U.S. Government Accountability Office

Weapon Acquisition Program Outcomes and Efforts to Reform DOD's Acquisition Process

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U.S. Government Accountability Office
DOD’s Affordability Challenge

IMPERATIVES:

• Continued Cost and Schedule Improvements in DOD’s MDAP Portfolio
• Increased Focus on Truly Understanding Requirements
• Greater Efficiencies by Continuing Improvements to the Acquisition Process
DEFENSE ACQUISITIONS:
Assessments of Selected Weapon Programs
(GAO-16-329SP)

Selected Findings from GAO’s Analysis of DOD’s Portfolio of Major Defense Acquisition Programs

For more information, contact J. Kristopher Keener 202-512-9310
Objectives

This is GAO's 14th annual assessment of DOD weapon system acquisitions, an area that has been on GAO's high-risk list for 24 years. The report assessed selected weapon programs in DOD's fiscal year 2015 major defense acquisition portfolio.

Our objectives were to determine:

1) how DOD’s portfolio of 79 major defense acquisitions performed over time in terms of both cost and schedule;

2) to what extent 43 selected weapon acquisition programs demonstrated key product knowledge at specific milestones in the acquisition process;

3) to what extent 43 current and 12 future major acquisition programs implemented key reform initiatives and addressed concurrent acquisition activities.
Observations on the cost and schedule performance of DOD’s major acquisition programs

Changes across portfolios

1. When compared to the 2014 portfolio, the cost of the 2015 portfolio decreased by nearly $15 billion from $1,455 to $1,440 billion and the number of programs in the portfolio increased by one to 79.*

2. The total amount of funding required for the portfolio has been decreasing since 2010. The future funding needed to complete the portfolio—$603 billion—is at its lowest point in over a decade. Of this future funding, $571 billion is for procurement and $32 billion is for development. The low amount of future development funding required is likely due to newer programs with less risk entering system development.

Changes in the 2015 portfolio

3. When analyzing the change to cost and schedule estimates over the past year for the 79 programs in the 2015 portfolio, the estimated total acquisition cost decreased by $2.5 billion and the average schedule delay in achieving initial capability increased by 2.4 months. When assessed against first full estimates, total costs have increased by $469 billion, over 48 percent, and the average delay in delivering initial capabilities has increased to almost 30 months.

Factors that explain changes in the 2015 portfolio

4. Older programs carry a majority of the total cost and cost growth since first full estimates. Of the 79 programs in the 2015 portfolio, 40 were also in the 2005 portfolio representing 80 percent of the portfolio’s total acquisition cost.

5. While the total cost of the 2015 portfolio decreased, 42 of the 79 programs increased in cost over the past year. Cost estimate decreases on 37 programs resulted in the overall net cost decrease.

*We exclude the Ballistic Missile Defense System as its reported baselines are not comparable with other programs.
Observations on the cost and schedule performance of DOD’s major acquisition programs

Factors that explain changes in the 2015 portfolio and other observations

6. 38 programs gained buying power during the past year resulting in a net gain of $10.7 billion. Six programs have demonstrated buying power gains or losses annually over the past 5 years.

7. Schedule delays over the past year in 11 of the 79 programs contributed to the portfolio’s overall delay of 2.4 months. The Airborne Maritime/Fixed Station radio system experienced the largest delay at more than 8 years, which disproportionately affected the portfolio.

8. Over the past year, 16 programs reported development cost growth while in production. This represents concurrency, which can be caused by many factors, and is a contributor to cost growth.

9. As measured against the metrics discussed with the Office of Management and Budget and DOD, more programs meet each metric for cost change than our last assessment.

10. The total cost of the portfolio estimated for Army programs is the smallest of the services and has been decreasing since 2007. The Navy and Air Force’s share of portfolio costs have been increasing since 2007 and 2012 respectively. Navy programs account for almost 55 percent of the 2015 portfolio’s total estimated acquisition cost.

11. The equity prices of contractors delivering the ten costliest programs performed well relative to broad-based market indices, indicating that investors expect them to remain profitable in the future.
The decrease in cost from the 2014 portfolio to the 2015 portfolio continues a trend identified in previous assessments.

