EASING THE BURDEN
REDUCING THE COST OF NATIONAL SECURITY SPACE CAPABILITIES

February 2014
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I am pleased to introduce our latest space report, Easing the Burden – Reducing the Cost of National Security Space Capabilities, which examines how industry and government are already working to reduce the cost of national security space capabilities and identifying future paths towards even greater economies. This report is the product of a two day workshop involving industry and government officials that was held at AIA last year.

While military space capabilities are incredibly important for our armed forces, they are often, quite frankly, expensive. In part, this is due to the complexity of the requirements they are designed to meet, the harsh operating environment in which they must function and the difficulty of reaching their work position – often tens of thousands of miles above the Earth. Space assets are also produced in small numbers since their capabilities are so wide reaching – for example, 3 or 4 geosynchronous communications satellites can cover the entire Earth – but as a consequence, their high development cost is not spread across very many operational units. At the same time, their value is undeniable. Today, one manned airplane or unmanned aircraft system can deliver a GPS precision-guided bomb to destroy a target that would have required fleets of bombers during World War II.

AIA recognizes that we are not the only organization working on this issue and it is encouraging to note that so much activity is underway on so many fronts to reduce costs. In this report we hope to illustrate some of the successes to date, identify candidate concepts for the future and educate key stakeholders of the efforts being made. As our national security community struggles to assure our safety while absorbing substantial cuts to the defense budget and the additional impact of budget sequestration, it is all the more important to focus on cost reduction in this critical area.

Best regards,

Marion C. Blakey
President and CEO
Aerospace Industries Association
# Table of Contents

Letter from Marion C. Blakey, President and CEO, AIA .................................................... iii

Executive Summary ..................................................................................................................... vi

AIA Recommendations ............................................................................................................. 1
  Increase Acquisition Stability ................................................................................................. 1
  Improved Contracting and Communication ........................................................................... 1
  Leverage Commercial Opportunities .................................................................................... 1
  Improve Government / Industry Collaboration .................................................................... 2
  Exploit the Benefits of Standardization and Technology Innovation .................................... 2
  Industry Initiatives .................................................................................................................. 2

Introduction ........................................................................................................................................ 3

Cost Reduction Workshop: Insights, Ideas and Lessons Learned ............................................. 4
  Improving Acquisition Stability and Innovation ..................................................................... 4
  Supporting Ways of Doing Business ......................................................................................... 7
  Improving Awareness of Cost Drivers .................................................................................... 8
  Effective Cost Management and Product Portfolios ............................................................. 10
  Exploit the Benefits of Standardization and Technology Innovation .................................... 11

Appendix ........................................................................................................................................ 13
  Meeting Agenda ....................................................................................................................... 13
  Speaker Approved Workshop ................................................................................................. 15
Executive Summary

For more than five decades, our national security space assets have grown tremendously more capable and essential to our nation’s armed forces and national security decision makers. They are invaluable for keeping our military second to none. Unfortunately, the space sector – as the Pentagon noted in the 2011 National Security Space Strategy – is increasingly becoming congested, competitive and contested.

Current American space capabilities will be increasingly difficult to sustain in the face of declining defense budgets. As a result, reducing the cost of space systems is not just prudent – it is crucial. Any additional resources devoted to space systems would put pressure on other important programs in a very tight federal budget environment. At the same time, due to their force-multiplying benefits, space systems enable substantial savings elsewhere.

Industry and government organizations are responding to these challenges and successfully reducing the cost of national security space systems, devising innovative ways of doing business, from “right sizing” to match changing market demand to increasing exports of space systems and components.

In May 2013, AIA’s National Security Space Committee held a Cost Reduction Workshop that identified successful initiatives providing the best capabilities in this challenging environment. These include:

- A focus on contractors’ internal management and product portfolios,
- Support for acquisition and procurement innovation, and
- Strategic investments to advance new paradigms of hardware development.

Throughout the workshop, a consistent theme emerged: Our nation’s aerospace industry is committed to its ongoing partnership with government in support of national security.
AIA Recommendations to Reduce National Security Space Program Costs

AIA’s National Security Space Cost Reduction Workshop did not seek to identify “one size fits all” solutions. Instead, participants identified a number of successful tools, techniques and new ideas to reduce costs. These can serve as a valuable starting point for future cost reduction efforts, providing either ideas based on lessons learned or templates to model new initiatives. Among these are the following, grouped by category:

**Increase Acquisition Stability:**
1. Define and stabilize program requirements prior to program authority to proceed.
2. Seek legislative support for multi-year procurement authority.
3. Provide stable program funding: Secure multi-year funding and utilize block buys when appropriate.
4. Provide stability for strategic plans, enterprise architectures, consensus roadmaps and utilize Analysis of Alternatives to ensure defensible program plans.

**Improved Contracting and Communication:**
1. Government agencies should supplant traditional restricted, formal communications during contract competitions with an open industry dialogue prior to the release of Requests for Proposal.
2. Increase use of firm fixed price contracts for programs with multiple or block buys of identical items with no competition. Contract flexibility should be adjusted based on the contractors’ risk exposure.
3. Government should engage in active dialogue with industry to optimize the contract type (fixed price, cost plus, etc.) for the program application prior to the competition.

