



# Aerospace & Defense Cost Management New Techniques for New Cost Challenges

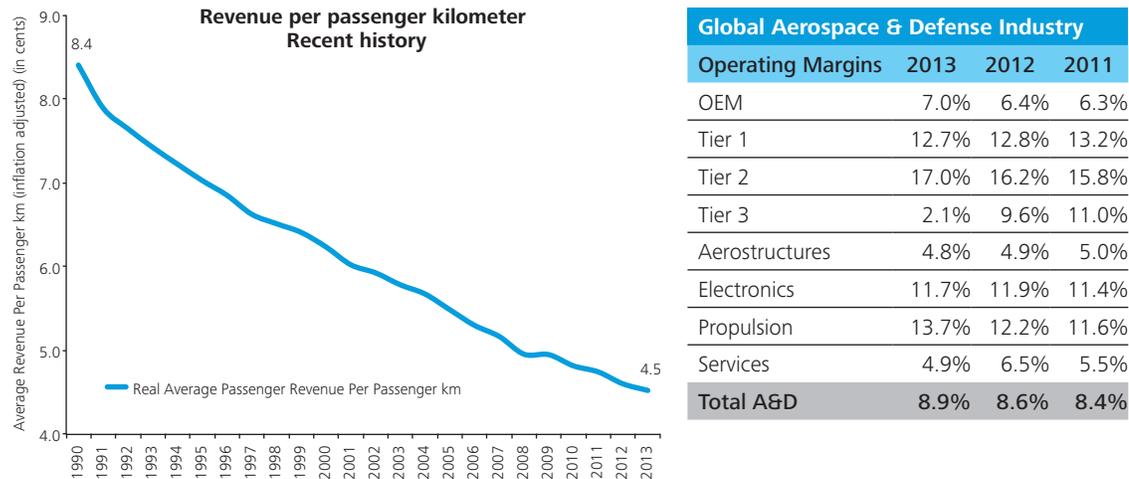




## Introduction

The aerospace and defense (A&D) industry has virtually always been on the forefront of product innovation. However, increasing cost challenges and changing cost dynamics are constraining businesses. Exponential operational, supply network, and program complexity are compounding the issue. Much of the innovative focus is now being redirected on improving techniques for cost management.

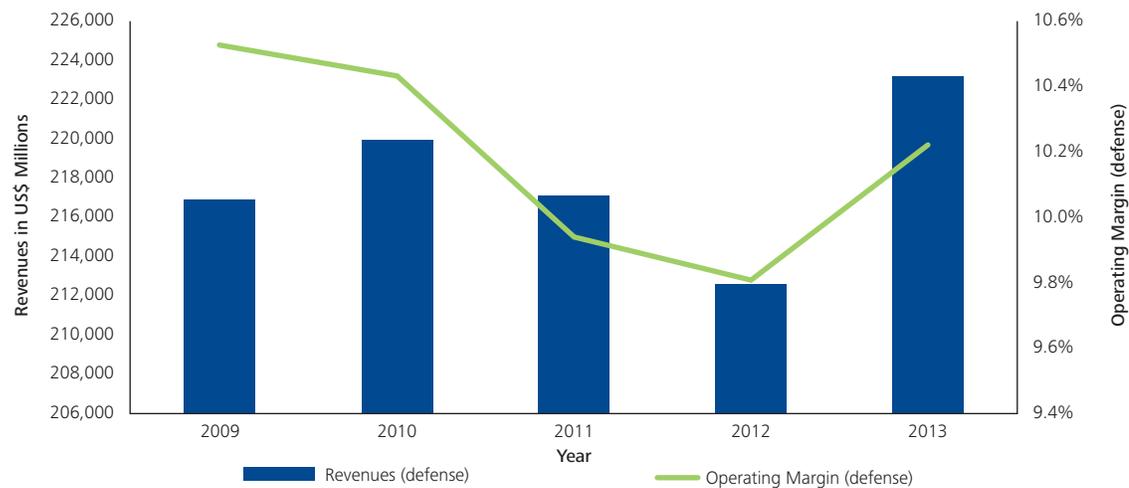
There is a real and present mandate for change. In the commercial aerospace market there has been a 46% decrease in airfares since 1990. This cost pressure is flowing from customers to airline operators to original equipment manufacturers (OEMs) and increasingly into the tiered supply base where average margins are nearly twice that of OEMs.



