Air Force Unmanned Aerial System (UAS) Flight Plan
2009-2047

Lt Gen Dave Deptula
Deputy Chief of Staff, Intelligence, Surveillance and Reconnaissance

U.S. AIR FORCE
New challenges, new adversaries mandate new role for ISR

- Collectively necessitated **AF ISR Transformation**
- Expanded role and reach of AF ISR
- Requires changing the culture regarding ISR

**Approach:**

- **ORGANIZATION:** Organize AF ISR as a holistic AF-wide enterprise to optimize presentation of ISR capabilities to service, joint, & national users
- **PERSONNEL:** Develop ISR career paths to build viable “bench” of AF ISR senior leaders to meet 21st Century demands
- **CAPABILITY:** Plan, guide, and orchestrate AF/ISR from a capability-based perspective as a consolidated functional area
1) **AF ISR Strategy**: AF ISR’s long-range plan that provides overall guidance and philosophy

2) **AF ISR Flight Plan**: Identifies options to resource the AF ISR strategy

3) **AF UAS Flight Plan**: Action plan to guide AF UAS development

4) **ISR CONOPs**: Describes how we envision integrating and optimizing ISR day-to-day operations
What do UAS’s Bring to Operations?

- Persistence—ability to loiter over a target for long time periods for ISR and/or opportunity to strike enemy target
- Undetected penetration / operation
- Operation in dangerous environments
- Can be operated remotely, so fewer personnel in combat zones—projects power without projecting vulnerability
- Integrates “find, fix, finish” sensor and shooter capabilities on one platform
Result: High Demand Asset

Growth in Air Force medium-altitude MQ-1 Predator and MQ-9 Reaper Combat Air Patrols

- 2004 = 5
- 2005 = 8
- 2006 = 11
- 2007 = 18
- 2008 = 33
- 2009 = 38

660% Increase in 6 years!
USAF UAS Vision: What We Believe

...A Joint approach to:

Get the most out of UAS to increase joint warfighting capability, while promoting service interdependency and the wisest use of tax dollars

Requires:

- Optimal Joint Concept of Operations (CONOPS)
- Airspace Control Resulting in Safe/Effective UAS Operations
- Air Defense Architecture to Achieve Security w/o Fratricide
- Increased Acquisition Effectiveness, Efficiency, Standardization

Integrity - Service - Excellence
An Air Force with…

- Unmanned aircraft that are fully integrated with manned aircraft across the full range of military operations
- UAS that use automated control and modular “plug-and-play” payloads to maximize combat capability, flexibility and efficiency
- Joint UAS solutions and teaming
- An informed industry and academia – knowing where we are going and what technologies to invest in

Capabilities-based Air Force UAS vision thru 2047: Defines DOTMLPF way forward
AF UAS Flight Plan
2009-2047

Colonel Eric Mathewson
AF UAS Task Force
Assumptions

- Manned and unmanned systems must be integrated to increase capability across the full range of military operations for the Joint Force
- UAS compelling where the human is a limitation to mission success
- Automation is key to increasing effects, while potentially reducing cost, forward footprint and risk
- The desired effect is a product of the “integrated system” (payload, network, and PED); and less the particular platform (truck)
- Modular systems with standardized interfaces enhance adaptability, sustainability and reduce cost
- Robust, agile, redundant C2 enables supervisory control (“man on the loop”)
- DOTMLPF-P solutions are linked and must be synchronized
**Conventional Harbor**

- 4 operators per crane
- Manpower-centric system
  - Legacy system
  - Manpower dependant
  - Manual Operation

**“Multi-Crane Control”**

- 1 operator per 6 cranes
- 24x increase in efficiency
- Tech-centric system
  - Multi-crane Control
  - Automation (cranes and AGV)
    - DGPS
    - Algorithms
### Potential Manpower Savings

