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# **Opportunities to Optimize the Operational Use of Unmanned Aircraft Systems and Gain Synergy in Developing New Capabilities**

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**24th Annual National Test &  
Evaluation Conference  
February 27, 2008**

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# GAO's Mission and Related Work

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- GAO is the audit, evaluation and investigative arm of Congress. It supports Congress in meeting its constitutional responsibilities and helps improve the performance and accountability of the federal government by
  - examining the use of public funds;
  - evaluating federal programs and policies; and
  - providing analyses, recommendations, and other assistance to help Congress make informed oversight, policy, and funding decisions.
- At Congress's request, GAO has assessed various aspects of the Department of Defense's (DOD) management and acquisition of intelligence, surveillance, and reconnaissance (ISR) assets, including the military services' unmanned aircraft systems (UAS) programs.

## Background

- Battlefield commanders carrying out ongoing operations are supported by DOD's ISR assets, some of which are UAS.
- To meet the growing demand for ISR assets at every level of command, DOD is investing in several ISR systems, including UAS.
- DOD plans to invest more than \$21 billion in UAS from fiscal year 2007 through fiscal year 2013.
- Each of the military services, as well as the U.S. Special Operations Command, operates UAS. As of September 2007, DOD components had more than 5,000 unmanned aircraft in inventory.

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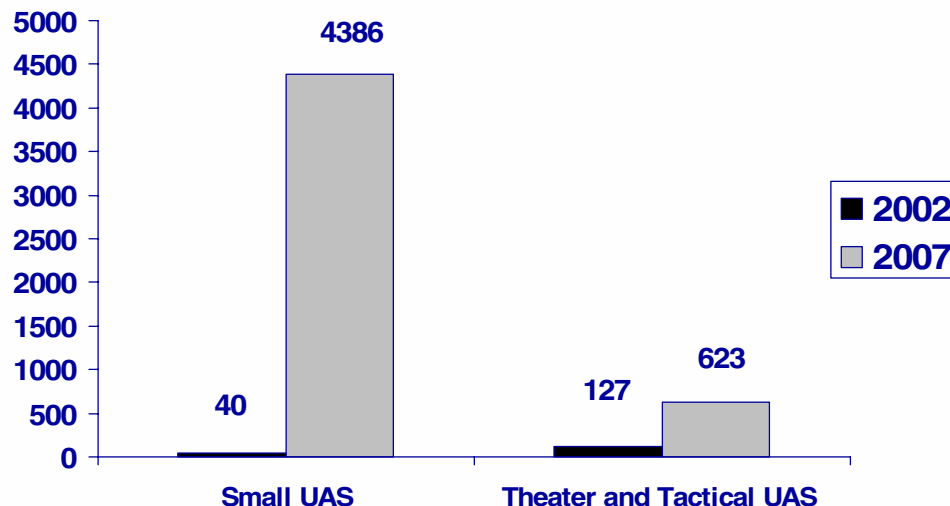
## Background (continued)

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- Acquisition of higher cost and more complex unmanned systems raised visibility and increased congressional scrutiny
- As with other major weapon systems, Congress wants
  - well-managed acquisition programs meeting cost, schedule, and performance goals
  - fielded systems providing the warfighter with the capabilities needed on time
  - emphasis on jointness, limited duplication, and strategic portfolio management of unmanned assets

# Unmanned Aircraft Inventory Increase, 2002-2007

- From 2002-2007, DOD substantially increased its inventory of unmanned aircraft.
- The largest increase was in small unmanned aircraft; e.g., the RQ-11 Raven and the RQ-13 Dragon Eye.
- Theater and Tactical unmanned aircraft include the MQ-1 Predator and the RQ-7 Shadow 200.



Source: GAO analysis of DOD data.  
 Note: Data as of September 2007. Small UAS weigh less than 10 pounds, Theater and Tactical more than 10 pounds.