**DOD Portfolio Cost and Size, 2005-2015**

Fiscal year 2016 dollars (in billions)

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Acquisition Cost</th>
<th>Number of Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>$1,558</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>$1,647</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>$1,684</td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>$1,666</td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>$1,699</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>$1,693</td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>$1,531</td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>$1,546</td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>$1,455</td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td>$1,440</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>$1,440</td>
<td></td>
</tr>
</tbody>
</table>

Source: GAO analysis of DOD data. GAO-16-329SP

Note: The 2009 portfolio is excluded because there were no annual Selected Acquisition Reports (SAR) released for the December 2008 submission date.

- DOD’s portfolio has been steadily decreasing in terms of cost since 2010.
- Over half, or 40 of the 79 programs in the 2015 portfolio, were also in the 2005 portfolio and represent 80 percent of the portfolio’s current total acquisition cost or over $1.1 of the $1.4 trillion.
The total amount of funding required for the portfolio has been decreasing since 2010, the amount needed to complete the portfolio—$603 billion—is at its lowest point in over a decade.

**Future Development and Procurement Funding in Comparison to Invested Funding by Year, 2005-2015**

Fiscal year 2016 dollars (in billions)

<table>
<thead>
<tr>
<th>Year</th>
<th>Needed to Complete</th>
<th>Invested in the Portfolio</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>$127.6</td>
<td>$618.2</td>
</tr>
<tr>
<td>2006</td>
<td>$113.2</td>
<td>$654.3</td>
</tr>
<tr>
<td>2007</td>
<td>$95.4</td>
<td>$729.4</td>
</tr>
<tr>
<td>2008</td>
<td>$76.9</td>
<td>$817.6</td>
</tr>
<tr>
<td>2009</td>
<td>$51.2</td>
<td>$943.6</td>
</tr>
<tr>
<td>2010</td>
<td>$56.5</td>
<td>$909.4</td>
</tr>
<tr>
<td>2011</td>
<td>$43.9</td>
<td>$811.5</td>
</tr>
<tr>
<td>2012</td>
<td>$37.2</td>
<td>$844.1</td>
</tr>
<tr>
<td>2013</td>
<td>$32.8</td>
<td>$798.2</td>
</tr>
<tr>
<td>2014</td>
<td>$32.0</td>
<td>$823.1</td>
</tr>
<tr>
<td>2015</td>
<td>$571.4</td>
<td>$1,000</td>
</tr>
</tbody>
</table>

- **Total development and procurement funding invested in the portfolio**
- **Development funding needed to complete the portfolio**
- **Procurement funding needed to complete the portfolio**

Source: GAO analysis of DOD data.

Note: The 2009 portfolio is excluded because there were no annual SARs released for the December 2008 submission date.

- Overall, the amount of total funding needed to complete the portfolio has been decreasing since 2006 and is currently $603 billion or 42 percent of the portfolio’s total cost.
- Of note is the decrease in the amount of development funding needed to complete the portfolio. Only $32 billion in development remains to be appropriated down from almost $128 billion in 2005.
Over the past year, the estimated cost of the 2015 portfolio decreased by $2.5 billion, the average delay in achieving initial capability increased by 2.4 months.

<table>
<thead>
<tr>
<th>Cost and Schedule Change for the 79 Programs in the 2015 Portfolio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiscal year 2016 dollars (in billions)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Estimated portfolio cost in 2014</th>
<th>Estimated portfolio cost in 2015</th>
<th>Estimated portfolio change since 2014</th>
<th>Percentage change since 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total estimated research and development cost</td>
<td>$285.9</td>
<td>$289.0</td>
<td>$3.1</td>
<td>1.1%</td>
</tr>
<tr>
<td>Total estimated procurement cost</td>
<td>1,143.5</td>
<td>1,137.6</td>
<td>-6.0</td>
<td>-0.5</td>
</tr>
<tr>
<td>Total estimated acquisition cost</td>
<td>1,442.0</td>
<td>1,439.6</td>
<td>-2.5</td>
<td>-0.2</td>
</tr>
<tr>
<td>Average delay from first full estimate in delivering initial capabilities</td>
<td>27 months</td>
<td>29.5 months</td>
<td>2.4 months additional delay</td>
<td>1.3</td>
</tr>
</tbody>
</table>

Source: GAO analysis of DOD data.
Note: In addition to research and development and procurement costs, total acquisition cost includes acquisition related operation and maintenance and system-specific military construction costs. Some numbers may not sum due to rounding.