**Leverage Commercial Opportunities:**
1. Procure capabilities commercially where possible.
2. Increase utilization of commercial, off-the-shelf technologies.
3. Consider greater utilization of hosted payloads on commercial spacecraft to reduce costs and improve resiliency.
**Improve Government / Industry Collaboration:**

1. Identify and reduce the “unseen costs” imposed by government on industry.*
2. Address issues through constructive dialogue with industry.
3. Identify sustainment and modernization needs of critical national security space capabilities down through the supply chain.
4. Implement export control reform to increase exports significantly - protecting the industrial base, driving greater economies of scale and fostering innovation.

**Exploit the Benefits of Standardization and Technology Innovation:**

1. Standardize hardware elements to facilitate competitive sourcing.
2. Judiciously invest where necessary to develop “big payoff” innovations and technologies – such as the DARPA Phoenix initiative – to repurpose in-space assets for productive use beyond their original service life.

**Industry Initiatives:**

1. Innovate and invest to make products more cost competitive and capture greater market share – thereby spreading development and fixed costs over a broader business base.
2. Right-size facilities and the workforce to meet changing market conditions.
3. Develop more balanced, diversified portfolios across a broad range of customers – through increased exports and other business strategies.


Introduction

Overview of Challenges

For more than fifty years, space assets have grown significantly more capable and essential to U.S. armed forces and national security decision makers. Potential adversaries are also aware of the importance of space assets and are developing their own capabilities and strategies to counter U.S. platforms or put them at risk. Space, as the Pentagon noted in the 2011 National Security Space Strategy, is increasingly becoming congested, competitive and contested.

Unfortunately, due to declining defense budgets, U.S. space capabilities will be increasingly difficult to sustain by simply investing more. In the past, space program budgets have reflected the view that these programs were critical to the nation. Today, reducing the cost of space systems is not only prudent but vital if the U.S. is to maintain other capabilities in an era of shrinking budgets for space and defense programs overall.

To succeed in the future, the national security space sector must embrace new technical approaches, new ways of doing business and new ways of working with other space sector stakeholders – from commercial firms to allied nations – in order to succeed. Many of these practices and initiatives are currently underway, and both industry and government have achieved important successes.

AIA’s National Security Space Committee Cost Reduction workshop provided an opportunity for industry and government to share success stories, discuss ideas for the future and collaborate on new solutions. The workshop provided an opportunity to understand the challenges, share new ideas, share success stories and provide greater visibility into the breadth of the sector’s current activities.

This report provides a summary of the key insights, ideas and best practices from workshop participants. Based on workshop discussions, the report also includes a set of recommendations to facilitate cost reductions in future space systems. An appendix includes the meeting agenda, a summary of remarks and briefing charts presented during the workshop.

Sustaining U.S. national security is the most important role of America’s aerospace industry. Space programs allow the nation to derive a tremendous asymmetric advantage over its adversaries. The critical capabilities provided by space programs include the ability to cast an unblinking view of the enemy, real-time communications between civilian leadership and armed forces around the world and precision navigation capabilities that enable weapon systems to operate with pin-point accuracy. AIA and its member companies are proud of our industry’s successes and we are committed to making certain that, even in times of tightening budgets, our national security space programs remain second to none.

“A resilient, flexible, and healthy space industrial base must underpin all of our space activities. We seek to foster a space industrial base comprised of skilled professionals who deliver those innovative technologies and systems that enable our competitive advantage. Our space system developers, operators, and analysts must deliver, field, and sustain national security space capabilities for the 21st century.”

NATIONAL SECURITY SPACE STRATEGY
January 2011

True color image of Earth as it would appear from 35,000 km (22,000 miles).
Cost Reduction Workshop: Insights, Ideas and Lessons Learned

Substantial budget cuts to civil and military space programs, combined with the continuing need for new and advanced capabilities, are significantly challenging the health of the space industrial base and the ability of its government customers to meet growing military requirements. This challenge has and will continue to test suppliers’ ability to adapt and provide new capabilities. In response to these challenges, industry and government partners are making significant strides to respond through cooperation, communication and the development of new and innovative practices and hardware.

AIA’s National Security Space Committee Cost Reduction Workshop identified four primary areas where industry is currently taking action to adapt to this challenging environment. These actions include a focus on contractors’ management and product portfolios; support for acquisitions and procurement innovation; new ways of doing business; and investments to reduce costs and grow the market, thereby spreading fixed costs over a larger base.

Improving Acquisition Stability and Innovation

For industry, stable and predictable funding is paramount to effectively managing cost-effective programs. While contractors strive to adapt to changing national security budgets and priorities, the fact remains that funding uncertainty leads to inefficiencies and higher costs. Stable requirements are also essential for industry to more efficiently procure from suppliers, manage the workforce and schedule production and delivery. Unfortunately, a dynamic budget and threat environment is making cost-effective program management increasingly difficult. Industry challenges have been further exacerbated by recent budget crises in Washington and the implementation of sequestration, which imposes cuts regardless of evolving national security threats.

AIA believes that the challenges associated with constrained budgets and the push for greater efficiency demand a closer look at how the nation procures complex space systems. Whenever possible, multiyear procurement authority should be the government’s objective and we encourage Congress to support this as a means to mitigate the challenges posed by budget cuts and the continuing threat of sequestration.

