simply be seen as practical applications of basic TQM principles across contractual boundaries.

Seen in this way, operational TQM informs our understanding of purchasing and supply management in at least three ways.

1. It provides useful insights about how to improve the performance of the function traditionally responsible for most purchasing and supply management in the Air Force – acquisition and, more specifically, contracting. It suggests fundamental changes in metrics, incentives, training, and so on relevant in this setting.
2. It provides useful insights about how to improve the joint performance of all the functions relevant to purchasing and supply management and coordinate these functions in a more strategic manner. It suggests fundamental changes in the leadership of purchasing and supply management, career management, decision-making and oversight, and so on.
3. And most important, it provides useful insights about how to improve the management of suppliers themselves and a buyer's relationship with them. It suggests fundamental changes in source selection criteria, performance metrics, contract types, and so on. These changes are integrally linked to changes within acquisition and across the Air Force as a whole.

Will the best commercial practices you identify fit the Air Force?

Answering that question is not our immediate task. We have been charged to identify potential opportunities in commercial practice. Time

will tell whether the Air Force embraces the practices we identify and the practices yield useful net benefits in an Air Force setting.

That said, as we seek potential opportunities in commercial practice, we are ever cognizant of what might benefit the Air Force, in a number of dimensions.

1. We have focused our examination on activities of immediate interest to the Air Force – logistics and facility management in particular.
2. We continue to ask how important operational TQM is to the success of new practices. The Air Force is not a TQM-based organization. Many believe that the Air Force tested TQM and it failed in the 1990s. That is not true, but the perception complicates any effort to adapt and transfer quality-based innovations to an Air Force setting. If we were to go back 25 years, the management bureaucracies then present in the commercial organizations we study today looked very much like those in the Air Force then. Today, these commercial organizations have changed a great deal more than the Air Force has. How did they become TQM-based organizations? What does that tell us about how the Air Force might change? These questions are ever-present in our studies of individual changes and the relationships relevant to them.
3. The Air Force has a heavily functionally oriented organization. The commercial firms we have studied are moving away from this orientation. The wartime mission of the Air Force, its rotation policy, and its determination to minimize lateral entry into its labor force make it hard to follow the lead of these commercial exemplars. Given that it must retain a strong functional structure, can the Air Force move toward the process focus that so many commercial practices use today? That remains an open question. We seek to understand the importance of cross-functional arrangements in new commercial process-oriented innovations and how the Air Force might adapt its functional arrangements to emulate them. In this study, we do not seek to identify specific changes in the Air Force that will do this.

4. We continually compare the Air Force to the commercial organizations we study to help understand how in particular the Air Force differs from those organizations, and hence to which dimensions we need to give special attention when thinking about transferability. For example, although their metrics and incentives differ, the implications of these differences are not the same for metrics and incentives. Most of the metrics we have seen can be transferred to the Air Force (the exceptions are externally determined values of outputs); it is not realistic to say that cash-based incentives can be as easily transferred. Could different promotion criteria, awards, and other incentives take the place of commercial cash payments? We attempt to highlight the importance of finding effective incentives in the Air Force, rather than defining which incentives are appropriate.

To summarize, we seek to identify what factors are most important to successful adaptation and transfer of new practices to the Air Force. We try to identify changes that will be easier to make, but we do not restrict our attention to them. We also seek changes likely to yield net benefits so large that the Air Force should be willing to stretch to achieve them. Without such changes, the Air Force would never look beyond best government practices. We cannot guarantee that all of these changes will succeed in an Air Force setting. In the end, quite certainly some will fail. We want to avoid failure, but should it occur we also want to have learned from the best commercial firms how they mitigated the effects of their failures and learned from them.

In a few words, then, please summarize your basic analytic approach.

We seek opportunities to improve purchasing and supply management practices and policies in the Air Force. We look for them in the commercial sector because we believe great opportunities exist there, even though it will be hard to adapt and transfer them successfully to an Air Force setting. We also look for commercial practices to help the Air Force learn how to change its approach to acquisition in ways likely to increase its access to the best commercial providers.

We do not expect to quantitatively identify precise estimates of the net benefits that new practices and policies might offer the Air Force. That is demanding more than the available data allow and fails to recognize the importance of adapting a practice observed in the commercial sector before transferring it to the Air Force. We focus rather on understanding

the context for an observed change and its basic logic in that setting. Drawing on several relevant analytic paradigms, we ask if the change should yield net benefits. We ask what institutional support is required to realize these net benefits. We ask what factors are relevant to bringing this change to the Air Force.

If we succeed, we will identify changes that offer enough potential for net benefits to justify further and more detailed study. Commercial experience suggests that the Air Force must ultimately employ its own practitioners to gather the data and make the decisions required to design changes in Air Force practices and policies. Our work here is a prelude to that effort.

E. EXAMPLES OF STRATEGIC SUPPLY-BASE REDUCTION

Strategic supply-base reduction has become a major tool used by leading firms to reduce costs and improve quality, responsiveness, flexibility, and other key dimensions of performance. In this appendix, we offer examples from the literature of how a broad range of large firms and one small firm are adopting this practice.

AlliedSignal

AlliedSignal's first step in its sourcing strategy was to prune the supply base from 10,000 in 1992 to fewer than 2,000 in 1997. Plans call for its supply base to shrink further to 1,500 over the next few years. AlliedSignal's automotive sector saved \$28 million in 1993, which came primarily from winnowing the supply base and negotiating new contracts (Minahan, 1997).

American Standard

American Standard reports it reduced its costs for U.S. office supplies by 28 percent when it reduced its vendors from 81 to one (Ridge, 2001).

AMR

In 1995, AMR had 7,200 suppliers. In 1996, buyers reduced the supply base by 30 percent. They reduced suppliers another 16 percent in 1997 and plan to remove another 13 percent by the end of 1998. The year 2000 goal is 2,000, which represents a 70 percent decrease in AMR suppliers since 1995. AMR's supply management strategy has resulted in more than \$250 million in savings (Avery, 1998).

Boeing

"Boeing will cut 13,000 of its 31,000 suppliers over the next four years, mostly smaller companies that duplicate equipment" (Rae-Dupree, 1999).

Chrysler

From 1989 to 1993, Chrysler reduced its production supplier base from 2,500 companies to 1,114 and fundamentally changed the way it works with those that remain. The time to develop a new vehicle is approaching 160 weeks, down from an average of 234 weeks during the 1980s. The cost of developing a new vehicle has plunged an estimated 20 to 40 percent. Since 1988, Chrysler has reduced its number of buyers by 30 percent and has sharply increased the dollar value of goods procured by each buyer. Profit per vehicle has increased from approximately \$250 in the 1980s (taking the average from 1985 through 1989) to \$2,110 in 1994 (Dyer, 1996).

“Now about 90 percent of Chrysler’s purchasing volume is with 150 suppliers” (Lewis, 1995).

Donnelly

From 1996 to 1997, Donnelly’s newly centralized purchasing activity saw a 5.2 percent reduction in projected material costs, a 25 percent improvement in supplier quality measures, and was on target for a 50 percent reduction in the size of its production supply base. For example, Donnelly reduced its injection-molding supply base from more than 35 to 5 and its stamping supply base from 21 to 6 (Wincel, 1998).

Ford

Ford reduced its stamping supply base from 150 suppliers to 11. Of those 11, seven are minority owned, supporting Ford’s supplier diversity efforts (Wincel, 1998).

GEC Marconi Electronics

GEC Marconi replaced the multiple systems it used to manage and order parts with a single system. As a result, it was able to reduce its supply base from 97,000 to 28,000 and generate a yearly savings in its component costs of 15 percent (Bylinsky, 1999).

Harley-Davidson

Harley-Davidson reports it cut its supplier base from 4,000 to 800 and shaved \$40 million off its materials costs since 1996. In addition, product-development time is down 30 percent and defect levels on bike parts have

fallen from an average of 10,000 to 48 parts per million for over 75 percent of its suppliers (Sullivan, 2001).

“Harley-Davidson has reduced its preferred less-than-truckload (LTL) carrier base to seven from 68 . . . [T]he company has trimmed \$1.5 million from transportation costs. LTL on-time performance has improved to nearly 98 percent from 95.5 percent. Service failures have been reduced substantially. Improved performance has allowed development and implementation of cross-docking opportunities, which have reduced transit times between plants by one to two days” (Bradley, 1998). Harley-Davidson consolidated its indirect spend maintenance, repair, and operation (MRO) supplier list of 3,500 down to 3 or 4 by forming an indirect materials \$86 million alliance with three major firms. These \$86 million in purchases represent about 17 percent of the company’s total purchased budget. Suppliers met Harley Davidson’s five-year goal for cost improvement in one year, reducing spend to \$57 million – a 34 percent savings and a 6 percent reduction off Harley Davidson’s total spend (Nelson et al., 2001).

IBM

“In 1993 IBM had about 4,900 production suppliers. Now about 85% of IBM’s \$17.1 billion in production purchases is with 50 suppliers.”

“Commodity councils that leverage IBM purchasing worldwide have resulted in IBM sourcing parts at price[s] that are 5%-10% below industry averages.”

“Leveraging has had a big impact on the bottom line. ‘Last year [1998] we [IBM’s Global Services Division] saved a little over \$1.5 billion on \$21 billion we spent . . . by leveraging, negotiating, and moving business to our preferred set of suppliers.’” Theresa Metty, Vice President, Global Customer Solutions and General Procurement for IBM.