#### 2011 (Current system)
- **50 CAPs**
  - 50 MQ-9 CAPs
  - + 7 a/c in constant transit
- **10 pilots per CAP**
  - 500 pilots required
  - + 70 pilots to transit a/c

**570 Total Pilots**

#### 2012 (MAC)
- **50 CAPs**
  - 50 MQ-9 CAPs
  - 2 CAPs per MAC GCS
  - 1 transit per MAC GCS
- **5 pilots per CAP**
  - 250 Pilots required
  - + 0 to transit aircraft

**250 Total Pilots**

**56% Manpower Savings**

#### TBD (MAC + 50% auto)
- **50 CAPs**
  - 50 MQ-9 CAPs on orbit
  - 25 CAPs automated
  - 25 CAPs in MAC (5 pilots/CAP)
- **10 pilots per CAP**
  - 125 pilots required
  - + 25 auto-msn monitor pilots
  - + 0 to transit aircraft

**150 Total Pilots**

**64% Manpower Savings**

**MAC = 1 pilot can fly up to 4 a/c**
Modularity

Effective

B-52
- Standard Interfaces
- Variable / Tailorable armament set
- JFC Mission Flexibility
  - Conventional/nuclear
  - Stand-off strike, CAS

Affordable

PCs
- Standard interface/bus
- Swappable components
- Promotes vendor competition
- Drives down price, improves quality, allows for tailorability
- $399 PCs are reality

Flexible

C-130
- One platform/truck
- Supports multiple missions
- Swappable modules
AMC-X CONCEPT
CAPABILITIES STUDY

Multi-Mission Aircraft

Notional Examples

• Mobility
• Long Range Strike
• Air Refueler

Common Platforms
Common R&D

M-X
PSAS
KC-X
AMC-X

Common components, similar shape, and same production line

Enabling the “Global” in “Global Vigilance, Reach and Power!”

13
How do we get there?

- Methodology
  - Identified where we are today
  - Examined future scenarios and desired capabilities
  - From that future perspective identified actions to get there from today
  - Matched compelling requirements to UAS capabilities aligned with AF Core Functions
  - Identified and sequenced actions addressing not only materiel solutions, but also the doctrine, organization, training, facilities and policy
## AF UAS Flight Plan:
### Mission sets for UAS

<table>
<thead>
<tr>
<th><strong>Today</strong></th>
<th><strong>FY09</strong></th>
<th><strong>EA GAP</strong></th>
<th><strong>FY47</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NANO/MICRO</strong></td>
<td><strong>Current Capability Shortfalls</strong></td>
<td><strong>Indoor recon, indoor lethal/non-lethal, indoor comm, cyber attack, Swarming</strong></td>
<td><strong>Personal ISR, Lethal, SIGINT, Cyber/EW, Counter UAS, Auto-sentry</strong></td>
</tr>
<tr>
<td>WASP III</td>
<td><strong>Nano</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Small</strong></td>
<td><strong>NextGen – Multi-Mission</strong></td>
<td><strong>ISR, Comm Relay, Lethal/Non-lethal, Cyber/EW, SEAD, SIGINT, Low Altitude Pseudo-Sats</strong></td>
<td></td>
</tr>
<tr>
<td>Raven</td>
<td><strong>Tier II STUAS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scan Eagle</td>
<td><strong>Air-Launched SUAS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Medium</strong></td>
<td><strong>“fighter size”</strong></td>
<td><strong>Close-in ISR, Lethal, SIGINT/DF</strong></td>
<td><strong>Fighter Recap</strong></td>
</tr>
<tr>
<td>MQ-1B</td>
<td></td>
<td><strong>ISR, Comm Relay, Lethal, SIGINT</strong></td>
<td></td>
</tr>
<tr>
<td>MQ-9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Large</strong></td>
<td><strong>“tanker size”</strong></td>
<td><strong>Counterair, Missile Defense</strong></td>
<td></td>
</tr>
<tr>
<td>EO/IR/SAR</td>
<td><strong>ISR, Comm Relay, Lethal, SIGINT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RQ-4 Blk 10/20</td>
<td><strong>MP-RTIP</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RQ-4 Blk 30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>+ASIP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Special UAS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RQ-4 Blk 40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Integrity - Service - Excellence</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SUAS “Family of Systems”

