DEFENSE ACQUISITIONS
Assessments of Selected Weapon Programs
GAO-15-342SP

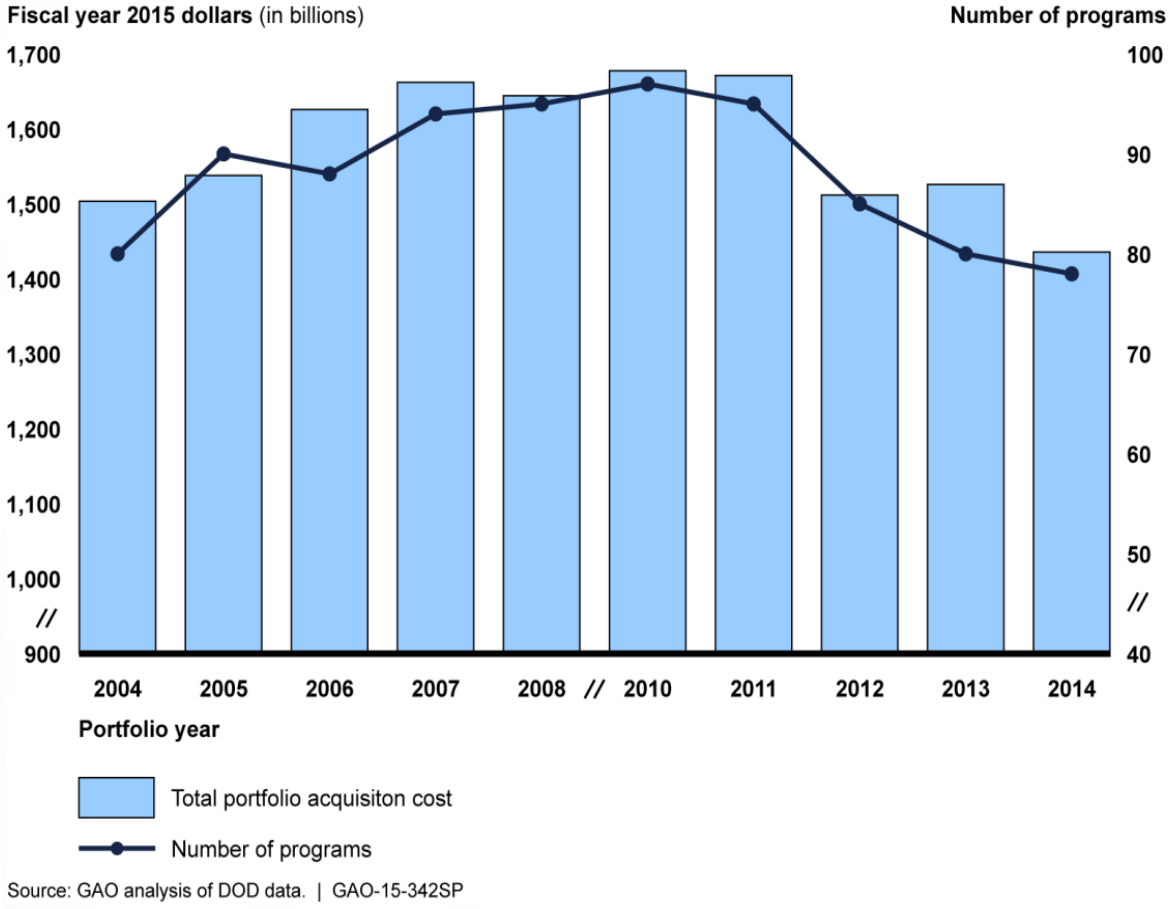
Selected Findings from GAO's Analysis of DOD's Portfolio of Major Defense Acquisition Programs

Observations on Cost and Schedule Performance

1. When compared to the 2013 portfolio, the number of programs in the 2014 portfolio decreased from 80 to 78 and its overall estimated cost decreased by $90 billion to $1,436 billion, driven primarily by programs completing acquisition and exiting the portfolio.
2. The current portfolio has the least number of programs and lowest total cost since 2004. Similarly, the amount of funding needed to complete the portfolio has been steadily decreasing.
3. When analyzing the change to cost and schedule estimates over the past year for the 78 programs in the 2014 portfolio, we found that costs decreased by more than $7 billion and the delivery of initial operating capability was delayed by more than 1 month on average. When assessed against first full estimates, the estimated total cost has increased by nearly 47 percent, with an average schedule delay of more than 29 months. These increases are proportionally higher than those seen in past assessments.
4. While the overall estimated cost of the 2014 portfolio decreased, a majority of the 78 programs experienced cost increases over the past year. Significant cost estimate decreases on two programs, WINT-3 and LCS, resulted in the overall net cost decrease.
5. When the effects of quantity changes are accounted for, 40 programs in the portfolio lost buying power and 38 gained buying power, or had no change, resulting in a net cost increase of $2.2 billion. This performance diverges from the buying power gains seen in our prior assessments.
6. Schedule changes over the past year on a small number of the 78 programs contributed to the portfolio's overall delay of more than one month in the estimated delivery of initial capability; 11 programs reported a delay of 6 months or more.
7. As measured against metrics discussed by GAO, the Office of Management and Budget, and DOD in 2008; 69 percent of programs meet the threshold for less than 2 percent growth in total acquisition cost over the past year and 44 percent met the threshold for less than 15 percent cost growth since first full estimates. Both percentages are lower than those reported previously.
8. Thirteen of the 23 programs reporting development cost estimate increases of 2 percent or more over the past year are in production, a phase of the acquisition cycle which should have minimal development cost growth.
9. The F-35 Joint Strike Fighter experienced the largest amount of cost growth in the portfolio since 2001. If the cost and schedule performance of the F-35 is removed, the 2014 portfolio's overall performance improves.