Multiyear procurement authority, however, is not a panacea. Government has been working with industry to cut costs for years in order to provide the best value for taxpayers. These efforts by government and industry to reduce costs in space system procurement and management are already leading to procurement innovations, more effective business practices and significant program successes.
Recent government initiatives include the Department of Defense (DOD) Weapon Systems Acquisition Reform Act of 2009, which established new cost-savings requirements for defense systems acquisitions. This program was followed by a 2010 DOD Initiative on “Better Buying Power,” which implemented “should cost/will cost” affordability as a requirement. In 2011, DOD developed the Evolutionary Acquisition for Space Efficiency (EASE) framework to reduce costs through block satellite purchases and program reinvestment. EASE was later selected by DOD for implementation on the Advanced Extremely High Frequency (AEHF) and Space-Based Infrared System (SBIRS) programs. In 2011, the Air Force reorganized its Evolved Expendable Launch Vehicle (EELV) program and began to introduce firm-fixed price (FFP) block buys and commercial competition in order to reduce growing costs associated with the program. Finally, DOD refined its acquisition expectations in 2012 through 36 initiatives that comprise “Better Buying Power 2.0”.

Central to these efforts is an emphasis and utilization of Firm Fixed Price (FFP) contracting for the operational phase of programs - and in some well-defined cases, development. FFP has been argued to protect taxpayers under government regulations, establish defined costs for the USG, incentivize long-term cost reduction, and enable adequate government oversight without additional burdens on industry. Furthermore, according to the Government Accountability Office, FFP practices could help reduce costs, shorten the length of time to complete major programs, and improve stability and predictability in the space industry, which has been plagued by program cancellations and frequent changes. To successfully utilize FFP for development programs, requirements need to be defined and stabilized early in the development process. With stable requirements that are clearly defined, FFP becomes less risky for both industry and government. For service applications, including space launch services, where mission requirements are well understood, FFP contracting offer a means to reduce costs through competition while keeping industry's risks manageable.

FFP practices however, are not appropriate for a number of situations. Such contracts can increase risk for contractors and may not be feasible for complex space system acquisitions. Moreover, cost increases under FFP can be damaging to the industry’s supplier base and may discourage firms from building innovative solutions. Government partners should consider the complexity and scale of a project when developing the optimal contract mechanism. More investigation into the ability of FFP to deliver cost savings over other contract mechanisms should be explored before committing to this approach.1

In 2012, the U.S. Air Force announced a plan to open procurement on the EELV program by combining a block buy with competition to create opportunities for new entrants, who must demonstrate a medium-to-heavy capability to become certified. This effort is intended to help reduce DOD’s costs through competition while improving assured access and program reliability.2

1 In 2013, DOD released the “Performance of the Defense Acquisition System Annual Report” which found that contract type alone (e.g. fixed price or cost reimbursable) does not predict lower cost growth in development or early production contracts. The report goes on to state that relying on contract type alone to achieve better affordability outcomes likely will not be successful.

2 Note that the block buy is not completely firm fixed-price; only the EELV Launch Services will be procured from the United Launch Alliance on an FFP basis. The EELV Launch Capability will continue to be procured on a cost-plus basis for the 36 core block buy.
SpaceX

Under NASA’s Commercial Orbital Transportation Services (COTS) program, SpaceX successfully demonstrated how firm-fixed-price, performance-based development partnerships can encourage innovation, reduce costs and ensure substantial government insight, without the added expense of traditional contracting mechanisms.

The use of commercial item, fixed-price FAR-12 contracting has been further validated by NASA’s successful Commercial Resupply Services program, which has already sent three missions to the International Space Station. Additionally, the U.S. Air Force is currently working to reduce its own costs and improve its assured access capabilities by reintroducing competition and moving back to fixed-price contracting in the EELV program. This approach is currently applied for the EELV Phase 1 contracts alone. The contract structure for EELV Phase 2 acquisition has yet to be determined.

Lockheed Martin

Lockheed Martin has also demonstrated acquisition innovation success under the implementation of EASE for the SBIRS and AEHF programs. EASE savings estimates include 40% for AEHF compared to single purchase, and 15-20% savings for SBIRS over traditional processes.
Supporting New Ways of Doing Business

The growing emphasis from both government and industry on increasing space program cost effectiveness has led to an active search for new ways of doing business that represent a significant break from traditional practices. The result: an “open mind toward the future” that includes approaches such as hosted payloads, commercial off-the-shelf components, leveraging commercial synergies, disaggregation of satellite capabilities and a greater reliance on international cooperation.

For government partners, the increasing commercialization of space activities opens up new, more cost-effective ways of meeting its requirements in space. Disaggregation has also been identified by the U.S. Air Force Space Command* and others as a framework for developing more affordable space capabilities while increasing resilience. While not a replacement for every national security space constellation, disaggregation proponents argue that some military space missions might be better served by systems of smaller satellites, through hosted government payloads on commercial satellites, nanosats and the utilization of commercial buses and other nonstrategic hardware for military applications.

Questions about the effectiveness and feasibility of disaggregation have yet to be fully answered. According to the GAO, disaggregation might lower the cost of satellite architectures in the long term but present higher upfront costs due to the overlap of old and new architectures. Other aspects of disaggregation require commitment and support from government and industry to achieve savings. These commitments include the modernization of control systems with common interfaces and standards, and advancement of data fusion practices as payloads are dispersed across multiple satellites.

Other steps can help DOD reduce costs. For example, Congress can stimulate private sector investment in infrastructure and purchase of commercial services by supporting multi-year procurement. Further action can be taken to advance export control reform. New systems should consider the use of more resilient architectures that utilize non-U.S. and commercial capabilities. International cooperation has also been shown to advance cost reduction through partnerships that integrate with allied nations on capabilities such as Wideband Global Satellite or the Space Surveillance Telescope. Moving forward, government should continue to emphasize an open door policy and ongoing collaboration with industry partners to encourage new methods of effective cost savings and capabilities advancement.

