Unmanned Systems Roadmap
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OUSD(AT&L)/PSA/Air Warfare

#07-S-2293

Cleared for Open Publication

UAS Planning Task Force

- Established October 2001 at the direction of Under Secretary of Defense for Acquisition, Technology and Logistics (USD(AT&L))
  - To address the need for an integrated Defense wide initiative for UAS planning and execution
  - Provides oversight on all DoD UA acquisition programs
  - Publications released
    - OSD UAS Roadmap (3 editions)
    - UAV Reliability Study
    - Airspace Integration Plan for Unmanned Aviation

Unmanned Systems Funding
(RDT&E, Procurement, O&M ($M))

UAS	**FY07**	**FY08**	**FY09**	**FY10**	**FY11**	**FY12**	**FY13**	**Total**
RDT&E	$760.8	$814.8	$1,246.7	$1,334.9	$1,181.8	$859.1	$839.5	$7,038
Procurement	$878.4	$1,370.3	$2,025.1	$2,010.5	$1,725.7	$1,750.8	$1,585.7	$11,346
O&M	$590.0	$382.9	$415.4	$479.5	$514.5	$558.2	$610.0	$3,551
								$21,935
UGS								
RDT&E	$198.2	$215.4	$199.8	$167.5	$129.3	$58.5	$20.0	$989
Procurement	$106.5	$39.3	$29.7	$18.3	$17.9	$156.3	$481.5	$849
O&M	$156.0	$5.7	$8.8	$10.3	$11.0	$12.1	$12.7	$217
								$2,055
UMS								
RDT&E	$41.5	$27.7	$44.2	$50.9	$59.6	$68.0	$97.5	$389
Procurement	$0.0	$0.0	$27.6	$28.1	$72.7	$52.8	$51.4	$233
O&M	$0.0	$0.0	$0.0	$0.0	$0.4	$2.1	$3.2	$6
								$628
TOTALS								
RDT&E	$1,000.6	$1,057.9	$1,490.7	$1,553.3	$1,370.7	$985.7	$957.0	$8,416
Procurement	$984.9	$1,409.5	$2,082.4	$2,056.9	$1,816.4	$1,959.9	$2,118.6	$12,429
O&M	$746.1	$388.6	$424.2	$489.8	$525.9	$572.4	$625.9	$3,773
Grand Total	$2,731.5	$2,856.0	$3,997.3	$4,099.9	$3,712.9	$3,518.0	$3,701.5	$24,617.1

UAS Funding
(RDT&E and Procurement)