When compared to the 2013 portfolio, the number of programs for 2014 decreased from 80 to 78 and the estimated overall cost decreased by $90 billion to $1.4 trillion, driven primarily by programs completing acquisition. The decrease in portfolio size follows a trend from 2011.

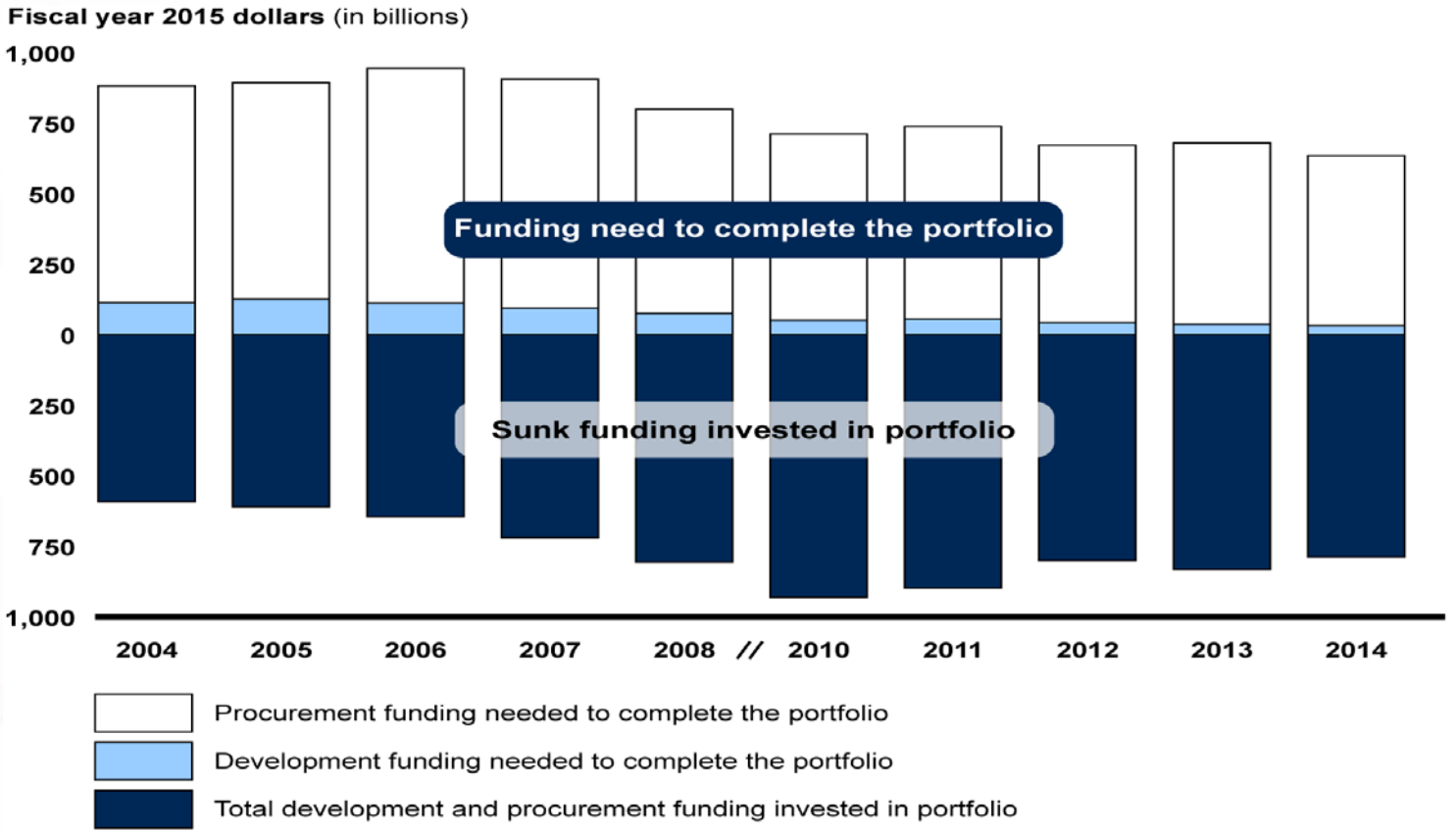
DOD Portfolio Cost and Size, 2004-2014



Source: GAO analysis of DOD data. | GAO-15-342SP

Like the number of programs, the amount of funding needed to complete the development and procurement of the portfolio has been steadily decreasing. 58 of 78 current programs are now well into production, meaning less funding remains. In addition, DOD has started few programs that require significant development efforts.

