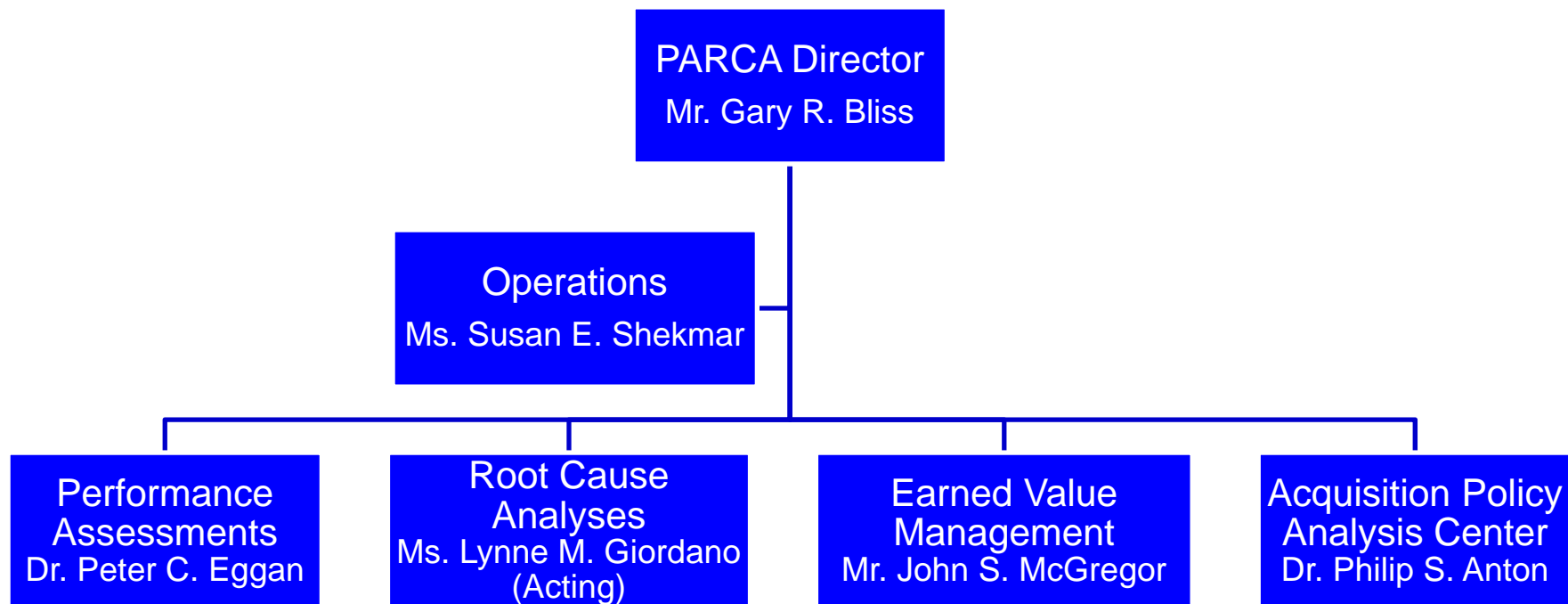# Performance Assessments and Root Cause Analyses

January 2017

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PARCA Organization

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Performance Assessments
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Earned Value Management
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Acquisition Policy Analysis Center
Dr. Philip S. Anton

Office of Performance Assessments and Root Cause Analyses (PARCA)

Root Cause Analyses Functions

▸ **PARCA's RCA duties as defined in WSARA**

– The SECDEF shall designate a senior official responsible for:

▪ Sec 103(b)(2) *Conducting root cause analyses for major defense acquisition programs* in accordance with the requirements of subsection (d) when required by section 2433a(a)(1) of title 10, United States Code (as added by section 206(a) of this Act), or when requested by the SECDEF, the USD(AT&L), the Secretary of a military department, or the head of a Defense Agency.

Critical Nunn-McCurdy breaches

Others as requested

▪ Sec 103(b)(3) *Issuing policies, procedures, and guidance governing the conduct of* performance assessments and *root cause analyses* by the military departments and the Defense Agencies.

No Program Execution Responsibility

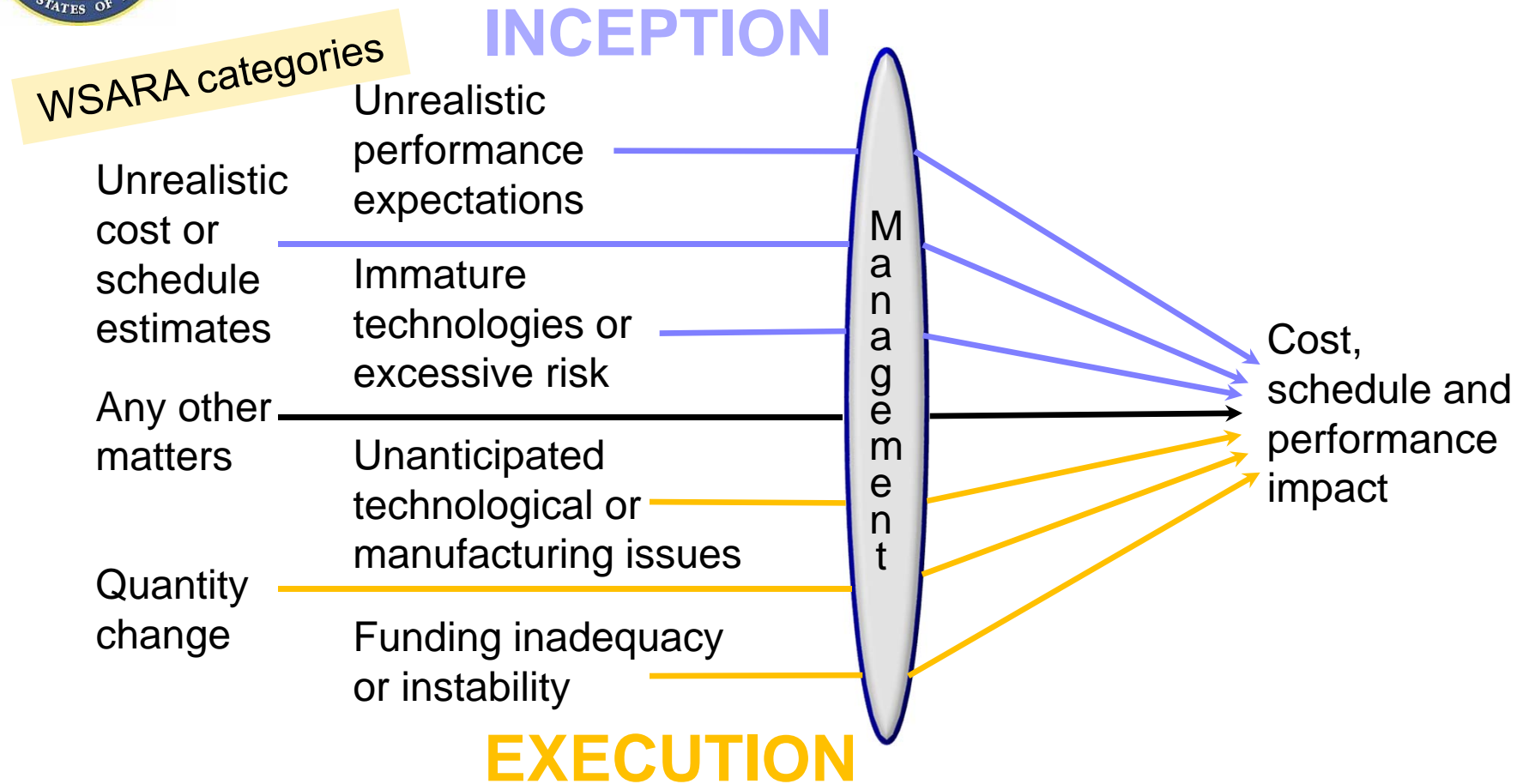Office of Performance Assessments and Root Cause Analyses (PARCA)