CPI — Source: Bloomberg.

Average Passenger Revenue per passenger km — Source: Bureau of Transport Statistics. ([http://www.rita.dot.gov/bts/sites/rita.dot.gov/bts/files/publications/national\\_transportation\\_statistics/html/table\\_03\\_20.html](http://www.rita.dot.gov/bts/sites/rita.dot.gov/bts/files/publications/national_transportation_statistics/html/table_03_20.html))

And in the defense aerospace market, despite a recent surge as traditional defense contractors shift focus to the commercial aerospace market, operating margins have been declining for years as the United States and many of its allies scale back defense spending and drive affordability mandates to their suppliers.



Source: DTL Global Manufacturing Industry group analysis of the following companies annual reports for 2009, 2010, 2011, 2012 (all accessed in September 2013) and 2013 (accessed in March 2014); Lockheed Martin, The Boeing Company, Northrop Grumman, United Technologies Corporation, L3 Communications, SAIC, Huntington Ingalls, Honeywell Aerospace, URS Federal Sector, GE Aviation, Exelis, Textron, Oshkosh Defense, Delta Tucker Holdings, CSC, Harris, CACI, Alliant Techsystems and Fluor Government Group.

The very visible impact of these cost pressures is driving an increased emphasis on protecting operating margins through effective cost management strategies. Unfortunately, many traditional approaches to cost reduction are not as effective in today's complex, global supply networks.

Cost reduction efforts are regularly siloed by function and are rarely truly cross-functional. Improvement efforts are typically targeted, but the hidden costs across complex operations and organizations are significant and unmeasurable. Metrics are often tied to targeted improvement levers that can mask or, in the worst case, negatively affect other performance metrics. Strategic decisions are typically either made based on top-down estimates or detailed, bottom-up tactics; however, a balance between the two often yields significant improvement opportunities.

Deloitte has refined and updated four traditional approaches to cost reduction using advanced analytics. Some of these levers may be familiar, but the insights are driven by advanced analytics and can support new levels of cost reduction in areas that have often been scrutinized for years. Each of these approaches emphasizes balanced, fact-based, and rapid improvement efforts that span functional silos. Also, these approaches regularly yield greater benefits than traditional approaches as cost levers are managed jointly, and the value is more sustainable as the operational DNA of a company changes. The four approaches are as follows:

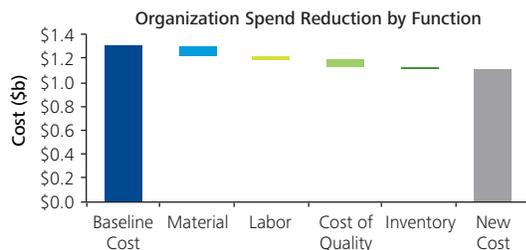
- a. **Total Product Cost (TPC)** — An approach to real-time, cross-functional cost trade-off management and improvement.
- b. **Strategic Supplier Management** — Cross-program, cross-commodity relationship realignment.
- c. **Direct Material Value Transformation (DMVT)** — A balanced supply chain and cost engineering approach to optimize material cost.
- d. **Delivery Performance Optimization** — A predictive approach to improve performance, while reducing total cost.

### TPC — An Approach to Real-Time, Cross-Functional Cost Trade-Off Management and Improvement

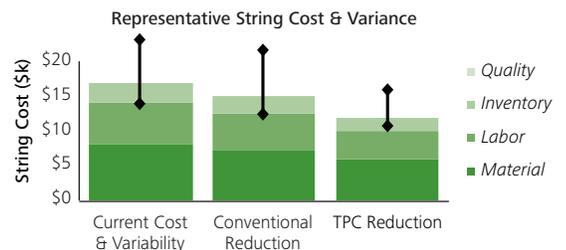
Traditional approaches to cost management focus primarily on the largest cost buckets. Improvement targets are set for these buckets, but strategies regularly ignore interdependencies across buckets. Many companies have embraced the concept of total cost of ownership (TCO) to expand cost visibility; however, the data used is typically historic and static, and improvement strategies remain relatively unfocused.