Comparison of DOD Portfolio Future and Invested Funding, 2004-2014



Source: GAO analysis of DOD data. | GAO-15-342SP

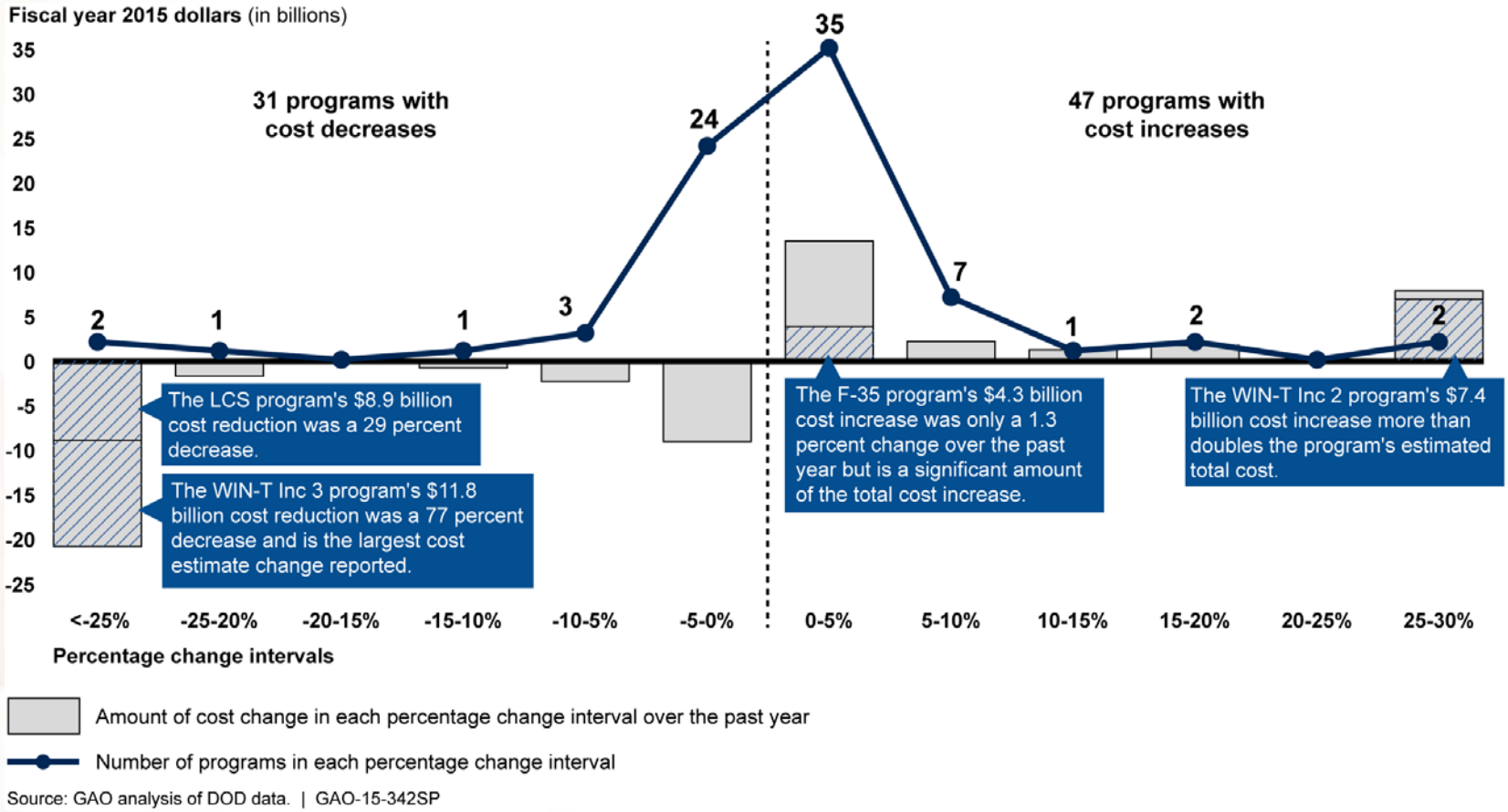
The 78 programs in the 2014 portfolio decreased in cost by $7.6 billion in total estimated cost over the past year and initial operating capability slipped an average of 1.4 months. From first full estimates, the total cost increased by over $457 billion with an average delay of 28.9 months in operating capability.

Changes in DOD's 2014 Portfolio of 78 Current MDAPs over the Past Year				
Fiscal year 2015 dollars in billions	Estimated current portfolio cost in 2013	Estimated current portfolio cost in 2014	Cost and schedule change since 2013	Percentage change since 2013
Total estimated research and development cost	$283.5	$284.9	$1.4	0.5%
Total estimated procurement cost	1,146.5	1,138.4	-8.1	-0.7
Total other acquisition costs	1,443.4	1,435.8	-7.6	-0.5
Average delay in delivering initial capabilities	27.4 months	28.9 months	1.4 months	1.7

Source: GAO analysis of DOD data. I GAO-15-342SP

While the overall cost of the portfolio has decreased, 47 of the 78 programs within the portfolio reported a cost increase over the past year. The majority of the net cost decrease can be attributed to significant reductions to the Warfighter Information Network-Tactical Inc. 3 program and the Littoral Combat Ship.

Distribution of the Total Acquisition Cost Change for the 2014 Portfolio



Source: GAO analysis of DOD data. | GAO-15-342SP

Note: The decrease in cost for the Littoral Combat Ship reflects cost estimates from the December 2013 Selected Acquisition Report and may change depending on the results of the Navy's Small Surface Combatant study.