“All other things being equal, we would source with a supplier who has multiple capabilities and we tell them that” (Carbone, 1999).

Intel

“Since the mid ’80s, Intel has made a serious effort to consolidate its supply base, adopting an n+1 rule-of-thumb in determining the maximum number of suppliers (‘n’) needed in each commodity area to satisfy production requirements.” That is, Intel will not have more than one extra

supplier above the minimum number needed to satisfy its production requirements. For example, the number of suppliers of leadframes has been trimmed from 12 to 3, ceramic packages from 6 to 3, and wire and molding compound from 3 to 1 (Morgan, 1995a).

John Deere Horicon Works

John Deere reports that it studied its \$70 million annual MRO spend across 40 North American units, and reduced the number of suppliers from 1675 to 20 and cut costs by 13 percent (Smock, 2001).

In 1985 Horicon had 850 suppliers. By 1991 this number was down to 160. Horicon is integrating its suppliers into its operations. It is currently helping its top 60 suppliers analyze and manage capacity and flexibility to reduce their manufacturing cycle times (Reese, 2001).

Kraft Foods

“Recent initiatives to consolidate activity [copier equipment and records retention] with a single vendor for each function are generating annual cost savings of 30 to 40 percent” (Westfall, 1999).

Lockheed Martin

Lockheed Martin’s supply base rationalization program has reduced the number of suppliers among its 17 divisions from about 80,000 to near 37,000 (Reese, 2000).

Lucent Technologies

Lucent has reduced its suppliers from 7,000 in 1998 to about 2,200 in 2000 and expects to further reduce its production suppliers to about 200 by 2002 (Carbone, 2000b).

Merck

Merck reduced its total global supplier base from 40,000 in 1992 to fewer than 10,000 in 1997 (Genna, 1997). Plans for 1998 called for an additional reduction in Merck’s active supplier base to 7,000 or less (Hunt, 1998).

Motorola

Supplier head count throughout Motorola was trimmed substantially from 1987 to 1991. In the communications sector, the supplier base was slashed from 4,200 in 1985 to 1,155 in 1991, and the number of preferred suppliers who receive 76 percent of the sector's business were slashed from 800 to 333 (Morgan, 1995b).

Motorola's communication's sector quickly reduced the number of its capacitor suppliers from 110 to about 25. The immediate cost savings in paperwork and logistics were so dramatic that they more than justified the costs of expanding Motorola's supply-base reduction efforts to other commodities. It took another year to reduce the number of suppliers to about 15, and efforts continued to trim the supply base further (Lewis, 1995). In 1991, three suppliers had 94 percent of Motorola's global capacitor business. This supply-base reduction saved the company several million dollars (Morgan, 1995b).

Nissan

Nissan plans to halve its worldwide supplier base to 4,000 by 2002 and then to leverage its increased business with the remaining suppliers to reduce prices paid by 20 percent (Magnier, 1999).

Osram Sylvania Products

In 1996, Osram Sylvania launched an intensive search for a single provider to consolidate as many of its 125 freight forwarders and customs brokers in the United States as possible, many of whom were small mom-and-pop shops. One firm got the account, and Osram Sylvania is now working to make that firm the exclusive logistics provider for the entire company (Bowman, 1999).

Sun

"Five years ago, 80 [percent] of the dollars Sun spent went to about 100 suppliers. Today [1996], 89 [percent] is spent with 20 suppliers. In fact, Sun's top five suppliers receive about 65 [percent] of Sun's purchasing dollars."

"Sun spends a lot of time working with suppliers to reduce leadtimes."
"Three years ago, Sun was on a 200-day cycle from the time it told a

supplier it needed a part to the time Sun was paid for a system it shipped to a customer. Today, it averages about 100 days; Sun wants to reduce it to 60 by next year" (Carbone, 1996).

Tennant

Tennant has deliberately whittled down its supplier base from 1,100 suppliers on its rolls in 1980 to 250 active suppliers, with a relative handful (50) enjoying the lion's share of Tennant's business in 1994.

In 1979, Tennant was ordering hydraulic hoses and fittings from 16 suppliers and was counting leaks per 100 joints. In 1985, it was down to one supplier, and leaks were down to one per 1,000 joints. By 1992, Tennant had quit counting leaks per joint altogether.

In the early 1980s, Tennant had about six coating suppliers. By 1987 over 90 percent of Tennant's coatings business was assigned to one supplier.

"Prior to 1986, Tennant was getting its steel from as many as 22 different sources." In 1995 two suppliers provided 95 percent of Tennant's steel requirements (six specialty producers satisfy the remaining 5 percent). "When it comes to establishing closer ties with suppliers, Tennant has discovered that two is more than enough company, three a definite crowd, and has come to prefer single-sourcing in most instances . . ." (Morgan, 1995c).

Texas Instruments

Texas Instruments began looking at supply base rationalization in mid-1998. Since then, it has reduced its MRO suppliers from about 5,000 to 750 using a process of evaluation that focuses on overall performance indicators, including price, quality, and delivery. The company expects to channel 90 percent of MRO purchases to 200 or fewer suppliers by the end of 2000 (Reese, 2000).

Whirlpool

Since 1998, Whirlpool reports it has reduced its supply base by about 50 percent to leverage volume, improve procurement efficiencies, and reduce overall costs (Stundza, 2001).

Xerox

From 1981 to 1985, Xerox reduced its supplier base from 5,000 to 400.¹ From 1981 to 1984, net product costs were reduced by about 10 percent per year. Rejects of incoming material were reduced by 93 percent. New product development time and cost were reduced by 50 percent. Production lead times were reduced from 52 weeks to 18 weeks (Burt, 1989).

¹Morgan (1995d) says Xerox's supply base shrank from 3,000 in 1982 to 300 in 1985.

F. INTERVIEW QUESTIONS

IMPLEMENTING IMPROVEMENTS IN THE PURCHASING PROCESS: HOW ORGANIZATIONS SUCCESSFULLY CHANGE

Interview Questions for Commercial Firms

I. OUTSOURCING BACKGROUND

- A. What are the primary reasons your organization decides to outsource activities or re-bundle and re-bid contracts?
- Better performance (quality, responsiveness, other)
 - Lower cost
 - Change in strategic vision
 - Other?
- B. What processes do you use for selecting activities and services as sourcing/re-contracting candidates?
- C. Over the past 5 years, which activities have you outsourced? For each activity,
1. How much have your costs changed? Over what time periods?
 2. How much did performance change? Over what time periods?
 3. Are you continuing to see improvements in these areas?
- D. How many providers have contracts with you for services?
- E. Which activities do you plan to subject to sourcing/re-bid competition next? Do you have any plans to change the structure of your contracts or your supplier base (e.g., issuing fewer, larger awards)?

II. ORGANIZATIONAL BACKGROUND

- A. How large is your purchasing organization?
- B. Does your firm have multiple sites in different geographic locations?
If so, is your purchasing organization centralized, decentralized, or a mixture of the two?
- C. Which of the following best describes those traits most valued by your corporate culture?

Innovation

Customer focus

Problem-solving skills

Continuous improvement

Compliance focus

Rule/procedure orientation

III. PURCHASING CHANGE INITIATIVES

- A. Are your strategic sourcing/purchasing process improvements part of a larger organizational change initiative? If so, please describe.
- B. With respect to your sourcing/purchasing process improvements,
 - 1. What event or series of events led you to shift your purchasing/sourcing processes?

Financial troubles

Loss of market share

Significant growth

Shift toward global organization/marketplace

New corporate leadership

Increased competition

Emergency situation

Supplier demands

Other?

2. What were/are the goals of your sourcing/purchasing process changes?

Reduced total cost (material, services, purchasing function)

Improved quality of material and services purchased

Higher value to the customer

Reduced cycle times (material, services, sourcing process)

Increased operational flexibility

Enhanced leverage of technology or management

More powerful competitive strategies

Other?

Who set these goals? Were they quantified and was there a time frame set for achievement? Were they clearly communicated and understood throughout the organization?

3. How do these goals relate to your firm's strategy and core activities?
4. Which purchasing processes have you changed or are in the process of changing? Who determined the priorities and scope for these change initiatives?
5. Which of the following practices best describes your former purchasing practices, and which are you currently trying to adopt?

New Paradigm:

Multifunctional team-based purchasing

Increased industry input in helping define customer needs

Output-oriented statements of objectives

Increased importance of past performance and future plans in source selection

Focus on best value or long-term total cost

Long-term alliances/contracts

More flexible contracts

Fewer providers/larger contracts
Strategic alliances
Devolving more management responsibility to providers
Post-award performance management
Frequent open communication during period of performance
Performance measurement and benchmarking
Incentives/requirements for continuous improvement by suppliers
More trust with verification
Increased risk sharing
Use of procurement cards for transactional purchases
Other?

Old Paradigm:

Functional purchasing processes
Minimal customer participation in final stages of the sourcing process
Specific compliance or procedure-oriented statements of work
Source selection based on low cost
Focus on pre-award contract negotiation
Short-term contracts/frequent re-bids
Many providers/smaller contracts
Arms-length relationships with providers
Out-tasking services/activities
Intensive oversight/monitoring
Other?