Today, progressive companies are making targeted cost improvements based on analytics-based, proactive trade-offs across buckets. For example, evaluating which supplier to source for a part based on the total combined spend in real time, including landed cost, quality, and inventory, instead of based on historic performance can drive a very different strategic decision.

Deloitte’s TPC approach focuses on cross-functional interdependencies to pinpoint discrete, high-impact cost drivers. The TPC framework turns the traditional cost management approach inside-out by evaluating costs simultaneously, not by organizational function, but by value stream. Advanced analytics techniques can now tie data together from disparate systems to develop, and even predict, a common, proactive insight. For example, TPC can tie visible manufacturing cost challenges to less visible supply chain cost issues, such as inventory issues, quality challenges, testing fees, and supplier expedite charges. Historically, an analysis connecting this many cost drivers would be lengthy and manual. TPC is an enabler of multipronged cost reduction solutions that target both the symptoms and the source. It increases the benefit to the bottom line, while reducing the likelihood of trading one cost for another.



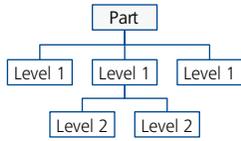
Taking a static and function-specific view of the cost structure ignores the cross-functional interdependencies of costs



Analyzing value streams cross-functionally and with variability drivers captures the interdependence of costs; specific improvement targets magnify the impact of cost reduction initiatives

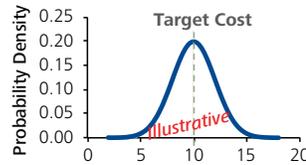
For example, a company targeted its improvement efforts using TPC analysis on a subassembly that had been scrutinized for cost reduction for years. The results were significant. The company was clearly able to develop a strategic portfolio of cost improvement projects that were customized to the most actionable and challenging cost drivers.

### Analyze BOM Structure & TPC Cost Elements



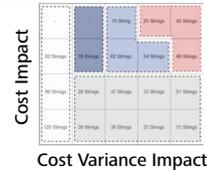
- BOM analysis shows standard cost of x
- Value stream cost analysis with inclusion of TPC cost elements shows true assembly cost of x + 30%

### Account for Variability



- Actual cost performance per part experiences variability by cost type and level in value string
- Simulation of significant cost variability predicts total assembly cost swings

### Assign Improvement Strategies



- TPC value stream analysis enables strategic targeting of areas with highest potential impact for cost reduction
- Actionable cost reduction tactics are clear from TPC outputs

**TPC Analysis and targeted improvements drove a 5% incremental reduction in true costs on a sub-assembly that had been targeted for select cost-reduction efforts for years**

### Strategic Supplier Management — Cross-Program, Cross-Commodity Relationship Realignment

While the TPC approach uses cross-functional information to reduce cost, strategic supplier management uses information across programs and across the supply network to optimize strategic supplier relationships and help reduce cost for instances in which negotiating power is unbalanced.

Over the past 15 years, the aerospace industry has experienced a fundamental restructuring of the supply chain ecosystem. OEMs have increasingly pushed the design and integration of major subsystems into the supply chain, and Tier 2 and Tier 3 suppliers have undergone a major consolidation. This combination of forces has increasingly changed the dynamics of competition across the traditionally tiered supply chain hierarchy. This changed dynamic requires a change in the traditional approach to strategic supplier management.