- The total procurement cost decreased, similar to our last assessment.
- The 2.4 month average delay in delivering operational capability is a month greater than our last assessment and continues a trend we have seen for the past decade.
- When measured from first full estimates the total estimated cost of the portfolio has grown by over 48 percent, or nearly $469 billion.
  - Eighty percent of cost growth since first full estimates occurred five or more years ago.
Although the total cost for the 2015 portfolio decreased, 42 of 79 programs increased in cost over the past year, the cost decreases on the remaining 37 programs resulted in the net cost decrease.

- Unlike previous assessments there were fewer programs at the extremes of the distribution with significant cost changes, i.e. no “outliers”.
- Cost changes resulted from a variety of program changes, including changes to program quantities.
Accounting for quantity changes, 38 programs in the portfolio gained buying power during the past year resulting in a net buying power gain of $10.7 billion.

### Procurement Cost Changes in the 2015 Portfolio due to Quantity Changes and Other Factors

<table>
<thead>
<tr>
<th></th>
<th>Number of programs</th>
<th>GAO Calculated Cost Change</th>
<th>Actual Procurement Cost Change</th>
<th>Cost change not attributable to quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Increased buying power</strong></td>
<td>38</td>
<td>$10.6</td>
<td>-$5.4</td>
<td>-$16.0</td>
</tr>
<tr>
<td>Procurement cost decreased with no quantity change</td>
<td>26</td>
<td>$0.0</td>
<td>-$10.6</td>
<td>-$10.6</td>
</tr>
<tr>
<td>Quantity increased with less cost increase than anticipated</td>
<td>11</td>
<td>$10.6</td>
<td>$5.9</td>
<td>-$4.7</td>
</tr>
<tr>
<td>Quantity decreased with more cost decrease than anticipated</td>
<td>1</td>
<td>-.06</td>
<td>-.07</td>
<td>-$0.7</td>
</tr>
<tr>
<td><strong>Decreased buying power</strong></td>
<td>35</td>
<td>-$4.2</td>
<td>$1.1</td>
<td>$5.3</td>
</tr>
<tr>
<td>Procurement cost increased with no quantity change</td>
<td>25</td>
<td>$0.0</td>
<td>$2.0</td>
<td>$2.0</td>
</tr>
<tr>
<td>Quantity increased with more cost increase than anticipated</td>
<td>6</td>
<td>$4.9</td>
<td>$5.5</td>
<td>$0.6</td>
</tr>
<tr>
<td>Quantity decreased with less cost decrease than anticipated</td>
<td>4</td>
<td>-$9.1</td>
<td>-$6.3</td>
<td>$2.8</td>
</tr>
<tr>
<td><strong>No change in buying power</strong></td>
<td>5</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
</tr>
<tr>
<td><strong>Program eliminated procurement</strong></td>
<td>1</td>
<td>-$1.7</td>
<td>-$1.7</td>
<td>$0.0</td>
</tr>
<tr>
<td><strong>Portfolio totals</strong></td>
<td>79</td>
<td>$4.7</td>
<td>-$6.0</td>
<td>-$10.7</td>
</tr>
</tbody>
</table>

Source: GAO analysis of DOD data.

- Our analysis shows that 38 programs increased their buying power in the past year and reduced procurement costs by a total of $5.4 billion. This total is the net amount of cost change given the $10.6 billion in increases due to quantity increases and the $16 billion in decreases due to other program efficiencies.
- These buying power gains outweighed losses resulting in a net buying power gain of $10.7 billion.
The total cost of the portfolio estimated for Army programs is the smallest of the services and has been decreasing since 2007. The Navy and Air Force’s share of portfolio costs have been increasing.

- Spending on Navy programs now accounts for 55 percent of the portfolio or $54.6 billion.
- As the share of cost for Navy programs increased, that for the Army has decreased, it is now at 10 percent of the portfolio.
- Some Navy programs, shipbuilding in particular, have experienced significant cost growth.
- In a constrained funding environment, unforeseen cost increases limit investment choices.
The equity prices of the contractors delivering the ten costliest programs have performed well relative to broad-based market indices, indicating that investors expect these firms to remain profitable well into the future.