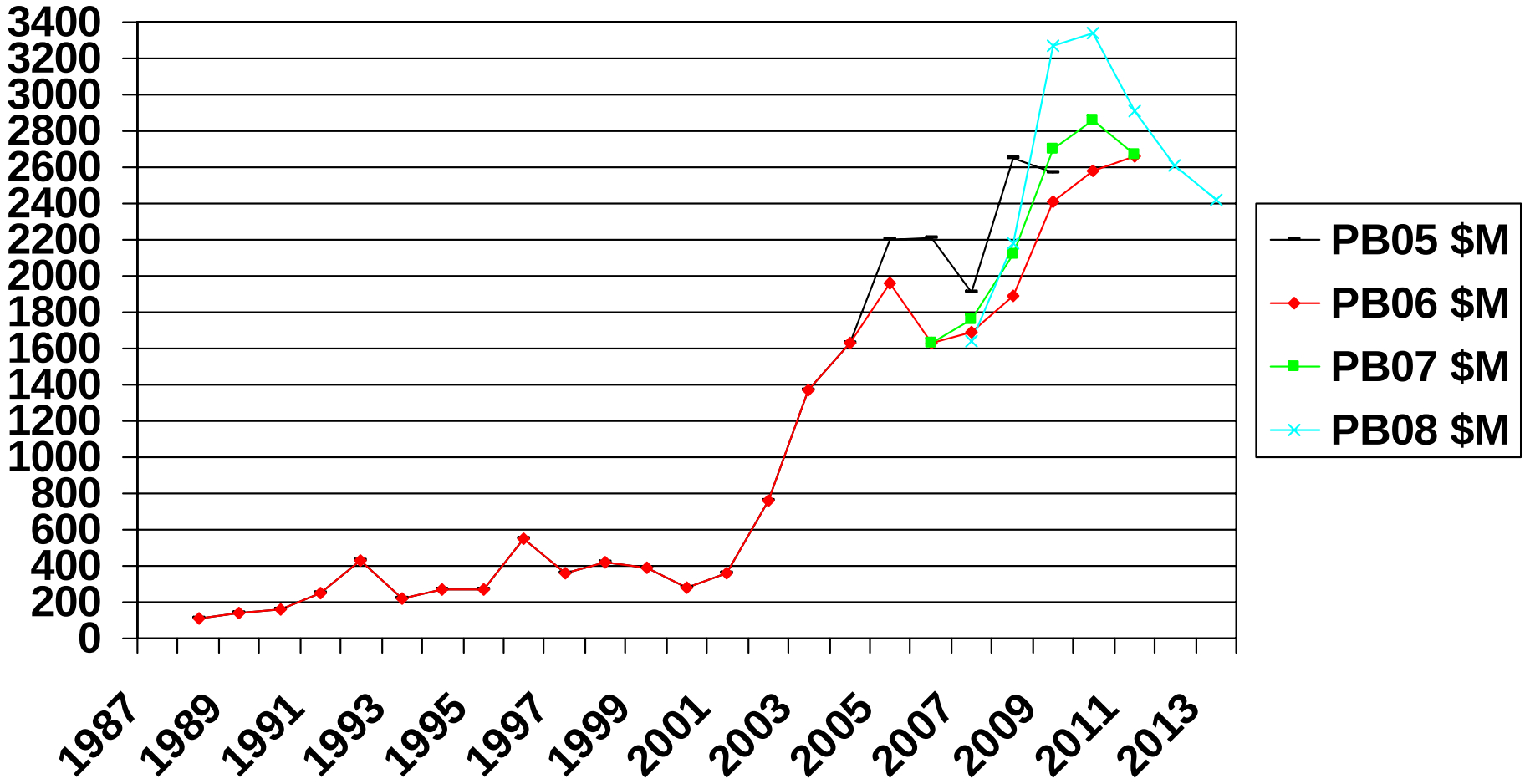

Chart does not include supplement funding

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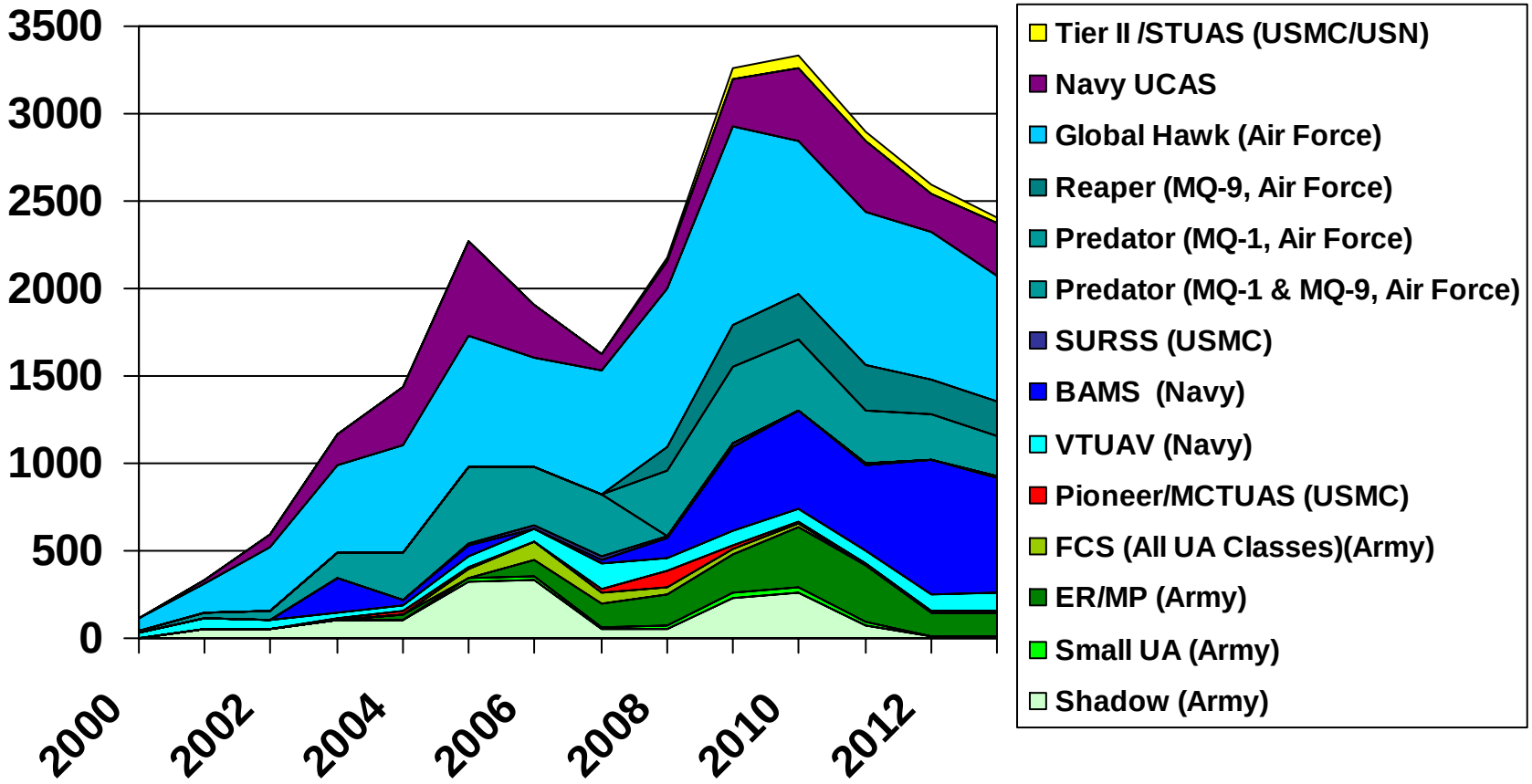
PB08 UAS Funding By Program