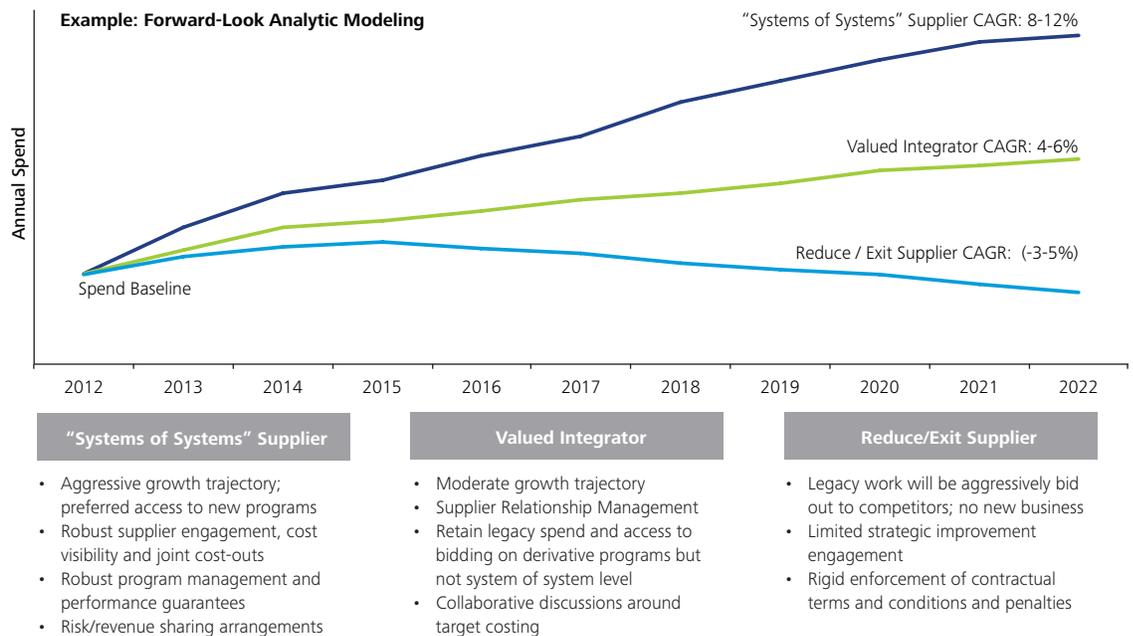
For example, recently a Tier 1 aerospace company faced increasing difficulty managing several of its engineered items suppliers — experiencing both performance issues and year-over-year price increases. Consolidation among Tier 2 and Tier 3 suppliers has left only two or three credible suppliers for many engineered items and systems. At the same time, these suppliers have increased their share of the overall intellectual property (IP) content and are bypassing the Tier 1 suppliers to design their products directly into the aircraft platform.

Managing these suppliers is further complicated by the nature of the customer-supplier relationship. The Tier 1 aerospace company sourced multiple commodities across its business divisions from multiple sites and divisions of the same supplier. Depending on the program and division, this supplier may also be a direct competitor for Tier 1 work.

Faced with these challenges, the Tier 1 aerospace company explored the following questions:

- How could it increase its negotiating leverage with the supplier, given the IP situation, when so few alternative suppliers exist?
- How could it best coordinate spend across multiple divisions and programs that are not fully aligned and that have different business objectives?
- How could it create a credible threat to a supplier when transitioning parts could take 12-18 months and cost millions of dollars in supplier qualification, certification, and ramp-up expenses?

To answer these questions, the Tier 1 aerospace company redefined the relationship with its suppliers at an enterprise level, while leveraging scenario-based look-ahead analytics to understand the potential for improved supplier relationships and cost management.



The net result was a comprehensive, enterprise-level supplier strategy that transformed the supplier relationship and targeted double-digit cost reductions over three years. Look ahead supplier analytics were used to classify cross-divisional, cross-commodity spend into the future. Cross-divisional knowledge sharing was leveraged to build sophisticated should-cost models and analysis of the sub-tier supply chain, highlighting previously unknown cost-out and negotiating opportunities. This insight was employed to build a negotiation strategy to guide the supplier to improved performance and reduced cost.