When the effects of quantity changes are accounted for, DOD lost buying power on 51 percent of the programs in the portfolio over the past year resulting in a $2.2 billion net loss. In contrast, in 2013 and 2014 we reported that 60 and 64 percent of programs, respectively, gained buying power.

Increases in Buying Power for the 2014 Portfolio over the Past Year

Fiscal year 2015 dollars in billions	Number of programs	Actual procurement cost change	GAO calculated cost change attributable to quantity changes	GAO calculated cost change not attributable to quantity changes
Programs that lost buying power	**40**	**$8.7**	**-$9.0**	**$17.7**
Procurement cost increased with no quantity change	26	$12.3	$0.0	$12.3
Quantity increased with more cost increase than anticipated	3	$8.2	$7.7	$0.5
Quantity decreased with less cost decrease than anticipated	11	-$11.9	-$16.7	$4.9
Programs that gained buying power	**34**	**-$16.7**	**-$1.3**	**-$15.4**
Procurement cost decreased with no quantity change	21	-$3.8	$0.0	-$3.8
Quantity increased with less cost increase than anticipated	10	$0.1	$10.6	-$10.5
Quantity decreased with more cost decrease than anticipated	3	-$13.0	-$11.9	-$1.1
Programs with no change in buying power	**4**	**$0.0**	**$0.0**	**$0.0**
Portfolio totals	**78**	**-$8.1**	**-$10.3**	**$2.2**

Source: GAO analysis of DOD data. I GAO-15-342SP

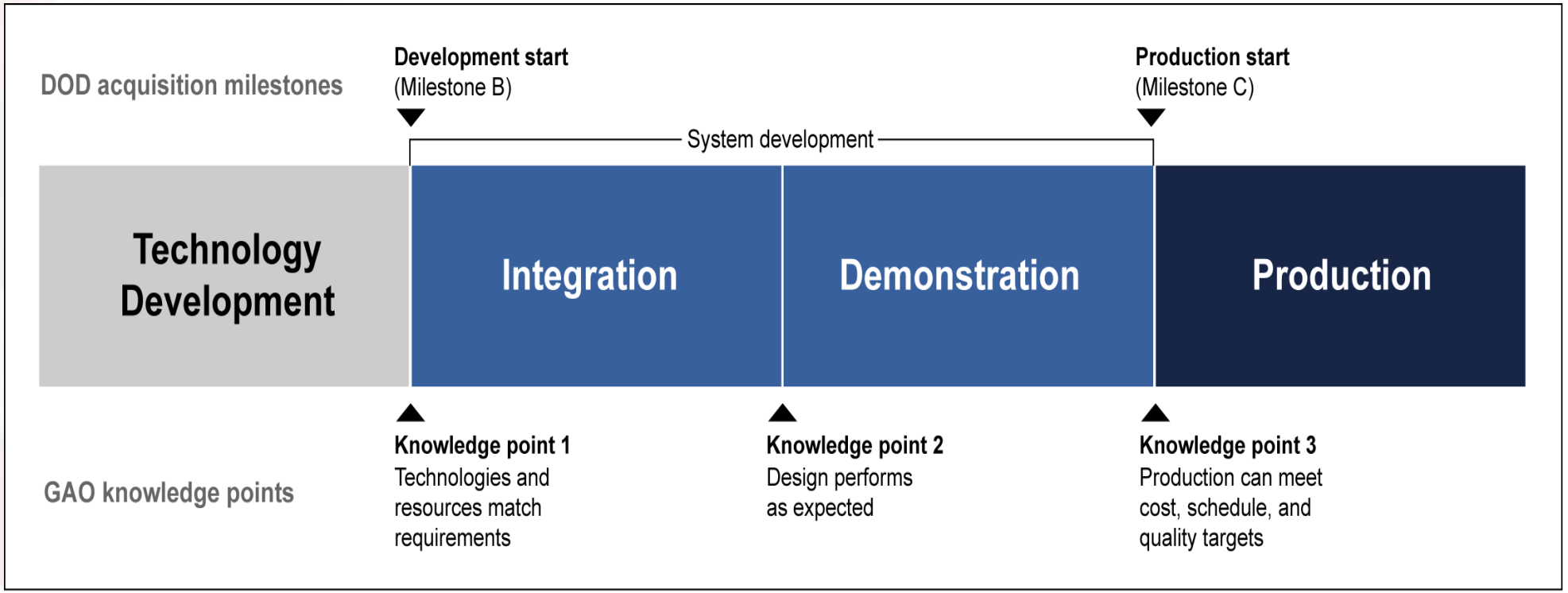
The average delay in the delivery of initial capability for programs in the 2014 portfolio grew by more than one month over the past year; the majority of this delay can be attributed to schedule slips of 6 months or more on 11 programs.

- Delays to the initial operational capability of systems within the portfolio have been a consistent theme in this annual report since at least 2006. Since first full estimates, the average delay in delivery of capabilities is now nearly 30 months or 2.5 years.

- As with cost, the 1.4 month schedule increase over the past year is the net result of changes reported by all the programs in the current portfolio.

- Our analysis shows that 16 programs reported schedule delays over the past year.
  - 4 programs reported a delay of 10 months or more since our last assessment.
  - 7 programs reported a schedule delay of 6 months over the past year, enough to qualify as a breach to their current acquisition baseline.
  - In some cases, these delays added to those previously reported.