What do Program Managers *DO* and how do they *FAIL?*

▶ At a macro level, PM's "do" two big tasks:

– *Establish cost, schedule and performance Baseline Goals*
  ▪ *Doing so __locks in__ a set of then-unknown program problems to be overcome*
  ▪ *Some amount of external turbulence is always anticipated; the amount incurred is un-knowable*
     → *[note that initial estimates may also be low-balled by assuming none]*

– *Manage program through the inevitable problems*
  ▪ *Daily management is an OODA problem "on the deck plates"*
  ▪ *Program __will__ incur the "locked in" problems of the baseline; it will also incur:*
     -- externally generated problems
     -- avoidable internally generated problems
  ▪ *Whatever the source, the PM's job is to OODA around the problems*

▶ *The "Art" of program management is doing these things well*

▶ *The "Orient" part of OODA is key to both:*

– *Understanding the "Big Bets" in the baseline*
– *Understanding the __meaning__ of execution metrics in terms of those bets*

Root Cause Analysis Framework

INCEPTION

WSARA categories

Unrealistic performance expectations

Unrealistic cost or schedule estimates

Immature technologies or excessive risk

Any other matters

Unanticipated technological or manufacturing issues

Quantity change

Funding inadequacy or instability

Management

EXECUTION

Cost, schedule and performance impact

In our business, problems will occur — why they occur and our response to them are subjects of root cause analysis

Office of Performance Assessments and Root Cause Analyses (PARCA)

PARCA RCA Findings, 2010-2016

Inception issues	WGS	ATIRCM	CMWS	RMS	AB3	DDG-1000	JSF	Excalibur	ACWA	RQ-4A/B GH	Navy ERP *	GCSS-MC *	JTRS GMR	FAB-T *	JLENS	P-8A *	EELV	ECSS *	JPALS	VTUAV	OCX	Totals
Unrealistic performance expectations			x															x				2
Unrealistic baseline estimates for cost or schedule							x			x	x	x	x								x	6
Immature technologies or excessive manufacturing or integration risk			x										x									2
Other												x						x				2
Execution issues																						
Unanticipated design, engineering, manufacturing or technology integration issues arising during program performance	x			x																x		3
Changes in procurement quantity						x	x		x							x						4
Inadequate program funding or funding instability																						0
Poor performance by government or contractor personnel responsible for program management					x		x			x	x	x	x	x				x	x		x	10
Other	x																x		x	x		4
RCA Memo Year (FY)				2010							2011					2012		2013		2014	2016	

* Indicates a discretionary root cause analysis

PARCA RCA's and FFRDC reports (public site): http://www.acq.osd.mil/parca/references.shtml
PARCA FFRDC FOUO reports (CAC-restricted site): https://extranet.acq.osd.mil/parca/cac-only.shtml

Challenge: distinguishing between "root" causes and symptoms or consequences

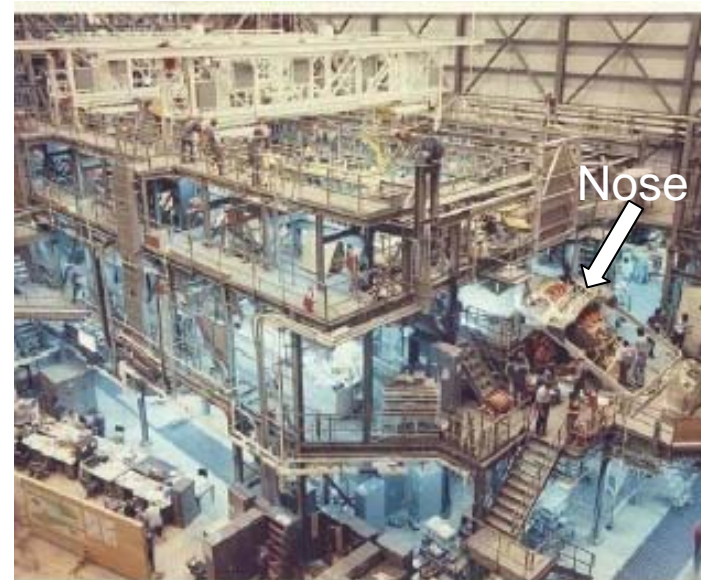Office of Performance Assessments and Root Cause Analyses (PARCA)

Why are Estimates Unrealistic?