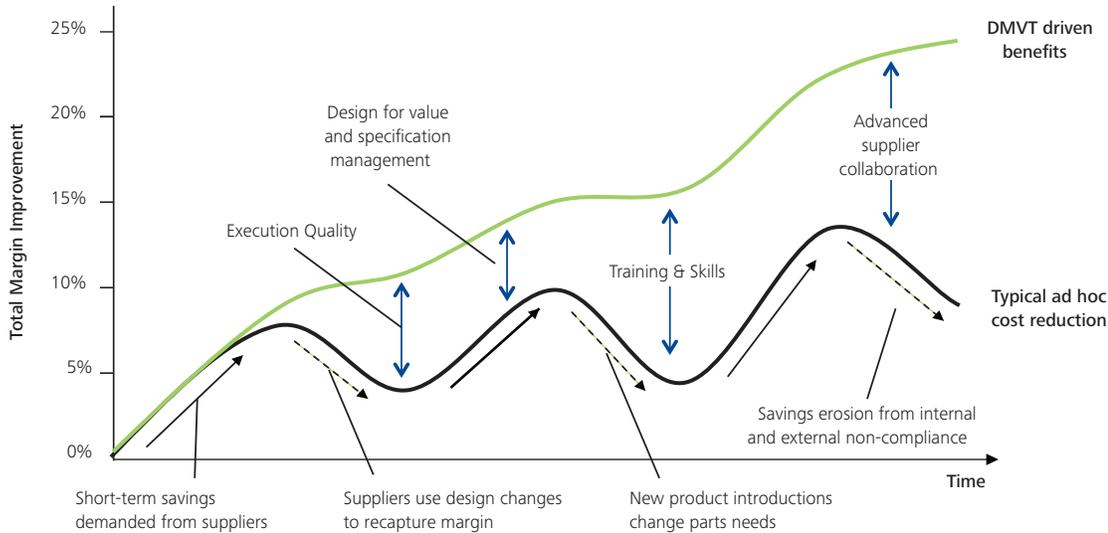
**DMVT — A Balanced Supply Chain and Cost Engineering Approach to Optimize Material Cost**

In addition to supply chain and operations-led cost-reduction efforts, many companies are also better incorporating engineering-aligned strategies. These companies typically target opportunities in product design and direct materials strategic sourcing. However, difficulties regularly arise in properly targeting and structuring efforts to achieve solid, sustainable results.

Engineering-aligned cost reduction efforts are typically mistargeted due to scope limitations, a piecemeal improvement approach, and a focus on short-term cost reduction rather than long-term value optimization. The drivers include fragmentation of category and subcategory responsibility in the organization, timing of sourcing efforts relative to product design life cycle, the scope of the supply base targeted for bid events, the availability and understanding of product specification and cost data, and the availability and capabilities of resources.

DMVT is focused on product design and direct materials sourcing based on a flexible and balanced approach that selects from a suite of leading-edge tools and methods to achieve impactful and sustainable cost reduction levels — with benefits that typically exceed single-threaded cost reduction efforts.

**Margin Improvement Over Time for DMVT vs. Typical Sourcing Efforts**



The combined, balanced, and rigorous application of five traditional techniques based on a customized analysis of capabilities and requirements drives significant value:

1. **Strategic Sourcing** — Sourcing of direct materials, which may include employing resources in low-cost countries; geographic and technology-based strategies; structured Requests for Proposals (RFPs); reverse e-auctions; and structured, evidence-based negotiations.
2. **Value Analysis and Value Engineering** — Approaches include product innovation and ideation, competitive teardown, voice-of-customer value assessment, cost and value optimization, and make versus buy analysis.
3. **Production Process Innovation** — Leverages leading-edge innovations in manufacturing to increase flexibility, while reducing product cost and complexity. It includes Deloitte’s market-leading approach to the utilization of additive manufacturing technologies.
4. **Product Cost Modeling** — Advanced should-cost and cost-build-up analyses to develop target costs for raw materials, manufacturing processes, production quantities, and other costs to identify pricing disparities from suppliers bids.
5. **“Similar To” Parametric Cost Analysis** — Regression-based analytical approach that demonstrates how part attributes, features, and specifications contribute to cost and highlights parts that are not competitively priced for supplier negotiations.