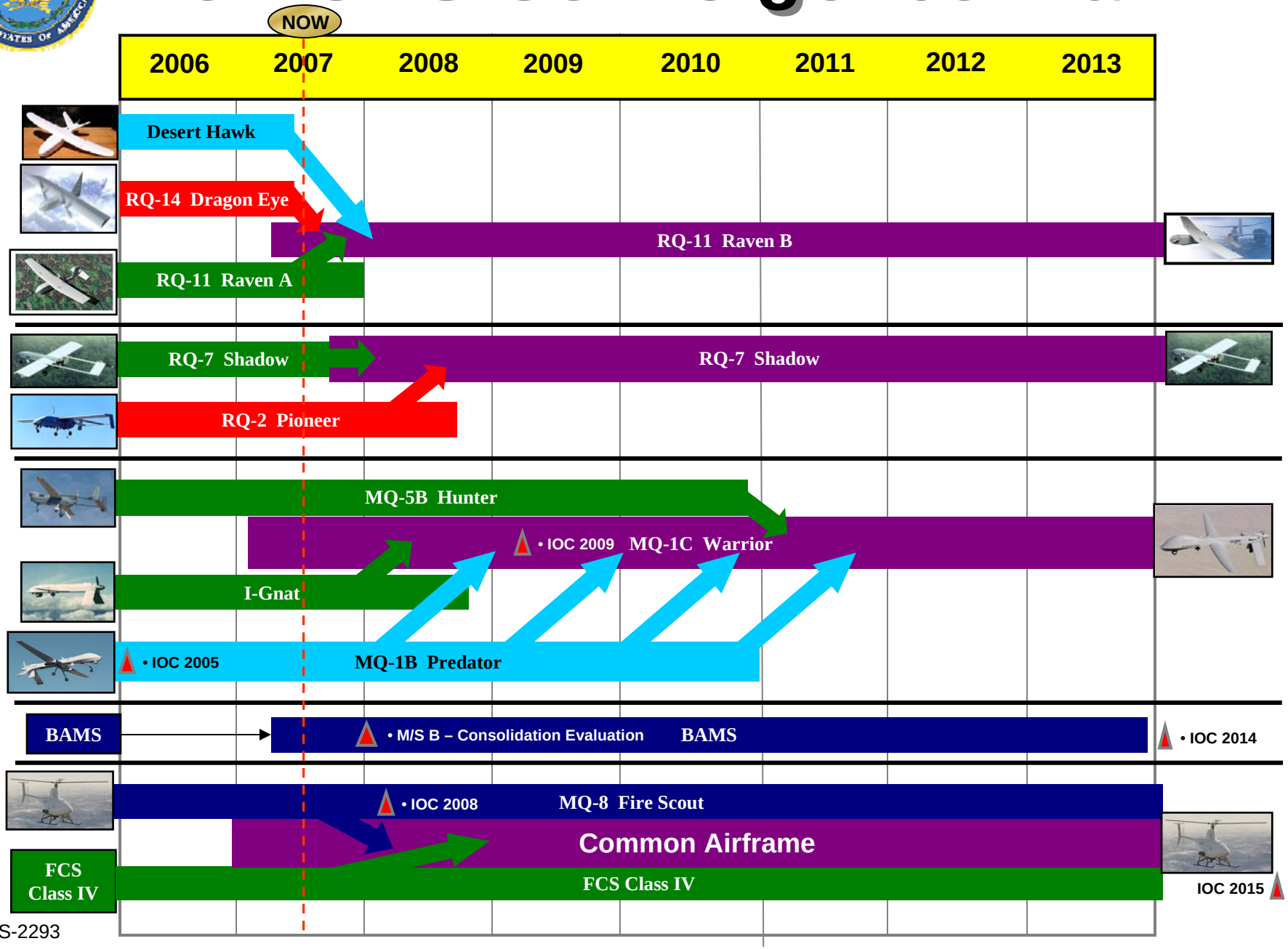
Change in Number of UA (2002 - 2007)