How did any industry or other regulations affect your choices of practices to change?

6. If you use cross-functional teams to carry out these purchasing practices, who are the participants associated with these practices, e.g., purchasing, human resources, legal, customer business units?
 - a. How much decision-making authority do teams have? To what extent do managers outside the team control or influence outcomes? Who has responsibility for the following?
 - Schedule team meetings
 - Select new members and/or team leaders
 - Control internal team processes
 - Make decisions
 - Present decisions to management
 - b. Are team recommendations or decisions ever rejected by management? If so, is the team given an explanation? Is there a chance to discuss or appeal the decision?
 - c. Are teams adequately resourced?
 - d. Do internal team processes and interactions work well? What kind of training are members given on working in a team environment?
 - e. Do the teams fit well into the external purchasing/corporate processes?
7. How long ago did you begin the overall purchasing change initiative? Is it complete? If so, how long did it take to fully implement changes in these processes and activities? If the change process is not complete, when do you expect to finish?
8. What are the most significant and difficult changes you have implemented? Please explain.
9. Have you undertaken any change initiatives that have failed? If so, please describe them and what you learned from these experiences.

10. If you knew then what you know now, what would you have done differently in changing your purchasing/sourcing processes?
11. What was the cost of changing your purchasing processes, e.g., direct dollars spent on training, cost of man-hours, etc.?

IV. MAKING A CASE FOR CHANGE

- A. Who in your organization motivated and supported the need for change? Senior management? Mid-level management? Purchasing management? Other? How high was their commitment to change?
- B. Did other organizations, such as suppliers, consultants, or customers help define the need for change?
- C. Who led the change effort? High-level leadership? Purchasing? Other?
- D. How and how often did you communicate the need for change throughout the organization? Who participated in this communication?
- E. Were additional resources provided to assist in implementation of changes? If so,
 1. What kinds of resources were provided (e.g., materials and supplies, time away from other duties, budgetary support)?
 2. Who provided them?

V. DEVELOPING AN IMPLEMENTATION PLAN FOR CHANGE

- A. Who was involved both formally and informally in creating a plan for implementing change in purchasing processes and what roles did they play? How important were they to the ultimate success of the changes?

Senior management

Middle/lower management

Purchasing employees

Internal customers

Outside consultants

Suppliers

Other?

Was anyone not involved who should have been?

B. Did your implementation plan include organizational changes, e.g., centralization/decentralization, sourcing teams focused on specific product groups? If so, how did the organizational changes map to your strategic goals for purchasing changes?

C. Did your implementation plan include any of the following?

New tools such as

Activity-based costing

Performance-measurement tools such as the Balanced Scorecard

Benchmarking studies

Audits

Pricing analysis

Other?

New systems such as

Databases for market research or contractor performance

Shared software for contracting teams

Web-based communication

Other?

Training opportunities such as

Formal courses (e.g., theoretical, focused on practical examples)

Formal on-the-job training solving actual workplace problems

Informal on-the-job training

Web-based training

Newsletters

Conferences

Self-study materials

Other?

D. What incentives were in place or were put in place to support purchasing changes?

Monetary awards

Non-monetary recognition

Other?

Were these tied to any of the following?

Personal performance evaluations based on participation in purchasing teams, performance of teams, and/or performance of the purchasing organization

Cost-savings goals

Efficiency of the purchasing function or process: purchase \$ per purchasing employees/teams, purchase order cycle time, etc.

Other?

E. How did you communicate the implementation plan to those involved in implementing the changes? More broadly throughout the organization? To suppliers?

VI. IMPLEMENTATION

A. Did you implement purchasing changes through a series of phases? If so, what were the phases and their associated timetables?

1. Who/which organizations were the key players in each phase? What roles did they play?
2. How were the phases selected? Moving from easier to harder initiatives? Lower risk to higher risk? Higher value for customers to lower value? Other?

B. Did you use pilot projects to begin the change implementation process? If so,

1. What were your first pilot projects and how were they selected?

2. What lessons did you learn from these pilot projects, and how were these lessons incorporated into follow-on phases?
 3. Did you abandon any change initiatives due to outcomes of the pilots?
- C. For the following participants, which skills were required to implement the desired purchasing process changes? How do these new skill requirements compare to previous requirements?
- Purchasing
- Human resources
- Accounting/finance
- Legal
- Internal customers
- Other?
- D. Did each of these groups have the required skills for implementing these changes? If not,
1. Which skills were lacking?
 2. Was training provided? If yes, what types of training (e.g., conferences, self-help guides, formal courses, certification)? How much training was provided (e.g., hours per employee)? Did you outsource training? If so, who are your provider(s)?
 3. Were any new employees with the desired skills hired?
- E. Did you upgrade any purchasing positions to reflect the more sophisticated skill levels required to implement strategic sourcing? Did you change the career paths for personnel associated with strategic sourcing activities?
- F. Did your suppliers have the skills/expertise needed to participate in strategic sourcing, implement continuous improvement, etc.? If not, did you provide any training for them?
- G. What barriers, impediments, or challenges to change have you encountered, if any (e.g., policy, culture, skills, organizational structure, information, disincentives)?

1. Who/what was the source of these barriers (e.g., senior management, middle management, line employees, industry regulations)?
 2. How did you identify and overcome them?
 3. Were these barriers addressed prior to or during the implementation of changes?
- H. Which of the following dimensions of your firm helped enable changes to your purchasing processes?
- Policy
 - Culture
 - Skills
 - Organizational structure
 - Incentives
 - Other?
- I. How applicable do you think your purchasing change process is to other business activities?

VII. FEEDBACK, REFINEMENT, AND REINFORCEMENT OF CHANGE

- A. How do you evaluate how well changes to the purchasing process have been implemented? Is this tied to your goals for purchasing process changes discussed above?
1. How do you identify the success or failure of specific change initiatives?
 - a. How do you differentiate among failures due to poor implementation, failures due to process changes that were flawed or inappropriate, and failures due to poor contractor performance?
 - b. How do you communicate results to participants in the process? Has this communication helped to convince participants who were uncertain about change?

2. How do you evaluate the performance (value-added) of the purchasing function? How do you evaluate the efficiency of the purchasing function?
 - a. Do you participate in benchmarking studies with other firms?
 3. How do you evaluate the contributions of internal customer organizations to the purchasing process?
 4. Do you hold people/organizations accountable for meeting the stated objectives of your purchasing process changes?
- B. How do you apply lessons learned from failures or successes to improve processes?
- C. Do you have a continuous improvement program for your purchasing process? If so, what are its elements?

Organizational structure

High-level support for continuous improvement

Incentives that are aligned with strategic goals

Training in new required skills

Performance measurement

Benchmarking

Other?

Have you set new goals for changes to your purchasing organization?

- D. What organizational characteristics are necessary for implementing a continuous improvement process in purchasing? For example, if you only go through the source selection for a large contract once every 5 years, it may be difficult to retain lessons learned over time.

VIII. NECESSARY CONDITIONS FOR CHANGE

- A. What do you consider to be the necessary conditions for a change in purchasing processes?

Sustained high-level support

Organizational structure that supports the change

Strategic seeding of personnel
Incentives aligned with change
Training
Performance measurement
Other?

- B. What roles do management information systems play in changing processes – both implementation and sustainment of change?
- C. Did you purchase/create a new MIS or outsource your MIS as part of the change process?

IX. MISCELLANEOUS

- A. What questions did we miss?
- B. What are the highly valued professional purchasing organizations and publications?
- C. Which firms do you consider to have the most innovative purchasing organizations?
- D. If you have the following, may we have a copy?
- A flow chart of new and old processes
 - A flow chart of new and old organizational structure
 - A copy of your implementation plan for changing purchasing processes
 - Metrics used to evaluate the purchasing organization and/or purchasing processes

Please forward any follow-up thoughts or questions concerning our research to

- Nancy Moore at (310) 451-6928 or at nancy@rand.org; or
- Laura Baldwin at (412) 683-2300 x4901 or at lbaldwin@rand.org;
or
- Cynthia Cook at (202) 296-5000 x5292 or at cook@rand.org

IMPLEMENTING IMPROVED CONTRACTING

Interview Questions for MAJCOMs and Installations

Thank you for agreeing to discuss contracting with RAND researchers. We will be using the following questions to guide the discussion during our visit. Please invite personnel who could provide useful input into these topics to the meeting.

I. ORGANIZATIONAL BACKGROUND AND OVERVIEW

- A. What is the mission/goal of your contracting organization? Do you have a strategic plan for your organization? If so, please provide a written copy of this plan if you have one.
- B. How many people work in your contracting organization? How many are military/civilian? What are their ranks/grades? How many years of experience do they average? Does experience differ between military and civilian personnel?
- C. Which of the following best describes those traits most valued in your organizational culture?

Innovations

Compliance focus

Customer focus

Rule/procedure orientation

Problem-solving skills

Risk minimization

Continuous improvement

Risk management

II. CONTRACTS

- A. What kind of contracts do you manage? (Contract values? Contract lengths? Types: firm, fixed-price; cost plus fixed fee; other? Subject: maintenance, supplies, construction, other services, other?) How many service providers do you have contracts with?