Many of these techniques have been used for decades, but the powerful combination of cost-reduction levers accelerated with new analytical tools is improving typical benefits. For example, a highly engineered product manufacturing company was focused on reducing cost in a

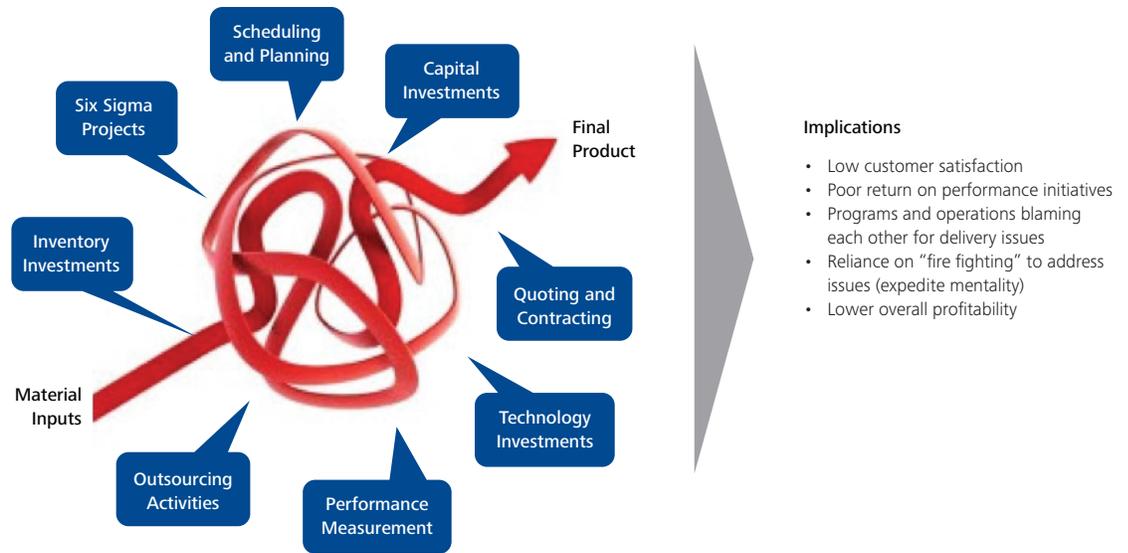
constrained market. The cost of direct materials purchased contributed 70% of product cost. Supplier processes and capabilities were not well understood, and supplier negotiations rarely yielded more than annual offsetting price increases. The company reoriented strategies using DMVT levers to reduce cost by identifying new, global suppliers and utilized advanced should-cost models to optimize transportation costs and redesign the engineering change management process. Through negotiations, direct material cost was reduced by more than 20%, transportation cost was reduced by nearly 70%, and, most importantly, a closed-loop supply chain and engineering process was created to develop cost models and analytics in support of future product designs.

**Delivery Performance Optimization — A Predictive Approach to Improve Performance, While Reducing Total Cost**

In addition to a direct focus on cost-reduction, some companies are focused on overall performance improvement that includes designing a more responsive system to deliver product to customers, as well as dramatically reducing hidden costs.

Increasing global supply chain complexity is making managing delivery performance much more difficult than in the past. On-time deliveries are influenced by a greater number of variables, both in the control of a company and outside a company’s control. Traditional risk mitigation and continuous improvement techniques are becoming less effective in these complex networks of companies and operations.

### Delivery Performance Complexity



Delivery performance optimization is designed around advanced analytics techniques to predict and monitor the lead-time performance of individual value streams. By deconstructing a bill of material (BOM) and designing predictive advanced analytics models, companies are able to target improvement efforts on the most variable and risky value streams. Improving lead-time performance has the added benefit of improving traditional hidden cost elements, such as inventory, cost of quality, quality review cycle time, and unnecessary production labor.

