Improving Weapon System Investment Decisions

A Knowledge-based Approach to Weapon System Acquisitions Could Improve Outcomes

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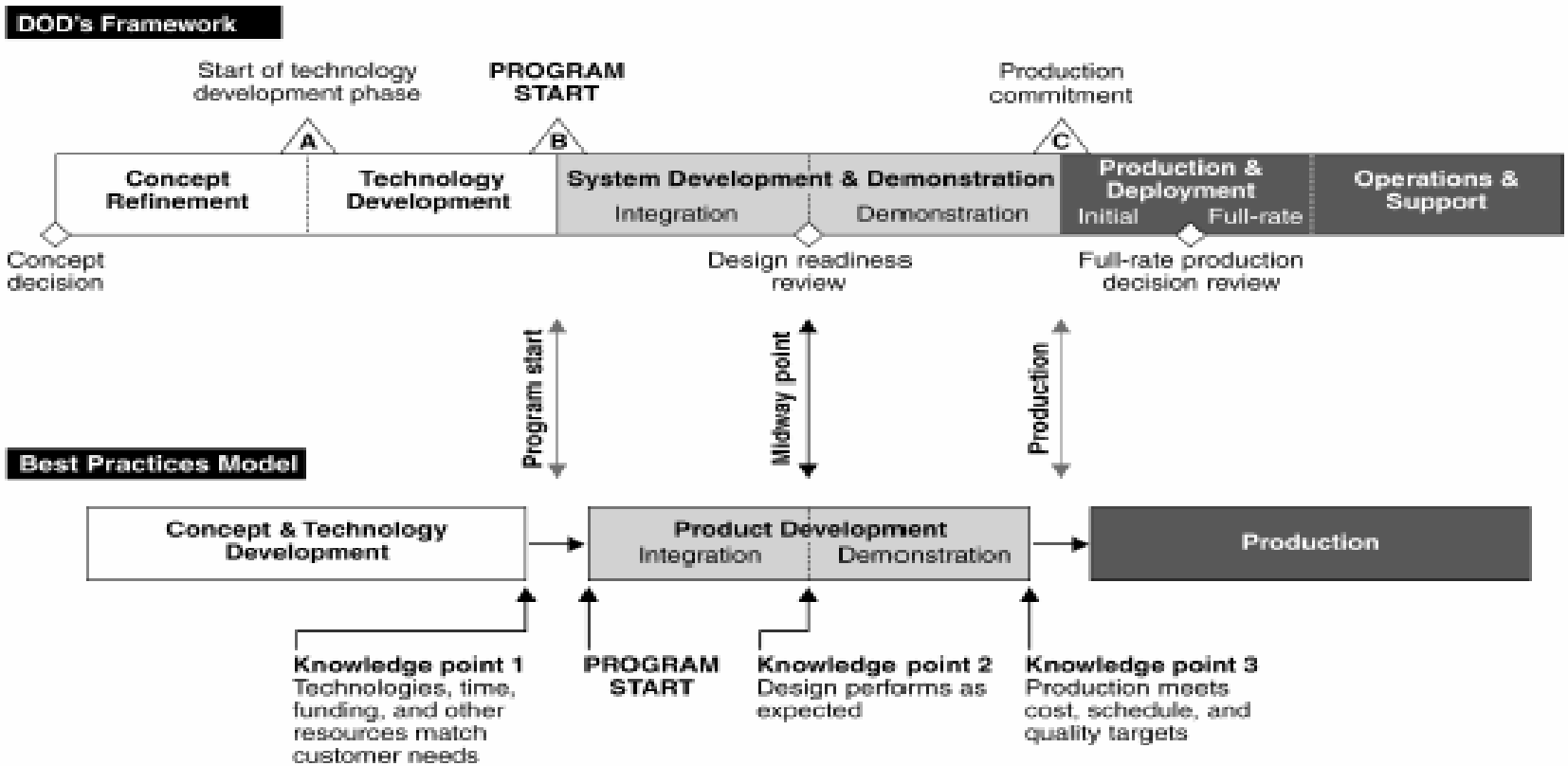
DOD Framework vs. Knowledge-based Best Practices Model



Sources: DOD and GAO.

