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NATIONAL DEFENSE INDUSTRIAL ASSOCIATION
Manufacturing Division – Supply Chain Network Committee

Recovering the Domestic Aerospace and Defense Industrial Base

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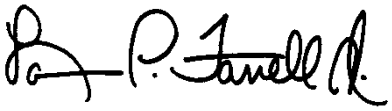
Preface

Amid today's concerns about the health and viability of the U.S. defense industrial base, you may be surprised to learn that there are many capable U.S. manufacturers that simply choose not to work in the aerospace and defense industries. This was one of the findings in a survey by the NDIA's Manufacturing Division when it recently looked at issues impacting the industrial base.

The division surveyed small- and medium-sized U.S. manufacturers to identify what could be done to get more manufacturers involved. This paper summarizes the survey results, identifying issues that prevent new suppliers from entering the aerospace and defense industries and previous suppliers from returning. The paper also provides evidence that the existing supplier base may not be the most conducive to helping the industry meet expanding requirements for improved security, higher levels of innovation and greater responsiveness.

NDIA's Manufacturing Division prepared this document to inform government leaders of the challenges we face in recovering the aerospace and defense industrial base. More importantly, the paper provides guidance for steps that can be taken to make the aerospace and defense industries more attractive to U.S. manufacturers—a key step in the recovery process. Additional copies of this white paper can be found at: http://www.ndia.org/Divisions/Divisions/Manufacturing/Documents/White%20Papers%202011/NDIA%20White%20Paper-Recovering%20A-D%20Industrial%20Base_FINAL.pdf

Sincerely,



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Lieutenant General, USAF (Ret.)
President and CEO

Table of Contents

About The National Defense Industrial Association (NDIA)

NDIA is America's leading defense industry association promoting national security. NDIA is proud to provide a legal and ethical forum for the exchange of information between industry and government on national security issues. Our members foster the development of the most innovative and superior equipment, training and support for our warfighters and first responders through our divisions, local chapters, affiliated associations and events.

NDIA has 34 divisions focusing on a broad spectrum of issues for defense and the national security industrial base. The Manufacturing Division, which has authored this paper, focuses its interests and actions on enhancing the security of the United States by promoting interaction and collaboration between government, industry and academia in the vital areas of manufacturing research, design, development, test, technology and production.

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Recovering the Domestic Aerospace and Defense Industrial Base

Overview

There should be no surprise that the available pool of U.S. manufacturers for American aerospace and defense needs is shrinking. What is surprising is that there are plenty of capable domestic suppliers that choose not to participate in the industry. Even more surprising is that many of the reasons why can be easily overcome, which would help ensure a viable U.S. industrial base for aerospace and defense. This paper will explore the reasons why domestic suppliers avoid this industry and the supply chain evolution that makes the issue ever more critical. Finally, we will discuss what can be done to address these challenges.

Findings Summary

A survey to identify key challenges for small- to medium-sized enterprises (SMEs) to participate in the aerospace and defense (A&D) industry was conducted by the National Defense Industry Association (NDIA) Manufacturing Division. This survey of nearly 100 manufacturers, carried out by the Division's Supply Chain Network Committee, specifically targeted domestic SMEs that are currently or had been in the past involved as suppliers in A&D supply chains. The findings point to some disturbing trends now plaguing the A&D supply chain.

- **Supplier obstacles are many.** Lack of transparency, underfunded programs, a lack of sufficient demand visibility and burdensome qualification requirements were all cited by those suppliers interested in getting involved in this industry.
- **Most previous A&D suppliers won't return.** Of the U.S. firms that were previously A&D industry suppliers, 63 percent indicated that they were 80 percent less likely to become an A&D industry supplier again. This implies that there is something about the A&D industry that makes it unattractive to past suppliers.
- **The current domestic A&D supply base is not conducive to innovation.** The supply base is "too stable," with more than 50 percent of the survey respondents having been

in the industry for more than 15 years. While stability is conducive to trust and cooperation, it is not conducive to innovation as the resulting complacency is the enemy of innovation.

When taken in total, the findings point to the need for action now if the A&D industry is to benefit from the presence of a strong, vibrant and healthy supplier base in the future. To ensure such a supplier base, the A&D industry must focus on three actions.