For example, a manufacturer of highly engineered products was struggling to meet the customer delivery dates for a product with a global supply base, a long lead time, a challenging bill of material with over 600 parts, and a complex production environment. Despite significant investment, historic efforts had failed to improve delivery performance across the 600 separate parts.

The company deconstructed the bill of material to better understand critical material flows and value streams and to identify customer delivery pain-points. The detailed analysis allowed the company to study a never-before-seen perspective of risk-adjusted lead times — planned lead times adjusted based on actual performance.

The analytics effort was then expanded to not only show the longest value stream lead time challenges, but also to predict, through simulated enterprise resource planning (ERP) runs, which value streams were the most likely to drive total critical path span time and, therefore, cause challenges to client delivery in the future.

As a result of this analysis, the company recognized that 35 parts in 20 value streams were driving over 95% of the customer delivery challenges. After a highly targeted improvement campaign, overall lead time was reduced by 35%, which led to a 20% reduction in inventory cost and a 10% improvement in capacity utilization, further driving down total cost. Using the delivery performance optimization approach, the company was able to begin recognizing value from this campaign within two months.

### Talent Challenges

A&D leaders recognize the imperative and power of advanced analytics; however, many organizations struggle to generate or apply the insights, even if they have made significant investments in new tools, technologies, or approaches. The reason is that, in this cost-reduction environment, few manufacturers are fully investing the necessary time and energy to equip the human side of the organization. As the examples have shown, these cost reduction approaches require people from across functions and in many different roles (e.g., manufacturing managers, business analysts, data analysts).

Moving forward, successful A&D companies will likely be those that can generate, deliver, and disseminate the analytical insights behind these updated cost reduction approaches. While a more formal human capital strategy is recommended, companies can start strengthening their human capital capabilities by making discrete, tangible investments, such as the following:

- **Improved Leadership Decision-Making** — Establish leadership behaviors that incent and foster cross-functional, value stream-based decision-making.
- **Dedicated Advanced Analytics Organization and Roles** — Build organizational capabilities (of critical mass with clear direction) to facilitate the data collection intradependencies, interdependencies, analytical models, and insights across the business. (These groups should be independent of traditional performance management or reporting functions.)
- **Focused Talent Development** — Institute development and retention practices that develop and retain the prioritized skills and capabilities necessary for key functions.

Relying on employees’ past experiences alone will likely be insufficient to drive the necessary efficiencies and/or growth. Business leaders should have organizations that can arm employees with cross-functional, holistic, data-driven insights rather than simply repackaging existing reporting data.

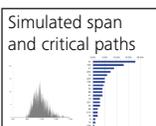
### Conclusion

It is an increasingly challenging cost environment for A&D manufacturing companies. New, innovative techniques are required. Advanced analytical tools are providing the means to reinvigorate and enhance traditional cost management strategies. The first step to taking advantage of these tools and techniques is to target an area to start.

Deloitte works with client leadership teams in a workshop setting to effectively determine the most difficult business challenges. Based on a rapid data collection exercise, our experience, and industry benchmarking across many clients, we can help select this area of focus, facilitate organizational alignment, and quickly develop a path to incremental and tangible cost reduction results.

Deloitte’s adept, competitive, efficient, streamlined (ACES) assessment methodology is designed to quickly and efficiently drive to the correct area of focus for rapid and effective cost reduction efforts. Assessment tools, benchmarking databases, and evaluation criteria are targeted in four areas that, in combination, typically highlight the largest areas of opportunity.

Based on the results of this assessment, a customized improvement program is designed that leverages some or all of the cost-reduction approaches described above. The opportunities for incremental cost reduction value are typically significant. With the changing cost ecosystem in the A&D industry, the time is right to embrace new techniques to manage traditional cost challenges.