Major Determinant Of Program Outcomes Is The Level Of Knowledge Attained At Key Junctures

Knowledge Point 1: At milestone B, a match is achieved between the user's needs and the developer's resources (indicator: technology readiness level)

Knowledge Point 2: At critical design review, the product design demonstrates its ability to meet user needs and is stable (indicator: % of engineering drawings released)

Knowledge Point 3: At milestone C, it is demonstrated that the product can be produced within cost, schedule, and quality targets (indicator: % of key processes in statistical control)

Making a Business Case that a Product Can Be Developed Within Resource Constraints

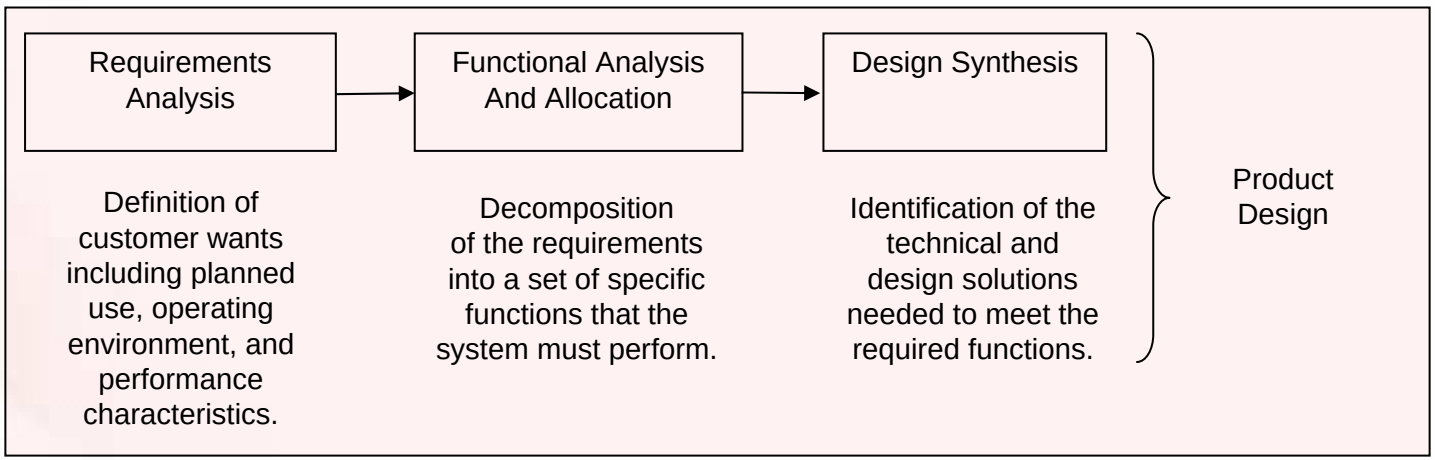
At milestone B programs should present a business case that provides evidence that:

(1)Warfighter needs are valid and can be met with chosen concept, and

(2)The chosen concept can be developed and produced within resources-technologies, funding, design knowledge, and time

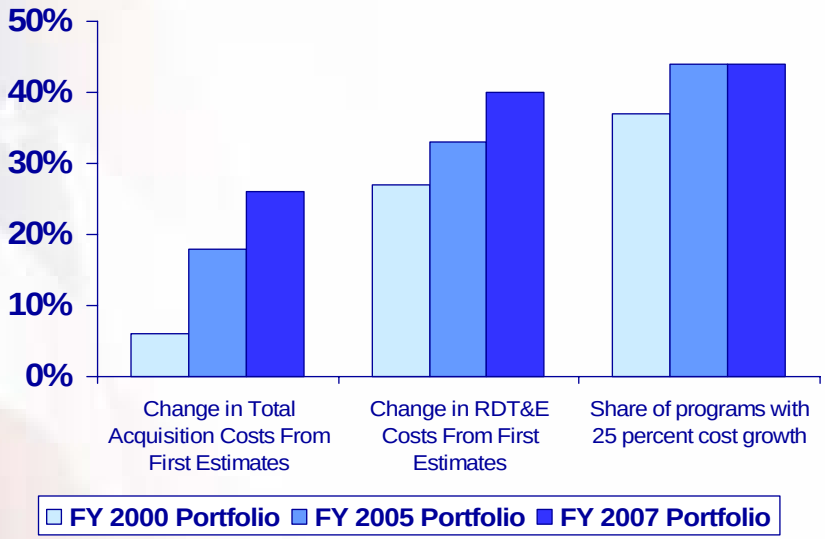
Resolving Gaps Between Requirements and Resources Before Program Start