Nano
- Navigate / communicate inside buildings

Micro
- Close-in reconnaissance & situational awareness

Man-portable
- ISR
- Time-Sensitive
- Lethal

Air-Launched
- Close-in ISR
- Lethal
- SIGINT/DF

Multi-Mission
- ISR
- Force protection
- FID

Irregular Warfare
- Increasing across all mission sets

Raven B
- ISR
- Lethal
- SIGINT
- Cyber/ EW
- Counter-UAV
- AutoSentries

Switchblade SUAS
- ISR
- Time-Sensitive
- Lethal
- Counter Air
- Precision Clandestine Resupply
- Cyber attack

Anti-Access Support

Tier II Joint
- ISR
- Comm Relay
- Lethal
- SIGINT

Scan Eagle
- ISR
- Lethal
- SIGINT

Wasp III

Bio-Mechanicals
- Indoor Reconnaissance
- Indoor Lethal/Non-lethal
- Indoor Comm
- Cyber attack
- Swarming

“SUAS Family of Transformers”
- Personal ISR
- Lethal
- SIGINT
- Cyber/ EW
- Counter-UAV
- AutoSentries

Lie Machine’s Conceptual SUAS

Family of Expendables
- Close-In ISR
- Expendable Jammers
- Lethal
- Counter Air
- Precision Clandestine Resupply
- Cyber attack

Next Gen Multi-Mission
- ISR
- Communications Relay
- Lethal / Non-lethal
- Electronic/Cyber Attack/SEAD
- SIGINT/Low Altitude Pseudo-Sats
- = New Mission areas

Now

Future

Integrity - Service - Excellence
Connectivity and Teaming

Future

MQ-LE
Collection/Info Ops
Connectivity

MQ-L
Collection/Info Ops
(AWACS/JSTARS)

MQ-Hyper Sonic
Strategic Attack/Prompt Global Strike

B-2/MQ-L Teaming
Strategic Attack/
CAS/Air Interdiction
Kinetic & Non-kinetic Wpns

MQ-Ls
EW/Collection/Info Ops
CAS/Air Interdiction/Airlift

MQ-L – JSF/MQ-X
Aerial Refueling/
Connectivity

F-22/MQ-X Teaming
Counterair/Missile Defense
Kinetic & Non-kinetic Wpns

JSF/Multi Msn MQ-X Teaming
Air Interdiction, CAS --
Kinetic & Non-kinetic Wpns

Multi Msn MQ-L/X, SUAS - FOS Teaming
ISR/EW/SEAD – Kinetic & Non-kinetic Wpns

NAT’L (JCS, NSA, NGA, DIA, etc.)

JTF HQ, CAOC MCEs, DCGS

SOF, ALO, TAC-P

Integrity - Service - Excellence
Action Synchronization

Doctrine
- Near-term FY09-10: CCDR allocation
- Mid-term FY10-15: J2/J3
- Long-term FY15-25: Autonomous Fight

Organization
- Near-term FY09-10: SUAS Sqn
- Mid-term FY10-15: MAC Ops Sqn, MAC Logistics Sqn
- Long-term FY15-25: Auto Tgt Engage

Training
- Near-term FY09-10: UAS Beta Test
- Mid-term FY10-15: 100% Sim Training, Common GCS
- Long-term FY15-25: Auto Flight

Materiel
- Near-term FY09-10: MAC, Auto T/O Land, ECSS
- Mid-term FY10-15: UAS AFSC, UAS EA, CBM+
- Long-term FY15-25: Autonomous Fight