▶ Unrealistic estimates are generally caused by the invalidity of major assumptions NOT methodological errors

Orbiter Processing Facility Concept (1974)

Nose

Actual Orbiter Processing Facility

▶ The cost estimating community can and should challenge assumptions but the acquisition community formulates them

This has led to a concept called "Framing Assumptions"
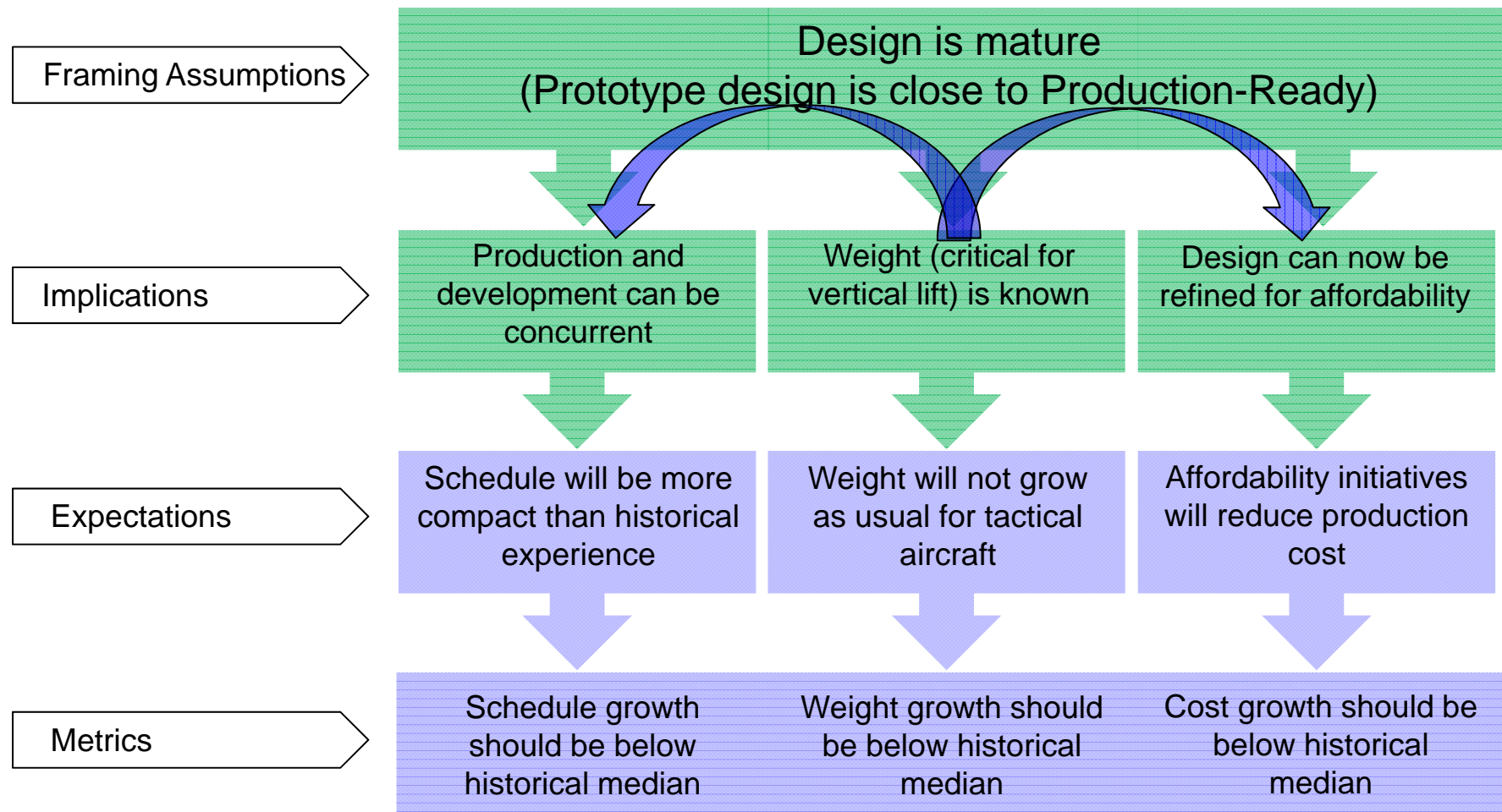
Framing Assumptions: Definition and Characteristics

Framing Assumption: any supposition central in shaping cost, schedule, or performance expectations of an acquisition program

▸ A program generally should have a small number of Framing Assumptions with the following attributes:

  – Critical: Significantly affects program expectations
  – No work-arounds: Consequences cannot be easily mitigated
  – Foundational: Not derivative of other assumptions
  – Program specific: Not generically applicable to all programs

When a Framing Assumption is invalid, there will be signals

Framing Assumptions	**Design is mature** (Prototype design is close to Production-Ready)
Implications	Production and development can be concurrent · Weight (critical for vertical lift) is known · Design can now be refined for affordability
Expectations	Schedule will be more compact than historical experience · Weight will not grow as usual for tactical aircraft · Affordability initiatives will reduce production cost
Metrics	Schedule growth should be below historical median · Weight growth should be below historical median · Cost growth should be below historical median

Uses for Framing Assumptions

▸ **Generally**
- Remind us of the "big bets"
- Create metrics that matter to the big picture
- Help us understand the implications of metrics that don't track as expected

▸ **Good for leaders, good for PMs**
- Create framework for DAB discussions and MDA decisions
- Create metrics enabling assessment of program execution

Illustrative Sources for Framing Assumptions

Cost/schedule/requirements trade-offs: The design is very similar to the prototype or legacy system.

Technological or Engineering: Modular construction will result in significant cost savings.

Managerial or Organizational: Arbitrating multi-Service or international participation will be straightforward.

Program interdependencies: FCS will facilitate solution of size, weight, and power issues.

Contractual terms/incentives: Contract type and/or incentives are suitable to deliver specific expected outcomes.

Industrial base/market: The satellite bus will have substantial commercial market for the duration of program.