UAS	# of UAS		Change in # (2002 - 2007)
	2002	2007	
Theater & Tactical (> 10 lbs)			
Buster		20	**20**
Pioneer	34	33	**-1**
Shadow 200	24	220	**196**
Neptune		15	**15**
Tern		15	**15**
Mako		14	**14**
Tigershark		9	**9**
SnowGoose		28	**28**
Hunter	41	54	**13**
I-Gnat		9	**9**
Predator	22	90	**68**
Predator B		8	**8**
Global Hawk - ACTD	6	4	**-2**
Global Hawk - Production		7	**7**
GHMD	0	2	**2**
Sub-Total	**127**	**528**	**401**

UAS	# of UAS		Change in # (2002 - 2007)
	2002	2007	
Small (< 10 lbs)			
Aqua Puma		18	**18**
Raven A & B		2469	**2469**
Dragon Eye	40	705	**665**
Desert Hawk		96	**96**
MAV (ACTD)		25	**25**
Swift		124	**124**
Sub-Total	**40**	**3437**	**3397**
Grand Total	**167**	**3965**	**3798**

Note: Small unmanned aircraft systems (SUAS), those weighing less than 10 lbs and being capable of being hand-launched, have been included. The greatest increase in numbers of aircraft is due to SUAS. SUAS are listed separately. Numbers listed are for aircraft, not systems. Systems are composed of varying numbers of aircraft.