Leadership
- Near-term FY09-10: CC’s, SAF/PA Outreach, PME
- Mid-term FY10-15: Career Pyramids
- Long-term FY15-25: Command of Autonomy

Personnel
- Near-term FY09-10: Rated? SUAS Operator, UAS LNOs
- Mid-term FY10-15: Recruiting Focus, Teaming w/ Schools

Facilities
- Near-term FY09-10: C2 Facility, CFACC Facility
- Mid-term FY10-15: Auto MX Facilities

Policy
- Near-term FY09-10: NAS, ILAs, Acq Excellence, MAC-in-NAS
- Mid-term FY10-15: Treaties, Autonomy
- Long-term FY15-25: Auto Tgt Engage

Integrity - Service - Excellence
AF UAS Flight Plan Vision

- An Air Force where unmanned aircraft systems are considered as viable alternatives to traditionally manned platforms

- An Air Force that harnesses increasingly automated, modular and sustainable systems resulting in a leaner, more adaptable, tailorable, and efficient force that maximizes combat capabilities to the Joint Force

- An Air Force that teams with the other Services, our allies, academia and industry to capitalize on the unique unmanned aircraft attributes of persistence, connectivity, flexibility, autonomy, and efficiency
BACK UPS
USAF UAS Vision: Definitions

**Theater-Capable UAS**
- Can operate across theater
- Long range UAS
- Can operate beyond line of sight
- Medium & High Altitude (MHA)

**Local-Effects UAS**
- Delivers local effects
- Short-range UAS
- Operates within line-of-sight

**Low-Altitude UAS**
- Operates in procedurally controlled airspace (below coordinating altitude)

Need Standardization & Unified Acquisition
Need Standardization
No Standardization or Acquisition Authority
USAF UAS Vision: Optimizing UAS Employment

- Theater-Capable UAS (low-density / high-demand resource)
  - Prioritized by Joint Force Commander (JFC)
  - Executed by JFC’s Joint Force Air Component Commander

- Local-Capable UAS (unlimited resource)
  - Prioritized by assigned unit commanders
  - Controlled by assigned unit commanders
  - If flown in controlled airspace must be integrated into theater airspace plan

Treating theater-capable UAS as local-effects assets sub-optimizes the resources and combat effects available to the Joint Force Commander

Integrity - Service - Excellence
USAF UAS Vision: Remote Split Operations

Total Force Operations
Active Duty, Reserve, National Guard, Special Operations, United Kingdom
6 - Stateside operations centers
5 - Launch and recovery units in theater

Global Operations Center – Creech AFB

Distributed Operations
Centrally Coordinated
Globally Applied

Over 1,000 personnel flying Combat Operations not in harms way; Projecting Power without Projecting Vulnerability
USAF UAS Vision:
Power of the Network
Distributed Common Ground System

Integrity - Service - Excellence
The Importance of CONOPs:
132 UAVs Supporting 4 Divisions

Remote Split-Ops Concept
= 34 CAPs

Organic Concept
= 12 CAPs
Shadow RSO Demonstration

Organic Assignment

- 30-40% of available Shadows employed...

Remote Split Ops (RSO)

- Line of Sight Link
- Iraq - Afghanistan

Up to 300% more capability by changing CONOPS

- CONUS
- Iraq - Afghanistan

- Air Force funded joint Army/AF demo for RSO Shadow ops conducted on 26 June 2008
- Shadow launched from China Lake, CA...controlled from Ft. Belvoir, VA...2500NM away
- Potential for RSO applied by Army to enable significant increase of FMV capability with fewer troops in the AOR
USAF UAS Vision:
Joint Airspace Control and Defense

Inability to rapidly ID & provide airspace clearance will result in failure to engage enemy forces...or fratricide

“So far we have been fortunate. What I worry about is the day I have a C-130 with a cargo load of soldiers, and a UAV comes right through the cockpit windshield.”