- B. What is your annual throughput or output?
- C. How many FAR Part 12 contracts do you manage? What are they? Do you have other innovative contracts that do not fall under FAR 12 guidelines?
- D. Over the past five years, which major activities have you outsourced or re-contracted? For each activity,
 - 1. How much have your costs changed? Over what time periods?
 - 2. How much did performance change? Over what time periods?
 - 3. Are you continuing to see improvements in these areas?
- E. Which activities do you plan to subject to sourcing/rebid competition next? Do you have any plans to change the structure of your contracts or your supplier base (e.g., issuing fewer, larger awards or accessing leading providers)?

III. GOALS OF ACQUISITION REFORM AND INNOVATIVE COMMERCIAL CONTRACTING

- A. The following goals are often associated with acquisition reform and innovative commercial contracting. In general, how important are these goals within your organization? Have they ever been quantified? Has there ever been a time frame set for their achievement? Do you perceive a difference in how important the goals are to (a) the Air Force, (b) your MAJCOM, (c) your installation, (d) your organization, and (e) your career development?

Product¹ outcomes

Reduce total ownership costs associated with the acquisition of new systems, support of existing systems, and other support services

Improve responsiveness/value to the war fighter and other customers in the value chain

Improve the quality of product

Reduce product design, production, and delivery cycle times

¹Throughout this questionnaire, a “product” can refer to a physical item or a service activity.

Increase operating flexibility (with respect to uncertainty in customer demand or access to improvements in providers' capabilities)

Sustain continuous improvement in total ownership cost and performance of product

Contracting process

"Regulatory" cost premium

Streamline the acquisition process to reduce contract cycle time, reduce contract oversight activities, other (please specify)

Increase flexibility in contracting

Contractor/industrial base

Increase number of offerors and/or degree of competition

Increase access to world-class business practices

Increase access to state-of-the-art commercial technologies

Integrate commercial and military industrial bases

Other (please specify)

- B. To what extent do these goals reflect (1) a real change in the way the Air Force does business; (2) a short-term, one-time effort to find cost savings that the Air Force needs now; or (3) management fads that will pass in a year or two like so many past "innovations"?

IV. PRACTICES ASSOCIATED WITH ACQUISITION REFORM AND INNOVATIVE COMMERCIAL CONTRACTING

- A. The following practices are often associated with acquisition reform and innovative commercial contracting. In general, how important is implementation of these practices within your organization? Do you perceive a difference in how important these practices are to (a) the Air Force, (b) your MAJCOM, (c) your installation, (d) your organization, and (e) your career development?

Use teams and an open process to raise and resolve issues early in the contracting process

Create and empower IPTs to resolve issues jointly at the lowest possible level

Involve customer at key points in the process

Use Electronic Data Interchange (EDI)

Define needs/requirements broadly

Solicit industry input to requirements specification/RFP

Specify performance/outcomes, not how to make or do

Increase use of commercial items and services (reduce reliance on military specifications and standards)

Conduct broad market research

Review offerors, capabilities, pricing, terms and conditions, warranties, quality systems, common incentives, management plans

Use large buyers/providers, trade journals, web pages, other government organizations as information sources

Use performance-based contracting methods

Use objective, quantifiable, regular (e.g., monthly, yearly) performance measurement

Use formal and informal incentives to promote good performance (e.g., award fees and contract terms, monitoring/oversight conditioned on performance to date, past performance as a qualification and selection criterion)

When problems arise, give providers credit for responsive and effective corrective actions

Require only cost data needed to support contract

Under FAR Part 12 contracts, require only technical cost data needed to support Economic Price Adjustment clauses

In open, long-term contracts that do not specify outcomes well enough to use firm fixed prices, share cost data, but rely on commercial accounting standards to define and audit relevant costs

Do not require access to cost data not needed to support effective joint decision-making

In the source selection process

Communicate with offerors to clarify and refine proposal/contracts

Use oral presentations when appropriate

Tighten offeror qualifications required to participate (“When in doubt, leave them out”)

Make tradeoffs among performance dimensions and cost to choose best-value provider

As criteria in source selection, in addition to data traditionally sought, use information on

Past performance (cost, quality, responsiveness) in government and commercial work; investigate negative ratings

Experience in relevant areas

Investment plans to support performance in the future

General management capabilities

Ability and/or formal programs to sustain continuous improvement

Quality and experience of subcontractors, key personnel

Quality of training programs

Quality of plan to transition for the current source to this new source

Life-cycle costs

Relevant management information systems

Develop long-term relationships based on trust, flexibility, and responsiveness

Use contractual terms and governance structures that help the provider remain aligned with the customer’s needs as they change over time

Share risks equitably to reflect relative costs imposed by surprises and relative abilities to respond to surprises

Expand workload, and hence contract size, and elements of integration discussed above as mutual satisfaction and trust grow

As satisfaction with certain suppliers grows, reduce the supplier base and invest in those suppliers who remain qualified

Encourage continuous improvement

Use formal and informal incentives to promote continuous improvement (e.g., award fees and contract terms, monitoring/oversight conditioned on performance to date, past performance as a qualification and selection criterion)

Work together to develop aggressive expectations for business/performance beyond the current contract period

Use benchmarking to set feasible performance improvement goals

Quality assurance

Reflect risks, costs, complexity, and consequences in quality plan

Focus on outcomes, not process, unless process is relevant to assessing surge capability or other abilities to respond to new requirements

Use commercial quality systems and warranties where appropriate (e.g., MIS, customer surveys, financial and operational audits, and benchmarking)

Develop governance structures and information systems that support periodic formal and frequent informal communication

Adjust plan to reflect provider's performance over time

Over time, devolve more management responsibility to providers

Shift "transactional" purchases to purchase cards

Other (Please specify)

- B. Broadly speaking, what efforts have you made toward implementing these practices in your contracting activities?
- C. Which practices have you adopted or are in the process of adopting? Who determined the priorities?
- D. How long ago did you begin to adopt acquisition reform and innovative contracting practices? Have you fully adopted them? If not, how long will it take you to do so?
- E. What are the most significant and difficult changes you have made? Please explain.
- F. Have any of the new practices resulted in successes or failures? If so, please describe them and what you learned from these experiences.
- G. If you can, please estimate the cost of changing your contracting practices (e.g., direct dollars spent on training, cost of man-hours, etc.)?

V. PLAYERS IN CONTRACTING PROCESSES

Contracting for services from external sources requires the following processes:

Definition of needs and requirements for specific activities

Acquisition plan/business strategy

Market research²

Choice of packaging (a.k.a. bundling) of activities/workscope

Source selection methods and criteria

Contract governance structure, terms and conditions, and pricing

Performance management (including metrics)/quality assurance plan

- A. Do you use cross-functional teams to carry out these processes? For each of these processes, which organizations (e.g., final customer, functionals, judge advocate, financial management, small business,

²Market research means different things to different people. We include (a) names and capabilities of potential offerors; (b) how commercial buyers and sellers typically package (bundle) relevant activities; and (c) contractual governance structures, terms and conditions, pricing, warranties and other quality assurance systems, and other incentives that typical commercial buyers and seller use.

contracting, Defense Contract Management Command) participate? What roles do they play? Does any one organization “own” the process? In particular, for each process that you participate in:

1. What roles do you and your organization play?
 2. What guidance do you have? Who provides that? Who is responsible for it?
 3. How much decision-making authority do teams have? To what extent do managers outside the team control or influence outcomes? Who has responsibility to
 - Schedule team meetings
 - Select new members and/or team leaders
 - Control internal team processes
 - Make decisions
 - Present decisions to management
 4. Does management ever reject team recommendations or decisions? If so, is the team given an explanation? Is there a chance to discuss or appeal the decision?
 5. Are teams adequately resourced?
 6. Do internal team processes and interactions work well? What kind of training are members given on working in a team environment?
- B. For each process that you participate in, what decisions have you made recently?
1. Did you make these decisions in ways that differed from your approach to analogous decisions in the past? How?
 2. Did you consider or use any of the practices listed in Section IV above? If so, how long have you been using them?
 3. What happened when you used these new practices?
 4. If you did not consider or use any of the practices above, why not?

VI. MAKING THE CASE FOR ACQUISITION REFORM AND INNOVATIVE CONTRACTING PRACTICES

- A. Who motivated and supported the need for changing contracting practices? DoD? Air Force? MAJCOM? Installation? Wing Commander? Purchasing management? Other? How committed are they to these changes?
- B. Did other organizations, such as suppliers, consultants, or customers reinforce the need for change?
- C. Who led the push for change? High-level leadership? Contracting? Other?
- D. How and how often did/do you communicate the need for change throughout your organization? Who participates in this communication?

VII. DEVELOPING AN IMPLEMENTATION PLAN

- A. Did/do you have a plan for implementing acquisition reform and innovative commercial contracting practices? Who was/is involved both formally and informally in creating this plan, and what roles did/do they play? How important were/are they to the ultimate success of the changes?

External organizations - DoD, Air Force, MAJCOM

Local organizations -Wing Commander, contracting flight commander

Contracting officers

Internal customers

Outside consultants

Suppliers

Other?

Was anyone not involved that should have been?

- B. Did/does your implementation plan include organizational changes (e.g., centralization/decentralization, creation of sourcing teams focused on specific product groups)? If so, what motivated these organizational changes?

C. Did/does your implementation plan include any of the following? If so, who provided resources for these?

New tools

Activity-based costing

Performance measurement tools such as the Balanced Scorecard

Benchmarking studies

Audits

Pricing analysis

Other?

