

IT Strategies for Aerospace and Defense: Modernizing Systems to Support New Industry Business Models

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CURRENT OUTLOOK

The outlook for growth in the aerospace and defense (A&D) industry is quite good. Major platforms are standing up in both the commercial sector and the defense sector, which will carry manufacturing activity for at least the next 10 years. Other segments such as air freight, business jets, and network-centric warfare remain robust, which adds to industry optimism. Meanwhile, the industry is in tremendous transition thanks to new contracting vehicles and new approaches to design, supply chains, and aftermarket service.

Prospects Are Very Good for Industry Growth

At the start of 2007, projections for orders of commercial aircraft were conservatively set at around 1,000. By the end of the year, Boeing had secured more than 1,400 orders, with Airbus trailing just behind with just over 1,300 orders. The strength of the commercial market results from a healthy mix of new platforms (A380, 787), good utilization in mature markets, and booming growth in emerging geographies, particularly Asia.

Although large commercial aircraft get the press attention, other segments are also robust. Orders for freight-configured aircraft, thanks to an expanding global supply chain, are breaking records. The business jet and small aircraft markets continue to grow, and a new market for very light jets (VLJ) appears to be emerging that will enable new travel options such as "air taxis."

Some market projections for defense spending had assumed some decline due to stabilization in hot spots such as Iraq. The reality has been that these theaters, particularly Iraq, have required accelerated spending. While this spending has translated to sustained business for companies supplying the warfighter (body armor, vehicles, rations), it has tempered investment in more long-term platform programs. Regardless, major programs such as the Joint Strike Fighter, unmanned vehicles, and network-centric warfare will continue to be funded. Overall, the defense segment will continue to represent a growth opportunity.

Opportunity is coming from all subsegments of A&D and from all regions of the world. Companies that take greatest advantage won't be satisfied with just the status quo while riding the overall wave. Rather, key trends in the industry are dictating new business models that require companies to develop new approaches to ensure that they capture a larger share.

Key Industry Trends Dictate New Capabilities

Several key trends are shaping the future of the A&D industry. The trend that had the most impact over the past 10 years was the high level of mergers and acquisitions that resulted in significant consolidation. Over the next 10 years, trends will be dictated by demanding customers who expect more innovation, higher reliability, and lower costs — both at acquisition and in operation.

Performance-Based Contracting

Performance-based contracting (PBC) or, as it is sometimes called, performance-based logistics, changes the basic reward system for A&D companies. Instead of paying for the asset and any subsequent service on that asset, customers increasingly want to pay for specific service levels. Pioneered by Rolls-Royce and GE Aircraft Engines, this "power by the hour" approach means that airlines or the military pay for every hour of operation (or hour available for operation), shifting the burden of maintenance to the A&D company. The approach has been expanded to a general contracting vehicle that pays for service levels rather than a product.

PBC requires new organizational capability in terms of program execution that is geared to delivering not just the platform but its operational capability. This new capability, in turn, requires the capture, organization, and analysis of new information about operating characteristics. Our interviews with A&D IT managers showed very low awareness of this trend, which is disconcerting. IT must understand that an ever larger portion of a company's revenue will be tied to performance, and information that supports operational excellence and performance realization will be critical to program management personnel.

Lean/Six Sigma

Continuous improvement disciplines have been in use in the industry for quite some time, and the difficult market environment at the beginning of the decade accelerated the use of methodologies such as lean and Six Sigma. More recently, companies are looking to bring these practices beyond the shop floor and into the supply chain. Further, both military and airline customers are adopting these approaches and asking A&D firms to participate in the efforts.

The key challenge for companies is to not be so lean that they are brittle — that is, so streamlined that they are vulnerable to unforeseen circumstances. Looking at pioneers such as Toyota provides some answers. Toyota avoids being vulnerable by making sure that the rigid processes are augmented by control systems that allow the company to adjust quickly. The imperative for IT organizations is to enable sustained benefits by putting the right decision systems in place that deliver flexibility to the lean processes.