- Five publicly-traded defense contractors are developing and delivering the ten largest DOD programs in the 2015 portfolio.
  - These 10 programs account for $866 billion in acquisition costs, over 60 percent of the total portfolio.
- The equity prices—a stock price-based indicator of investor expectations of future earnings over many years—for these contractors over the past decade has increased at a rate that outperformed broad-based indices for markets as a whole, as well as narrower indices covering similar sectors of the economy.
  - This indicates that investors expect the performance of these companies to be particularly strong for some time to come.
  - Strong equity performance among these contractors could be driven by a number of factors and is not necessarily related to the financial condition of major acquisition programs.
Of the 12 future programs we assessed, 5 identified critical technologies and their anticipated maturity levels

<table>
<thead>
<tr>
<th>Program</th>
<th>Development start</th>
<th>Projected to demonstrate all critical technologies in an operational environment</th>
<th>Projected to complete all systems engineering reviews</th>
<th>Plan to constrain system development</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-AO(X)</td>
<td>06/2016</td>
<td>●</td>
<td>O</td>
<td>●</td>
</tr>
<tr>
<td>IFPC Inc. 2</td>
<td>06/2016</td>
<td></td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>F-15 EPAWSS</td>
<td>09/2016</td>
<td></td>
<td>O</td>
<td>●</td>
</tr>
<tr>
<td>OR</td>
<td>09/2016</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAR</td>
<td>03/2017</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P-8A Inc. 3</td>
<td>06/2017</td>
<td></td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>UCLASS</td>
<td>06/2017</td>
<td>●</td>
<td></td>
<td>O</td>
</tr>
<tr>
<td>JSTARS Recap</td>
<td>09/2017</td>
<td></td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>ITEP</td>
<td>06/2018</td>
<td></td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>LX(R)</td>
<td>09/2018</td>
<td></td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>APT</td>
<td>12/2017</td>
<td></td>
<td>O</td>
<td>●</td>
</tr>
<tr>
<td>WSF</td>
<td>12/2018</td>
<td></td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

• The best point of leverage to ensure a program’s success is at the start of a new program. At this point, decision makers can ensure that new programs implement best practices and exhibit desirable principles before they are approved and funded.

• Three of the 12 programs plan to conduct all of the recommended systems engineering reviews before development start, including a system functional review, a system requirements review, and a preliminary design review.
The seven programs that started system development, or planned to, during our assessment period have knowledge deficits which introduce risk and could lead to cost and schedule growth.

- OASuW Inc. 1 plans to have immature technologies at the start of system development.
- None of the programs demonstrated critical technologies in an operational environment.
- Five programs conducted all systems engineering reviews, including a preliminary design review, before entering system development.
Of the five programs that held, or are planning to hold, a critical design review during our assessment period, two met all of the best practices.

- Two programs have not demonstrated mature technologies, yet all plan to release at least 90 percent of drawings.

- Two programs do not plan to test a system-level integrated prototype.
Of the five programs that held a production decision during our assessment period, one met all of the best practices, including demonstrating that critical processes are in statistical control.

<table>
<thead>
<tr>
<th>Knowledge-based practices at production start</th>
<th>FAB-T</th>
<th>JLTV</th>
<th>MQ-4C</th>
<th>SDBII</th>
<th>SSC</th>
<th>For the 11 non-shipbuilding programs that have reached this juncture²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstrate all critical technologies in an operational environment</td>
<td>○</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>5</td>
</tr>
<tr>
<td>Release at least 90 percent of drawings or 100 percent of 3D zones</td>
<td>●</td>
<td>---</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>7</td>
</tr>
<tr>
<td>Demonstrate manufacturing process capabilities are in control</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>●</td>
<td>○</td>
<td>1</td>
</tr>
<tr>
<td>Demonstrate critical processes on a pilot production line</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>6</td>
</tr>
<tr>
<td>Test a production-representative prototype in its intended environment</td>
<td>○</td>
<td>●</td>
<td>○</td>
<td>●</td>
<td>○</td>
<td>4</td>
</tr>
</tbody>
</table>

- SDB II met all of the best practices for production.
- Three of the programs do not plan to test a production-representative prototype before making a production decision.