*Resiliency and Disaggregated Space Architectures – a White Paper released 8/21/2013
Boeing’s WGS program demonstrates how the adoption of commercial practices and standardized hardware lines can achieve significant cost savings and affordability while retaining high mission assurance. Reduced government oversight, tailored contract deliverable items, reduced contract compliance documentation and commercial firm-fixed price terms have resulted in savings of more than $150 million across WGS spacecraft 7 through 9.

In addition to WGS, Boeing is using commercial practices to reduce the cost of other space systems. The Boeing 702 SP bus is part of the 702 satellite family and serves as an example of innovative cost reduction. The 702SP “all electric” satellite is being utilized for telecommunication satellites, including the Asia Broadcast Satellite and SatMex commercial operators. These projects continue to leverage synergies across the commercial and government customer base to achieve significant cost savings for Boeing customers.

**Improving Awareness of Cost Drivers**

The 2009 AIA report, *Unseen Costs: Industrial Base Consequences of Defense Strategy Choices*, identified a critical disconnect between industry and government acquisitions that threatens the vitality of the defense industrial base. In this regard, DOD’s inability to understand or anticipate the consequences of acquisitions programs suggested a greater role for communication and cooperation between government and industry. Since then, these stakeholders have worked together to develop new tools for better cost estimation that are preventing major cost overruns for systems development, improving the ability of agencies to secure funding for systems and helping to stabilize the industrial base.

Most notably, the Joint Space Cost Council (JSCC), established in 2005, has been working to address unseen costs through the development of improved standards and procedures to estimate the cost of space systems. With the involvement of industry and other government agencies, JSCC has successfully
implemented several initiatives critical to both government and industry, including standard work breakdown structures and Contract Data Requirements List (CDRL), identifying and quantifying cost and schedule risk, technical data CDRL and technical schedule baselines.

Government entities are also leading efforts to reduce costs through more effective estimation techniques, industrial base analytics and cooperation with industry. DOD has taken several steps to reduce costs in response to the AIA report. These steps include programs such as the Manufacturing and Industrial Base Policy Office (MIBP) criticality and fragility assessments, and Sector-by-Sector Tier-by-Tier (S2T2) industrial base reviews. The National Reconnaissance Office (NRO) is also trying to improve cost estimation methods for space systems by developing new tools and working with industry to generate data on acquisitions programs.

UNDERSTANDING THE “UNSEEN COSTS”:
THE NRO AND DOD’s MIBP

DOD’s MIBP is leading several efforts to reduce the inherent yet unseen costs in the space industrial base acquisitions process. MIBP is assessing the industrial base through surveys and criticality and fragility assessments to better understand the defense supply chain’s evolution and status. MIBP is also leading the S2T2 industrial base review that includes a look at the space industrial base. The S2T2 review will map the industrial base and supply chain in order to better inform DOD acquisition strategy, reduce programming swings that disrupt industry operations and contribute to the Department’s oversight of mergers and acquisitions.

NRO is also leading efforts to understand cost drivers by developing better estimation tools that aid in cost reduction discussions, including acquisition complexity, costs of mission assurance, long-term implications of acquisition strategies and “will and should” cost management. The data used in these efforts grew out of discussions with industry, demonstrating the importance of open and collaborative communication between industry and government partners. As NRO continues to improve cost estimating and search for cost savings, conversations with industry will be essential for educating government estimators regarding commercial acquisition programs and practices. By providing more data for cost estimators, industry better equips them to make more informed recommendations on acquisition and management strategies.
Effective Cost Management and Product Portfolios

As space systems manufacturers adapt to an increasingly lean business environment, they are engaging in a number of actions relative to their corporate structure and product portfolios. Effective cost management is central to firms’ strategies, which can include steps such as:

1. Reorganizing business units,
2. Right sizing facilities and workforce,
3. Merging companies or consolidating divisions into integrated teams, and
4. Discontinuing unused production lines and reshaping teams across functional units.

To augment these actions, firms are also seeking to diversify and grow balanced product portfolios in space systems and other markets to leverage their competitive advantage and technical expertise. These efforts can involve capturing new markets, evolving business and export models, technology and manufacturing process innovation, and redefinition of the industry/government business relationship.

ADAPTING TO LeanER TIMES:
AEROJET ROCKETDYNE

With more than 50 years of involvement in the aerospace sector, Aerojet Rocketdyne has a unique perspective on affordability and adaptation in lean fiscal environments. Cost-effective management is central to Aerojet Rocketdyne’s strategy, which includes rolling several companies into one integrated management team; mothballing unused production lines; and a cross-trained team to support both solid and liquid propulsion systems. As a result of the success of these practices, the price of Aerojet Rocketdyne’s Solid Rocket Motor for the Atlas V launch vehicle has remained constant for several years despite significant price increases of production materials.

“Aerojet Rocketdyne’s Solid Rocket Motor price has remained constant for several years--despite significant material price increases, as a result of their cost reduction strategy.”
Exploit the Benefits of Standardization and Technology Innovation

As government agencies look to the future of space systems development, they are exploring new paradigms of hardware development that challenge traditional practices. Specifically, the Office of the Director of National Intelligence (ODNI) and the Defense Advanced Research Projects Agency (DARPA) are working to standardize component interfaces and develop new architectures of satellite hardware interoperability that advance capabilities, reduce costs and generate new business opportunities. Already, the GAO has noted that successfully implementing hardware standards will be critical for ensuring that cost reduction efforts such as disaggregation are successful.