DOD's Acquisition Cycle and GAO Knowledge Points



Source: GAO. | GAO-15-342SP

Observations on Knowledge Point 1: Resources and Requirements Match

Few programs fully develop technologies or complete systems engineering reviews prior to system development

Knowledge-based practices at development start	EPS	VH-92A	Space Fence	CRH	3DELRR	AMPV	●	Other 32 programs ○	Other 32 programs ––
Demonstrate all critical technologies in a relevant environment	●	●	●		●	●	16	8	8
Demonstrate all critical technologies in an operational environment		○	○		○	●	3	20	9
Complete system functional review and system requirements review before development start	○	○	●	○	●	○	10	20	2
Complete preliminary design review before development start	●	○	●	○	●	○	11	19	2
Constrain development phase to 6 years or less	●	●	●	●	●	●	20	5	7

● Practice implemented

○ Practice not implemented

–– Practice not applicable or information not available per the program office response

Source: GAO analysis of DOD data. | GAO-15-342SP

Note: EPS is Enhanced Polar System, CRH is Combat Rescue Helicopter, 3DELRR is Three-Dimensional Expeditionary Long-Range Radar, and AMPV is Armored Multipurpose Vehicle.

Six programs began system development in 2014 and none of them implemented all four of the knowledge based practices for development start.

- Technologies were demonstrated in a operational environment on only one program.
- Two of 6 programs held the full spectrum of systems engineering reviews, including PDR.
- All six programs plan to constrain their development phase.

The implementation of knowledge based practices by these 6 programs differs little from what we observed on the other programs we assessed that have previously passed this knowledge point.

Observations on Knowledge Point 2: Product Design is Stable

Programs enter system demonstration prior to maturing their design

Knowledge-based practices at critical design review	EPS	SSC	Other 27 programs ●	Other 27 programs ○	Other 27 programs ––
Demonstrate all critical technologies in an operational environment	––	●	3	17	7
Release at least 90 percent of drawings or 100 percent of 3D zones	––	○	6	14	7
Test a system-level integrated prototype	●	○	2	18	7
Establish a reliability growth curve	●	●	17	5	5
Identify key product characterisitics	●	●	24	0	3
Identify critical manufacturing processes	––	●	19	2	6
Conduct producibility assessments to identify manufacturing risks for key technologies	––	●	20	2	5
Complete failure modes and effects analysis	●	○	21	1	5

● Practice implemented

○ Practice not implemented

–– Practice not applicable or information not available per the program office response

Source: GAO analysis of DOD data. | GAO-15-342SP

Two programs began system development in 2014 and neither implemented all the knowledge based practices for development start.

- EPS is a satellite program consisting of a software development effort with no hardware design work, as such some practices do not apply.
- SSC is a more traditional acquisition program, but did not mature or demonstrate its design prior to critical design review.
- Each program implemented some, but not all of the other activities to increase the confidence in their product's design stability.

This performance adheres to that of the other 27 programs that passed this knowledge point prior to 2014.

Note: EPS is Enhanced Polar Satellite and SSC is Ship to Shore Connector.

Observations on Knowledge Point 3: Manufacturing Processes are Mature

Programs are using pilot production lines and prototypes before entering production, but are not demonstrating full control of manufacturing processes

Knowledge-based practices at production start	Totals for the 13 programs assessed ●	○	--
Demonstrate all critical technologies in an operational environment	8	4	1
Release at least 90 percent of drawings	8	2	3
Demonstrate manufacturing process capabilities are in control	1	8	4
Demonstrate critical processes on a pilot production line	8	3	2
Test a production-representative prototype in its intended environment	6	6	1

● Practice implemented

○ Practice not implemented

-- Practice not applicable or information not available per the program office response

Source: GAO analysis of DOD data. | GAO-15-342SP

None of the 38 programs we assessed made a production start decision over the past year although three programs were scheduled to do so.

- None of these three programs—MQ-4C Triton, Small Diameter Bomb II, and Ship to Shore Connector—fully demonstrated knowledge based practices at earlier points and were not likely to do so by their scheduled production decisions.

For the other programs we assessed, implementation of knowledge based practices at this decision point were mixed, leaving their future cost and schedule objectives at risk.

- Most programs utilized a pilot production line.
- About half tested a production representative prototype.
- One demonstrated that manufacturing processes were in control