Lead Systems Integrator

The U.S. military's Future Combat Systems program introduced the fairly new concept of the lead systems integrator (LSI). Boeing was named the LSI rather than the prime contractor. The key difference between LSI and prime is that, as a prime, Boeing would be able to choose which components of the program it built and which components would be awarded to outside contractors. As an LSI, Boeing was guaranteed only the overall contract administration with all significant components going out for competitive bid. Although the Future Combat Systems program has drawn some criticism, it is clear that the government is interested in utilizing this contracting approach.

The principle is not limited to defense. Boeing has outsourced key elements of both the design and manufacture of the 787. And much of this activity is being spread across the world. Boeing has become a de facto LSI for this commercial platform.

The overall effect is a new emphasis on more effective supply chain management as success becomes more dependent on effectively managing the flow of key components into the final assembly process. In fact, a recent editorial in *Aviation Week* identified supply chain management competency as the top critical success factor in the industry. Investment in technology that better facilitates the coordination of supply with program delivery schedules is likely to follow.

Spiral Development

The Joint Strike Fighter program was another initiative that utilized a new contracting approach. Instead of providing detailed specifications for the platform, the DoD simply provided some basic operating characteristics (e.g., vertical takeoff, airspeed). The specific requirements were then refined in a series of incremental or spiral development steps.

There is an obvious analogy in commercial development as well — as aerospace companies respond to basic airline requirements such as more efficient fuel consumption. The information challenges lie in a more integrated set of engineering tools from mechanical and electronic design to prototyping and then on to as-built and as-serviced product configuration management.

The revenue growth in front of A&D companies will come from customers with new contract structures that shift significant risk to the vendors. Companies, both OEMs and tier suppliers, must be able to support these new operating models. Information technology can be essential to enabling these capabilities.

IT STRATEGIES TO DELIVER CRITICAL BUSINESS CAPABILITIES

Given the "growth while transforming" nature of the industry, it will be important for IT organizations to become more active in supporting business objectives. IT organizations will have to take stock of their current portfolio and understand the business capabilities needed to be successful. Then gaps can be identified and an investment plan can be put together.

Current Profile

To take stock of the current situation, one must understand a typical IT portfolio in terms of hardware infrastructure, services, and applications.

The approaches to hardware infrastructure (e.g., servers, storage, networking) fall into three distinct categories. The most prevalent tactic among large companies is to outsource this management entirely. There has been a tendency for smaller tier suppliers to hang on to their midrange systems largely because of their application investments and thin IT organizations. The third and least common tactic is to create centralized datacenter operations that provide a shared service to the organization and, in some instances, to other companies as well.

A&D companies have taken advantage of datacenter outsourcing and have also contracted services for desktop support. Application development services, however, have been much slower to develop in the A&D industry than in other industries, perhaps owing to strict data protection requirements of the defense work. Business process outsourcing, particularly embedded software development for commercial platforms, is beginning to take hold, although these contracts are rarely administered by the IT organization.

A typical profile in the industry includes an application portfolio that includes a considerable complement of legacy applications developed in-house. To a greater extent than their counterparts in other manufacturing industry segments, A&D firms maintain large staffs of developers to maintain and extend these applications. Even those companies that have invested in ERP software have largely implemented core financial modules rather than the complete footprint. One company that was interviewed for this document may be the most committed to ERP, but, even in that case, it considers things such as supply chain management modules as "bolt-ons" even when they come from the company's primary ERP vendor.

The other application area to consider is product life-cycle management. A&D is an engineering-centric industry, and for many years, engineering and program management departments funded shadow IT organizations to support their need for design tools. This separation of the engineering church and operations state is blurring rapidly as design tools, product data management, and configuration genealogy become more tightly integrated with operations-related systems.

The savings from outsourcing datacenter operations have frequently been squandered on keeping legacy in-house-developed systems running. Many IT organizations in A&D have a credibility problem with the business leadership, particularly the powerful program management function. The significant transformations in the industry itself, however, present an opportunity for IT to deliver key new capabilities and be seen as an effective change agent.