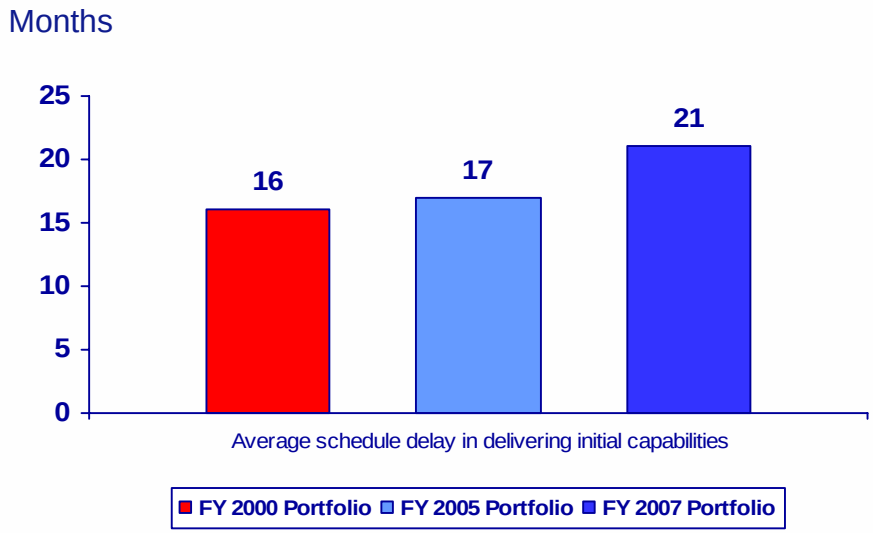
Early systems engineering enables a developer to identify and resolve gaps between resources and requirements before product development begins



Source: GAO.

DOD Programs Continue to Experience Cost and Schedule Problems





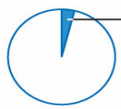
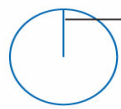
Source: GAO analysis of DOD data.

GAO Continues to Find That Programs Begin Without Key Knowledge

- Requirements are not well understood
- Quantum leaps in capability not incremental changes
- Technologies are not mature
- Cost and schedule estimates are overly optimistic
- Program cycle times are too lengthy

Little Evidence of Widespread Adoption of Knowledge-based Acquisition Process

- DOD's acquisition practices necessary to ensure effective implementation of knowledge-based process are not always followed despite policies and guidance to the contrary.

Key junctures	Development start	Design review	Production start
	Knowledge point 1	**Knowledge point 2**	**Knowledge point 3**
Best practices	Mature all critical technologies	Achieve knowledge point 1 on time and complete 90 percent of engineering drawings	Achieve knowledge points 1 and 2 on time, and have all critical processes under statistical control
DOD outcomes[a]	 12 percent of programs	 4 percent of programs	 0 percent of programs[b]

Source: GAO presentation of DOD data.