ODNI AND THE SPACE UNIVERSAL MODULAR ARCHITECTURE

The objective of the Space Universal MOdular architecture (SUMO) is to reduce the cost of satellites and support the U.S. space industry in response to a growing international space market. These objectives will be addressed by advancing common standards in the interoperability of satellite components. Interoperability will be enabled by leveraging existing and evolving initiatives and an industry-consensus process to create standard interfaces and common qualification environments for satellite components.

Currently, each satellite manufacturer uses application-specific interfaces and qualification environments for the satellite components. Consequently, component manufacturers must comply with up to 20 interfaces and a variety of qualification environments for a given component. As SUMO matures, all of the primes will increasingly use the same interface and component manufacturers will build to one or two interfaces and design to a similar number of qualification environments. SUMO permits flexibility for re-purposing a satellite bus using scalability and adaptability, improves manufacturers’ inventory risk and production rate, and has been modeled to save the U.S. government and U.S. space industry $18.8 billion over 17 years.
DARPA’s Phoenix program is taking a dramatically different approach to reducing costs by recycling space components for industry and government partners. According to DARPA, the Phoenix program may increase government return on investment by reusing high-value components from satellites that are no longer functional to enhance existing or new operations. This approach also provides opportunities for non-traditional space suppliers to enter space markets using high-volume/low-cost manufacturing, which could provide new opportunities for commercial resellers, government initiatives and the development of commercial servicing platforms.
Appendix

Meeting Agenda
AIA Space Council Cost Reduction Workshop | May 29–30, 2013

Wednesday, May 29, 2013

8:15 – 8:30 a.m. Breakfast & Networking

8:30 – 8:45 a.m. Introductions; Review of Agenda and Meeting Objectives
Frank Slazer AIA Vice President Space Systems

8:50 – 9:00 a.m. Welcoming Remarks – Marion Blakey, AIA President & CEO

9:00 – 9:40 a.m. Keynote Remarks – “The Importance of Reducing Space Costs”
Richard W. McKinney (Confirmed)
Deputy Under Secretary of the Air Force for Space

9:40 – 10:25 a.m. Joint Space Cost Council Status & Successes
Speaker: Keith Robertson, NRO

10:25 – 10:45 a.m. Break

10:45 – 12:00 p.m. Industry Case Studies in Success – panel discussion; 15 minutes each plus time for Q&A

- Cost Reduction Through Innovative Contracting
  - Mat Dunn SpaceX

- A Case study in Cost Reduction
  - Julie Van Kleeck Aerojet Rocketdyne

- Cost Reduction Lessons Learned
  - Dennis Grannato Lockheed Martin

12:00 – 12:30 p.m. Lunch Buffet & break

12:30 – 1:30 p.m. Working Lunch/Presentation: “Space Fence Lessons Learned”
Mr. Douglas Loverro or designee
Deputy Assistant Secretary of Defense for Space Policy
Office of the Under Secretary of Defense for Policy

1:30 – 1:45 p.m. Break
1:30 – 2:30 p.m. Better Buying Power 2.0 and Space Systems
Speaker: Ted Bujewski, Principal Director
Mfg & Industrial Base Policy OSD/AT&L

2:30 – 4:00 p.m. Industry Cost reduction Ideas–panel discussion; 15 minutes each plus
            time for Q&A (Solicit company volunteers)

• Affordable Protected MILSATCOM
  – Rick Skinner, Northrop Grumman

• Responsive and Affordable Small Satellite Launch Vehicles
  – A.C. Carnia, Virgin Galactic

• WGS Cost Reduction Case Example
  – Jeff Trauberman, Boeing

• Applying Cost Reduction Lessons to
  – Kyle Schmackpfeffer, Director, Mapping and Resource Solutions

4:00 – 5:00 p.m. GAO Assessment of Military Space Program Costs & Trends
Christina T. Chaplin, Director
Acquisition and Sourcing Management
Government Accountability Office

Thursday, May 30, 2013

8:00 – 8:30 a.m. Breakfast & Networking

8:30 – 8:40 a.m. Opening Greetings and Introductions:
Frank Slazer AIA Vice President Space System

8:40 – 9:30 a.m. Cost Reduction through Innovation –
DARPA’s Phoenix Satellite Servicing Concept
Mr. Dave Barnhart Program Manager, DARPA TTO

9:30 – 10:15 a.m. AIA Acquisition Reform Initiative:
Micah Edmond, AIA Assistant V.P., Industrial Base Policy

10:15 – 10:30 a.m. Break

10:30 – 11:30 a.m. Affordably Meeting Future Military Space Requirements –
Space Universal MOdular architecture “SUMO”
Bernie Collins ODNI – Senior S&T Advisor

11:30 – 12:00 noon Wrap-Up & Adjourn – Frank Slazer
  – Discuss follow-up action plan
Speaker Approved Workshop
Government Summaries

Mr. Richard McKinney
Deputy Under Secretary of the Air Force (Space)
Wednesday, May 29 | 9:00–9:40 AM
“The Importance of Reducing Space Costs”
http://www.aia-aerospace.org/assets/McKinney.pdf

The fiscal challenges currently faced by the DOD have led to a greater focus on cost reduction in space systems acquisitions and management. As the Deputy Under Secretary for the Air Force (Space), Mr. McKinney identified three themes and related implications including sequestration, innovation and cooperation.