New systems

Databases for market research or contractor performance

Shared software for contracting teams

Web-based communication

Other?

Training opportunities

Formal courses (e.g., theoretical, focused on practical examples)

Formal on-the-job training solving actual workplace problems

Informal on-the-job training

Web-based training

Newsletters

Conferences

Road shows

Self-study materials

Other?

Time away from other duties

D. How did you communicate the implementation plan to those involved in implementing the new practices? More broadly throughout the installation, MAJCOM? To suppliers?

- E. Broadly speaking, how do you plan to implement acquisition reform and innovative commercial contracting in your *future* contracting activities? What plans/activities exist today in your organization to prepare for these?

VIII. IMPLEMENTATION

- A. Are you implementing new contracting practices through a series of phases? If so, what are the phases and their associated timetables?
1. Who/which organizations are the key players in each phase?
 2. How were the phases selected? Moving from easier to harder practices? Lower risk to higher risk? Higher value for customers to lower value? Other?
- B. Have you or do you plan to use pilot projects to begin implementing new practices? If so,
1. What were your first pilot projects, and how were they selected?
 2. What lessons did you learn from these pilot projects, and how were these lessons incorporated into follow-on phases?
 3. Did you abandon implementation of any new practices due to outcomes of the pilots?
- C. For the following participants, which skills are required to implement the desired practices? How do these new skill requirements compare to previous requirements?
- Contracting
 - Human resources
 - Financial management
 - Legal
 - Functionals
 - Internal customers
 - Other?
- D. Did/do each of these groups have the required skills for implementing these new practices? If not,

1. Which skills were/are lacking?
 2. Did your organization receive training in acquisition reform and innovative commercial contracting practices? If yes, what types of training (e.g., conferences, self-help guides, formal courses, certification, etc). How much training was provided (e.g., hours per employee)?
 3. Was training outsourced? If so, who were your provider(s)?
 4. What other sources of information about new practices are available?
 5. What additional training do you need (e.g., formal individual training, videos, road shows, seminars, conferences, trade shows, site visits, etc.)?
 6. Have you hired any new employees with the desired skills?
- E. Have any contracting positions been upgraded to reflect the more sophisticated skill levels required to implement acquisition reform and innovative commercial contracting practices? Did you change the career paths for personnel associated with sourcing activities?
- F. Did/do your suppliers have the skills/expertise needed to participate in implementation of new practices, continuous improvement, etc.? If not, did you provide any training for them?

IX. ENABLERS AND INCENTIVES TO CHANGE

- A. Which of the following dimensions of your organization helped enable changes to your contracting practices?

Policy

Culture

Skills

Organizational structure

Incentives

Other?

- B. If incentives are an enabler of change, which of the following incentives do you and your organization have to adopt acquisition reform and innovative commercial contracting practices?

Promotion

Recognition from the Air Force

Recognition from your professional/functional peers

Increased compensation based on performance evaluation

Formal plans to share savings generated

More meaningful or challenging work

Other (please specify)

What are these tied to, e.g., participation in cross-functional teams, performance of teams, performance of the contracting organization, meeting cost-savings goals?

X. BARRIERS, IMPEDIMENTS, AND CHALLENGES TO CHANGE

- A. Which, if any, of the following disincentives do you and your organization have to adopt acquisition reform and innovative commercial contracting practices?

Fear of punishment or loss of job for breaking a law or doing something poorly

Loss of funding/reduction in budget or manpower

Pressure from your professional/functional peers

Other (please specify)

- B. Which, if any, of the following prevent or discourage you and/or your organization from applying the principles of acquisition reform or innovative commercial contracting? Who/what was the source of these (e.g., senior leadership, middle management, contracting officers and other staff employees)? If they are no longer barriers, how did you identify and overcome them? Were they addressed prior to or during the implementation of new practices?

Lack of consistent senior leadership support for new practices

Regulations or policies (please provide reference) associated with:

Type of contract

Length of contract

Size of contract

Preferences for small, minority-owned, or women-owned businesses (goals, set-asides, recommendations of Small Business Administration Procurement Center representatives)

Quality assurance methods

Other?

Lack of knowledge about, experience in, or training on using innovative practices:

Lack of understanding of the practices themselves

Uncertainty about what current regulations and policies actually allow

Difficulty sharing lessons learned across sites or activities

Turnover of personnel due to rotation, transfer, or separation:

Lack of persistent, consistent leadership over time

Loss of skills and experience once they are developed (discouraging initial investment)

Lack of ability to attract and reward/promote good employees

Availability and flexibility of resources to support:

Training and education

Market research

Up-front investments in contracts to reduce costs over time

Too busy/too much workload to change

Culture (please explain)

Organizational structure (please explain)

Lack of repetition of practices (e.g., due to fewer, longer contracts)

Other (please specify)

XI. FEEDBACK, REFINEMENT, AND REINFORCEMENT OF CHANGE

- A. How do you learn about the success or failure/poor performance of specific contracts?
1. How closely is your performance assessment tied to contract outcomes?
 2. Has anyone in your organization been adversely affected by a contract with a poor outcome or rewarded for a contract with a good outcome? Please describe.
- B. How do you evaluate how well these new practices have been implemented? Is this tied to the goals discussed in Section III?
1. How do you identify the success or failure of specific new practices?
 2. How do you differentiate between failures due to poor implementation, failures due to process changes that were flawed or inappropriate, and failures due to poor contractor performance?
 - a. How do you communicate results to participants in the process? Has this communication helped to convince participants who were uncertain about change?
 3. How do you evaluate the performance (value-added) of the contracting function? What metrics are used? Number of contracts managed, written, modified? Number of contracting actions? Funds obligated? Other? Who performs the measurement? How do you evaluate the efficiency of the contracting function (e.g., purchase dollars per employee/team, purchase order cycle time)?
 - a. Do you participate in benchmarking studies with other organizations?
 4. How do you evaluate the contributions of internal customer organizations to the sourcing process?
 5. How do you measure individual personnel performance?
 - a. Specifically, how would your effective support for acquisition reform or innovative commercial contracting affect your performance evaluation?

- b. Specifically, how would your effective participation in cross-functional teams affect your performance evaluation?
- 6. Do you hold people/organizations accountable for meeting the stated objectives of your purchasing process changes?
- C. How do you collect and share lessons and experiences within your organization? With other organizations in your MAJCOM? Across the Air Force? Do these lessons change how you perform contracting? Please describe.
- D. Do you have a continuous improvement program for your contracting organization and sourcing teams? If so, what are its elements?
 - Organizational structure
 - High-level support for continuous improvement
 - Incentives that are aligned with strategic goals
 - Training in new required skills
 - Performance measurement
 - Benchmarking
 - Other?
- E. Have you set new goals for changes to your contracting practices?
- F. Which organizational characteristics are necessary for implementing a continuous improvement process in sourcing? For example, if you only go through the source selection for a large contract once every 5 years, it may be difficult to retain lessons learned over time.

XII. NECESSARY CONDITIONS FOR CHANGE

- A. What do you consider to be the necessary conditions for implementing acquisition reform and innovative commercial contracting practices?
 - Sustained support from Air Force leadership
 - Organizational structure that supports the changes
 - Strategic seeding of personnel
 - Incentives aligned with changes
 - Training

Performance measurement

Other?

- B. What roles do management information systems play in changing practices – both implementation and sustainment of changes?
- C. Did you purchase/create a new MIS or outsource your MIS as part of the change process?

XIII. IN CLOSING

- A. What suggestions do you and your colleagues have to accelerate acquisition reform and the adoption of innovative commercial contracting practices in your organization, installation, MAJCOM, or the Air Force?
- B. If you knew then what you know now, what would you have done differently in changing your contracting practices?
- C. What did we miss? Do other issues associated with the implementation of acquisition reform or innovative commercial contracting practices need attention?
- D. What are the highly valued professional purchasing organizations and publications?
- E. Which parts of the Air Force do you consider to have the most innovative sourcing practices?
- F. If you have the following, may we have a copy?

A strategic plan for your organization

A flow chart of new and old contracting processes

A chart of new and old organizational structure

A copy of your implementation plan for changing contracting practices

Metrics used to evaluate the contracting organization, sourcing teams, and/or contracting processes

Please forward any follow-up thoughts or questions concerning our research to:

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- Laura Baldwin at (412) 683-2300 x4901 or at lbaldwin@rand.org;
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REFERENCES

- Anderson, BGen Frank J. Jr., USAF, *A Plan to Accelerate the Transition to Performance-Based Services: Report of the 912(c) Study Group for Review of Acquisition Training, Processes, and Tools for Services Contracts*, AF903T1, Department of Defense, Washington, D.C., June 25, 1999.
- Arthur Andersen Government Services, *Office of the Secretary of Defense: Industry Price-Based Acquisition Roundtable, Executive Report*, December, 1998.
- Atkinson, William, "What's in a Name? New CPO Title Reflects Buying's Strategic Role," *Purchasing*, June 1, 2000, pp. 45-51.
- Avery, Susan, "AMR lands the medal!" *Purchasing*, September 15, 1998.
- Avery, Susan, "Purchasing Is Cost Consultant for Non-Traditional Services," *Purchasing*, January 13, 2000a, pp. 77-79.
- Avery, Susan, "Purchasing Shows One Face to Suppliers," *Purchasing*, December 22, 2000b, pp. 48-51.
- Baldwin, Laura H., Frank Camm, and Nancy Y. Moore, *Federal Contract Bundling: A Framework for Making and Justifying Decisions for Purchased Services*, RAND, MR-1224-AF, 2001.
- Baldwin, Laura H., and Glenn A. Gotz, *Transfer Pricing for Air Force Depot-Level Repairables*, RAND, MR-808-AF, 1998.
- Barker, Joel Arthur, "Paradigms: The Business of Discovering the Future," *Harper Business*, 1993.
- Bartlett, Christopher A., and Sumantra Ghoshal, "Changing the Role of Top Management: Beyond Systems to People," *Harvard Business Review*, May-June 1995.