Key Capabilities Needed

Understanding the key capabilities articulated by the business leadership will allow IT organizations to plot a strategy to harvest value from investments and enable those capabilities. Each function within the organization has specific requirements.

The supply chain organization is taking on greater responsibility in the context of the new business models. Companies are quickly becoming less vertically integrated and more dependent on suppliers. And those suppliers may be very geographically dispersed. The industry that perfected materials requirements planning must now create visibility through multiple supply tiers, optimize transportation costs, and deal with global trade management. The rising importance of MRO revenue and profit also necessitates sophisticated spare parts planning.

Manufacturing execution, in the vertically integrated model, has generally been managed plant by plant and program by program. Logically, applications have proliferated on this basis, and in conjunction with the new supply chain capabilities, companies are looking to move to a common platform for manufacturing execution, quality, and refurbishment work. These platforms must be tightly integrated with supply management to deliver a lean supply chain capability.

Perhaps the areas most affected by industry changes are product management and program management. Product information management, from design models to product structures, must be more integrated with operational systems to support cradle-to-grave visibility and decision making. Program management will require the assembly of the right IT services and functionality to support ever more complex contract terms.

The finance organization is not immune to the industry changes. The "virtual joint venture" nature of supplier relationships and the pay-for-performance agreements with customers will impact fundamental cash management. Management accounting will also be affected with complex cost accounting approaches required to support the new business models.

Other functions such as human resources, service, and even IT itself also need new management capabilities. IT portfolios remain siloed, and many organizations are too vested in maintaining the status quo. Companies that break through these challenges will transform their IT organizations into key partners in delivering new business capabilities.

ESSENTIAL GUIDANCE

IT organizations are burdened by too many legacy applications that inhibit the ability to support new business requirements. The issue is less about the cost to maintain these systems — companies have actually become quite efficient at this — and more about the lack of flexibility they represent, flexibility that is needed to support changing business practices. Manufacturing Insights recommends an IT strategy of modular modernization.

Modular Modernization to Deliver Critical Industry Capabilities

Modular modernization involves investing in an application foundation that offers the opportunity to replace and update existing legacy systems — the modernization. However, investment in a big monolithic ERP suite can be quite impractical for companies that need to act quickly; they need an architecture that allows for a function-by-function rollout — the modular.

There are tremendous benefits in choosing a modern, modular architecture. Modules can be implemented based on priority, but with an overall vision for a completely integrated set of functionality when completed. This approach enables the upgrading of the portfolio while paying attention to the business needs on a reasonable timetable.

The industry has many unique requirements from regulatory processes (FAA or DoD) to security to sophisticated program management. The other benefit of a modular architecture is that industry-specific functionality can be built as an extension to the generally accepted business processes. This construct enables a seamless upgrade process when either general or industry-specific functionality is enhanced.

Manufacturing Insights advises A&D IT organizations to take the following actions in order to put in place a modular modernization strategy:

- Inventory the existing applications in the portfolio, if you haven't already done so. Be sure to account for the relative age of the software, the technology basis, and how much is spent to maintain the system.
- Engage the business leadership to discuss how the industry trends discussed in this document are affecting their activity. Have them articulate the key capabilities they need to be successful as the business models transform.
- Evaluate how well positioned the existing portfolio is to support the delivery of those capabilities. Identify barriers and produce a priority list of applications that must be replaced.
- Look for a software vendor that not only can bring process breadth and industry depth to your efforts but also has a modern, modular architecture that supports more immediate benefits. Even if you have selected one of the large monolithic ERP vendors for financial management, don't assume it is the right choice for other functional capabilities.
- Implement at a measured pace that aligns with the priorities. Look to train existing personnel on the system, but not at the expense of schedules. Be open to using implementation partners.

The A&D industry is in an era of transformative growth. If IT organizations cannot keep pace, functional leadership will look outside for capability. Modern modularization is the strategy that supports business needs and keeps IT relevant.

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