- **Reduce the obstacles.** Whether it is identifying the opportunity, qualifying as a supplier, submitting quotes or handling the ongoing reporting, the obstacles in the A&D industry require more time and money from the SMEs than do other industries. Specific actions are explained in the recommendations section of this paper and include:
  - Explore ways to more efficiently describe needs and then proactively match them with manufacturer capabilities;
  - Streamline and standardize manufacturer qualification requirements across all government agencies; and,
  - Eliminate all non-value added activities, particularly those that flow down to the SMEs.
- **Increase transparency.** Frustration with the lack of transparency into the bidding and awarding process was cited as a key reason to avoid the A&D industry. Transparency would not only reassure suppliers that decisions are fair, it also would help them learn so they can improve on subsequent bid attempts.
- **Aggregate capability and capacity needs across programs.** While there may not be enough demand for a certain qualified SME supplier on one program, there often is enough demand across multiple programs to keep the SME healthy and viable. (NASA is already achieving success in this area.) The goal should be to keep and attract qualified, appropriate suppliers by ensuring that overall there is enough demand to meet their needs.

Background

On October 11 2010, the *Wall Street Journal* (Raice & Ante, 2010) reported that the U.S. Department of Defense (DoD) had inserted a little-noticed measure (Section 815) into the 2011 Senate Defense Authorization Action. This section was designed to give the DoD more control over the domestic defense supply chain by allowing it to exclude certain foreign parts suppliers as security risks. This action underlines the importance of not only security to the DoD but also the increasing significance of the supply chain and the *industrial supplier base* (the set of suppliers available to work with the military). These issues extend beyond DoD to the broader audience of the A&D industry—the focus of this paper.

As noted by researchers such as Christopher (2000), in today's environment, it is no longer organization competing against organization; rather, it is supply chain competing against supply chain. Consequently, any organization and any industry finds itself highly dependent on its supply chain and on the set of suppliers that make up its supplier base.

The supply chain and its associated supplier base significantly influence the ability of the firm or industry to achieve the desired outcomes of cost, quality, responsiveness, resilience, security, sustainability, and innovation (Melnyk, Davis, Spekman, & Sandor, 2010b). With this recognition of the importance of the supply chain also comes the awareness that, for the supply chain and the supplier base to support and meet the objectives and needs of its customer, the supply chain should be healthy, dynamic, and vibrant (Melnyk, Cooper, Griffis, Macdonald & Phillips, 2010a).

Key to this requirement is the ability of the industry to be able to attract and retain qualified suppliers at all tiers—first, second, third and beyond. This ability is critical because supply chains are inherently dynamic, with existing suppliers leaving for such reasons as bankruptcy, acquisition, or changes in strategic direction. The domestic suppliers who have left the A&D industry must be replaced by new suppliers who can quickly fill in the gap.

Attracting and retaining the "right" qualified suppliers is not an easy task. It involves more than simply discovering these suppliers (Melnyk et al., 2010a); it involves the challenge of "attractiveness." For the A&D industry, this means assessing how attractive this industry is to these potential suppliers. This is especially critical when dealing with domestic SMEs. In today's environment, it is important to remember that the A&D industry is not the only industry seeking out qualified SMEs; this industry is in competition with other industries (e.g., medical, energy, automotive) for the same firms.