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## General Observations on DOD's Ability to Optimize the Operational Use of UAS

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- DOD has experienced a high level of mission success with UAS in ongoing operations. For example, UAS have been used to identify time-critical targets and to strike enemy positions to defeat opposing forces.
- While DOD has taken steps, GAO has reported that DOD has experienced difficulties in the management of its UAS programs in the following specific areas:
  - Strategic planning
  - Operational challenges
  - Performance measurement

# Strategic Planning

- GAO's prior work has found that DOD lacks a robust oversight framework and a strategic plan to guide UAS development and investment decisions, to include key elements such as a clear link between goals, capabilities, funding priorities, and needs.
- DOD has established oversight bodies, such as the UAS Planning Task Force and the Joint UAS Center of Excellence, to facilitate planning and coordination. However, these entities are advisory bodies and lack directive authority.
- In lieu of establishing an executive agent for UAS, DOD recently established a new Task Force to "lead a DOD-wide effort to coordinate UAS issues and to develop a way ahead to enhance operations, enable interdependencies, and streamline acquisition."
- At this point, it is unclear whether the Task Force has the purview and authority to resolve the management challenges GAO has previously identified.

# Operational Challenges

- DOD components have established guidance to facilitate the integration of UAS into combat operations, such as multi-service tactics, techniques, and procedures, along with a Joint UAS concept of operations.
- However, commanders face challenges in fully optimizing the use of UAS assets, due in part to the growing number of UAS. These challenges include:
  - Limited interoperability
  - Electromagnetic spectrum constraints
  - Lack of DOD-wide procedures for the advanced coordination of UAS into a theater of operations



## Operational Challenges (continued)

- While DOD is taking several positive steps, we reported that the department's strategic approach to managing its current UAS assets is not enabling DOD to fully optimize its use of these assets.
- U.S. Strategic Command's Joint Functional Component Command for ISR (JFCC-ISR) manages the annual process for allocating available ISR assets to the combatant commanders to meet theater-level needs, including UAS. However, JFCC-ISR has limited visibility into national and allied ISR assets, and lacks visibility into UAS assets embedded and controlled by tactical units.
- The Joint Force Air Component Commander (JFACC) tasks theater UAS assets, including the Predator and Global Hawk, against specific ISR requests. The JFACC has had limited visibility into the use of UAS ISR assets controlled by tactical units. That limitation can lead to duplicative taskings as well as diminish the commander's ability to fully leverage all available assets.

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# Performance Evaluation

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- DOD uses limited quantitative metrics to measure the effectiveness of its ISR missions, and it does not routinely capture feedback on ISR effectiveness in meeting warfighters' requirements.
  - DOD components, such as JFCC-ISR, have been tasked with developing ISR performance metrics. While they have made some progress, they have not set milestones for completing this effort.
  - Without developing metrics and systematically gathering feedback, DOD is not in a sound position to validate the true demand for its ISR assets, determine whether it is allocating and tasking these assets in the most effective manner, or acquire new systems that best support its warfighting needs.
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## General Observations on UAS Acquisitions

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- More joint investment strategy based on portfolio management principles needed
  - Improved business case development and lower risk acquisition strategies
  - More effective systems engineering practices need to be followed
  - Better cost and schedule outcomes
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## Opportunities Exist For Greater Collaboration Across UAS Programs

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- Greater collaboration on similar programs but different services would create a more efficient and affordable approach
    - Army and Navy's collaboration on Fire Scout has achieved benefits
    - BAMS could benefit from greater collaboration
    - Warrior and Predator have been slow to exploit synergies
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# UAS Are Not Immune to Common Development Problems