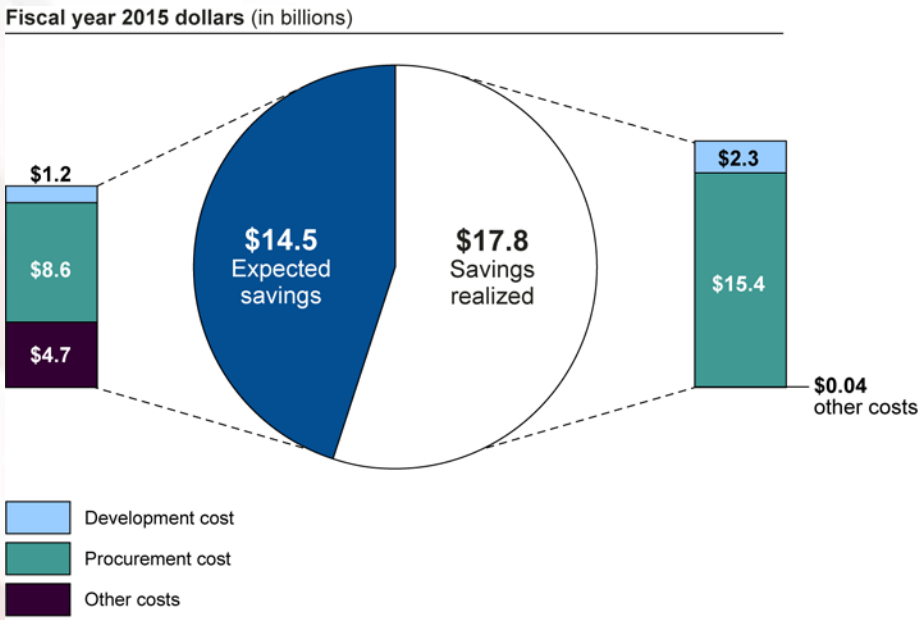
Observations on Acquisition Reform

1. Thirty-five of the 53 current and future programs we assessed have established an affordability constraint, an improvement from our last assessment, and all but one of these programs reported they are on track to remain within their constraints.
2. Thirty-four of the 38 current programs we assessed have conducted a “should-cost” analysis resulting in anticipated savings of $32.3 billion; over half of which has been realized.
3. Forty-nine of the 53 current and future programs we assessed have acquisition strategies that include some measures to encourage competition, an improvement over prior assessments. Less than half of the 15 future programs plan to conduct competitive prototyping before development start.
4. Thirty-six of the 38 current programs we assessed had conducted a configuration steering board, with 25 programs reporting that this review occurred during the past year. Nine programs reported that changes were approved at their last review.
5. Eighteen of the 38 current programs we assessed have held a milestone B since 2009. Ten of these were granted a total of 19 different waivers to selected components of mandatory program certifications required at this point. DOD most frequently waived components of the certifications related to ensuring full funding availability for product development and completion of a preliminary design review prior to milestone B.

Thirty-four of the 38 current programs we assessed have conducted a “should-cost” analysis resulting in anticipated savings of $32.3 billion; over half of which has been realized.

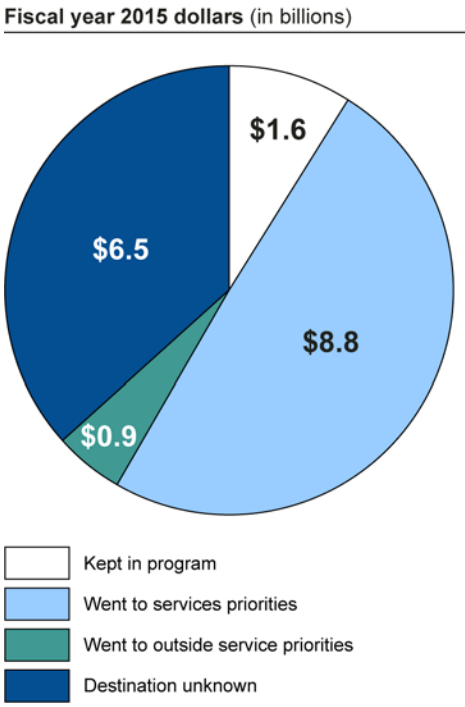
- According to our analysis of questionnaire responses, 34 of 38 current programs we assessed conducted a “should-cost” analysis and identified $32.3 billion in savings as a result.
  - Twenty-three of the 34 programs that report conducting a “should-cost” analysis claim a total of $17.8 billion in realized savings to date. Of this a reported $227 million was used to offset prior year sequestration reductions.

Realized and Expected “Should-Cost” Savings



Source: GAO analysis of questionnaire data. | GAO-15-342SP.

Destination of Realized “Should-Cost” Savings



Source: GAO analysis of DOD data. | GAO-15-342SP

Forty-nine of the 53 current and future programs we assessed have acquisition strategies that include some measures to encourage competition. Less than half of future programs plan to conduct competitive prototyping prior to milestone B.

Use of Activities to Ensure Competition on 53 Future and Current Programs

Activity to ensure competition is utilized or expected to be utilized		For the 15 future programs	For the 38 current programs
Competitive prototyping conducted prior to system development start	Yes	7	16
	No	8	22
Measures to ensure competition after system development start included in program strategy	Yes	15	33
	May not or will not take place	0	6

Programs planning for competition versus those that are taking no actions	For the 15 future programs	For the 38 current programs
Actions taken to promote competition both prior to and after system development start	**7**	**15**
Actions to promote competition taken only prior to the start of system development	0	1
Actions to promote competition will or have taken place only after the start of system development	8	18
No actions taken to promote competition before or after system development start	**0**	**4**

Source: GAO analysis of questionnaire data. | GAO-15-342SP

Eighteen of the 38 current programs we assessed have held a milestone B since 2009. Ten of these programs were granted a total of 19 different waivers to selected components of mandatory program certifications required at development start.

DOD most frequently waived components of the certifications related to ensuring full funding availability for product development, completion of a preliminary design review prior to milestone B, and consideration of trade-offs.