Program Program now

Program future

Program Environment

Poor Management Performance

➢Issues/problems should always be examined through lens of management performance
- – Contractor
- – Program Office
- – PEO
- – OSD

➢ PARCA has found issues in three broad areas
- – Systems engineering
- – Contractual incentives
- – Organizational awareness and response

Management → Cost, and schedule impact
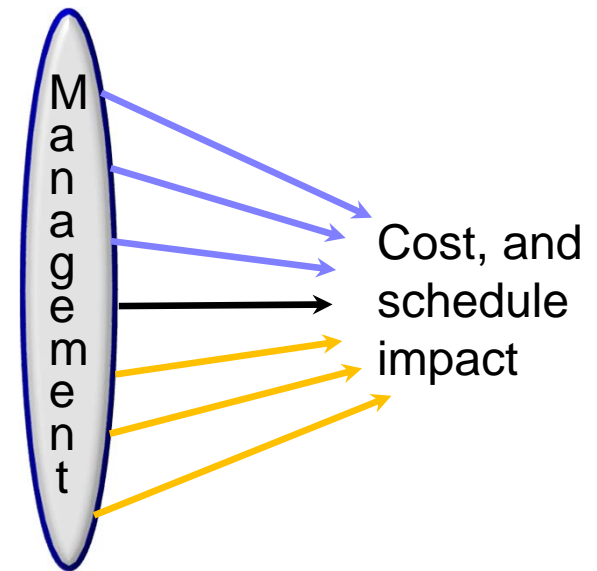
Systems Engineering

▶ **General observations**
- High potential to be a root cause because SE is critical for complex systems
- Recognizing poor systems engineering early is a challenge
- "Systems Engineering" too broad for actionable root causes

▶ **Problems have been observed in:**
- Requirements management
  - Ambiguities in combining requirements documents
  - Development, translation and allocation of requirements
  - Adequately funding program to include all requirements
- Interface and environment management
- Holistic performance attributes e.g., reliability, weight
- Risk assessments

Quantity Changes

▶ To consider a quantity change to be a root cause, PARCA has defined two conditions:

– The reason for the change was outside the control of the acquisition community.

- Doctrinal or threat change
- "Pure" fiscal constraints

but NOT

- Escalating unit costs
- Schedule slips

– Other cost growth would not have caused a breach without the quantity change

▶ PARCA has found that quantity changes were due to factors within acquisition community's control in about half of the cases

Effective Contracting Strategy

▸ **Incentive evaluation**
  – Aligned with program goals and challenges
  – Demanding yet achievable
  – Sufficient to motivate
  – No perverse effects
  – Correct signal sent and received

▸ **Incentive strategy**
  – Are conditions for strategy satisfied?
  – Consistent with corporate goals and position?
  – Consistent with policy?
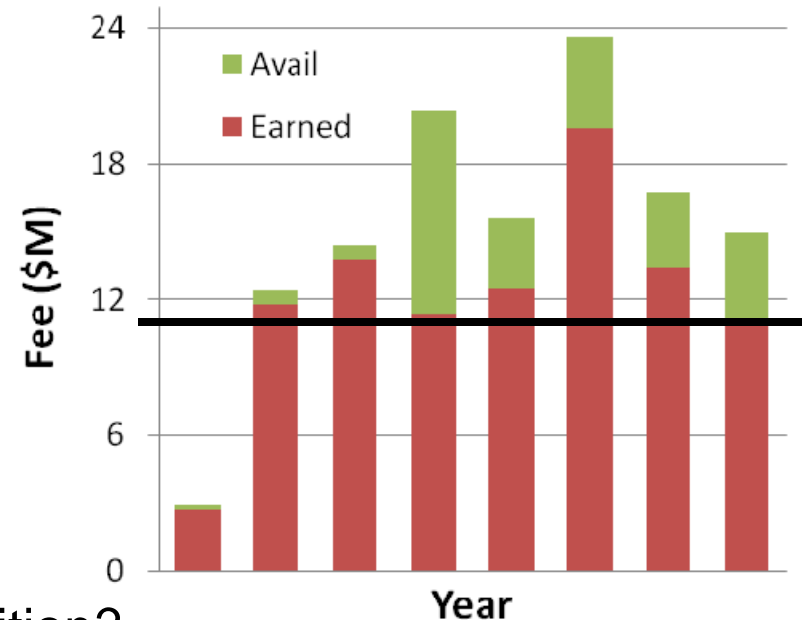
Government's goals must be viewed from contractor's perspective

Other PARCA Divisions

Performance Assessments Functions

▸ PARCA's PA duties as defined in WSARA
  – SECDEF shall designate a senior official responsible for:
    ▪ Sec 103(b)(1) *Carrying out performance assessments of major defense acquisition programs* … periodically or when requested by the SECDEF, the USD(AT&L), the Secretary of a military department, or the head of a Defense Agency.

    Sec 103(b)(3) *Issuing policies, procedures, and guidance governing the conduct of performance assessments* and root cause analyses by the military departments and the Defense Agencies.

    ▪ Sec 103(b)(5) Advising acquisition officials on performance issues regarding a major defense acquisition program that may arise--(A) *prior to certification under section 2433a … (B) prior to entry into full-rate production; or (C) in the course of consideration of any decision to request authorization of a multiyear procurement* contract for the program.

    Sec 205(c) …shall *assess the performance of each major defense acquisition that has exceeded critical cost growth thresholds* … but has not been terminated in accordance with section 2433a … not less often than semi-annually until one year after the date on which such program receives a new milestone approval … results of reviews performed under this subsection shall be reported to the USD(AT&L) and summarized in the next annual report of such designated official.