Of central importance is the 2011 Budget Control Act, which has created challenges in acquisition processes and driving changes in how DOD does business. This new focus is based on a data-driven “approach to measure and advance both capability and resilience.” An additional focus is how to balance technological development and new programs with a demand for upfront investment costs that are currently unavailable. The second theme, innovation, calls for new internal and external tools to advance cost reduction in a constrained resource environment. Internally, DOD has identified tools such as block buys, new entrants, efficient space procurements, disaggregation, hosted payloads, international partnerships, stovepipe avoidance and launch studies to advance capabilities and resilience.

Other players can impact DOD’s ability to reduce cost, including Congress, by providing tools for private sector investment in infrastructure and purchase of commercial services with multi-year authority. Lastly, international cooperation has also been shown to advance cost reduction through partnerships that integrate with allied nations on capabilities such as WGS or the Space Surveillance Telescope. Moving forward, DOD will continue to sponsor an open door policy and healthy collaboration with industry to find new ways to achieve cost savings and capabilities advancement.

Mr. Keith Robertson
National Reconnaissance Office (NRO)
Wednesday, May 29 | 9:40–10:25 AM
“Joint Space Cost Council Status and Successes”

Mr. Robertson outlined the advancements that both the Joint Space Cost Council (JSCC) and National Reconnaissance Office (NRO) have made to improve space system cost estimating, and provided examples on NRO initiatives aimed at reducing acquisition costs. The JSCC is a joint NASA, USAF, NRO and industry working group, whose goal is to improve the accuracy, credibility and application of cost estimation on space systems.
Examples of past JSCC initiatives include standardizing Work Breakdown Structure (WBS) and Contractor Data Requirements List (CDRL); data driven basis of estimates; identification and quantification of cost and schedule risk; realistic technical and schedule baselines, and technical data CDRLs. New initiatives include will cost/should cost assessments, understanding impacts of varying contracting modes and methods, and development of industrial base analytics.

Mr. Robertson further discussed the NRO estimating tools that aid in cost reduction discussions, including acquisition complexity, costs of mission assurance, modeling of long-term implications of acquisition strategies, and “will and should” cost management. Central to this discussion is the utilization of EASE and GEAC approaches. Robertson further emphasized that commercial estimating data grew out of discussions with industry, demonstrating the importance of open and collaborative communication. In sum, as NRO and JSCC continue to improve cost estimating and search for areas to reduce space system costs, conversations and cooperation with industry will be essential for educating government cost estimators on how commercial acquisition program and procurement processes are run. By providing more data for cost estimators, estimators are better able to make more informed recommendations on acquisition and management strategies.

Mr. Douglas Loverro
Deputy Assistant Secretary of Defense for Space Policy
Wednesday, May 29 | 12:30–1:30 PM
“The Cost of Securing Space”
http://www.aia-aerospace.org/assets/Loverro.pdf

Mr. Loverro discussed DOD’s perspective on the costs associated with securing space capabilities. The emphasis from DOD’s perspective is to balance the military and threat dynamic, which continue to evolve, in the context of budget cuts, with program requirements and capability advances. Using several examples, Loverro demonstrated how prior successes and current cost-saving practices can define a path forward.

The first example, GPS III, demonstrates how savings were made through smart acquisition and standardization. Space Fence applied lessons learned from GPS III and added fixed price competition with prototype construction to achieve savings. Additionally, several classified satellites have applied these practices and achieved savings by building payloads before the satellite and utilizing commercial buses.

Moving forward, Loverro highlighted several points to reduce acquisition costs, and more generally, emphasized being “smart buyers and smart sellers.” Specific examples include hosted payloads and international cooperation, such as Galileo; using the multi-satellite GPS, which inherently resulted in increased system robustness; multi-year leasing of communications capabilities; and weather data purchase and aggregation. Lastly, Loverro noted the role of public policy in advancing innovation and industrial base costs savings - especially with respect to export control reform and resilient ISR utilizing both foreign and commercial systems.
Mr. Ted Bujewski  
Principal Director, Mfg & Industrial Base Policy, DOD  
Wednesday, May 29 | 1:45–2:30 PM  
“Reducing Unseen Costs”  
http://www.aia-aerospace.org/assets/Bujewski.pdf

There is a need by government to better understand the dynamics of the defense sector's industrial base in the current declining budget environment. In this context, DOD's Manufacturing and Industrial Base Policy office (MIBP) is attempting to reduce inherent yet unseen costs in the system caused when DOD does not have a full picture of its supply base. These unknowns were brought to light in a 2009 report published by the AIA that characterized a number of unseen costs associated with DOD's interaction with the industrial base. These unknowns could be mitigated through greater cooperation, communication and knowledge exchange. In an effort to mitigate these challenges, the MIBP office is assessing the industrial base through industry surveys and criticality and fragility assessments to better understand the DOD supply chain evolution and its status, the end goal of which is to engage in early risk identification and mitigation exercises.