Key:
- ● Practice implemented
- ○ Practice not implemented
- --- Practice not applicable or information not available per the program office response

FAB-T - Family of Advanced Beyond Line-of-Sight Terminals
JLTV - Joint Light Tactical Vehicle
MQ-4C - MQ-4C Triton Unmanned Aircraft System
SDB II - Small Diameter Bomb Increment II
SSC - Ship to Shore Connector Amphibious Craft

Source: GAO analysis of DOD data. | GAO-16-329SP
Objective 3: Observations on current and future programs
implementation of acquisition reforms and initiatives

1. Of the 55 current and future programs we assessed, 37 have established an affordability constraint, similar to the implementation rate in our last assessment. The development cost growth for programs we assessed with an affordability constraint is 33 percentage points lower than the median development cost growth for programs without a constraint.

2. Of the 43 current programs we assessed, 39 have conducted a “should-cost” analysis resulting in anticipated development and procurement savings of over $35 billion; approximately $21 billion of these savings have been realized to date.

3. Of the 55 current and future programs we assessed, 43 plan to promote competition at some point during acquisition. Eight of the 43 current programs have no plans for competition before or after development start. Half of the future programs we assessed plan to conduct competitive prototyping.

4. Of the 55 current and future programs we assessed, 40 reported software development as a high-risk area. Programs which did not report their software development as high-risk have experienced greater schedule delays. Sixteen of the 43 current programs we assessed plan to concurrently conduct production and software development.

5. Sixteen of the 43 current programs we assessed are in production. Eleven of these programs plan to complete 30 percent or more of their developmental testing after production start. Further, three of these 11 programs plans to place more than 20 percent of procurement quantities under contract before testing is complete. For the programs we assessed, as concurrency increases, so does total acquisition cost growth.
Of the 43 current programs we assessed, 39 have conducted a “should-cost” analysis resulting in anticipated savings of over $35 billion; approximately $21 billion of these savings have been realized to date.

Of the 39 programs, 35 identified approximately $35 billion in realized and future savings.
- $21.2 billion of this has been realized.
- Programs reported that nearly $286 million of those savings were used to offset budget cuts required by sequestration.
- Programs may not have strong incentives to realize or report “should-cost” savings if they result in the funding of other DOD priorities.

Programs cited several activities as responsible for some or all of their “should-cost” savings, including:

- efficiencies realized through contract negotiations (15 programs),
- design trades to balance affordability and capability (12 programs), and
- developmental or operational testing efficiencies (7 programs).
Of the 55 current and future programs we assessed 43 have acquisition strategies that include some strategies for encouraging competition, eight will not conduct a competition, and 4 are unsure of their approach at this time.

Current Programs’ Plans to Promote Competition

- Competition before system development start: 22 (Yes), 21 (No)
- Competition after system development start: 16 (Yes), 25 (No), 1 (Neither)
- Competition before and after system development start: 8 (Yes), 8 (Yes), 13 (Before only), 13 (After only), 1 (Both)

Future Programs’ Plans to Promote Competition

- Competition before system development start: 6 (Yes), 6 (No)
- Competition after system development start: 2 (Yes), 5 (No), 5 (Neither)
- Competition before and after system development start: 4 (Yes), 3 (Yes), 2 (Before only), 3 (After only)

Source: GAO analysis of DOD data. | GAO-16-329SP
Program assessments

- There are currently 55 programs that will be covered in assessments
  - 42 2-page
  - 13 1-page

### 1-page assessments

- APT
- DDG 51 Flight III
- F-15 EPAWSS
- IFPC Inc 2-I Block 1
- ITEP
- JSTARS Recap
- LX(R)
- Ohio Replacement
- P-8A Inc 3
- PAR
- T-AO(X)
- UCLA
- WSF