USCENTCOM CFACC
## USAF UAS Vision:
### Standardization & Single Acquisition Authority

**Standardization Delivers:**
- Integrated capability
- Joint training & certification standards
- Shared information
- Common architectures
- Elimination of equipment seams
- Uniform DoD requirement to industry, interagency, and allies

**Single Acquisition Authority:**
- Reduces duplication
- Ensures commonality of investment
- Agile response to urgent needs
- Improved logistics & life cycle
- Fields systems faster

<table>
<thead>
<tr>
<th>Air Force</th>
<th>Army</th>
<th>Navy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predator</td>
<td>Warrior</td>
<td>BAMS*</td>
</tr>
<tr>
<td>Global Hawk</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

We can’t afford multiple UAS program offices, independent training, logistics and maintenance operations, plus multiple support facilities and procurement contracts.
Perspectives on UAS Operators

- Exploring alternatives to operate UAS to meet: increased UAS demand; rated management challenges; and appropriate levels of responsibility
  
  - Current Beta Test for UAS Operators:
    -- Flight screening at Pueblo
    -- Instrument training at Randolph
    -- UAS fundamentals at Randolph
    -- Joint firepower course at Nellis
    -- FTU at Creech
  
  - 100 SUPT grads / yr
  
- FAA, ICAO, and DOD, regulatory and safety requirements same for UAVs as manned aircraft

- Level of responsibility should dictate level of qualification in combat

Increased Demand, Limited Rated Inventory, Current FAA/ICAO Regulations, and Training Commensurate With Implications of Employment—Require New Approach
Air Force ISR Surge

Integrity - Service - Excellence
Between 2001 and 2008 ISR Hours up 1,431%
AF ISR “Surge”
Predator Program of Record

Jun Action
- Delay UAS Weapons School
- Delay PDMII FTU Build
- Previously Qualified Ops Supervisors
- Ops Support Contractors
- ANG/AFRC Mobilized for 2d Year

Mar Action
- Continue assignment freeze
- 179 day TDY to 365 days

Jan Action
- Assignment Freeze
- Add’nl Mobilization

Sep Action
- Curtailed Test
- Mobilized ANG Crew Recall

Jul Action
- Extended Tours

POR Equipment Limit

06 POR - 12 CAPs 1QFY08
07 POR - 21 CAPs 1QFY08
Jul Surge - 21 CAPs 1QFY09
Sep Surge - 16 CAPs 1QFY08 / 21 CAPs 3QFY09
Jan Surge - 24 CAPs 3QFY08
Mar Surge - 25 CAPs 3QFY08
Jun Surge - 31 CAPs 1QFY09

Integrity - Service - Excellence
AF ISR “Surge”
Predator Program of Record

Jun Action
Delay UAS Weapons School
Delay PDMII FTU Build
Previously Qualified Ops Supervisors
Ops Support Contractors
ANG/AFRC Mobilized for 2d Year

Mar Action
Continue assignment freeze
179 day TDY to 365 days

Jan Action
Assignment Freeze
Add'nl Mobilization

Sep Action
Curtail Test
Mobilized ANG
Crew Recall

Jul Action
Extended Tours

35 MQ-1/9 CAPs in-place 6 Months before planned 21 MQ-1 CAPs of DoD program of record...Over 280% growth in 18 months...

Integrity - Service - Excellence
Way Ahead to Meet Increasing Demand

AF Shifting to all MQ-9 procurement:
- 600% more payload capability
- 250 knots vice 120 knots
- Adjusted FY 08 and FY 09 Supplementals from MQ-1 to MQ-9
- Will complete MQ-1 FY 08 and 09 procurement/shift to MQ-9 only in FY 10
- Developing/fielding a new Wide Area Airborne Surveillance (WAAS) sensor
- MQ-9 capable of carrying WAAS pod—MQ-1 not capable
  - Increases the effectiveness of individual CAPs by over 1,200% initially
  - Eventually increasing the effectiveness to over 6,000% from where we are today with the Predator MQ-1