On-going assessments (via DAES)

Critical Nunn-McCurdy breaches, FRP, MYP

No Program Execution Responsibility

Office of Performance Assessments and Root Cause Analyses (PARCA)

Defense Acquisition Executive Summary (DAES)

▸ PARCA leverages DAES to meet its WSARA requirements
  – Conduct periodic assessments
  – Issue policy, procedures and guidance
  – Develop metrics

▸ PARCA roles
  – Assess Contract Performance category for all programs
  – Assess other categories as appropriate
  – Consolidate assessments from all rating organizations
  – Participate in selecting programs to be briefed at the DAES
  – Identify critical issues to be addressed in DAES briefings
  – Participate in DAES meetings
  – Create tools and metrics (EVA)
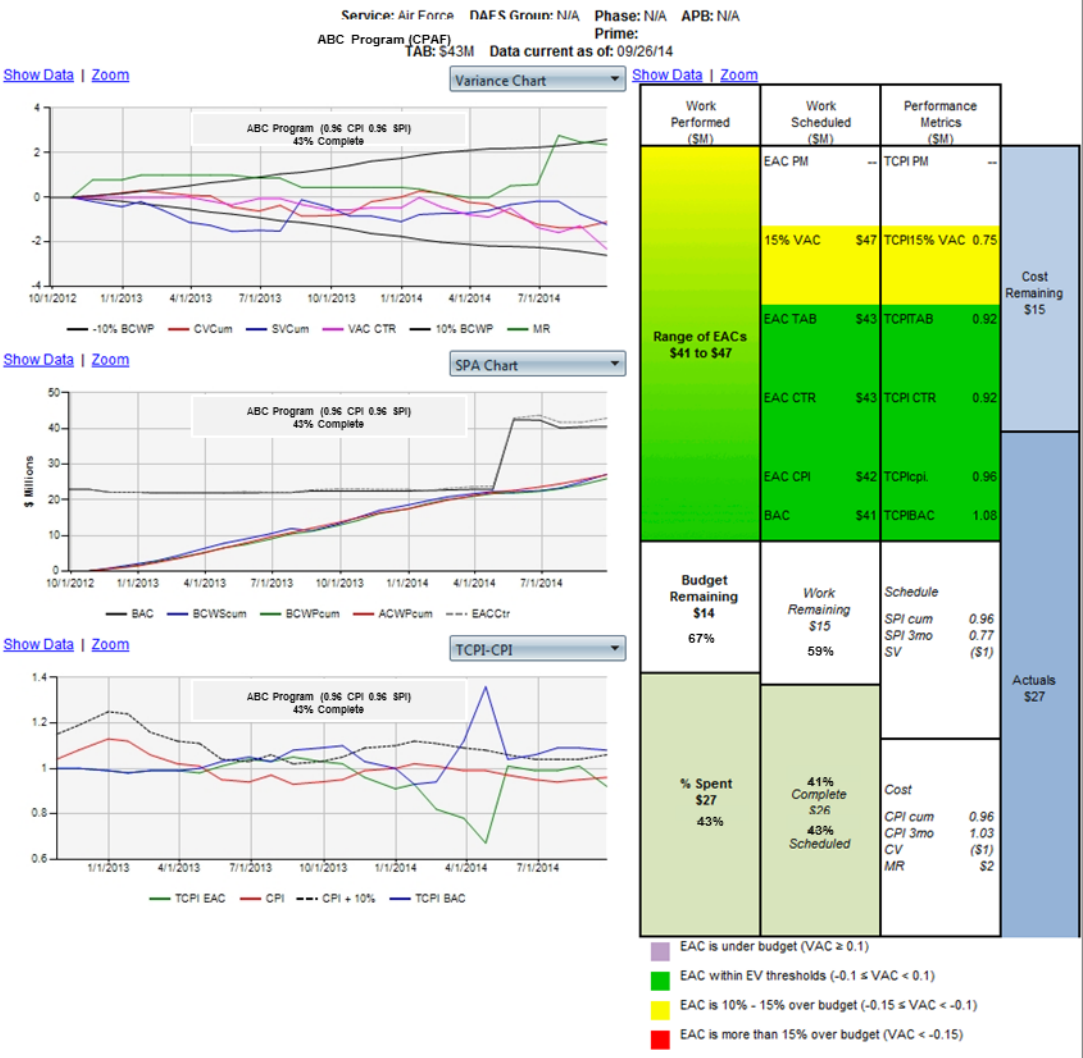 – Issue guidance (DAES Assessment Guidance and Deskbook)

DAES Assessments

▸ OSD and PMs assess programs in 11 categories:
  – Cost, schedule, performance, contract performance, management, funding, test, sustainment, interoperability, production, international

▸ Assessments document programs' status and history, are stored on a shared website, and are read by all levels of staff and leadership

▸ EV data is used in:
  – *Contract Performance:* EVM and IMS data are the core of contract performance assessments
  – *Management:* Lack of EVM data or EVM systems problems can produce negative ratings
  – *Cost:* EVM data aggregated across contracts informs program cost status
  – *Schedule:* EVM data, with IMS data and program milestones is often part of schedule assessments
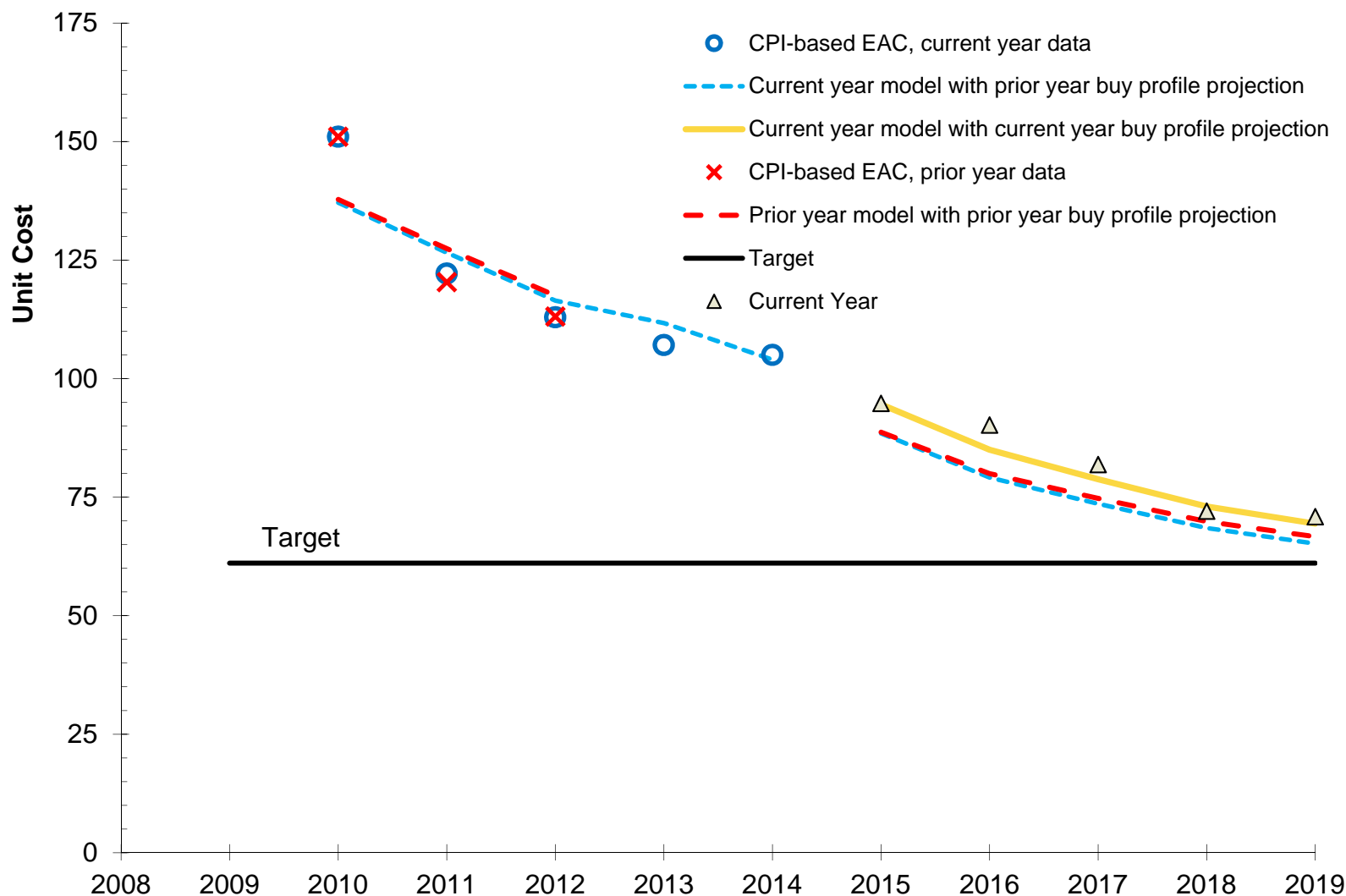
DAMIR EVA Tool