Selected Components of Mandatory Certification Waivers Granted since 2009

Program name	Funding available to execute program	Formal preliminary design review was conducted	Cost, schedule, and performance trade-offs considered
Armored Multi-Purpose Vehicle	✓	✓	
Air and Missile Defense Radar		✓	
Combat Rescue Helicopter	✓	✓	✓
F-22 Increment 3.2B	✓		✓
Next Generation Operational Control System	✓		✓
KC-46 Tanker Modernization Program	✓	✓	✓
Joint Light Tactical Vehicle	✓		
Littoral Combat Ship	✓		✓
Littoral Combat Ship - Mission Packages	✓	✓	
VH-92A Presidential Helicopter		✓	

Source: GAO analysis of questionnaire data. | GAO-15-342SP

Observations on Program Concurrency

Many programs plan significant overlap in development, including software development, and production

- Twenty-five of the 38 current programs we assessed reported software development as a high-risk area. Of these, 19 programs plan to begin production prior to completing the software development for integration with system hardware and achieving baseline capabilities.

- Eleven of the 15 current programs we assessed that have started production plan to perform 30 percent or more of their developmental testing after production begins despite the increased risk of design changes and costly retrofits.
  - Concurrency in this analysis is overlap in production and development testing.
  - Five of these programs expect to place more than 20 percent of their procurement quantities under contract before developmental testing is completed.

- 12 current programs we assessed are scheduled to make a production decision in the coming years and 5 of them intend to execute 30 percent or more of their developmental testing concurrent with production.
  - Four of these 12 programs expect to have more than 10 percent of their total procurement quantity on contract before developmental testing completes.

Program assessments

- In addition to the portfolio assessments, we produced brief “Quick Look” assessments of individual programs analyzing their cost, schedule, and performance as well as their adherence to knowledge-based best practices.
  - 37 2-page assessments on current major defense acquisition programs, generally in development or early production.
  - 16 1-page assessments on programs in technology development or are well into production.

- For a copy of the full report: http://www.gao.gov/products/GAO-15-342SP

Backup Slides

Changes in DOD's Portfolio of Major Defense Acquisition Programs from 2012 to 2013

Fiscal year 2015 dollars (in billions)	
2013 portfolio (80 programs)	**$1,526**
Less estimated total cost of the 5 exiting programs	-97
Plus estimated total cost of the 3 entering programs	+13
Less net cost changes on the 75 remaining programs	-7
2014 portfolio (78 programs)	**$1,436**

Source: GAO analysis of DOD data. | GAO-15-342SP

Note: Some numbers may not add due to rounding.

Changes in DOD's 2014 Portfolio of Major Defense Acquisition Programs over 4 Years and Since First Full Estimates

Fiscal year 2015 dollars (in billions)

	4 year comparison (2009-2014)	Since first full estimate (Baseline to 2014)
Change in total research and development cost	$17.4 billion 6.5%	$98.5 billion 52.8%
Change in total procurement cost	$57.3 billion 5.3%	$357.8 billion 45.8%
Change in total other acquisition costs	$2.2 billion 21.7%	$1.2 billion 10.4%
Change in total acquisition cost[a]	$76.9 billion 5.7%	$457.5 billion 46.8%
Average delay in delivering initial capabilities	7.0 months 8.1%	28.9 months 36.2%

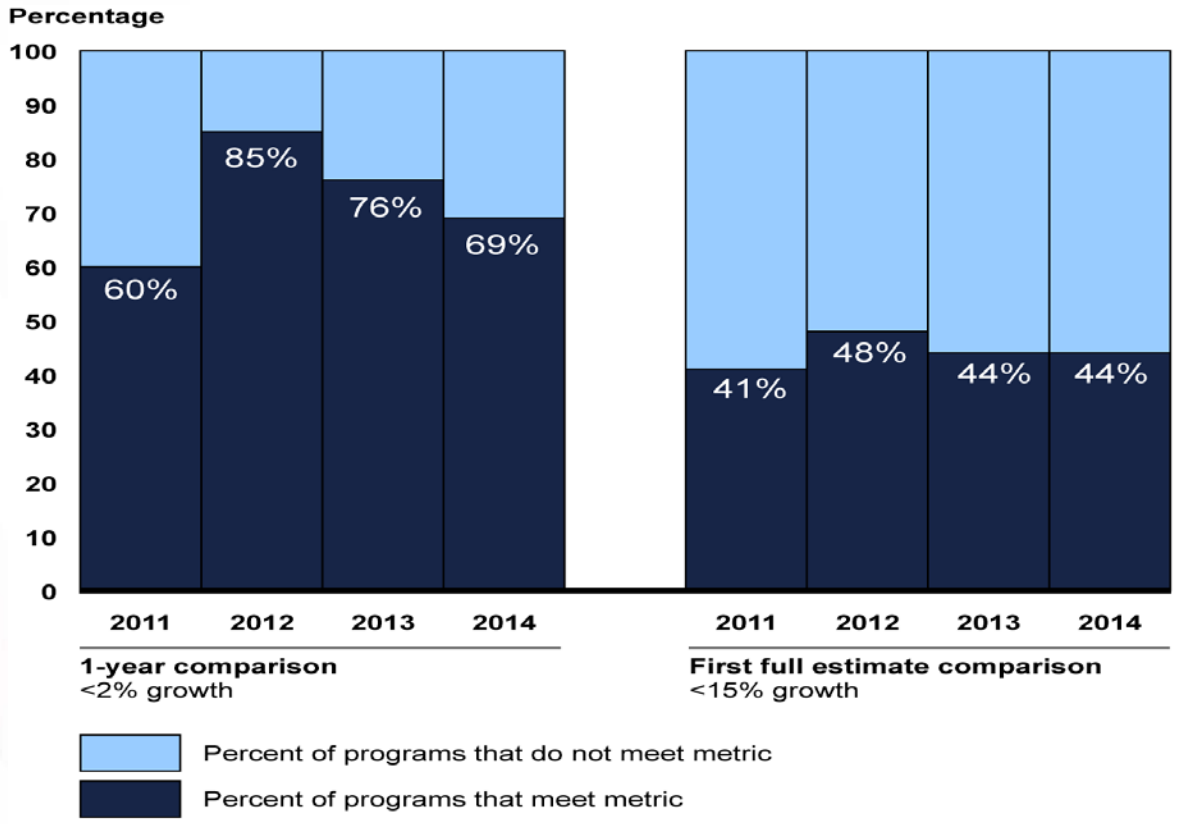
Source: GAO analysis of DOD data. | GAO-15-342SP