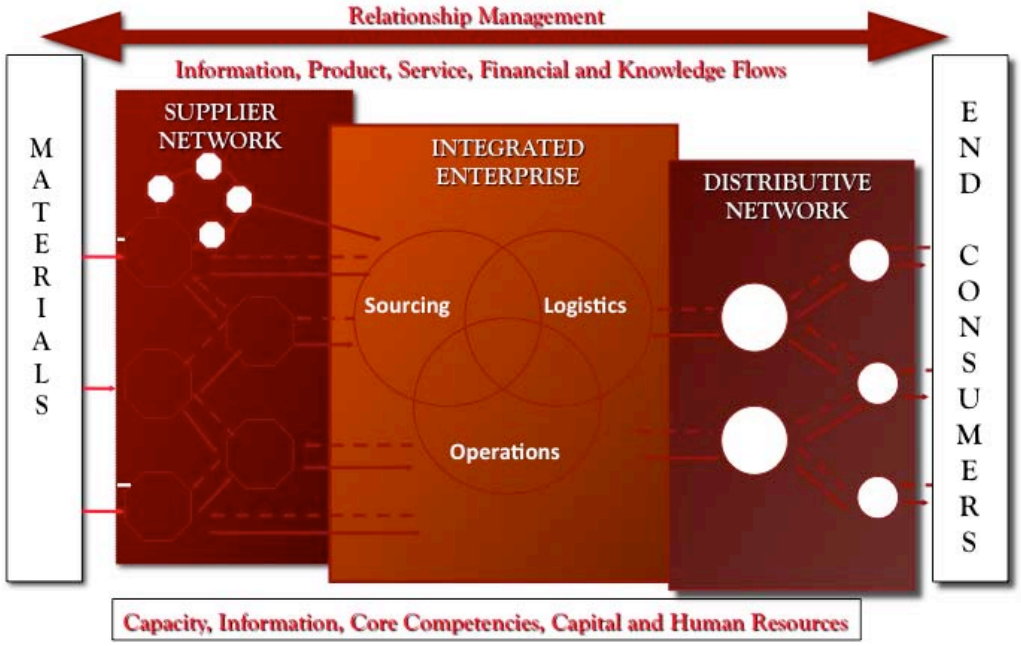
The NDIA survey yields significant implications of the lack of attractiveness of the A&D industry and its inability to attract and retain qualified domestic suppliers. These results are best understood in the context of today's A&D supply chains. Of particular note is the growing importance of small- to medium-sized manufacturers in the supply chain as the large "primes" and first-tier suppliers shift more to being integrators.

Evolving Supply Chains in the A&D industry

The last twenty years have seen the emergence of the supply chain (see Figure 1) as a critical competitive force in today's increasingly turbulent marketplace (Lee and Billington, 1992; Lee, 2004, Melnyk, Lummus, Vokurka, Burns, and Sandor, 2009). By drawing on the capabilities (i.e., capacity and skills) offered by the supply chain (the set of suppliers who work either directly or indirectly with the firm) and by developing and fostering appropriate ties with its customers at the various stages, firms can realize significant benefits in the form of reduced inventories,

lower costs, enhanced responsiveness, and improved strategic focus in terms of design, execution and capital investments (Harvard Business Review, 2006). Providing further support for supply chain management's impact on performance, AMR (a leading supply chain research organization) reported that the top 25 companies with best supply chain practices for 2008 reported an average return of 17.89 percent as compared to 6.43 percent for the Dow Jones Industrial Average (DJIA) and 3.53 percent for the S&P 500 (Reuters, January 10, 2008).

Figure 1
The "Prototypical" Supply Chain



More importantly, the advent of the supply chain as a competitive weapon has changed the strategic locus. In the past, the locus was the firm; today, the locus is the supply chain (Christopher, 2000; Ketchen & Hult, 2007). In other words, what this means is the firm or the industry is no stronger than its supply chains. A strong supply chain translates into a strong system; a weak supply chain significantly hinders the firm and the industry. Yet, for the supply chain to be strong, it must be healthy. For the supply chain to be considered healthy, it must possess certain critical traits.

First, it must have the "*right*" number of suppliers. Like Goldilocks, the supply chain cannot have too few suppliers—this discourages innovation while encouraging increased costs and overall complacency. Also, it cannot have too many suppliers, as it then becomes difficult to manage the supply chain as more resources and time are tied up in administering the various suppliers. With too many suppliers, there is also a greater chance of unqualified suppliers entering the system. Finally, with too many suppliers, we run the risk of being unable to use

leverage. That is, our order quantities are spread over too many suppliers with the result being that we often pay too much as we are unable to use our volume to reduce price.

