Unmanned Combat Air Systems
26 July 2006

Dyke D. Weatherington
OUSD(AT&L)/PSA/Air Warfare
2006 QDR Guidance

- The 2006 Quadrennial Defense Review Report emphasizes the importance of Unmanned Aircraft Systems
  - Department will also increase procurement of unmanned aerial vehicles to increase persistent surveillance, nearly doubling today’s capacity
  - Approximately 45% of the future long-range strike force will be unmanned
  - Establish a SOF unmanned aircraft systems squadron
  - Maritime aviation will include unmanned aircraft for both surveillance and strike
  - Restructure the Joint Unmanned Combat Air System (J-UCAS) program and develop an unmanned longer-range carrier-based aircraft capable of being air-refueled to provide greater standoff capability,
  - Increase investment in unmanned aerial vehicles to provide more flexible capabilities to identify and track moving targets in denied areas
  - Nearly double UAV coverage capacity by accelerating the acquisition of Predator UAVs and Global Hawk
Persistent Surveillance

- The Department will also increase procurement of unmanned aerial vehicles to increase persistent surveillance, nearly doubling today’s capacity. It also will begin development of the next generation long-range strike systems, accelerating projected initial operational capability by almost two decades. Page-6

- Nearly double UAV coverage capacity by accelerating the acquisition of Predator UAVs and Global Hawk. Page-46
### Unmanned Aircraft (UA)
#### 2006

<table>
<thead>
<tr>
<th>Theater &amp; Tactical (&gt;10lbs)</th>
<th>Small (&lt;10lbs)</th>
</tr>
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<tbody>
<tr>
<td>Buster 20</td>
<td>Pointer 126</td>
</tr>
<tr>
<td>Pioneer 34</td>
<td>Raven 1776</td>
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<tr>
<td>Shadow 200 140</td>
<td>Dragon Eye 402</td>
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<tr>
<td>Neptune 15</td>
<td>Desert Hawk 126</td>
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<tr>
<td>Tern 15</td>
<td>BATCAM 54</td>
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<tr>
<td>Mako 14</td>
<td>Swift 212</td>
</tr>
<tr>
<td>Tigershark 6</td>
<td>Sub-total 2570</td>
</tr>
<tr>
<td>SnowGoose 25</td>
<td></td>
</tr>
<tr>
<td>Hunter 32</td>
<td></td>
</tr>
<tr>
<td>I-Gnat 4</td>
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<tr>
<td>Predator 70</td>
<td></td>
</tr>
<tr>
<td>Predator B 6</td>
<td></td>
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<tr>
<td>Global Hawk(GH) - ACTD 4</td>
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<tr>
<td>Global Hawk - Prod 5</td>
<td></td>
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<tr>
<td>GH Maritime Demo 2</td>
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<tr>
<td>Sub-total 392</td>
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<tr>
<td><strong>309% Increase from 2002</strong></td>
<td><strong>1,773% Increase from 2002</strong></td>
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<table>
<thead>
<tr>
<th>Year</th>
<th>Aircrafts</th>
<th>Costs</th>
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<tbody>
<tr>
<td>2002</td>
<td>167</td>
<td>$763M</td>
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<tr>
<td>2004</td>
<td>727</td>
<td>$1,631M</td>
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<tr>
<td>2006</td>
<td>2,962</td>
<td>$1,627M</td>
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</table>

Total R&D and Procurement costs per year

#06-S-2070
DoD UAS Flight Hours

Flight Hours by Fiscal Year

Does not include Small UAS

120,000
100,000
80,000
60,000
40,000
20,000


NAVY & USMC  AIR FORCE  ARMY

#06-S-2070
Current Predator & Global Hawk Operations

- Edwards AFB, CA
- Creech AFB, NV
- Beale AFB, CA
- NPS Monterrey, CA
- Patuxent NAS, MD

#06-S-2070
Persistent Surveillance

RQ-4 Global Hawk
Attributes:
• Ceiling – 65,000 ft
• Endurance – 32 hours
• Radius – 5,400 nm
• Sensors – EO/IR, SIGINT, SAR/MTI
• Payload – 1,950 lbs
• Data Link (s) – BLOS (SATCOM)/ LOS