### 2-page assessments

<table>
<thead>
<tr>
<th>Program</th>
<th>Program</th>
<th>Program</th>
<th>Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>3DELRR</td>
<td>DDG 1000</td>
<td>JLTV</td>
<td>NGJ Inc. 1</td>
</tr>
<tr>
<td>ACV</td>
<td>EELV</td>
<td>JPALS Inc 1A</td>
<td>OASuW Inc. 1</td>
</tr>
<tr>
<td>AIM-9X Blk II</td>
<td>EPS</td>
<td>JTRS HMS</td>
<td>OCX</td>
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<tr>
<td>AMDR</td>
<td>F-22 Inc 3.2B Mod</td>
<td>KC-46A</td>
<td>PAC-3 MSE</td>
</tr>
<tr>
<td>AMF JTRS</td>
<td>F-35 JSF</td>
<td>LCS</td>
<td>SDB II</td>
</tr>
<tr>
<td>AMPV</td>
<td>FAB-T</td>
<td>LCS Packages</td>
<td>Space Fence Inc 1</td>
</tr>
<tr>
<td>B-2 DMS-M</td>
<td>G/ATOR</td>
<td>LHA 6</td>
<td>SSC</td>
</tr>
<tr>
<td>CH-53K</td>
<td>GPS III</td>
<td>M109A7 FOV</td>
<td>VH-92A</td>
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<tr>
<td>CIRCM</td>
<td>IAMD</td>
<td>MGUE Inc 1</td>
<td>WIN-T Inc 2</td>
</tr>
<tr>
<td>CRH</td>
<td>JAGM</td>
<td>MQ-4C Triton</td>
<td>WIN-T Inc 3</td>
</tr>
<tr>
<td>CVN 78</td>
<td>JAGM</td>
<td>MQ-8 Fire Scout</td>
<td></td>
</tr>
<tr>
<td>WSF</td>
<td>JAGM</td>
<td>MQ-8 Fire Scout</td>
<td></td>
</tr>
</tbody>
</table>

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Requirements Really Matter

Travis J. Masters
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Requirements Knowledge Is Critical

- Positive acquisition outcomes require the use of a knowledge-based approach to product development that demonstrates high levels of knowledge before significant commitments are made—knowledge supplants risk over time.

- An executable program business case must demonstrate a match between requirements and available resources before beginning system development.

- Keys to achieving a match:
  - Clearly defined and understood requirements – down to at least a completed preliminary design
  - Resource knowledge – available technologies, time, money, and skilled people
What Are Requirements?

- It depends, because “where you sit determines where you stand”

- Operational requirements
  - Typically rooted in capability gaps
  - Establish capability needs and set operational goals
  - Provide the high-level success criteria

- Design requirements
  - Also known as derived requirements or specifications
  - Identify the key subsystems (technologies) and interfaces through preliminary design and ultimately full (or critical) design
  - Provide a clear understanding of technical / design feasibility of a system
Requirements Creep or Knowledge Gained?

- For Major Defense Acquisition Programs, operational requirements like Key Performance Parameters, don’t tend to change after development begins, but as operational requirements are decomposed the number of design requirements (i.e. specifications) grows significantly, often giving the appearance of “creep.”

- Growth in the number of design requirements is a natural process for every system as requirements are decomposed and the system design matures.

Source: GAO-15-469
Characteristics of More Successful Programs

- Incremental, Derivative, and/or Prototypes
- Limited system complexity and high technology maturity
- Requirements informed through systems engineering
- Cost and schedule estimates informed through systems engineering

Examples include:
- KC-46A
- Joint Light Tactical Vehicle
- Small Diameter Bomb
- P-8A
Typical DOD Requirements Flow

ICD

CDD

Performance Specification

Functional Baseline

Allocated Baseline

Product Baseline

Typical DOD Program Start

Best Practice Program Start
Systems Engineering Builds Knowledge

- Implementation of the SE processes begins with the identification of a validated operational need.

- The technical processes … include the **top-down design processes** and **bottom-up realization processes** that support transformation of operational needs into operational capabilities (i.e. a delivered weapon system).