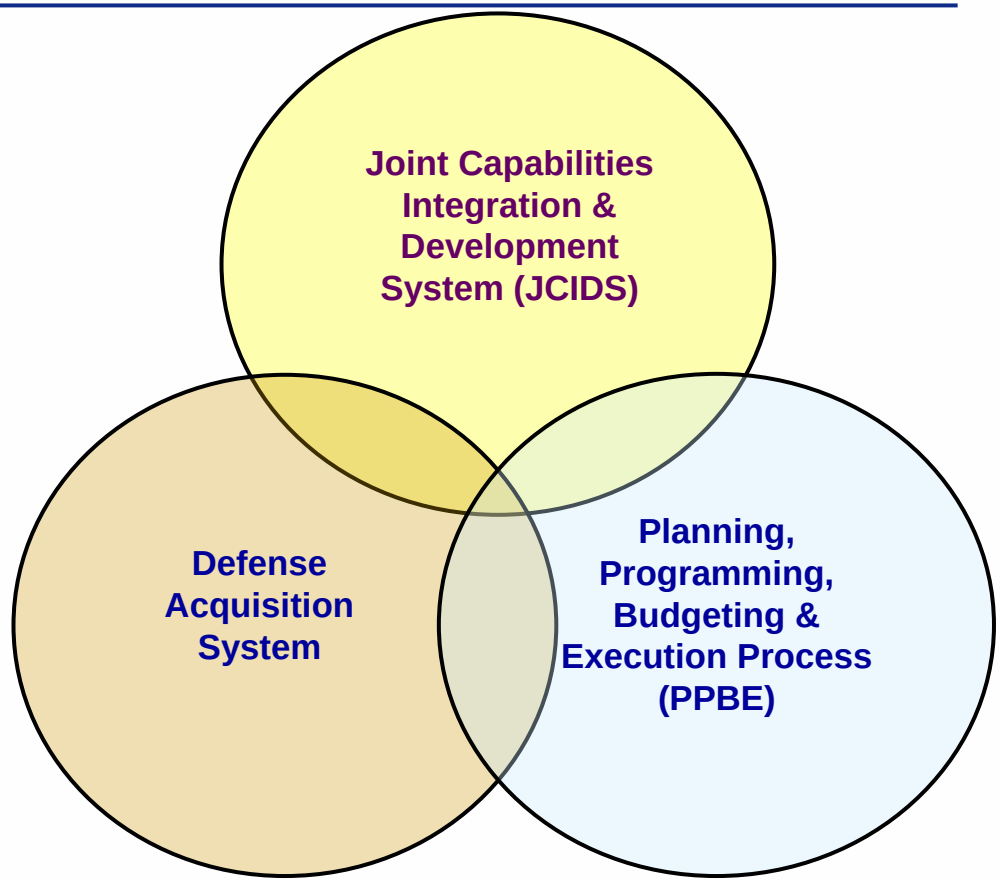
a Not all programs provided information for each knowledge point or had passed through all three key junctures.

b In our assessment of two programs, the Light Utility Helicopter and the Joint Cargo Aircraft, are depicted as meeting all three knowledge points when they began at production start. We excluded these two programs from our analysis because they were based on commercially available products and we did not assess their knowledge attainment with our best practices metrics.