MQ-1 Predator
Attributes:
• Ceiling – 25,000 ft
• Endurance – 14 hours (armed)
• 24 hours (unarmed)
• Radius – 500 nm
• Sensors – EO/IR, SAR
• Payload – 450 lbs
• Data Link (s) – BLOS/ LOS
Future Long-Range Strike

• The Air Force has set a goal of increasing its long-range strike capabilities by 50% and the penetrating component of long-range strike by a factor of five by 2025. Approximately 45% of the future long-range strike force will be unmanned.  Page-46
3-Phased Approach

- Phase 1 – Continues modernization of legacy bombers to upgrade combat effectiveness

- Phase 2 (Next Generation Long Range Strike) – Leverages near-term technologies to start development of long range strike capability to augment current fleet
  - Technology maturity a key consideration to meet QDR-directed 2018 IOC
  - Analysis of Alternatives being conducted, results due Spring 2007

- Phase 3 – Cutting edge *producible* technology in the 2035+ timeframe
  - Directed energy, hypersonics, exo-atmospheric
  - Speed, range, accuracy, connectivity & survivability improvements
Air Force Long Range Strike (Phase 2) AoA Desired Capabilities

- **Long-range** – Global from CONUS or forward operating bases
- **Persistent** – 24/7 capability in anti-access environment
- **Responsive** – Respond globally within hours to minutes
- **Flexible, precise weapons payload** – Mixed load, nuclear capable
- **Highly survivable** – Self-defending – reduces support
  - Low observable, standoff weapons, speed, altitude
  - Manned, unmanned, or optionally manned
- **Global situational awareness**
  - Robust, fused sensor suites
- **Real-time, robust beyond line of site connectivity** – Fully netted
- **Autonomous operations** – Onboard sensors, offensive, defensive, non-traditional ISR
- **Flexibility /adaptability** – easily incorporate new capabilities, open architecture – “plug and play”
Joint Tactical Air Control

• Expand the Air Force Joint Tactical Air Control program by jointly training personnel for air/ground operations and use of Unmanned Aerial Vehicles.
A TACP is generally a two-airman team, working in an Army ground unit and directing close air support firepower toward enemy targets on the ground in close proximity to friendly forces.
Special Operations UAS Squadron

- The Air Force will establish an Unmanned Aerial Vehicle Squadron under U.S. SOCOM. Page-5
- Establish a SOF unmanned aerial vehicle squadron to provide organic capabilities to locate and target enemy capabilities in denied or contested areas. Page-45
The Air Force is currently standing up a special operations Predator UAV squadron at Creech Air Force Base, NV. The squadron will initially consist of 24 MQ-1 aircraft but could eventually add the larger MQ-9 Predator B when the aircraft completes development. The Air Force has not announced a specific timetable for the completion of the stand up of the AFSOC Predator squadron.
MQ-9 Predator B
Naval Aviation

- Maritime aviation will include unmanned aircraft for both surveillance and strike. Page-45
- Restructure the Joint Unmanned Combat Air System (J-UCAS) program and develop an unmanned longer-range carrier-based aircraft capable of being air-refueled to provide greater standoff capability, to expand payload and launch options, and to increase naval reach and persistence. Page-46
Restructure the Joint Unmanned Combat Air System (J-UCAS) program and develop an unmanned longer-range carrier-based aircraft capable of being air-refueled to provide greater standoff capability, to expand payload and launch options, and to increase naval reach and persistence.

<table>
<thead>
<tr>
<th>Year</th>
<th>RDT&amp;E-Navy ($M)</th>
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<tr>
<td>FY07</td>
<td>+239</td>
</tr>
<tr>
<td>FY08</td>
<td>+310</td>
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<tr>
<td>FY09</td>
<td>+369.4</td>
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<td>FY10</td>
<td>+491.1</td>
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<tr>
<td>FY11</td>
<td>+421.1</td>
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<tr>
<td>FY07-11</td>
<td>+1,830.5</td>
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</tbody>
</table>

CAT/TRAP Demonstration planned for FY11
Automated Aerial Refueling

Goal: Develop and Flight Demonstrate Initial AAR Capability

Initial User/TAD: J-UCAS, FY07

Technology Challenges:

- Rendezvous
- UAS Operations near tanker
  - Precise relative position
  - Collision avoidance
- C2: MCS supervised, Boomer breakaway
- Systems integration