- During the Technology Development (TD) phase:
  - Program Manager and Systems Engineer work to reduce technical risk and develop a sufficient understanding of the materiel solution development
  - Validate design approaches and cost estimates, to refine requirements and to ensure affordability is designed into the desired capability…(i.e. the top-down design processes cited above)

Source: Defense Acquisition Guidebook
The Requirements Part of Systems Engineering

![Diagram showing the requirements part of systems engineering]

- **Requirements**
  - Initial Capability Document
  - Capability Development Document
  - Performance Specification
  - Functional Baseline
  - Allocated Baseline
  - Product Baseline

- **Systems Engineering**
  - Capability Gaps
  - Operational Requirements
  - Preliminary Design
  - Final Design
  - Product
  - Validated Solution
  - Delivered Capability

- **Typical DOD program start**
- **DOD Objective & Best Practice Program Start**

- **Risk and Uncertainty**
Considerations For Further Improving Weapon System Acquisition Performance

• Cultural shift to get rid of the “we can’t do that here” attitude
  • DOD 5000 is flexible and statute does not prohibit it
  • DOD programs have done it successfully
  • Think incremental or derivative—build on what is known

• Consider knowledge as an independent variable—properly align decisions with knowledge, don’t try to force knowledge to the left of a schedule-driven process

• Think outside the box about ways to work with the industrial base to better understand design requirements before program start
  • Different contracting types
  • Competition through PDR or even CDR
  • Require a “prototype or derivative solution”

• Consider ways to work with the Congress to identify ways to invest in systems engineering knowledge — pay me now or pay me later
GAO on the Web
Web site: http://www.gao.gov/

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Katherine Siggerud, Managing Director, siggerudk@gao.gov
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Acquisition Reform

Efforts to Streamline DOD’s Acquisition Process and Reduce Burden on Commercial Companies

For more information, contact Cheryl Andrew at andrewc@gao.gov
Contents

• Recent Reform and Improvement Efforts
• Impact of DOD’s Implementation of Reform Efforts on Internal Processes
• Efforts to Streamline DOD’s Oversight of Acquisition Programs
• Future Congressional Areas of Emphasis
Recent Reform and Improvement Efforts

- **People**: Rebuild the acquisition workforce
  - **DAWIA**
  - **Defense Reform Initiative**
  - **WSARA**
  - **Better Buying Power**

- **Faster, Better, Cheaper**:
  - **Acquisition Reform of the 90’s**
  - **Reduce infrastructure and overhead costs and improve business process**

- **Knowledge & Savings**:
  - **Improve acquisition program cost and schedule outcomes**
  - **Improve DOD’s purchasing power**

1990’s - 2015
Impact of DOD’s Implementation of Reform Efforts on Internal Processes

Average time to complete information requirement (months)

![Bar chart showing time to complete information requirements for different levels of value: High value, Moderate value, Less than moderate value.]

Source: GAO analysis of DOD data. | GAO-15-192

Review levels - traditional program:
- Office of the Secretary of Defense Milestone Decision Authority
- Functional Offices Senior Managers
- Functional Offices Staff
- Service Acquisition Executive
- Functional Offices Staff
- Program Executive Officer
- Program Executive Officer Staff
- Program Office

Review levels - some classified programs:
- Board of Directors - Milestone Decision Authority
  - Defense Acquisition Executive
  - Service Secretary
  - Service Chief of Staff
  - Service Acquisition Executive
  - Program Executive Officer
  - Program Office

Specific, focused interactions with a small number of functional offices as necessary.

Source: GAO presentation of DOD data. | GAO-15-192

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# Impact of DOD’s Implementation of Reform Efforts on Internal Processes