PA Analysis

Legend:
- ○ CPI-based EAC, current year data
- ---- Current year model with prior year buy profile projection
- —— Current year model with current year buy profile projection
- ✕ CPI-based EAC, prior year data
- – – Prior year model with prior year buy profile projection
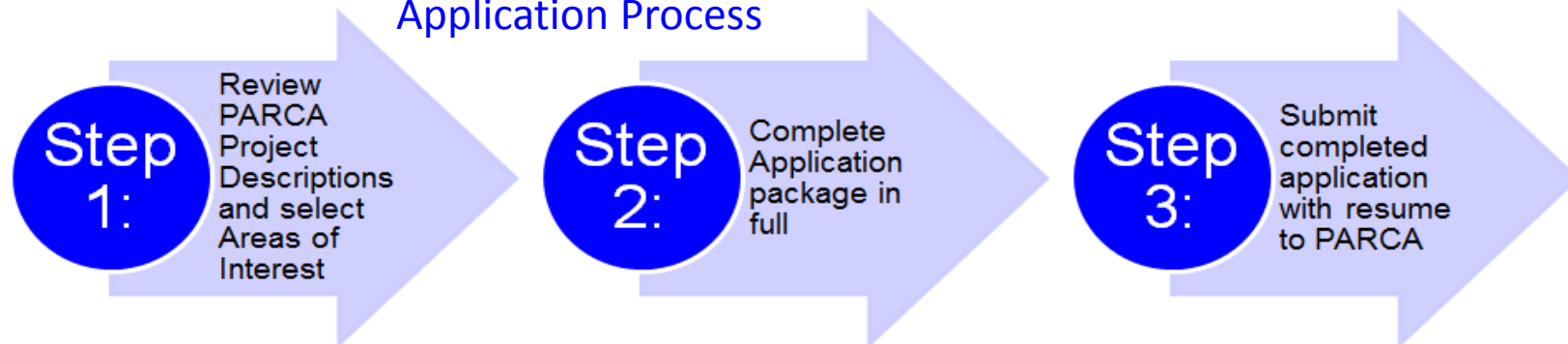- —— Target
- △ Current Year

Acquisition Exchange Program

What is it?

PARCA Acquisition Exchange Program (AEP) provides a unique career-development experience for high-caliber individuals interested in acquisition and acquisition-related career fields.

Application Process

Step 1: Review PARCA Project Descriptions and select Areas of Interest

Step 2: Complete Application package in full

Step 3: Submit completed application with resume to PARCA

Objectives

- Experience with the Department's executive-level MDAP decision process
- Assist implementation of DoD-wide acquisition policies
- Enhance acquisition and senior-level policymaking skills
- Prepare for future positions within the acquisition community
- Develop relationships and interact with key Govt and Industry EVM stakeholders

Office of Performance Assessments and Root Cause Analyses (PARCA)

PARCA EVM Division

The EVM Division of PARCA is responsible and accountable for EVM performance, oversight, and governance across the Department

Policy and Guidance	EVM Competency	Program Interface	EVM Central Repository	Communications and Outreach
Develop, publish, and maintain DOD policy and guidance on EVM	Serve as DoD EVM Functional Lead to influence EVM competency requirements; Coordinate with Defense Acquisition University (DAU)	Review and approve EVM data requirements for MDAP programs in coordination with Services and Defense Agencies; Resolve interpretive differences in EVM policy, practice, and requirements	Responsible for the Earned Value Mgt Central Repository (CR) and maintenance of CR data alignment with the Acquisition Visibility framework; Report EVM data compliance, integrity, and quality to AT&L	Maintain communications with Government and Industry on EVM policy

Work with Program Managers to ensure EVM is applied correctly, provide guidance, and assist with EVM reporting requirements and tailoring

Office of Performance Assessments and Root Cause Analyses (PARCA)

DoD EVM Policy Functions

Effective and disciplined use of EVM for integrated program management, decision making, and joint situational awareness