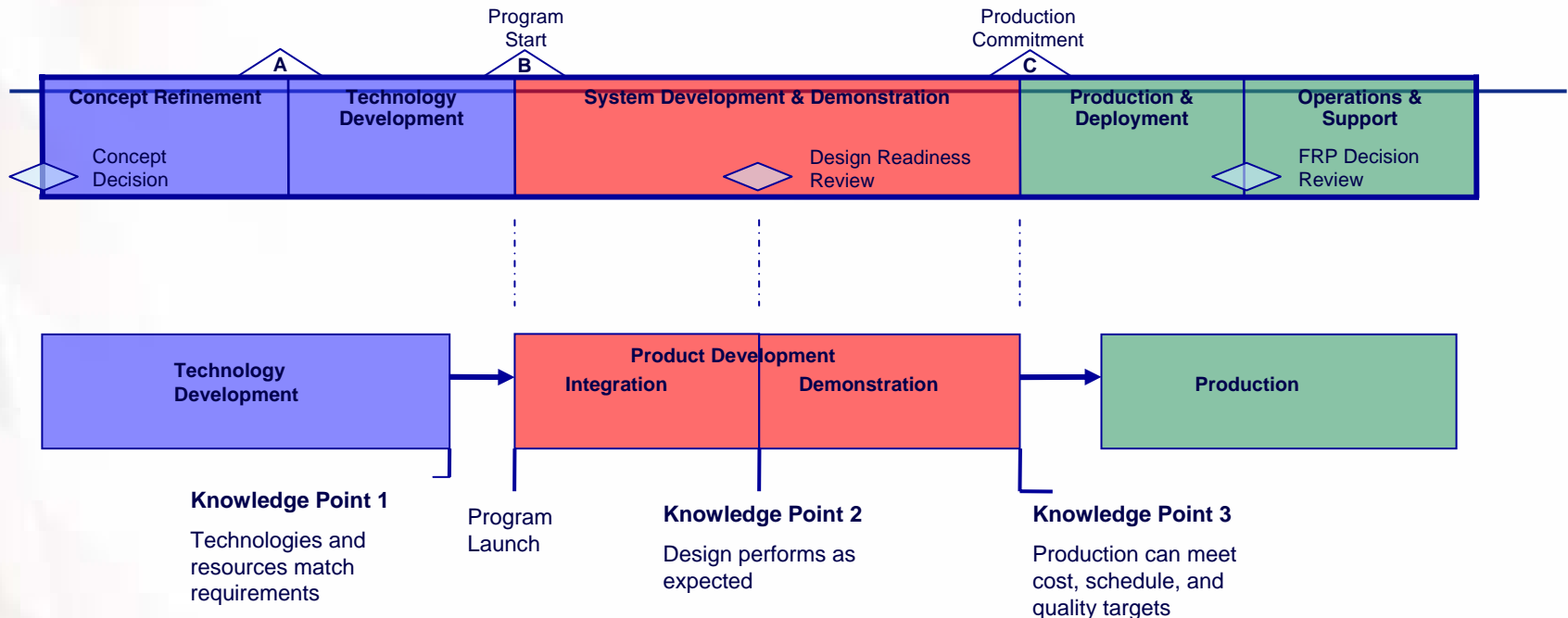
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- Immature technologies
- Requirement changes
- Design changes
- Quality and reliability problems

# Examples of UAS Programs, Problems Encountered, and Impact

System	Problem Encountered	Impact
<b>Global Hawk</b>	<ul style="list-style-type: none"> <li>•Concurrent acquisition strategy</li> <li>•Immature technology</li> <li>•Requirements changes</li> <li>•Design changes</li> </ul>	<ul style="list-style-type: none"> <li>•Development cost growth of 261 percent</li> <li>•Schedule delay of 36 months</li> <li>•Several program restructures</li> <li>•Increased investment in legacy systems</li> </ul>
<b>MQ-9 Reaper</b>	<ul style="list-style-type: none"> <li>•Concurrent acquisition strategy</li> <li>•Immature technology</li> </ul>	<ul style="list-style-type: none"> <li>• Development cost growth of 13 percent</li> <li>• Schedule delay of 7 months</li> </ul>
<b>Warrior</b>	<ul style="list-style-type: none"> <li>•Concurrent acquisition strategy</li> <li>•Immature technology</li> </ul>	<ul style="list-style-type: none"> <li>•Development cost growth of 21 percent</li> <li>•Schedule delay of 9 months</li> </ul>
<b>Broad Area Maritime Surveillance</b>	<ul style="list-style-type: none"> <li>•Immature technology</li> <li>•Funding availability</li> </ul>	<ul style="list-style-type: none"> <li>•Schedule delayed 39 months</li> </ul>