Strong ACC & AMC participation in effort - Includes desire to minimize impact to existing tanker fleet and con-ops
Reserve Component

- The Air Force is optimizing Reserve Component personnel for new missions that can be performed from the United States, including unmanned aerial vehicle (UAV) operations and ISR reach-back, leveraging the core competencies of the reserves while reducing stress on the force. Page-45
• Grand Forks initially is scheduled to receive Predators in 2009 and Global Hawks in 2010, North Dakota Senator Kent Conrad
• The details of the Grand Forks and Fargo missions were embedded in the Air Force's Total Force Integration program, which lays the ground rules for military strategies and acquisitions. Under this program, the North Dakota Air National Guard's 119th Wing was assigned two missions at Hector International Airport. Those missions are flying an unidentified joint cargo aircraft and operating a Predator UAV ground control station.
• The Guard will create a new maintenance unit at Grand Forks Air Force Base that will support Predator launch and recovery operations. The new maintenance squadron also may be asked to support Global Hawk UAV operations once those aircraft arrive on base, Senator Conrad said.
Reserve Component

- Air National Guards units will conduct Predator unmanned aircraft systems missions in a reachback capacity over long distances from their home states.

- Air Force Reserve members will participate in all mission areas at the Air Warfare Center at Nellis Air Force Base, Nev. The first new reserve-component mission will be Predator unmanned aircraft systems missions.

- 5 Predator Squadrons
  - Arizona – Davis-Monthan/Fort Huachuca
  - California – March ARB
  - New York – Hancock Field Syracuse
  - North Dakota – Fargo/Grand Forks
  - Texas – Ellington Field

- Global Hawk Units
  - North Dakota - Grand Forks

- United States Air Force Warfare Center
  - Reserve & Guard augmentation
Proposed Guard and Reserve Predator and Global Hawk Locations

- March ARB, CA
- Creech AFB, NV
- Grand Forks AFB, ND
- Hancock Field, NY
- Davis-Monthan AFB, AZ
- Ellington Field, TX
Moving Targets

• Increase investment in unmanned aerial vehicles to provide more flexible capabilities to identify and track moving targets in denied areas. Page-57
Lynx II Synthetic Aperture Radar/Ground Moving Target Indicator (SAR/GMTI)

- **Mission**
  The Lynx II SAR/GMTI is a multi-function radar that operates in Synthetic Aperture Radar (SAR) and Ground Moving Target Indicator (GMTI) modes. High-resolution SAR and GMTI data is processed on-board and is data-linked to a Ground Station for exploitation.

- **Description**
  The Lynx II consists of a Radar Electronics Assembly (REA) and an Antenna/Gimbal Assembly. SAR modes operate in 0.1 m to 3.0 m resolution. In the GMTI mode, the radar detects moving targets at speeds of 10-70 kph and overlays their locations on a digital map. The Lynx II is slated for production in FY07 and is sized for operations on the UA Class IV, ER/MP and Hunter UAVs.

- **Applications**
  - All-condition RSTA of moving and stationary targets
  - Battle Damage Assessment (BDA)
  - Wide area surveillance
  - Brigade/Division intelligence operations
  - Multi-mode cueing
Office of the Secretary of Defense
Unmanned Systems Roadmap 2007-2032

• Focus
  – Interoperability of air, ground, and sea systems
  – Remains on customer, technology and industry

• Adds
  – Unmanned Ground Systems
  – Unmanned Surface Systems
  – Unmanned Underwater Systems

• New Format
• Long term plan is to publish an integrated Unmanned Systems Roadmap in 2009
• The goal is for the 2009 Road map to influence the FY 2010 POM
Unmanned Systems Roadmap, 2007

Very Rough Format Straw Man
- Executive Summary
- Chapter 1 – Introduction
- Chapter 2 – Strategic Planning, Policy, Guidance, & Organization
- Chapter 3 – Capabilities
- Chapter 4 – Joint Mission Areas
- Chapter 5 – Technology Application (appendices in current version of the roadmap)
- Chapter 6 – Experimentation and Test
- Chapter 7 – Roadmap – programs/capabilities/timeline
- Annex A – Unmanned Aircraft Systems
- Annex B – Unmanned Ground Systems
- Annex C – Unmanned Sea Systems
- Annex D – Standards Listing

- Separate volume with detailed appendices...?
- Targeting completion Fall FY07
Questions?