Second, we must recognize the need for turnover in the supply chain. There are distinct attractions associated with stability in the supply chain—trust, long-term working relationships, and familiarity—to name a few. However, against these advantages there exist some significant disadvantages. Without some degree of turnover, complacency emerges. Without new competitors entering the supply chain looking for business, there is little or no pressure on the existing firms to reduce prices or to enhance the competitiveness and attractiveness of their products and services. Without new entrants having different ways of looking at existing problems, the level of innovation deteriorates. As we have learned from biology, the entrance of new species is critical to survival and growth of any genetic pool. Without the entrance of new members, the species is destined to atrophy.

Finally, the supply chain must be consistent with the desired outcomes. As recently noted by Melnyk, Davis, Spekman and Sandor (2010b), supply chains are not simply cost driven; they are outcome-driven. That is, all supply chains are built around six basic, major outcomes:

- ***Cost*** – reducing price (initially) and cost (ultimately) is the key focus. Delivery and quality, while important, are secondary considerations and considered part of this outcome. It is important to recognize the difference between price and cost. Price focuses on what you pay for the good or service—it is the price found in the contract or on the tag. In contrast, cost represents all of the costs incurred including acquisition, storage, rework, and all other associated costs over the life of the product or services. As such, cost is a broader concept.
- ***Responsiveness*** – The ability to change quickly in terms of volume, mix or location in response to changing conditions. Typically, responsiveness warrants a higher price.
- ***Security*** – This involves supply chains that are safe and protected from external disruptions. Security is a relatively new requirement but has gained a great deal of attention recently, with cases of tainted food products from China and generic drugs from India.
- ***Sustainability*** – This outcome is different from security; it involves "green" supply chains that are environmentally responsible.
- ***Resilience*** – This refers to supply chains that can deal with unexpected disruptive conditions or threats to supply, ranging from natural disaster to bankruptcies or even political embargos.
- ***Innovation*** – In recent years, many firms have increasingly relied on their supply chain as a source of product and process innovation. For example, IKEA long ago generated a competitive advantage by changing how products were delivered. More recently, Proctor and Gamble involved both suppliers and customers in its highly successful new "connect and develop" innovation process.

The most effective supply chains are a blend of these outcomes—a blend that is attractive to the critical customers (and for which these same customers are willing to pay) and that differentiates them in the minds of the customer. Achieving and delivering the desired blend of outcomes to the customer cannot be achieved by accident. It requires not only strategic planning and intent; it also requires having the "right" supply chain and the "right" supplier base in place. It is interesting to note that many of the "experts" who were asked to review the survey instrument used in this study strongly felt that many of the current A&D supply chains have been allowed to evolve, rather than being designed or planned. Their structure and their outcomes often reflect the path of least resistance (people did what created the least amount of conflict) rather than doing what was most appropriate.

Advanced Supply Chain Strategies Increase Supplier Base Emphasis

As observed by Melnyk et al. (2010a), the supplier base is essentially the upstream portion of the supply chain. This portion consists of all *qualified* and *appropriate* suppliers—first, second, third tier and beyond. The two adjectives preceding "suppliers" are critical because they indicate that not all suppliers are equal and that not all belong in the supplier base. The first adjective—qualified—refers to the fact that we are dealing with suppliers that can meet our needs, that are financially stable, and that have the appropriate systems and infrastructure in place. The second adjective—appropriate—refers to whether the suppliers being considered can deliver the capabilities needed by the firm. These capabilities deal with the ability of the suppliers to deliver the desired set of outcomes—cost, responsiveness, security, sustainability, resilience, and innovation. A supplier who can perform at a low cost may not be able to perform when asked to become responsive, innovative, or resilient.

The supplier base is critical for several reasons. First, it influences, and can constrain, a firm's output levels. Second, the supplier base shapes the capabilities of the overall supply chain (i.e., the types of specific problems that the supply chain can address and, more importantly, the types of problems that the supply chain cannot address). Third, it can shape and influence our ability to respond quickly, both to changes in market demand and to strategic changes being implemented by the firm. However, unlike the *internal factory*—that part of the transformation process that we directly own and control—we do not own nor can we directly control, in most cases, the actions of the supplier base. Yet, firms are dependent on them for how we respond to and deal with changes and demand fluctuations in marketplace. There is more to the notion of a supplier base than this, however.