Ms. Christina Chaplin  
Director, Acquisition and Sourcing Management, GAO  
Wednesday, May 29 | 4:00–5:00 PM  
“GAO Assessment of Military Space Program Costs and Trends”  
http://www.aia-aerospace.org/assets/Chaplin.pdf

The Government Accountability Office has identified multiple actions to achieve cost reduction/savings for government actors in space system acquisitions. The specific actions identified include:

1. Cut or restructure programs.  
2. Implement best practices and acquisition reform.  
3. Perform “should cost” analysis.  
4. Eliminate redundancy and modernize satellite control networks.  
5. Increase use of hosted payloads.  
6. Strengthen negotiating position for launch acquisition and increase competition.  
7. Increase use of strategic sourcing.  

Specific examples were used to demonstrate the savings of hosted payloads, including the success of DOD’s Commercially Hosted Infra-Red Payload and the FAA’s Wide Area Augmentation System. Additionally, GPS III and NASA’s small science project portfolio were used to demonstrate the savings associated with adopting best practices. An emphasis was also placed on the potential of strategic sourcing to achieve cost savings for government initiatives, as well as the introduction of competition and interagency collaboration in launch acquisitions cost reduction. The GAO notes the success and the continued need of outreach efforts to industry and other partners to develop and implement these recommendations.
Mr. Brook Sullivan
Program Manager, DARPA TTO
Thursday, May 30 | 8:40–9:30 AM
“Economics of repurposing in-situ retired spacecraft components”
http://www.aia-aerospace.org/assets/Sullivan.pdf

DARPA is developing a new paradigm for achieving cost savings in space by repurposing retired satellite capabilities under the Phoenix Program. Specifically, the Phoenix program utilizes cellularized satellites, or satlets, to repurpose in-situ spacecraft apertures in geostationary Earth orbit by leveraging advancements in hosted hardware, satlet technology and ubiquitous tele-operation. Central to this program is the advancement of satlet and satellite components for easy replacement and installation, and the development of the servicer/tender spacecraft to perform repurposing.

According to DARPA, the Phoenix program approach will increase the effectiveness of DoD/U.S. government return on investment by reusing high-value components in orbit, thus enhancing existing or new operations. This approach also allows new, non-traditional space suppliers to enter space markets using high-volume/low-cost manufacturing, which could provide new opportunities for commercial resellers, government initiatives and the development of commercial servicing platforms.

Mr. Bernie Collins
Senior S&T Advisor, Office of Department of National Intelligence
Thursday, May 30: 10:30 – 11:20 AM
“Space Universal MOdular architecture – SUMO”
http://www.aia-aerospace.org/assets/Collins.pdf

The objective of the Space Universal MOdular architecture (SUMO) is to reduce the cost of satellites and help U.S. industry be more responsive in a growing international space market. These objectives will be addressed through interoperability of satellite components. Interoperability will be enabled by leveraging existing and evolving initiatives and an industry-consensus process to create standard interfaces and common qualification environments for satellite components. Currently, each prime predominately uses application-specific interfaces and qualification environments for the satellite components and consequently, the component manufactures must comply with up to 20 interfaces and a variety of qualification environments for a given component.

As SUMO matures, the primes will increasingly use the same interface and the component manufactures will build to one or two interfaces and design to one or two qualification environments. SUMO permits flexibility for re-purposing a satellite bus using scalability and adaptability, improves manufacturers’ inventory risk and production rate, and has been modeled to save the U.S. government and U.S. space industry $18.8 billion over 17 years (29% off the cost of several hundred satellite busses).
SpaceX was established with an explicit mission to lower the cost of spaceflight and extend human presence beyond Earth. With regard to the government space launch market, routine and reliable American spaceflight demands a need for affordability, a need for true assured access, and a need to preserve the industrial base. Innovative contracting approaches for the development of new technologies and the procurement of launch services are central to addressing each of these concerns.

As was successfully demonstrated in NASA's Commercial Orbital Transportation Services (COTS) program, firm-fixed-price, performance-based development partnerships, known as Space Act Agreements (SAAs), encourage innovation, reduce costs and ensure substantial government insight, without the added overhead expense of traditional contracting mechanisms. A 2011 NASA study conducted using the NASA-Air Force Cost Model (NAFCOM) indicated that SAAs may have saved the government more than $1 billion in the development of the Falcon 9 launch vehicle.

In the operational phase of programs, SpaceX believes the government should use commercial item, fixed-price FAR-12 contracting to protect taxpayers under government regulations, establish defined costs for the U.S. Government, incentivize long-term cost reduction and enable government oversight without additional burden. This approach has been validated by NASA’s successful Commercial Resupply Services program, which has already sent three missions to the International Space Station.

Applying these approaches and the introduction of a robust competitive environment will ameliorate many of the pricing and schedule delay issues that have affected government space launch. NASA is leveraging the success of the COTS program model in the development of its next-generation crewed spacecraft. The U.S. Air Force is currently endeavoring to reduce its own costs and improve its assured access capabilities by reintroducing competition and moving back to fixed-price contracting in the Evolved Expendable Launch Vehicle program.
Ms. Julie Van Kleeck  
Vice President of Space Programs, Aerojet Rocketdyne  
“Case Study for Rocket Propulsion Cost Reduction and Stability”  
http://www.aia-aerospace.org/assets/Van_Kleeck.pdf

With more than 50 years of involvement in the sector, Aerojet Rocketdyne has a unique perspective and experience on affordability, and adaptation through leaner fiscal environments. Cost effective management is central to Aerojet Rocketdyne’s cost reduction strategy, which includes a variety of actions such as rolling several companies into one integrated management team; mothballing unused production lines; and innovative team reshaping that includes a cross-trained and employed team in both solid and liquid propulsion. As an example of the success of these practices, the Aerojet Rocketdyne Solid Rocket Motor price has remained constant for several years-- despite significant material price increases.