▶ EVM policy development, guidance, and interpretation

▶ EVM functional lead and DAU course curriculum development

▶ **EVM requirements review**

▶ EVM-CR authoritative source of EVM data

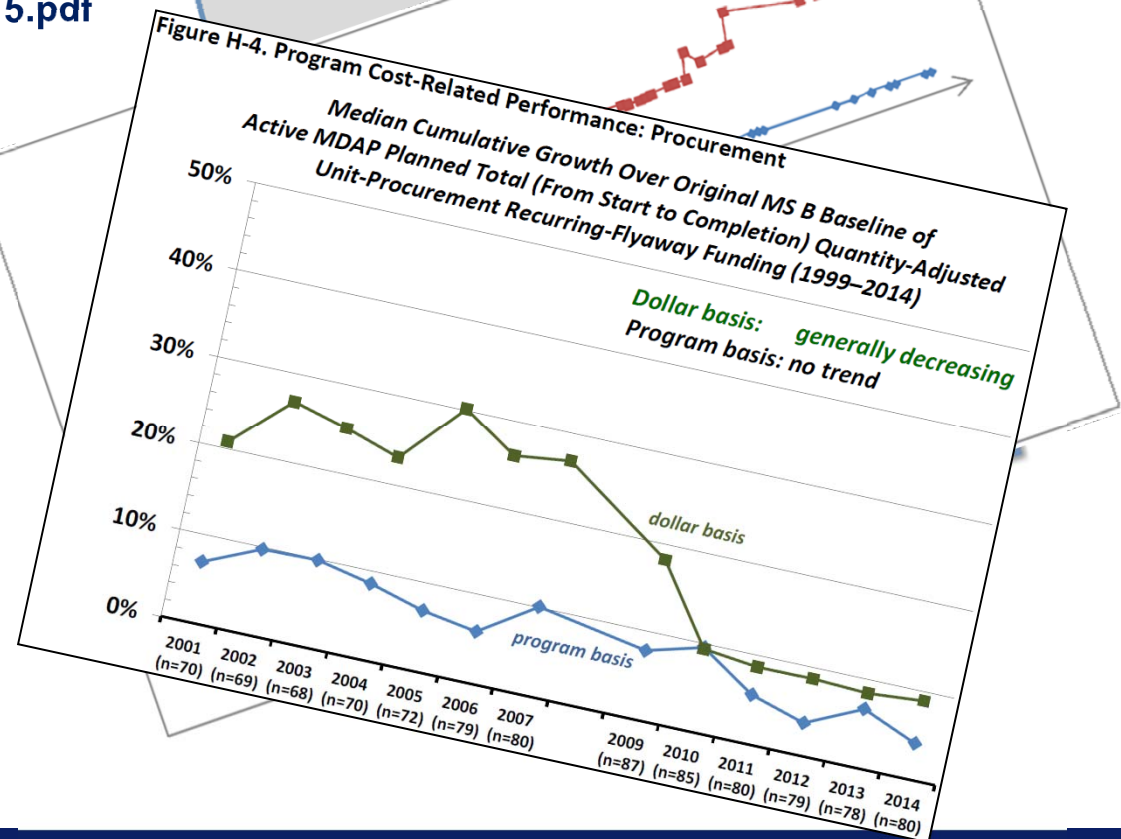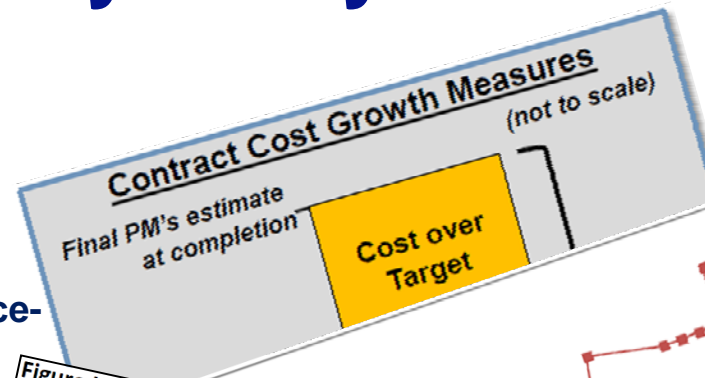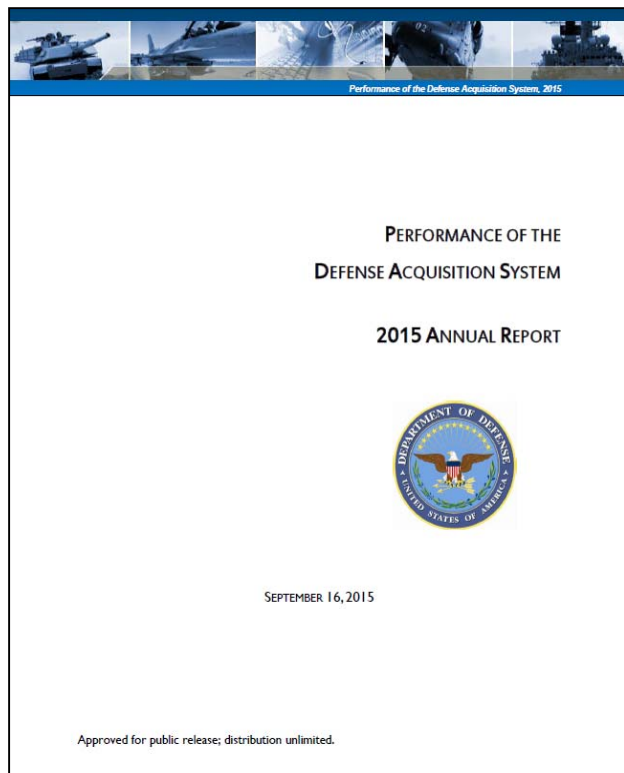*Reaching across Government and Industry to accomplish PARCA EVM Division Functions and DoD Goals*

PARCA EVM Website: **http://www.acq.osd.mil/evm/**

Office of Performance Assessments and Root Cause Analyses (PARCA)