Too often the view of the supply chain is both limited and static. This "old" view of the supply chain considers only those suppliers that firms currently deal with, and focuses only on managing these existing relationships. Generally, this view ignores the fact that there are other supply chains, often competing for the same set of resources and whose actions can affect the performance of their supply chains, and that their suppliers may also be members of their

competitors' supply chains as well. In contrast, a new and different view of the supplier base is emerging. These differences are summarized in Table 1. As the table suggests, the new view takes a more holistic approach to supplier base management. It focuses on a larger set of suppliers (current and potential), recognizes that the supplier base and supplier relationships are dynamic, that the desired outcomes from the supplier base may include multiple competitive dimensions, and that attention must be paid to competitor supply chains as well as your own.

Table 1: Changing Supplier Base Views[1]

Key Issues	Old View	New View
Which suppliers to focus on	Current major suppliers (those that we do the most business with or who are important to our business)	Current major suppliers Minor suppliers Potential suppliers "Past" suppliers
Relationships	Current	Current and Future
Attention spent on past suppliers	Minimal (since they are past, they are no longer important)	Great (knowledge transfer, discussion/decision on technical support)
View of the supply chain	Static (change not considered)	Dynamic (supply chain constantly changing)
Measuring supply chain performance	Cost Quality	Multiple dimensions (depending on desired outcomes)
Awareness of other supply chains	Low (we are only concerned about our supply chain)	High (we recognize that we are in competition with other supply chains for qualified, appropriate suppliers)

Surviving with this new supplier base reality requires several important changes. First, managers must recognize that it is no longer enough to focus on managing the current major

[1] The changing view of the supplier base is influenced by a change in "scope" of outsourcers' expectations. In the past, large companies were more vertically integrated. Today, the large companies are typically integrators while other supply chain participants fabricate the parts. This shift will be the subject of an upcoming NDIA Manufacturing Division white paper.

suppliers. These suppliers are important; yet, the ability to maintain a healthy, vibrant supplier base is dependent on three other sets of activities.

- ***The ability to manage minor suppliers*** – The minor suppliers are important for many reasons. They represent additional capacity that can be called upon should demand suddenly and unexpectedly increase. They also represent replacements for those major suppliers who, for whatever reason, decide to leave. They represent new capabilities (skill sets) and a source of pressure on existing major suppliers to be competitive in terms of prices, quality, delivery and innovation. Finally, minor suppliers are a major source of innovation. Yet, managing minor suppliers involves more than evaluation. It is here that we evaluate, assess, improve, train, educate, and inculcate (with our values, culture, and way of doing things) these suppliers.
- ***The ability to scout*** – As noted by Melnyk et al. (2010a), scouting focuses on identifying and recruiting potential suppliers. It also involves scouting competitive supply chains to identify what changes are taking place and the reasons for these changes. More importantly, it involves assessing how attractive we are to these potential suppliers.
- ***The ability to manage transitions*** – This final skill refers to the ability of the enterprise (be it a firm or an industry) to manage seamlessly the transition of a prospective supplier to a minor supplier and finally, if appropriate, a major supplier. It also deals with the ability of the enterprise to manage the transition of a supplier out of the supply chain with the goal of minimizing or preventing the possible disruptive implications of this transition.

At the heart of these issues is access to and inclusion of the small- to medium-sized enterprise (SME). While this may not be a significant issue in some industries, the complexity and depth of A&D supply chains make it a very daunting challenge as evidenced by the survey results.

A&D Supply Chains Impose Additional Challenges

Aerospace and defense supply chains are inherently complex and deep, requiring an even greater focus on the availability of healthy and qualified domestic manufacturers. For example, Murman et al. (2002) explored outsourcing in the aerospace industry where the costs of intellectual capital and infrastructure associated with maintaining diverse technical capabilities have pressured prime contractors to utilize outsourcing. They noted that the Boeing Military Aircraft and Missile Systems report called for outsourcing 75 percent of their work by 2016—an increase from the 60 percent level reported in 1998. In addition to the changes discussed in the preceding sections, the A&D supply chain is also experiencing its own set of challenges.