GAO's Review of the Acquisition Decision Support Systems

GAO has done a lot of work looking at the DAS

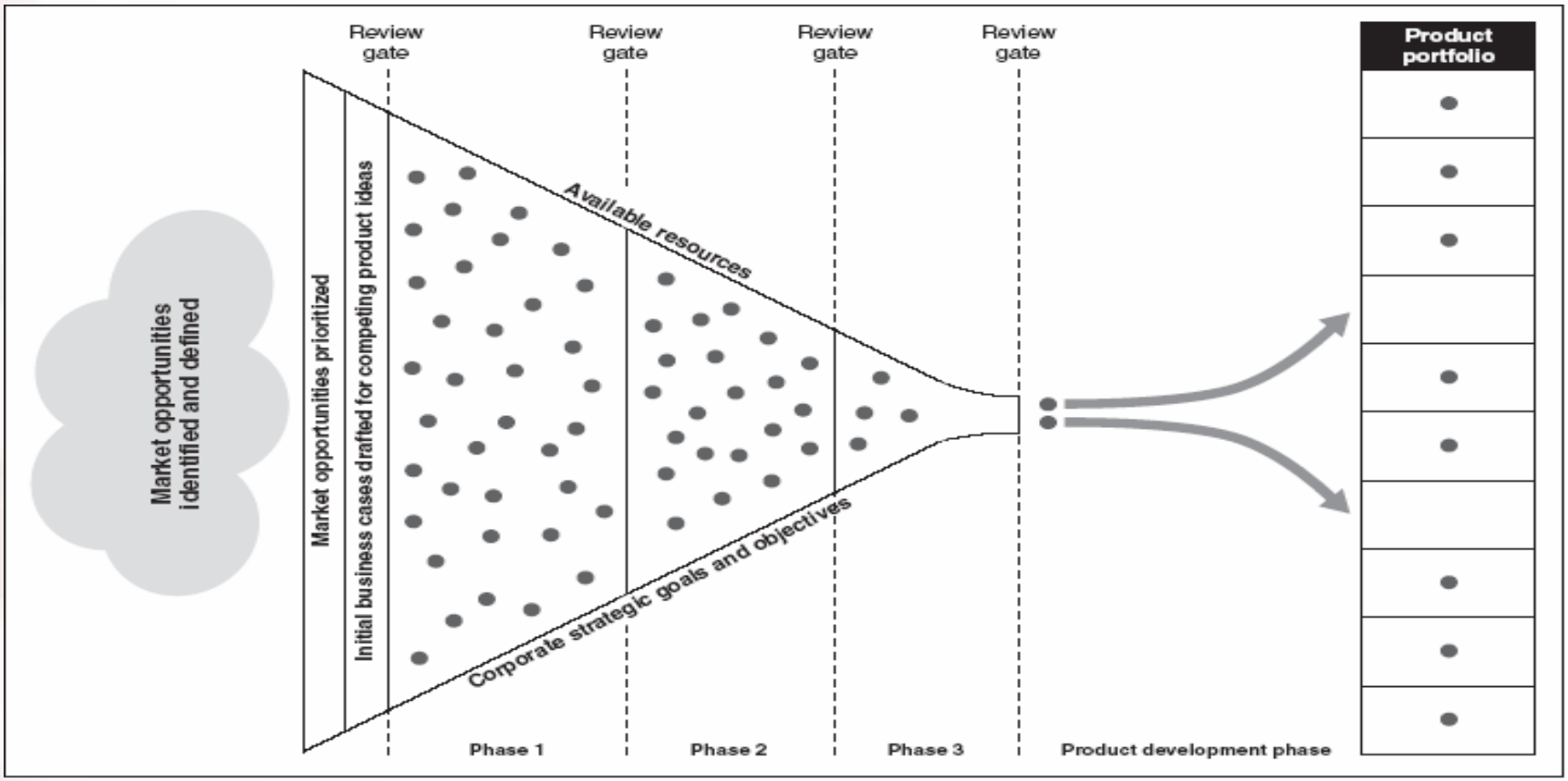
Congress directed GAO to initiate a body of work looking at the funding and requirements processes and how they could support better program outcomes



Portfolio Management: A Successful Commercial Model

- Each investment must be viewed from an enterprise level as contributing to the collective whole, rather than independent and unrelated
  - Identify and Prioritize Market Opportunities to Lay the Foundation for Achieving the Right Mix of Products
  - Use a Disciplined Process to Identify New Products and Achieve a Balanced Portfolio
  - Ensure strong governance, committed leadership, empowered decision makers, and effective accountability