- Belyea, Kathryn, "How to Prepare for e-Commerce," *Purchasing*, July 13, 2000.
- Bensaou, M., "Portfolios of Buyer-Supplier Relationships," *Sloan Management Review*, January 1999, pp. 35-44.
- Bowman, Robert J., "Looking for Providers and Buyers with Global Reach," *Global Sites & Logistics*, September 1998, pp. 40-46, 89.
- Bowman, Robert J., "Logistics in Europe: Tear Up the Old Maps," *Global Logistics & Supply Chain Strategies*, Vol. 3, No. 6, July 1999, pp. 38-51.
- Bradley, Peter, "Harley-Davidson Keeps Its Eyes on the Road," *Logistics*, August 1998, pp. 68-71.
- Brynjolfsson, Erik, Amy Austin Renshaw, and Marshall Van Alstyne, "The Matrix of Change," *Sloan Management Review*, Winter 1997, pp. 37-54.
- Builder, Carl H., *The Masks of War: American Military Styles in Strategy and Analysis*, Johns Hopkins University Press, Baltimore, Maryland, 1989.
- Burt, David N., "Managing Suppliers Up to Speed," *Harvard Business Review*, July-August 1989, pp. 127-135.
- Bylinsky, Gene, "Challengers Are Moving in on ERP," *Fortune*, December 6, 1999, pp. 250B-250D.
- Byrne, John A., "How Jack Welch Runs GE," *Business Week*, June 8, 1998, p. 98.
- Camm, Frank, *The F-16 Multinational Staged Improvement Program: A Case Study of Risk Assessment and Risk Management*, RAND, N-3619-AF, 1993.
- Camm, Frank, and Amy Praskac, *Housing Demand and Department of Defense Policy on Housing Allowances*, RAND, R-3865-FMP, 1990.

- Camm, Frank, "Adapting Best Commercial Practice to the Department of Defense," draft chapter for RAND Graduate School book on advanced topics in defense analysis, August 1999.
- Caplan, Gayle, and Mary Teese, *Survivors: How to Keep Your Best People on Board after Downsizing*, Davies-Black Publishing, Palo Alto, CA, 1997.
- Carbone, James, "Sun Shines by Taking Out Time," *Purchasing*, September 19, 1996.
- Carbone, James, "Reinventing Purchasing Wins the Medal for Big Blue," *Purchasing*, September 16, 1999, pp. 38-62.
- Carbone, James, "Internet Is Key to Cisco Outsourcing Model," *Purchasing*, May 18, 2000a.
- Carbone, James, "Lucent's Supply Strategies Evolves," *Purchasing*, December 22, 2000b, pp. 38-47.
- Carley, William, M., "To Keep GE's Profits Rising Welch Pushes Quality-Control Plan," *Wall Street Journal*, January 13, 1997.
- Carter, Phillip L., Joseph R. Carter, Robert M. Monczka, Thomas H. Slaughter, and Andrew J. Swan, *The Future of Purchasing and Supply: A Five- and Ten-Year Forecast*, Center for Advanced Purchasing Studies, 1998.
- Casbon, Ronald D., "Implementing New and Changing Supplier Relationships Through Strategic Sourcing to Achieve Win/Win Results," Presentation to 2nd Annual Strategic Sourcing Management Conference, Institute for International Research, San Diego, CA, February 22, 1999.
- Cavinato, Joseph L., and Ralph G. Kaufman, editors in chief, *The Purchasing Handbook: A Guide for the Purchasing and Supply Profession*, Sixth Edition, National Association of Purchasing Management, McGraw Hill, New York, 1999.

- Center for Advanced Purchasing Studies (CAPS), *Executive Summary of Purchasing's Organizational Roles and Responsibilities*, Tempe, Arizona, 1996.
- Champy, James, "Reengineering: A Light That Failed," *Across the Board*, Vol. 32, No. 3, March 1995, pp. 27-31.
- Chapman, Timothy L., Jack J., Dempsey, Glenn Ramsdell, and Michael R. Reopel, "Purchasing and Supply Management: No Time for 'Lone Rangers,'" *Supply Chain Management Review*, Winter 1998, p. 65.
- Christopher, Martin, "Relationships and Alliances: Embracing the Era of Network Competition," in John Gattorna (ed.), *Strategic Supply Chain Alignment: Best Practice in Supply Chain Management*, Gower, Hampshire, England, 1998.
- Ciancarelli, Agatha, "Traits of Tomorrow's Purchasing Executive," *Purchasing*, April 8, 1999, p. 88.
- Clark, Kim B., and Steven C. Wheelwright, "Organizing and Leading 'Heavyweight' Development Teams," *California Management Review* Spring 1992, pp. 9-28.
- Collins, James C., and Jerry I. Porras, "Building Your Company's Vision," *Harvard Business Review*, Sept-Oct 1996, pp. 65-77.
- Collins, James C., and Jerry I. Porras, *Built to Last: Successful Habits of Visionary Companies*, Harper Business, New York, 1994.
- Cooper, Robin, and M. Lynne Markus, "Human Reengineering," *Sloan Management Review*, Summer 1995, pp. 39-50.
- Davidson, Pat, "Key Elements in Successful Strategic Management of Your Supply Base," presented at Strategic Sourcing Management Conference, New Orleans, LA, February 10, 1997.

- Defense Logistics Agency, *Direct Vendor Delivery and Logistics Response Time*, briefing, n.d.
- DeGeus, Arie, "Planning as Learning," *Harvard Business Review*, March/April 1988, p. 74.
- Dent, Eric B., and Susan Galloway Goldberg, "Challenging 'Resistance to Change,'" *The Journal of Applied Behavioral Science*, March 1999, pp. 25-41.
- Dertouzos, James N., Conrad P. Schmidt, Beth A. Benjamin, and David Finegold, *Facilitating Effective Reform in Army Acquisition*, RAND, DB-233-A, 1998.
- Drucker, Peter, "The Discipline of Innovation," *Harvard Business Review*, May-June 1985.
- Dubrin, Andrew J., and R. Duane Ireland, *Management and Organization*, South-Western Publishing, Cincinnati, Ohio, 1993.
- Dunphy, Dexter, and Doug Stace, "The Strategic Management of Corporate Change," *Human Relations*, Vol. 46, No. 8, 1993.
- Dyer, Jeffrey H., "How Chrysler Created an American Keiretsu," *Harvard Business Review*, July-August 1996, pp. 42-56.
- Easton, Robert, Robyn Brown, and Duncan Armitage, "The Dynamics of Change in the Supply Chain: Translating Supply Chain Strategies into Action," in John Gattorna (ed.), *Strategic Supply Chain Alignment: Best Practice in Supply Chain Management*, Gower, Hampshire, England, 1998.
- Ellram, Lisa M., and Amelia Carr, "Strategic Purchasing: A History and Review of the Literature," *International Journal of Purchasing and Materials Management*, Spring 1994, pp. 10-18.

- Erba, Joseph, Jr., "Developing Strategic Sourcing Capabilities Through the Use of Cross Functional Teams," presentation at the Strategic Sourcing Management Conference, New Orleans, Louisiana, February 1998.
- Eure, Rob, "On the Job: Corporate e-Learning Makes Training Available Anytime, Anywhere," *The Wall Street Journal*, March 12, 2001.
- Everett, *Diffusion of Innovations*, Fourth Edition, The Free Press, New York, 1995, p. 59.
- Fast Company*, "Make Yourself a Leader," special insert, June 1999.
- Fearon, Harold E., and Michael R. Leenders, *Executive Summary of Purchasing's Organizational Roles and Responsibilities*, Center for Advanced Purchasing Studies (CAPS), November 1995.
- Fernandez, Ricardo R., *Total Quality in Purchasing and Supplier Management*, St. Lucie Press, Boca Raton, Florida, 1995.
- Fitzgerald, Kevin R., "For Superb Supplier Development – Honda Wins!" *Purchasing*, September 21, 1995, pp. 32-40.
- Fitzgerald, Kevin R., "Purchasing Unlocks Supply Treasures," *Purchasing*, March 11, 1999a, pp. 50-53.
- Fitzgerald, Kevin R., "Profile of the Purchasing Professional," *Purchasing*, July 15, 1999b, pp. 74-84.
- Fitzgerald, Kevin R., "Purchasing Occupies Key Position in Supply Chain," *Supply Chain Yearbook 2000*, Cahners, New York, New York, 2000a, p. 21.
- Fitzgerald, Kevin R., "IBM Corp. Transforms Itself into a Supply Chain Leader," *Supply Chain Yearbook 2000*, Cahners, New York, New York 2000b, pp. 36-37.