- Projects now being managed have longer lives and are far more costly. For example, consider the Fairchild A-10 Thunderbolt II. This aircraft was designed with a limited life. It is still in use, even if its initial builder, Fairchild, is no longer building it. This creates a

new need to develop a supply chain designed to support the maintenance and upgrading of this aircraft.

- The role of primes has changed. In the past, they were responsible for designing and building the product. In today's world, they are more of product integration and system coordinators.
- More is expected of the A&D industry in terms of transparency and outcomes. One example of the importance assigned by investors and the government to increasing importance of transparency and governance can be seen in the passing of the Sarbanes-Oxley Act in 2002. This trend, it should be noted, is not unique to the United States. Parallels can be seen in Bill 198 (Ontario, Canada), J-SOX (Japan), German Corporate Governance Code (Germany), CLERP9 (Australia), Financial Security Law of France (France), and the King Report (South Africa).
- Demand is unpredictable with large swings in demand present. One area in which A&D industry experiences its own set of unique set of challenges involves demand patterns. On average, order quantities are relatively small, product requirements high, and demand is highly unpredictable. One reason for demand being unpredictable is that A&D industry deals a lot with uncertainty, as compared with risk. With risk, a manager can predict with confidence both the probability of an event occurring and the impact; with uncertainty, this is not the case. The A&D industry is tasked with responding to events characterized by high uncertainty—a sudden uprising in a country or a natural disaster. Further complicating this situation is the nature of planning within this industry. When dealing with military campaigns, for example, the planners do not necessarily want to share information with their supply chain—surprise is a valued asset. In addition, once the event takes place, rapid increases in demand are experienced. It is not unexpected for a firm to experience a 300 percent increase in demand over a three-week period. All of these traits drive a requirement for high responsiveness.
- To better manage costs, programs are not funded in advance. This action, while helping improve cost control, has hindered the attainment of other outcomes such as innovation—a fact that has been recognized by Erwin (2010) and Datia (2010). By not funding programs in advance, the risk for failure (a reality when innovating) is placed on the supplier. It also requires that the supplier fund their own research—a potential obstacle when dealing with SMEs—especially in today's environment where access to loans and external funding is severely restricted.
- There are higher expectations that the supply chain will be managed to meet certain non-economic corporate and social expectations. That is, in the A&D industry there is an expectation that the supply chain will be managed so as to provide for greater opportunities for businesses that are minority-owned, woman-owned, veteran-owned and so on.

Given these changes and challenges, there is now a greater need for the supplier base to help the A&D industry meet these challenges. However, there is a change now taking place in the supplier base.

The recent economic conditions in the United States have forced many marginal SME suppliers into liquation or bankruptcy. The result is that the domestic SME supplier base is smaller with more competition for the remaining suppliers. This competition comes from many different domestic and overseas sectors, such as medical, energy, and automotive to name a few. Consequently, there is competition for "good" SME suppliers and even more for "great" suppliers.

This means, using the framework provided by Melnyk et al. (2010a), scouting becomes more important. As previously noted, scouting refers to more than simply the ability to identify and recruit potential suppliers; it also refers to assessing the extent to which the firm or industry is attractive to these suppliers. Assessing this attractiveness was the major focus of this study.

Conclusion:
Action Is Needed to Attract Domestic SMEs to A&D Industry

As compelling as the quantitative evidence is, the qualitative findings from this survey are even more damning. The level of frustration on the part of manufacturers is high and readily rises to the surface. At a time when U.S. manufacturers are looking for ways to survive or even grow, those not already involved in the aerospace and defense industry typically will not consider this industry for new opportunities. Meanwhile, the government and top industry buyers are lamenting the lack of a healthy industrial base.

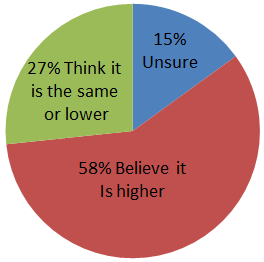
Fortunately, the survey helps identify some of the actions that can improve the situation. While respondents readily voice their frustrations, they also provided insights into what would make the industry more attractive. Specific recommendations for these actions are below.