MQ-9, with nearly twice the performance of the MQ-1 and nearly 10 times the external payload—matched up with Wide Area Airborne Surveillance system, will deliver 13 to eventually 60 times more capability than MQ-1 series UAS
Increasing Capabilities
Wide Area Airborne Surveillance (WAAS)

MQ-9 advantages over MQ-1
- 2 x faster – more responsive
- 2 x higher – broader coverage
- 6 x payload (versatile: sensor, weapons)

4x4 km coverage area
- 12 independent ROVER/OSRVT

8x8 km coverage area
- As many as 30 ROVER queries and potentially 65 clips to the Tactical Operations Center

1st four wide area sensors

Next six wide area sensors

Potentially 65 clips to the Tactical Operations Center

Today

IOC 2nd Qtr FY10

4th Qtr FY11

*Autonomous Real-time Ground Ubiquitous Surveillance - Imaging System (ARGUS-IS)
Potential Growth of Video Effect
(Result of MQ-1 to MQ-9 Shift w/WAAS)

Motion Imagery Spots

- WAAS Increment One
  - 13 spots per MQ-9
- WAAS Increment Two
  - 65 spots per MQ-9

FY08 FY09 FY10 FY11 FY12 FY13 FY14 FY15 FY16
34 CAPs 39 CAPs 49 CAPs 50 CAPs

MQ-9 only "spot" numbers with WAAS
MQ-1 and MQ-9 FMV "spot" numbers w/o WAAS

Integrity - Service - Excellence
USAF UAS Vision: Joint Employment

- Organizing air ops by individual service components creates seams.

- So Joint Doctrine established a joint functional component for air operations: to integrate airspace, air defense, and effects from the air in accordance with the Joint Force Commander’s priorities.

- TODAY:
  “We are confusing the joint battlespace doctrine. Air Component Commanders should coordinate all UAVs based on Combatant Commander situational war-fighting directives.”

  “Primary control of these assets should be exercised by centralized Joint Air Component command and control.”

General Barry R. McCaffrey, USA (Ret)

JFACC-Controlled Airspace
Service Distinctions
Air Force: blue/left  Army: green/right

C2 / Employment

Weapons Used in Combat to Date

*20 Hellfire shot in test

2 Viper Strike, 2 Hellfire
(55 lb)  (105 lb)

Composition of Inventory

USAF Med/Lg UAS: 158
Army Med UAS: 42

Small UAS: 3992
Medium UAS: 42

Predator: 118
Reaper: 27
Global Hawk: 13

Hunter: 20
I-GNAT: 3
Warrior A: 15
Sky Warrior: 4

Raven: 3756
Shadow: 236

Army Med UAS 20%
USAF 80% Med/Lg UAS
Wide Area vs. Standard Coverage

Predator “Soda straw” coverage area

WAAS Coverage Area
USAF UAS Vision: Continued UAS CAP Growth

- Sep 11 – 53 CAPs
  (31 MQ-1, 19 MQ-9, 3 RQ-4)
- Sep 10 – 44 CAPs
  (31 MQ-1, 12 MQ-9, 1 RQ-4)
- Nov 09 – 39 CAPs
  (31 MQ-1, 7 MQ-9, 1 RQ-4)
- Today – 35 CAPs
  (31 MQ-1, 3 MQ-9, 1 RQ-4)
- Dec 08 – 34 CAPs
  (31 MQ-1, 2 MQ-9, 1 RQ-4)

- 1st 250k hours
  (1995 – May 07)
- 2nd 250k hours
  (May 07 – Nov 08)
- 3rd 250k hours
  (Projected: Dec 08 – Dec 09)
Air, Space & Cyber Power are American Asymmetric Advantages

“Tanks And Armor Are Not a Big Deal...The Planes Are The Killers, I Can Handle Everything But The Jet Fighters”