# DOD Acquisition Process and Best Practices



## Key pre-system development markers:

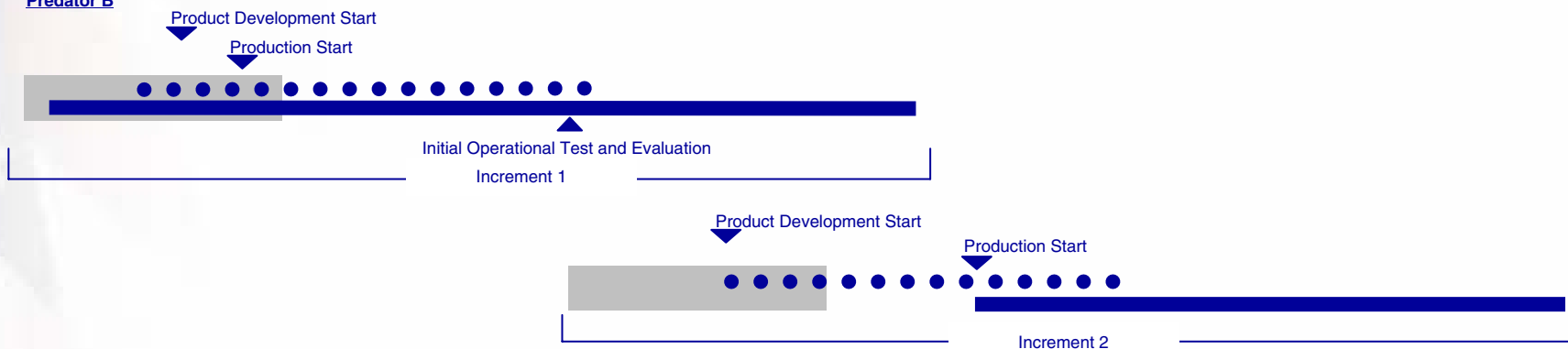
- Integrated portfolio management strategy
- Systems Engineering/Requirements Analysis
- Technology maturation and transition

## Key development markers:

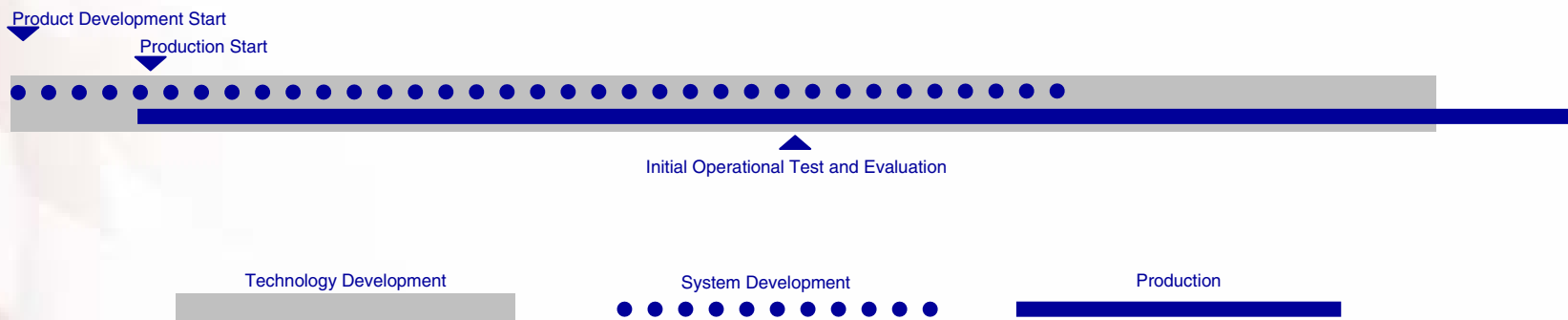
- Sound, executable business case
- Evolutionary approach
- Knowledge based decision points