Notes: Data were obtained from DOD's SARs and acquisition program baselines. In a few cases data were obtained directly from program offices. Some numbers may not sum due to rounding.

[a]In addition to research and development and procurement costs, total acquisition cost includes acquisition-related operation and maintenance and system-specific military construction costs.

As measured against metrics discussed by GAO, OMB, and DOD in 2008, 69 percent of programs in the current portfolio meet the metric for less than 2 percent cost growth over the past year and less than half of all programs meet the goal for less than 15 percent cost growth from first full estimates.

Comparison of the Cost Performance of DOD's Portfolios Since 2011



Source: GAO analysis of DOD data. | GAO-15-342SP

Many of the programs reporting development cost increases over the past year are already in production, a point where significant changes to development costs should be minimized.

Programs in Production with the Largest Development Cost Increases

Program	Percentage increase in development cost over the past year	Amount of development cost growth over the past year	Initial capability achieved	Primary cause for development cost increase
AIM-9X Block II	65	$148	No	Deficiency
Fire Scout	25	180	Yes	New capability
JTRS HMS	10	130	Yes	Deficiency
E-2D AHE	9	497	Yes	New capability
G/ATOR	8	78	No	Deficiency
TACTOM	8	58	Yes	Modernization
EA-18G	7	157	Yes	New capability
AGM-88E AARGM	7	57	Yes	Software update
GMLRS/GMLRS AW	7	69	Yes	New capability
LHA 6	6	24	No	New capability
AMRAAM	5	216	Yes	New capability
GPS III	5	147	N/A	Deficiency
M109A7 FOV	5	55	No	Deficiency

Source: GAO analysis of DOD data. | GAO-15-342SP

If the cost and schedule performance of the F-35 is removed, the 2014 portfolio's performance improves.

- Since joining the portfolio in 2001, F-35 has been the costliest program in the portfolio while also experiencing approximately $113 billion in cost growth, more than any other program.
- The program has also experienced a significant loss in buying power as this cost growth occurred despite quantities dropping by more than 400 aircraft since the start of development.
- The F-35 currently accounts for almost one-quarter, or more than $335 billion, of the total estimated development and procurement cost of the portfolio; among the 78 programs, it has the largest amount of funding remaining for development and procurement.
- Without the cost growth over the past year on this program, the acquisition cost change reported by the portfolio would have decreased an additional $4.3 billion for a total decrease of $11.9 billion instead of $7.6 billion. Exclusion of the delay in delivery of operational capability on this one program reduces that calculated for the other 77 programs to 28.4 months on average.

Thirty-five of the 53 current and future programs we assessed have established an affordability constraint, an improvement from our last assessment, and all but one of these programs reported that they are on track to remain within their constraints.

- Sixty-eight percent of the current programs we assessed, or 26 of 38, have established an affordability requirement—a better rate of implementation than the 54 percent reported in our last assessment.
  - All of these programs, with the exception of the Joint Tactical Radio System Handheld, Manpack, and Small Form Fit Radios, responded that they currently expect to meet their affordability requirement.
  - Most of the 12 programs that have not established an affordability requirement either plan to establish one in the future or began system development before this requirement was put in place.
- Nine of the 15 future programs report that they established an affordability goal, also a slight improvement over our last assessment.
  - Most of the remaining 6 programs that have not established an affordability constraint report that they plan to establish one before their system development start.

All but two of the 38 current programs we assessed report conducting a recent configuration steering board, with 25 programs reporting that this review occurred during the past year. Nine programs reported that changes were approved at their last review.

- Thirty-six current programs we assessed report conducting such a review while another 2 programs report that they had not as they only recently began system development.
  - A majority, 25 of 38 programs, report that this review occurred in the 12 months prior to the submission of our questionnaire.
  - Another 3 planned to hold a configuration steering board review in September and October of 2014 and the remaining programs have not yet scheduled their next review.
- Nine programs report that changes were approved or recommended for further consideration at their review.
  - Two of these 9 changes were options to reduce program cost or moderate requirements, referred to as “descoping”.
- For additional information on configuration steering board reviews see also *Defense Acquisitions: Military Services Consistently Held Required Configuration Steering Boards That Actively Reviewed Requirements Changes* (GAO-14-466R)

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