## Organizations Typically Involved in the Review Process for an Air Force Acquisition Strategy

<table>
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<th>Office of the Secretary of Defense (OSD) Level</th>
<th>Service Acquisition Executive (SAE) Office Level</th>
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<tbody>
<tr>
<td>• Defense Acquisition Executive</td>
<td>• Assistant Secretary of Defense (Research &amp; Engineering)</td>
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<tr>
<td>• Vice Chairman of the Joint Chiefs of Staff</td>
<td>• Deputy Assistant Secretary of Defense, Strategic &amp; Tactical Systems</td>
</tr>
<tr>
<td>• Under Secretary of Defense (Policy)</td>
<td>• Deputy Assistant Secretary of Defense, Space &amp; Intelligence</td>
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<tr>
<td>• Under Secretary of Defense (Comptroller)</td>
<td>• Deputy Assistant Secretary of Defense, Communication, Command, and Control Cyber</td>
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<tr>
<td>• Under Secretary of Defense (Personnel &amp; Readiness)</td>
<td>• Director, National Geospatial-Intelligence Agency</td>
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<tr>
<td>• Under Secretary of Defense (Intelligence)</td>
<td>• Deputy Director, Cost Assessment</td>
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<tr>
<td>• Chief Information Officer</td>
<td>• Director, Defense Pricing</td>
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<tr>
<td>• Director, Operational Test &amp; Evaluation</td>
<td>• Director, Systems Engineering</td>
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<tr>
<td>• Director, Cost Assessment and Program Evaluation</td>
<td>• Director, Developmental Test &amp; Evaluation</td>
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<tr>
<td>• Director, Acquisition Resources &amp; Analysis</td>
<td>• Deputy Assistant Secretary of Defense, Manufacturing &amp; Industrial Base Policy</td>
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<tr>
<td>• Principal Deputy Under Secretary of Defense (Acquisition, Technology, &amp; Logistics)</td>
<td>• Director, International Cooperation</td>
</tr>
<tr>
<td>• Assistant Secretary of Defense (Acquisition)</td>
<td>• Director, Performance Assessment and Root Cause Analysis</td>
</tr>
<tr>
<td>• Assistant Secretary of Defense (Logistics &amp; Materiel Readiness)</td>
<td>• Assistant Secretary of Defense (Legislative Affairs)</td>
</tr>
<tr>
<td>• Deputy Under Secretary of Defense (Installations and Environment)</td>
<td>• Director, Defense Procurement and Acquisition Policy</td>
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<tr>
<td>• Deputy General Counsel (Acquisition &amp; Logistics)</td>
<td>• Assistant Secretary of Defense (Operational Energy Plans and Programs)</td>
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<th>Program Executive Office</th>
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<td>• Program Executive Officer</td>
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<td>• Deputy Program Executive Officer</td>
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<tr>
<td>• Functional Staff contracting, logistics, finance, and engineering</td>
<td></td>
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<tr>
<td>• Program Executive Officer Execution Group</td>
<td></td>
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</tbody>
</table>

30 OSD organizations

22 Service-level organizations

4 PEO-level organizations

Source: GAO presentation of DOD data. | GAO-15-102
Impact of DOD’s Implementation of Reform Efforts on Internal Processes

Challenge is Determining the Right Balance of Oversight and Insight
Efforts to Streamline DOD’s Oversight of Acquisition Programs

**FY 16 NDAA**
- Milestone Decision Authority for most programs will now be the service acquisition executive instead of OSD.
- Milestone Decision Authority makes a determination about an acquisition program’s “business case” at Milestone A and a certification at Milestone B.
- OSD Systems Engineering and Developmental Test and Evaluation Offices will serve in an advisory role and are not directly in the chain of command for approving programs.
- Some required documentation was eliminated – such as stand alone manpower estimates.

**DOD Improvement Efforts**
- OSD and the Navy are pilot testing a streamlined reporting process with the Next Generation Jammer program.
- OSD delegated 24 programs to the services for oversight in FY 15.
- OSD and the services are using an electronic coordination tool to review and approve acquisition strategies.
- DAU is analyzing data it collected on 5 MDAPs related to the number of higher level reviews and the timeline for approval of key acquisition documents.
Future Congressional Areas of Emphasis

• Obtaining Technologically Advanced Weapon Systems Quicker (Acquisition Agility)
  • Prototyping
  • Open Systems

• Reducing Burden on Commercial Companies with Changes to:
  • Commercial Item Determinations
  • Other Transaction Authority
  • Technical Data Rights
  • Cost and Pricing Data
GAO Review on Reducing Burden on Commercial Companies

- GAO is currently conducting a review to identify impediments innovative companies perceive or face when conducting business with DOD
  - We are conducting 12-15 case studies to illustrate the impediments companies face. The majority of the companies are involved with cyber security, data analytics, or robotics.
  - We plan to analyze DOD policies and initiatives aimed at eliminating impediments
Most common concerns:

- Lengthy decision-making process (commercial item and price reasonableness determinations)
- Multiple, costly software certifications
- Unstable funding and budget inflexibility
- Intellectual property rights
- Requirements that are too prescriptive
- Difficulty identifying business opportunities
- Acquisition workforce lacks subject-matter and technical expertise
- Risk averse workforce
- Rotating DOD workforce