- General Accounting Office, *Best Practices: DoD Teaming Practices Not Achieving Potential Results*, GAO-01-510, April 10, 2001.
- Genna, Albert, "How Merck Leverages Supply for Profit," *Purchasing*, September 4, 1997.
- George, Stephan, and Arnold Weimerskirch, *Total Quality Management: Strategies and Techniques Proven at Today's Most Successful Companies*, John Wiley & Sons, Inc., New York, 1994.
- Gilmore, Thomas N., and James Krantz, "Resolving the Dilemmas of Ad Hoc Processes: Parallel Processes as Scaffolding," in Alan Altschuler and Tobert D. Behn (eds.), *Innovation in American Government: Challenges, Opportunities, and Dilemmas*, Brookings Institution Press, Washington, D.C., 1997, pp. 301-318.
- Giunipero, Larry C., and Dawn H. Percy, "World-Class Purchasing Skills: An Empirical Investigation," *The Journal of Supply Chain Management*, Fall 2000, pp. 4-13.
- Goldfeld, Charles, *Supplier Strategies*, PT Publications, Inc., Palm Beach, Florida, 1999.
- Goldratt, Eliyahu, *The Haystack Syndrome: Sifting Information Out of the Data Ocean*, North River Press, New York, 1990.
- Gormley, William T., Jr., and David L. Weimer, *Organizational Report Cards*, Harvard University Press, Cambridge, MA, 1999.
- Greenfield, David (ed.), "Harley-Davidson's Parts and Accessories Division Integrates Purchasing and Inventory Management," *APICS – The Performance Advantage*, April 1998, pp. 44-47.
- Hamel, Gary, and C. K. Prahalad, *Competing for the Future*, Harvard Business School Press, Boston, Massachusetts, 1994.

- Hatry, Harry P., with Joseph S. Wholey, *Performance Measurement: Getting Results*, Urban Institute Press, Washington, D.C., 1999.
- Hunt, Jennifer L., "Linking Local Purchasing Activity to Global Procurement Strategy," *Performance Measurements for the Purchasing Function*, Institute for International Research Conference, La Jolla, CA, June 15-16, 1998.
- John Deere, "Sourcing Strategies," *Supply Management Strategies*, 1997.
- John Deere, "Supplier Relationships," *Supply Management Strategies*, 1997.
- Junkins, Jerry R., "Insights of a Baldrige Award Winner," *Quality Progress*, March 1994, pp. 57-58.
- Juran, J. M., "The Upcoming Century of Quality," *Quality Progress*, August 1994, pp. 64-71.
- Kolchin, Michael G., and Larry Giunipero, *Purchasing Education and Training Requirements and Resources: Executive Summary*, Center for Advanced Purchasing Studies, Tempe, Arizona, 1993.
- Kooker, Naomi R., "Think Bigger, Better, Bolder: The Best Companies Empower Purchasing Pros to Rise to the Next Level," *Purchasing*, December 8, 2000, pp. 60-65.
- Kotter, John P., *Leading Change*, Harvard Business School Press, Boston, Massachusetts, 1996.
- Kotter, John P., "Leading Change: Why Transformation Efforts Fail," *Harvard Business Review*, March-April 1995.
- Kotter, John P., and L. A. Schlesinger, "Choosing Strategies for Change," *Harvard Business Review*, March-April 1979, pp. 106-114.
- Koumartzelis, Christina, "Purchasing in the Future Will Require Higher Skill Levels," *Purchasing*, December 11, 1997.

- KPMG Consulting, *Global Supply Chain Benchmarking and Best Practices Study: Phase II*, 1999.
- Kraljic, Peter, "Purchasing Must Become Supply Management," *Harvard Business Review*, September-October 1983.
- Lange, Richard J., and Gail Conkin Vavruska, "Training: Getting the Most Out of Your Investment," *APICS – The Performance Advantage*, December 1998, pp. 36-38.
- Larkin, T. J., and Sandra Larkin, "Reaching and Changing Frontline Employees," *Harvard Business Review*, May-June 1996, pp. 95-104.
- Laseter, Timothy M., *Balanced Sourcing: Cooperation and Competition in Supplier Relationships*, Josey-Bass Publishers, San Francisco, California, 1998.
- Latamore, G. Berton, "Reengineer or Perish," *APICS – The Performance Advantage*, January 1999, p. 47.
- Leclere, Bernard, "Developing a Strategic Sourcing Organization," Institute for International Research Strategic Sourcing Management Conference, New Orleans, LA, February 9-11, 1998.
- Leonard-Barton, Dorothy, *Wellsprings of Knowledge: Building and Sustaining Sources of Innovation*, Harvard Business School Press, Massachusetts, Boston, 1996.
- Lewis, Jordan D., *The Connected Corporation*, The Free Press, New York, 1995.
- Liker, Jeffrey K., and Yen-Chun Wu, "Japanese Automakers, U.S. Suppliers and Supply-Chain Superiority," *Sloan Management Review*, Fall 2000, pp. 81-93.
- Magnier, Mark, "Nissan Unveils Plan for Sweeping Restructuring," *Los Angeles Times*, October 10, 1999.

- Marcum, Cheryl, Lauren Sager Weinstein, Susan Hosek, and Harry Thie, *DoD Political Appointments: Positions and Process*, RAND, MR-1253-OSD, 2001.
- Mark, J. H., and M. A. Goldberg, "Alternative Housing Price Indices: An Evaluation," *American Real Estate and Urban Economics Association Journal*, Vol. 12, 1984, pp. 30-49.
- Marrow, A. J., *Making Management Human*, McGraw-Hill, New York, 1957.
- Mauer, Rick, *Beyond the Wall of Resistance: Unconventional Strategies That Build Support for Change*, Bard Books, Austin, Texas, 1996.
- Mazel, Joseph L. (ed.), "New Technology Skills Purchasing Pros Need to Meet Job Challenges," *Supplier Selection and Management Report*, Institute of Management and Administration, New York, New York, November 1998.
- McCormick, John, "Scoring Goals Towards Cost Reduction," [Commercial Vehicle Sourcing/Automotive Sourcing.com](#), Vol. VII, No. 3, 2000, pp. 72-78.
- McFadden, Randall, Director, ACC Contract Program Squadron, Langley Air Force Base, VA, electronic correspondence, November 1, 1996.
- McGuire, W. J., "Attitudes and Attitude Change" in G. Lindzey and E. Aronson (eds.), *The Handbook of Social Psychology*, Third Edition, Random House, New York, 1985, pp. 233-346.
- Melymuka, Kathleen, "GE's Quality Gamble," *Computerworld*, June 8, 1998, pp. 64-66.
- Milgrom, Paul, and John Roberts, "The Economics of Modern Manufacturing: Technology, Strategy, and Organization," *American Economic Review*, Vol. 80, 1990, pp. 511-528.

- Milligan, Brian, "Supplier Consolidation Brings New Challenges," *Purchasing*, August 12, 1999.
- Milligan, Brian, "Aerospace Buyers Boost Supply Chain Emphasis," *Purchasing*, July 13, 2000, pp. 241-248.
- Minahan, Tim, "AlliedSignal Soars by Building Up Suppliers," *Purchasing*, September 18, 1997.
- Monczka, Robert M., and Robert T. Trent, *Cross-Functional Sourcing Team Effectiveness*, Center for Advanced Purchasing Studies, Tempe, Arizona, 1993.
- Morgan, James P. (ed.), "The Problem of Getting and Developing World-Class Suppliers," *Working with World Class Suppliers, Purchasing*, 1990.
- Morgan, James P. (ed.), "Inside Intel," *Purchasing's Book of Winners*, 1995a, p. 101.
- Morgan, James P. (ed.), "It's the Ability to Accept Change," *Purchasing's Book of Winners*, 1995b, p. 13.
- Morgan, James P. (ed.), "Swept Away by Tennant," *Purchasing's Book of Winners*, 1995c.
- Morgan, James P. (ed.), "It Takes Skill to Manage Suppliers," *Purchasing's Book of Winners*, 1995d.
- Morgan, James P. (ed.), "Strategies for Non-traditional Buying," *Purchasing*, 1999.
- Morgan, James P., "Cessna Charts a Supply Chain Flight Strategy," *Purchasing*, September 7, 2000a, pp. 42-61.
- Morgan, James P., "How Effective Are Your Measurement Systems," *Purchasing*, December 2, 2000b, pp. 26-28.