DoD UAS Convergence Plan



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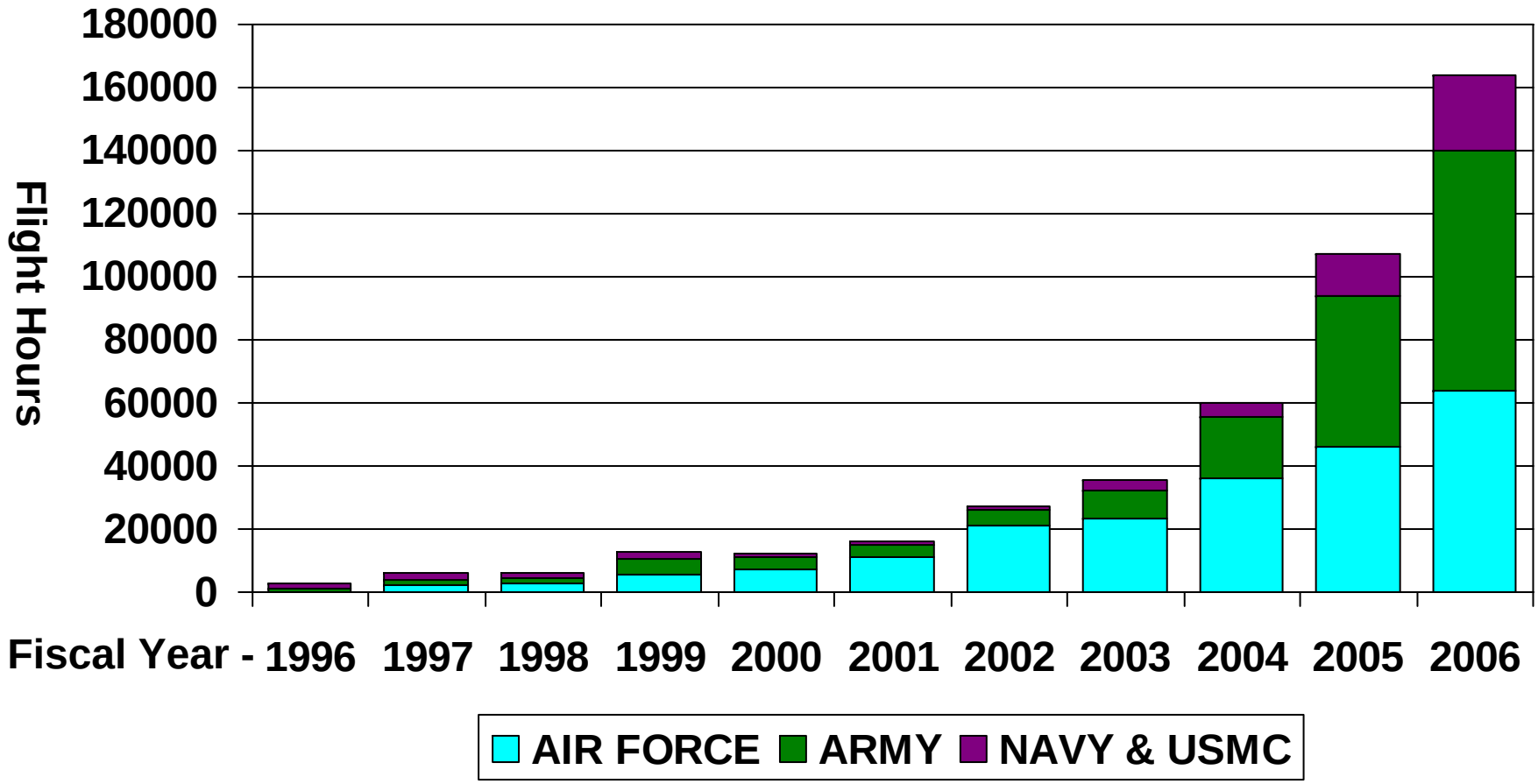
DoD UAS Flight Hours

(Does not include Small UAS)



Unmanned Systems Roadmap

- The Unmanned Systems Roadmap spans 2007-2032 and covers Unmanned Aircraft Systems, Unmanned Ground Systems, and Unmanned Maritime Systems.
- Combines existing information from the Office of Secretary of Defense Unmanned Aircraft Systems (UAS) Roadmap (2005-2030), the 2005 Joint Ground Robotics Master Plan, and the 2004 Unmanned Underwater Vehicle Roadmap.
- The long term plan is to publish a truly integrated *Unmanned Systems Roadmap* in 2009 that will focus on all Service systems, air, ground, and sea; their interoperability and how to achieve our future vision.