The Portfolio Management Funnel

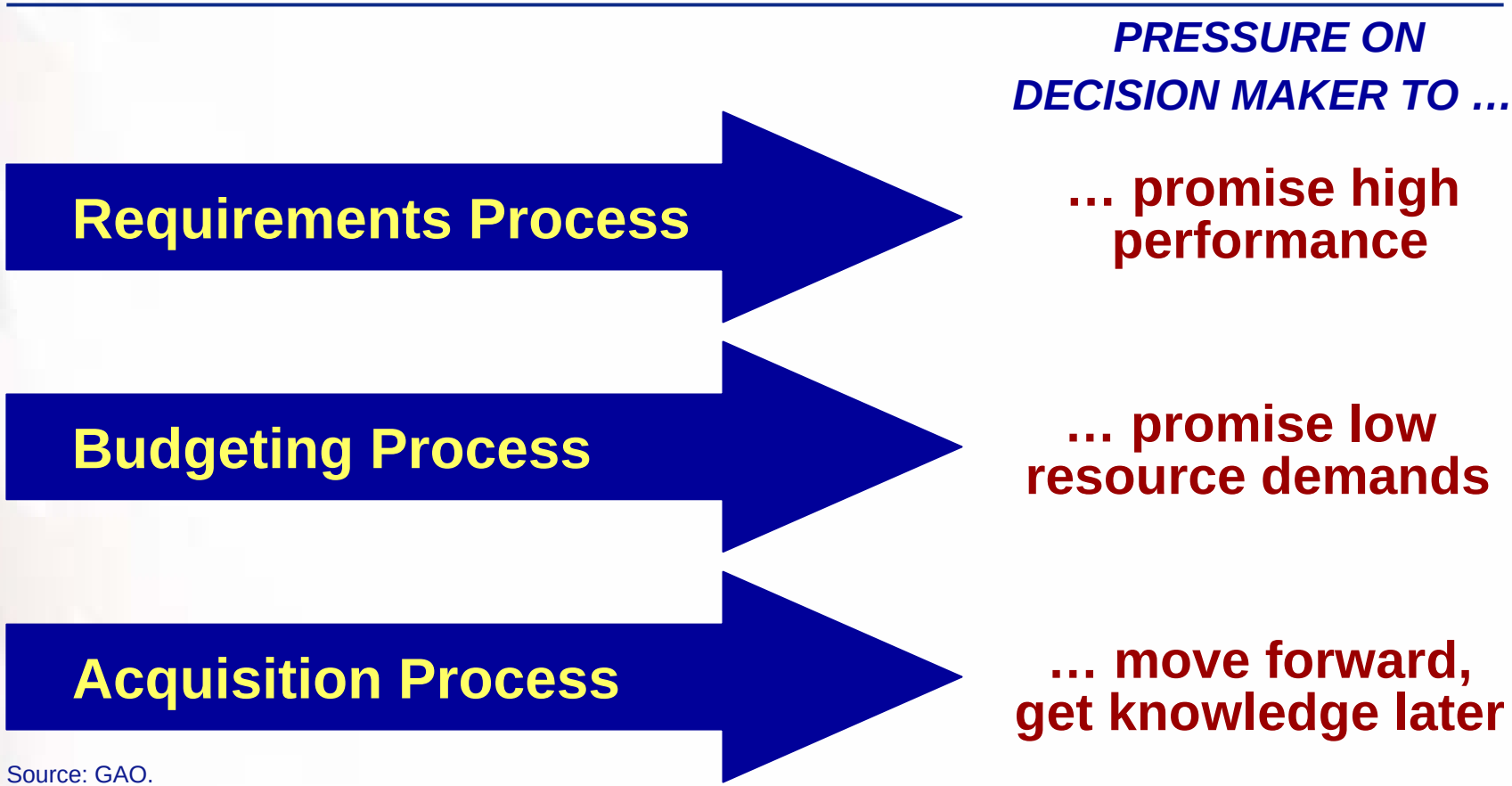


Source: GAO analysis and presentation of commercial best practices.

DOD's Decision Making Processes are Service-centric and Fragmented

- Services identify needs and budget for solutions
  - FCBs don't have the resources to effectively evaluate the service assessments within the context of the broader portfolio
  - FCBs don't have the authority to allocate resources
- Service funding appears to be allocated according to historical percentages
  - 40% AF, 20% Army, 30% Navy, and 10% DOD Wide
- JCIDS, PPBE, and DAS led by different organizations
  - Joint Staff, USD(AT&L), OSD (PA&E and Comptroller)

Fragmented Processes With Adverse Incentives



Source: GAO.

DOD Commits to Solutions Early and With Limited Knowledge

- Review points prior to milestone B are “optional” and typically by-passed
- Key processes are not integrated early to provide insight into cost and feasibility
  - ICDs don’t address cost or technical feasibility
  - AOAs often make the case for a specific solution vs. identifying the preferred solution
- Programs don’t have sound business cases
  - Undefined requirements
  - Immature technology
  - Optimistic cost and schedule estimates