- Nadler, David A., Robert B. Shaw, and A. Elise Walton and Associates, *Discontinuous Change: Leading Organizational Transformation*, Jossey-Bass, San Francisco, California, 1995.
- Nadler, David A., Michael L. Tushman, and Mark B. Nadler, *Competing by Design*, Oxford University Press, New York, 1997.
- Nelson, David, "Understanding How Strategic Sourcing Differs from Traditional or Tactical Purchasing and How It Can Benefit Your Organization," Institute for International Research Strategic Sourcing Management Conference, New Orleans, LA, February 9-11, 1998.
- Nelson, Dave, Rick Mayo, and Patricia E. Moody, *Powered by Honda: Developing Excellence in the Global Enterprise*, John Wiley & Sons, Inc., New York, 1998.
- Nelson, Dave, Patricia E. Moody, and Jonathan Stegner, *The Purchasing Machine: How the Top Ten Companies Use Best Practices to Manage Their Supply Chains*, The Free Press, New York, 2001.
- Office of Inspector General, Department of Defense, *Audit Report: Response Time for the Direct Vendor Delivery Process*, Defense Supply Center, Report Number 99-101, Columbus, Ohio, March 4, 1999, p. 7.
- Osborne, David, and Ted Gaebler, *Reinventing Government: How the Entrepreneurial Spirit Is Transforming the Public Sector*, Addison-Wesley, New York, 1992.
- Ostroff, Frank, *The Horizontal Organization: What the Organization of the Future Looks Like and How It Delivers Value to Customers*, Oxford University Press, New York, 1999.
- Ouellette, Ron, and Jay Pittinger, "Microsoft Manages Growth with an Integrated Facilities Management Agreement," Tradeline New Facilities Management Strategies Conference, San Diego, August 6-7, 1997.

Owens, Gregory, Oliver Vidal, Rick Toole, and Donovan Favre, "Strategic Sourcing: Aligning Procurement Needs with Your Business Goals," in John Gattorna (ed.), *Strategic Supply Chain Alignment: Best Practice in Supply Chain Management*, Gower, Hampshire, England, 1998.

Patterson, James L., and J. Dougal Nelson, "Executive Summary: OEM Cycle Time Reduction Through Supplier Development," *PRACTIX, Best Practices in Purchasing and Supply Chain Management*, Vol. 2, No. 3, March 1999.

Perry Johnson, Inc., *QS-9000: An Executive Overview*, Southfield, Michigan, 1995, cited in "QS-9000: Quality," *Automotive Engineering*, June 1995, pp. 61-65.

Peterson, Paula, "Going Beyond e-Procurement Today – What's Next?" presentation at Strategic Sourcing: e-Procurement in a New Economy Conference, Institute for International Research, San Diego, California, November 13-15, 2000.

Porter, Anne Millen, "Supplier Ratings Affect Buyer Rewards," *Purchasing*, June 3, 1999a, pp. 73-77.

Porter, Anne Millen, "Firms Give Purchasing More Central Control," *Purchasing*, July 15, 1999b, pp. 34-35.

Porter, Anne Millen, "The Virtual Corporation: Where Is It?" *Purchasing*, March 23, 2000, pp. 40-48.

Porter, Michael E., "What Is Strategy?" *Harvard Business Review*, November-December, 1996, pp. 61-78.

Purchasing, "NAPM Will Roll Out Revised C.P.M. Exam in 2001," June 1, 2000a, pp. 32-33.

Purchasing, "Supplier Development: Half Work with Suppliers, Half Don't," June 15, 2000b, pp. 20-22.

- Purchasing*, "Comp Rates Hit 13-Year High," December 8, 2000c, pp. 50-58.
- Rae-Dupree, Janet, "Can Boeing Get Lean Enough?" *Business Week*, August 30, 1999, p. 182.
- Raia, Ernest, "1991 Medal of Professional Excellence. Adopting the Golden Rule, Motorola Is Applying Everything It Has Learned About Quality to Its Suppliers," *Purchasing*, September 26, 1991.
- Reese, Andrew, "eProcurement Takes on the Untamed Supply Chain," *iSource*, November 2000, p. 108.
- Reese, Andrew K., "Where S3 Doesn't Apply – Yet," *iSource*, April 2001, p. 61.
- Reichers, Arnon E., John P. Wanous, and James T. Austin, "Understanding and Managing Cynicism About Organizational Change," *Academy of Management Executive*, Vol. 11, No. 1, 1997, pp. 48-59.
- Ridge, Pamela Sebastian, "American Standard Polishes Its Brand for Future Growth," *The Wall Street Journal*, August 28, 2001.
- Rogers, Everett M., *Diffusion of Innovations*, Fourth Edition, The Free Press, New York, 1995, p. 262.
- Rudzki, Robert A., "Leading Strategic Change at Bethlehem Steel," *Supply Chain Management Review*, January/February 2001, pp. 34-42
- Russo, William M., "Managing Change at Chrysler: A Voyage of Discovery," briefing at RAND, July 31, 1997.
- Schein, Edgar, H., "How Can Organizations Learn Faster? The Challenge of Entering the Green Room," *Sloan Management Review*, Winter 1993.
- Schiemann, William, "Why Change Fails," *Across the Board*, April 1992, pp. 53-54.

- Schmidt, Conrad P., *Changing Bureaucratic Behavior: Acquisition Reform in the United States Army*, MR-1094-A, RAND, 2000.
- Schrage, Michael, "Notes on Collaboration," *Wall Street Journal*, June 19, 1995.
- Senge, Peter, Art Kleiner, Charlotte Roberts, Richard Ross, George Roth, and Bryan Smith, *The Dance of Change: The Challenge of Sustaining Momentum in Learning Organizations*, Doubleday, New York, 1999.
- Senge, P. M., *Fifth Discipline: The Art and Practice of the Learning Organization*, Doubleday, New York, 1990.
- Smeltzer, Larry R., "Executive and Purchasing Leadership in Purchasing Change Initiatives," *International Journal of Purchasing and Materials Management*, November 1998, pp. 12-19.
- Smith, K. K., *Groups in Conflict: Prisons in Disguise*, Kendall/Hunt, Dubuque, Iowa, 1982.
- Smock, Doug, interview with Chris Sawchuck in "Reorganizing for E-Buying: This Ain't Your Grandfather's Purchasing Professional," *Purchasing*, November 16, 2000.
- Smock, Doug, "Deere Takes A Giant Leap," *Purchasing*, September 6, 2001.
- Spencer, Karen L., review of "Beyond the Wall of Resistance: Unconventional Strategies That Build Support for Change," by Rick Mauer, *Academy of Management Executive*, Vol. X, No. 1, February 1996, pp. 90-92.
- Stallkamp, Thomas T., "Chrysler's Leap of Faith: Redefining the Supplier Relationship," *Supply Chain Management Review*, Summer 1998, pp. 16-23.
- Stewart, Thomas A., "See Jack. See Jack Run Europe," *Fortune*, September 27, 1999, pp. 124-136.

- Stratton, Brad, "Goodbye, ISO 9000; Welcome Back, Baldrige Award," *Quality Progress*, August 1994, p. 5.
- Strebel, Paul, "Why Do Employees Resist Change?" *Harvard Business Review*, May-June 1996, pp. 86-92.
- Stundza, Tom, "Aerospace Purchasing Gets Overhauled," *Purchasing*, June 3, 1999, pp. 66-73.
- Stundza, Tom, "Prepping the Supply Base for Leaner Supply Systems," *Purchasing*, June 1, 2000a, pp. 62-68.
- Stundza, Tom, "New Era Dawns at Boeing," *Purchasing*, August 10, 2000b, pp. 34-48.
- Stundza, Tom, "Whirlpool Aims to Cut Costs 5% Annually," *Purchasing*, August 9, 2001, pp. 17-24.
- Sullivan, Missy, "Harley's Supply Chain Makeover," *Forbes*, September 10, 2001.
- Tang, Christopher S., "Supplier Relationship Map," *International Journal of Logistics: Research and Applications* 2, 1999, pp. 39-56.
- Thie, Harry, Margaret Harrell, and Clifford Graf II, "General and Flag Officer Careers: Consequences of Increased Tenure," RAND, unpublished.
- Trent, Robert J., "Applying TQM to SCM," *Supply Chain Management Review*, May/June 2001, pp. 70-78.
- Trent, Robert J., "Individual and Collective Team Effort: A Vital Part of Sourcing Team Success," *International Journal of Purchasing and Materials Management*, November 1998, pp. 46-54.

- Trent, Robert J., and Robert M. Monczka, "Purchasing and Supply Management Trends and Changes Throughout the 1990s," *International Journal of Purchasing and Materials Management*, Fall 1998, pp. 3-4.
- United States Air Force, *Performance Based Services Contracts (PBSC)*, Air Force Instruction 63-124, 1 April 1999a.
- United States Air Force, *Statistical Digest*,
<http://www.saffm.hq.af.mil/FMC/statdigest/digest.html>, 1999b.
- U.S. Bureau of Economic Activity, *Survey of Current Business*, Vol. 79, March 1999.
- U.S. Department of Commerce, *Bureau of Labor Statistics Handbook of Methods*, Washington, D.C., 1988, pp. 175-176.
- U.S. Department of Commerce, *Statistical Abstract*, Table 538, 1998, p. 339.
- Westfall, Steve, "Benchmarking at Kraft Foods Gets Results," *FM DATA Monthly*, April 1999.
- Wiggenhorn, William, "Motorola U: When Training Becomes an Education," *Harvard Business Review*, July-August 1990, pp. 71-83.
- Wincel, Jeffrey P., "A Practitioner's View of Strategic Procurement," *Supply Chain Management Review*, Summer 1998, pp. 56-64.
- Wisner, Joel D., and Keah Choon Tan, "Supply Chain Management and Its Impact on Purchasing," *The Journal of Supply Chain Management*, Fall 2000, pp. 33-42.
- Womack, James P., and Daniel T. Jones, *Lean Thinking: Banish Waste and Create Wealth in Your Corporation*, Simon & Schuster, New York, 1996.