# Comparison of Predator B and Global Hawk Acquisition Plans

## Predator B

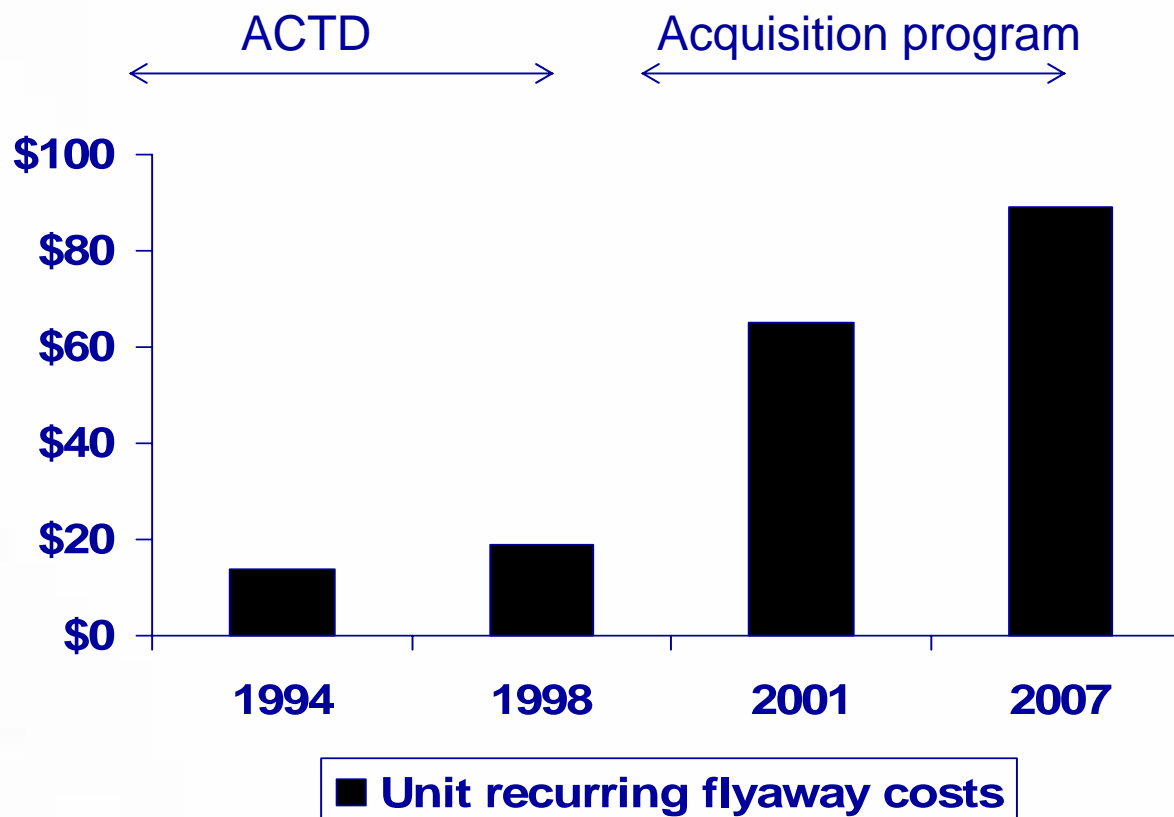


## Global Hawk





# Example of Global Hawk Unit Cost Growth



## Related GAO Products

- *Unmanned Aircraft Systems: Advanced Coordination and Increased Visibility Needed to Optimize Capabilities*, GAO-07-836 (Washington, D.C.: July 11, 2007).
- *Intelligence, Surveillance, and Reconnaissance: Preliminary Observations on DOD's Approach to Managing Requirements for New Systems, Existing Assets, and Systems Development*, GAO-07-596T (Washington, D.C.: April 19, 2007).
- *Defense Acquisitions: Greater Synergies Possible for DOD's Intelligence, Surveillance, and Reconnaissance Systems*, GAO-07-578 (Washington, D.C.: May 17, 2007).
- *Defense Acquisitions: Assessments of Selected Weapon Programs*, GAO-07-406SP (Washington, D.C.: March 30, 2007).
- *Best Practices: An Integrated Portfolio Management Approach to Weapon System Investments Could Improve DOD's Acquisition Outcomes*, GAO-07-388 (Washington, D.C.: March 30, 2007).
- *Unmanned Aircraft Systems: Improved Planning and Acquisition Strategies Can Help Address Operational Challenges*, GAO-06-610T (Washington, D.C.: April 6, 2006).

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## Related GAO Products (continued)

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- *Unmanned Aircraft Systems: New DOD Programs Can Learn from Past Efforts to Craft Better and Less Risky Acquisition Strategies*, GAO-06-447 (Washington, D.C.: March 15, 2006).
  - *Unmanned Aircraft Systems: Global Hawk Cost Increase Understated in Nunn-McCurdy Report*, GAO-06-222R (Washington, D.C.: December 15, 2005).
  - *Unmanned Aircraft Systems: DOD Needs to More Effectively Promote Interoperability and Improve Performance Assessments*, GAO-06-49 (Washington, D.C.: December 13, 2005).
  - *Unmanned Aerial Vehicles: Improved Strategic and Acquisition Planning Can Help Address Emerging Challenges*, GAO-05-395T (Washington, D.C.: March 9, 2005).
  - *Unmanned Aircraft Systems: Changes in Global Hawk's Acquisition Strategy Are Needed to Reduce Program Risks*, GAO-05-6 (Washington, D.C.: November 5, 2004).
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# GAO Contact Information

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