Mr. Dennis Granato  
Director, Space Surveillance Systems, Lockheed Martin  
“EASE Implementation Results for AEHF and SBIRS”

Cost reduction through advanced procurement processes are a defining focus of Lockheed Martin’s Space Based Infrared System (SBIRS) and Advanced Extremely High Frequency (AEHF) satellites. The satellites, which will provide advanced surveillance and communications capabilities for DOD, are being implemented through the Evolutionary Acquisition for Space Efficiency, or EASE strategy. EASE is a new approach to space acquisition that reinvests savings made in lower-cost satellites into capability improvement programs. An additional focus of Lockheed Martin’s cost-reduction strategy is the broadening of the company’s international and domestic product and service portfolio.

Mr. Jeff Trauberman  
Vice President, Space, Intelligence & Missile Defense, Boeing  
“Space Cost Reduction: Wideband Global Satellite Case Study”  
http://www.aia-aerospace.org/assets/Trauberman.pdf

Boeing’s Wideband Global Satellite (WGS) project demonstrates how the adoption of commercial practices and standardized hardware lines can achieve significant cost savings and affordability while retaining high mission assurance. For the WGS example, the U.S. Air Force has purchased 10 communications satellites from Boeing. The WGS program leverages commercial practices to lower costs through reduced government oversight, reduced/tailored CDRL items, reduced contract compliance documents and commercial firm-fixed price (FFP) terms. According to the presentation, these practices resulted in savings of greater than $150 million across WGS 7-9. In addition to WGS, Boeing is using commercial practices to reduce the
cost of space systems in other areas. The Boeing 702 SP bus is part of its 702 family and serves as the company’s most recent example of space cost reduction. The 702SP “all electric” satellite is being utilized for telecommunication satellites, including the Asia Broadcast Satellite and SatMex. These projects continue to leverage synergies across the commercial and government customer base and achieve significant cost savings for customers.

Mr. Rick Skinner
Director, Communication Systems Business Development, Northrop Grumman

“Protected SatCom for the Same Price as Unprotected”
http://www.aia-aerospace.org/assets/Skinner.pdf

Northrop Grumman outlines multiple areas for improvements to the SatCom network, most notably achieving “protected SatCom for the price of unprotected.” This approach focuses on several themes including efficiency and performance, reducing user/platform burden, protection and resiliency, and affordability. The space component of this approach includes evolutionary EHF inter-satellite links, free-flyers, airborne platforms and hosted capabilities.

Approved content inclusion from article in MILSAT Magazine – June 25

Mr. A.C. Charania
Manager, Business Development, Virgin Galactic

“Responsive and Affordable Small Satellite Launch Vehicles”
http://www.aia-aerospace.org/assets/Charania.PDF

Virgin Galactic is developing an air-launched orbital launch vehicle called LauncherOne to boost small satellites of 500lbs or less into Low Earth Orbit. Virgin Galactic has taken a multi-dimensional approach to reducing launch costs for LauncherOne. The company has focused on designing a simple and reliable system that leverages existing corporate infrastructure, is focused on a growing and robust commercial market, is built in a scalable production process, relies on reduced ranges costs and takes a pragmatic approach to U.S. government contracting. On the last element, specific approaches to enable greater affordability would include enlightened mission assurance requirements for Class B/C/D payloads for small, dedicated launch vehicles, along with the use of leaner contracting approaches including Other Transaction Authority and Indefinite Delivery Indefinite Quantity mechanisms.
Mr. Kyle Schmackpfeffer  
Director, Mapping and Resource Management Solutions,  
Exelis Geospatial Systems  
“Cost Reduction Lessons Learned from Commercial Remote Sensing.”  
http://www.aia-aerospace.org/assets/Schmackpfeffer.pdf

Exelis has gained a variety of insights into making space payloads more cost effective through the development and operation of its commercial remote sensing portfolio. Exelis helped create the commercial remote-sensing market by designing and building the imaging system for IKONOS, the world’s first commercial high-resolution satellite, launched in 1999 and still operating today. Since then, Exelis has built payloads for the majority of commercial remote-sensing satellites, including GeoEye-1, the world’s first space-borne imaging system with better than one-half meter resolution.

Lessons Exelis has learned from the commercial remote sensing business are focused on five main themes that impact across-the-board procurement and management practices, including performance/risk mindset, schedule execution, collaborative government oversight, requirement lock-in, and increased use of Firm Fixed Price (FFP) contracting.

The first point is focused on shifting the mindset from “exquisite performance and no risks,” to meeting cost and schedule with “high performance and managed risk.” This management recommendation builds on the challenges and lessons learned from complex or aggregated “one-offs,” and further suggests a role for minor performance waivers. The second point is focused on incentivizing government and industry program offices to better integrate cost schedule expectation and incentives. “They have to realize that they are in this together,” Schmackpfeffer explained. Shifting away from more government oversight to a more collaborative relationship incentivizes program success – not just risk avoidance. In this example, stakeholders must balance keeping design review teams lean and efficient with the importance of getting to the “root cause” quickly.

In Exelis’s experience, additional contracting adjustments have been shown to reduce cost and uncertainty by locking in requirements early in the process. This highlights the tendency of changes to result in delays; however, some limited development is acceptable. Also, increased use of FFP contracting with commercial terms and practices tends to incentivize the contractor to deliver on time with a quality product.