Acquisition Policy Analysis Center Data-Driven Policy Analysis

▸ **2015 Annual Report on the** *Performance of the Defense Acquisition System*

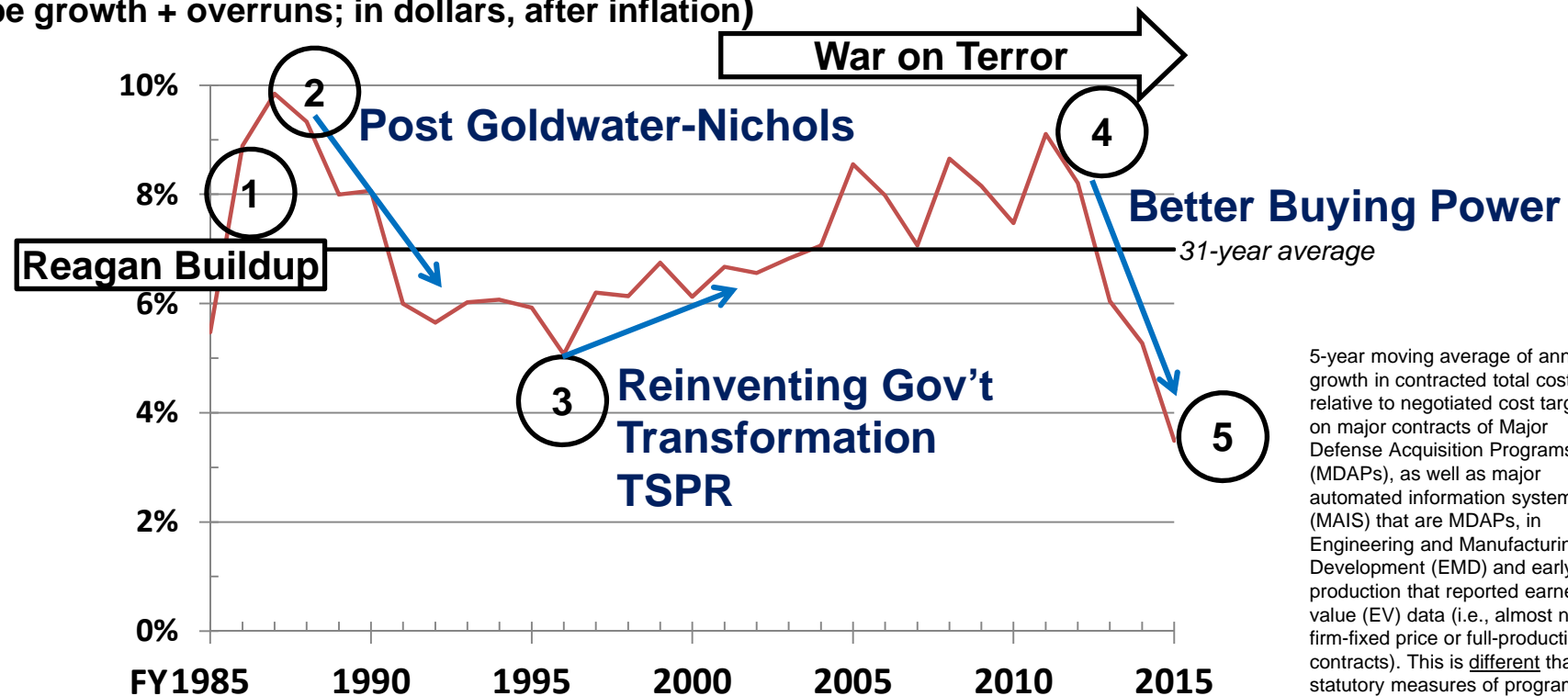– http://www.acq.osd.mil/fo/docs/Performance-of-Defense-Acquisition-System-2015.pdf

PERFORMANCE OF THE DEFENSE ACQUISITION SYSTEM

2015 ANNUAL REPORT

SEPTEMBER 16, 2015

Approved for public release; distribution unlimited.

Contract Cost Growth Measures (not to scale)

Final PM's estimate at completion — Cost over Target

Figure H-4. Program Cost-Related Performance: Procurement
Median Cumulative Growth Over Original MS B Baseline of
Active MDAP Planned Total (From Start to Completion) Quantity-Adjusted
Unit-Procurement Recurring-Flyaway Funding (1999–2014)

Dollar basis: generally decreasing
Program basis: no trend

dollar basis

program basis

| 2001 (n=70) | 2002 (n=69) | 2003 (n=68) | 2004 (n=70) | 2005 (n=72) | 2006 (n=79) | 2007 (n=80) | 2009 (n=87) | 2010 (n=85) | 2011 (n=80) | 2012 (n=79) | 2013 (n=78) | 2014 (n=80) |

5-year Moving Average of Annual Growth of Contracted Costs
(largest contracts on major programs, 1985–2015)

Contract Growth: Development and Early Production

(scope growth + overruns; in dollars, after inflation)

War on Terror

② Post Goldwater-Nichols

① Reagan Buildup

④ Better Buying Power
31-year average

③ Reinventing Gov't Transformation TSPR

⑤

5-year moving average of annual growth in contracted total costs relative to negotiated cost targets on major contracts of Major Defense Acquisition Programs (MDAPs), as well as major automated information systems (MAIS) that are MDAPs, in Engineering and Manufacturing Development (EMD) and early production that reported earned-value (EV) data (i.e., almost no firm-fixed price or full-production contracts). This is <u>different</u> than statutory measures of program cost growth relative to Milestone B baselines.

TSPR = Total System Performance Responsibility

n = 1,123 contracts for 239 programs

1. **Reagan buildup**
2. **Goldwater-Nichols (G-N) preceded a steep decline in the 5-year moving average. 5-year moving average hit a peak of 9.8% annual cost growth in 1987.**
3. **Reforms in mid-1990s precedes rise in 5-year moving average.**
4. **After local peak of 9.1% in 2011, we see a steep, sustained decline in the 5-year moving average of annual cost growth.**
5. **In 2015, the 5-year moving average of annual cost growth is at its lowest point (3.5%) since before 1985. Sustained lower cost would lower overall average.**

PARCA Sponsored Analyses

▶ Program Performance Assessments

▶ Root Cause Analyses

▶ EVM Competence

▶ Essential Views on IPMRs

▶ Framing Assumptions

▶ Tying Contractor Incentives to Performance

▶ Acquisition Workforce Management

▶ Systems Engineering Metrics

▶ Cost Growth Studies

▶ Eliminating Requirements Imposed on Industry