On a positive note, there were very few respondents who indicated an inconsistency between their capabilities and DoD needs. For the most part, there seems to be a good match—even a carryover from suppliers' existing business segments to DoD business.

These findings indicate that there are many manufacturers not currently engaged in aerospace and defense that could readily support the A&D industry. They are capable. They are willing. They just need someone to step up and clear the many obstacles that make this industry so unattractive.

Recommendation #1:
Reduce the obstacles to doing business with the government

Figure 2
Perceived Cost to Enter
A&D Industry vs. Other Industries



The bureaucratic obstacles that SMEs must overcome to do business just for the defense industry are so imposing, they often have to set up a separate department or group to handle DoD business. Whether it is identifying the opportunity, qualifying as a supplier, submitting quotes or handling the ongoing reporting, these obstacles require more time and money from the SMEs than do other industries. As shown in Figure 2, the majority of SMEs perceive the cost to enter the A&D industry higher than other industries, negatively impacting the attractiveness of this industry. To become attractive to a greater number of SMEs, the A&D industry must find ways to clear some of the following obstacles.

Finding business

Programs that advertise government needs, such as FedBizOps and DIBBS, are so challenging to use that intermediaries of all types offer to filter and find results for SMEs. This is particularly challenging for manufacturers that also must review technical data. Most SMEs have neither the manpower nor the sophistication necessary to efficiently search, identify and respond to opportunities. **The government should explore ways to more efficiently describe needs and then proactively match needs with manufacturer capabilities.**

Qualifying as a supplier

The process to qualify as a government supplier is onerous and drawn out, requiring significant SME resources and taking up to a year to complete. Compounding the problem is that there is no standard process between government agencies and the prime contractors impose their own unique requirements. **The government should streamline and standardize manufacturer qualification requirements across agencies.**

Conducting business

The process of bidding, capturing and delivering business in the A&D industry is rife with govern-ment imposed non-value-added activities. These activities are often imposed on SMEs by "flow-down" requirements. While the larger

companies have the resources and experience to handle these requirements efficiently, the SMEs typically do not. **The government should take steps to eliminate all non-value added activities, particularly those that flow down to the SMEs.**

Recommendation #2:
Increase transparency in the procurement process

Another often-cited frustration is the lack of transparency into the procurement process. SMEs indicated that they simply want a level playing field without "politics" coming into play. For instance, suppliers are often asked to participate in an opportunity only to have the award repeatedly go to the incumbent supplier. Greater transparency would not only help the suppliers better determine if the quoting effort is worth the risk, but also provide a greater understanding of what to do differently the next time to improve their chances.

This represents a significant challenge as many of these issues stem from embedded government policies, practices and cultures. While this challenge may be daunting, change can be accomplished if driven from the top down.

Recommendation #3:
Aggregate capability and capacity needs across programs

One of the greatest challenges for the A&D industry is the very nature of its business. Demand is highly variable and difficult to predict, order quantities are small, quality requirements are high, documentation needs are demanding and inventory requirements are often unusual. All of these issues substantially increase a manufacturer's risk while decreasing their profits.

One approach to overcoming this challenge is to aggregate the need for like items across multiple programs. While one order for a few like items from a single organization may have little appeal to a supplier, aggregating the orders across multiple organizations could make the opportunity more attractive. This is particularly true if the organizations were to coordinate their ordering schedules, providing even some continuity to a low-volume purchase.

This approach can certainly help make the A&D industry more attractive to manufacturers. More importantly, it provides a new tool to help the government maintain a healthy and viable industrial base.

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Christopher Peters

Christopher Peters is CEO of The Lucrum Group, where he focuses on next generation manufacturing supply chains for government and commercial clients. He was the co-founder of MetalSite, developing the concepts and model for the world's first industry-backed online supply chain hub. That firm exceeded all revenue projections in the first six months and earned his client a $183 million return on a $20 million investment. Mr. Peters went on to develop advanced manufacturing supply chain solutions in more than twenty industries throughout the U.S., Europe and Asia. His work has been documented in several books and in numerous publications ranging from *The Wall Street Journal* to *BusinessWeek*. Mr. Peters is secretary of the Supply Chain Network Committee for the NDIA's Manufacturing Division.

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