|  |   | ACES Assessment (Client Example)  |      |      |      |  |
|--|---|---|------|------|------|--|
|  |   | Low   | Med. | High | Exc. | Observations   |
| <b>Adept</b><br>Production System Gap Assessment<br><br><b>Competitive</b><br>Total Product Cost Diagnostic<br><br><b>Efficient</b><br>Strategic Cost Structure Assessment<br><br><b>Streamlined</b><br>Product Span Analytics | <b>Inputs</b><br>Examples<br><ul style="list-style-type: none"> <li>• Exec. interviews</li> <li>• Talent plans and surveys</li> <li>• Benchmarks</li> </ul> |  |      |      |      | <b>A</b> <ul style="list-style-type: none"> <li>• Stable and performing workforce</li> <li>• Workforce plan incorporates shifts in required skills due to future plans</li> <li>• Succession and training programs are limited, need key enhancements</li> </ul> |
|  | <ul style="list-style-type: none"> <li>• BOMs</li> <li>• Cost data</li> <li>• Standards/actuals</li> </ul>  |  |      |      |      | <b>C</b> <ul style="list-style-type: none"> <li>• Poor product margins due to high costs — trend not improving</li> <li>• No global sourcing for cost savings</li> <li>• Poor realization of mfg learning economies due to disruption</li> </ul>                 |
|  | <ul style="list-style-type: none"> <li>• Cost reports</li> <li>• HR database</li> <li>• Transactional data pulls</li> </ul>                                 |  |      |      |      | <b>E</b> <ul style="list-style-type: none"> <li>• OH consumption/allocation in line</li> <li>• Transactional volumes match overall business volume and requirements</li> <li>• Some automation in routine periodic processes, more required</li> </ul>           |
|  | <ul style="list-style-type: none"> <li>• BOMs</li> <li>• System lead time</li> <li>• Lead time actuals</li> </ul>   |  |      |      |      | <b>S</b> <ul style="list-style-type: none"> <li>• Cold start lead times for aircraft platform significantly above market</li> <li>• Frequent point-of-use shortages across all fab/assembly facilities</li> <li>• Very high WIP inventory investments</li> </ul> |

## Contacts

### Tom Captain

U.S. and Global Aerospace & Defense Leader  
Deloitte Touche Tohmatsu Limited  
[tcaptain@deloitte.com](mailto:tcaptain@deloitte.com)

### John Coykendall

Principal  
Deloitte Consulting LLP  
[jcoykendall@deloitte.com](mailto:jcoykendall@deloitte.com)

### Steve Shepley

Principal  
Deloitte Consulting LLP  
[sshepley@deloitte.com](mailto:sshepley@deloitte.com)

### Dan Haynes

Principal  
Deloitte Consulting LLP  
[dhaynes@deloitte.com](mailto:dhaynes@deloitte.com)

### Pete Heron

Principal  
Deloitte Consulting LLP  
[pheron@deloitte.com](mailto:pheron@deloitte.com)

## Contributors

### Josh Cohen

Manager  
Deloitte Consulting LLP  
[joscohen@deloitte.com](mailto:joscohen@deloitte.com)

### Jason Ward

Manager  
Deloitte Consulting LLP  
[jasonward@deloitte.com](mailto:jasonward@deloitte.com)

### Steve Leschuk

Manager  
Deloitte Consulting LLP  
[sleschuk@deloitte.com](mailto:sleschuk@deloitte.com)

### Ross Barney

Manager  
Deloitte Consulting LLP  
[rbarney@deloitte.com](mailto:rbarney@deloitte.com)





**About Deloitte**

As used in this document, "Deloitte" means Deloitte Consulting LLP, a subsidiary of Deloitte LLP. Please see [www.deloitte.com/us/about](http://www.deloitte.com/us/about) for a detailed description of the legal structure of Deloitte LLP and its subsidiaries. Certain services may not be available to attest clients under the rules and regulations of public accounting.

This publication contains general information only and Deloitte is not, by means of this publication, rendering accounting, business, financial, investment, legal, tax, or other professional advice or services. This publication is not a substitute for such professional advice or services, nor should it be used as a basis for any decision or action that may affect your business. Before making any decision or taking any action that may affect your business, you should consult a qualified professional advisor.

Deloitte shall not be responsible for any loss sustained by any person who relies on this publication.

Copyright © 2014 Deloitte Development LLC. All rights reserved.