DOD's Funding Process Contributes to Poor Acquisition Outcomes

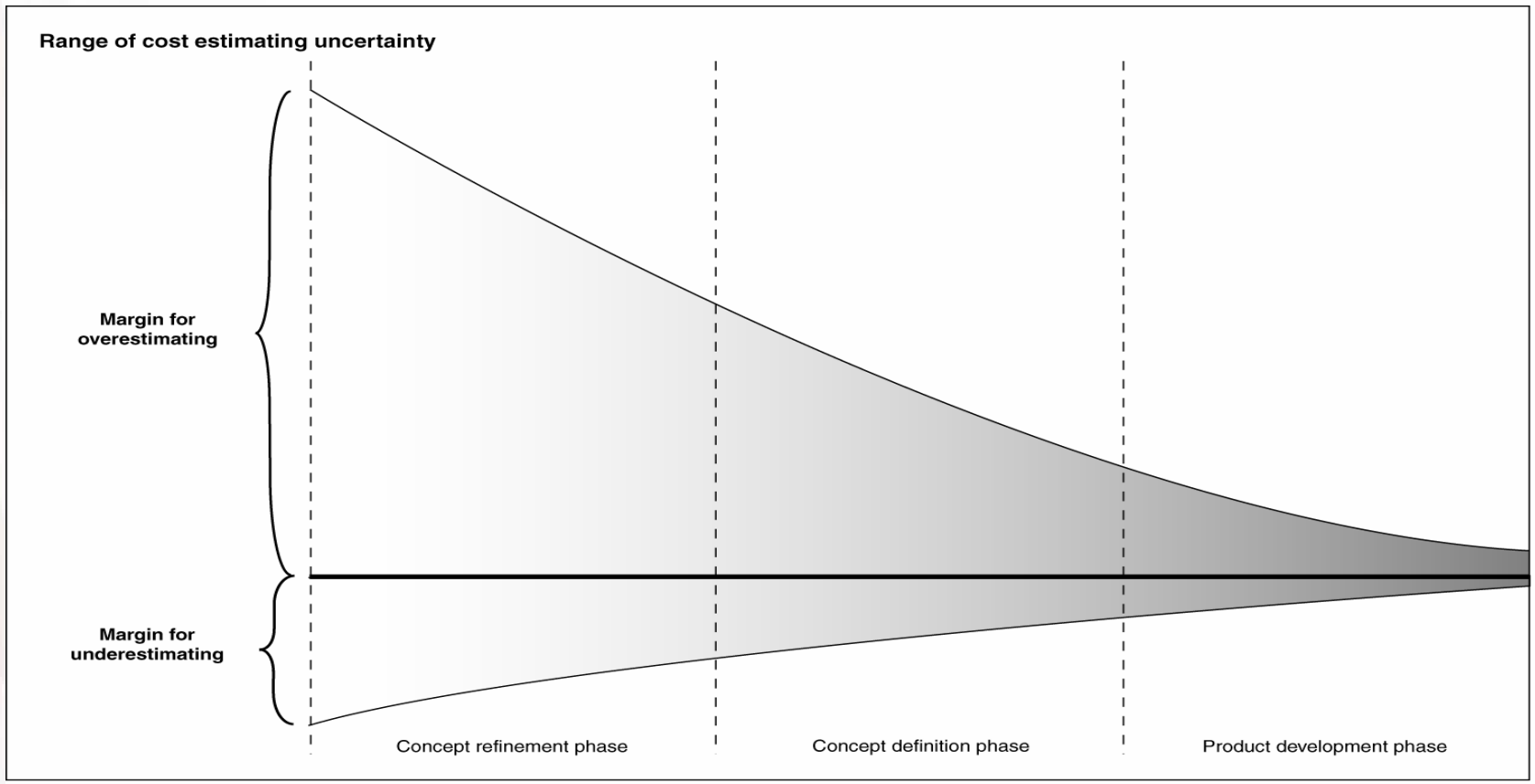
- Assessed cost and funding data for 20 major acquisition programs, and conducted detailed analysis of five of those programs:
  - Global Hawk
  - Joint Strike Fighter (JSF)
  - Future Combat Systems (FCS)
  - Warfighter Information Network – Tactical (WIN-T)
  - Multi-mission Maritime Aircraft (MMA)
- Leveraged work GAO has been doing in cost estimating and earned value best practices (*GAO Cost Assessment Guidebook*)
- Leveraged prior best practices work and obtained additional input from several of the companies that contributed to our prior work

Accurate Cost Estimates Are Needed Before Adequate Funding Can Be Allocated

- Without accurate estimates it is not realistic to assume that funding will be adequate

- Cost estimating best practice is to assess risk and uncertainty and present estimate as range of potential costs
  - Conduct sensitivity analysis and identify the range of likely costs
  - Ranges will be “broader” as knowledge is limited but as knowledge is gained (before development begins) the range should “narrow” until
  - Ranges allow decision makers to make more informed decisions—they can test the estimate’s reasonableness and decide on what level of funding risk they want to take)

The Cone of Uncertainty



Source: GAO.

Built-in Funding Instability

- DOD programs often initiate development with funding that does not reflect true costs
  - 75% of the programs we reviewed were under-funded in the FYDP when they began development
  - The FYDP doesn't cover the entire development program
- DOD makes unplanned and inefficient adjustments to compensate for poor planning / projections
  - Creates / perpetuates instability
  - Pushes costs into the future
  - "Robs Peter to pay Paul"
  - Reduces procurement quantities

Unrealistic Cost Estimates Hinder Accurate Funding Commitments

- Estimates are often based on limited knowledge about requirements and technologies and optimistic assumptions—lack of systems engineering analysis up front
- Our analysis of 20 programs found that both CAIG and Service estimates tended to be too low
- Estimates are presented as point estimates representing "most likely cost" and do not depict risk and uncertainty
- Program cycle times are longer than the FYDP timeframe

DOD's Failure to Balance Needs with Resources Promotes Unhealthy Competition

- Relying on unrealistically low estimates, DOD has committed to more programs than its resources can support
- In a zero-sum game, increases in one program will impact other programs
- Pressure to make a program stand out from others
- Pressure to appear affordable (fit within the FYDP)
- When "reality" hits and things don't go as planned, instability is the inevitable result

Recommended Steps to Improve Program Funding

- Balance the current portfolio (to reduce the pressures of unhealthy competition)
- Require programs to have short, manageable development cycles (5 to 6 years long)
- Require cost estimates to be presented as a range of likely costs (wider at a milestone A point and more narrow at milestone B)

DOD's Requirements Process (JCIDS) Has Not Been Effective in Prioritizing Joint Capabilities

- JCIDS is not meeting its objective to prioritize joint warfighting needs
  - Military services, not the joint warfighting community continue to sponsor most JCIDS proposals
    - Almost 70% of initial capability proposals submitted to JCIDS since 2003 were sponsored by a military service
  - Virtually all capability proposals that go through the JCIDS process are validated—or approved
    - Of 140 capability proposals since 2003 that completed the process, only 6 were not validated
  - Process is also lengthy and cumbersome, making it difficult to respond to near-term needs
- DOD is losing opportunities to strengthen joint warfighting capabilities and constrain its portfolio of weapon system programs to match available resources

DOD Lacks An Approach and Alignment of Resources to Prioritize and Balance Capability Needs

- JCIDS largely responds to capability proposals that are submitted by sponsors on a case-by-case basis
- Lacking a more proactive and analytic approach, JCIDS has been ineffective at integrating and balancing needs
- The military services continue to drive the determination of capability needs, in part because they retain most of DOD's analytic capacity and resources
- Without an approach and entity in charge to determine what capabilities are needed, all proposals tend to be treated as priorities within the JCIDS process

Recommended Steps To Improve JCIDS

- Develop an analytic approach within JCIDS to better prioritize and balance capability needs department-wide, and
- Determine and allocate appropriate resources for conducting joint capabilities development planning

Related GAO Products

- *Defense Acquisitions: DOD's Requirements Determination Process Has Not Been Effective in Prioritizing Joint Capabilities.* GAO-08-1060. September 25, 2008.
- *Defense Acquisitions: A Knowledge-Based Funding Approach Could Improve Major Weapon System Program Outcomes.* GAO-08-619. July 2, 2008.
- *Defense Acquisitions: Better Weapon Program Outcomes Require Discipline, Accountability, and Fundamental Changes in the Acquisition Environment*. GAO-08-782T. June 3, 2008.
- *Defense Acquisitions: Assessments of Selected Weapon Programs*. GAO-08-467SP. March 31, 2008.
- *Cost Assessment Guide: Best Practices for Estimating and Managing Program Costs*. GAO-07-1134SP. July 2, 2007.
- *Best Practices: An Integrated Portfolio Management Approach to Weapon System Investments Could Improve DOD's Acquisition Outcomes*. GAO-07-388. March 30, 2007.