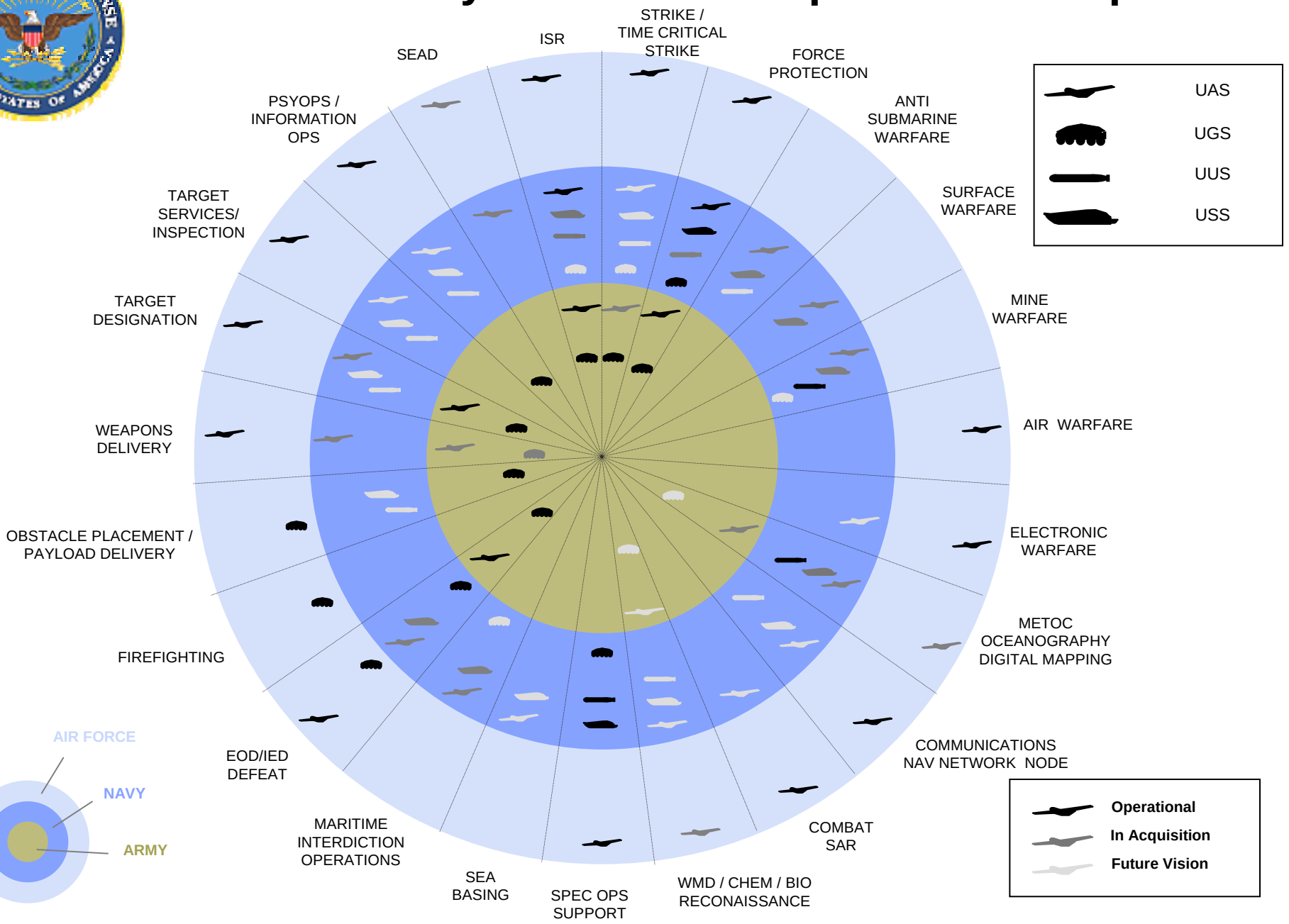
- Planned publish date – 31 Aug 07

OSD Application

- The Unmanned Systems Roadmap is *guidance* for the systematic migration of mission capabilities to Unmanned Systems while addressing the most urgent COCOM mission needs that are supported both technologically and operationally

- The Unmanned Systems Roadmap will *not be a* budgetary document and will *not direct* funding of Unmanned Systems nor related technology
  - But it *is* the document we will use to evaluate how well the services and components have implemented the OSD Unmanned Systems vision …

Unmanned Systems Roadmap Mission Graphic



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Top 7 Aircraft Systems Mission Areas

Mission	Unmanned Aircraft Class			
	Small	Tactical	Theater	Combat
1 - Reconnaissance	1	1	1	1
2 - Precision Target Location and Designation	2	2	2	2
3 - Signals Intel	7	3	3	4
4 - Battle Management	3	4	5	6
5 - Communications/Data Relay	8	6	4	7
6 - Chem/Bio Reconnaissance	5	5	9	8
7 - Combat SAR	4	7	8	9

(Prioritized by mission area across unmanned aircraft class)

Office of the Secretary of Defense
Unmanned Systems Roadmap, 2007-2032

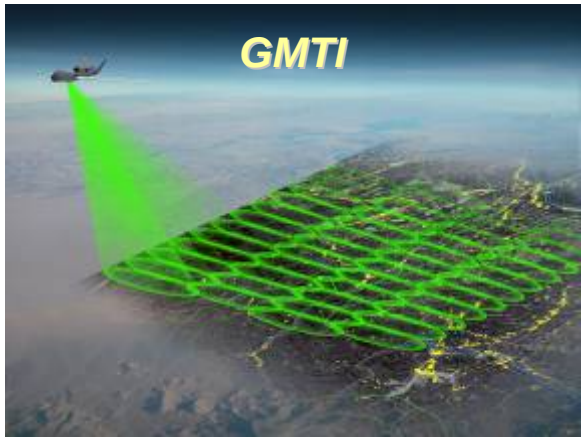
Format

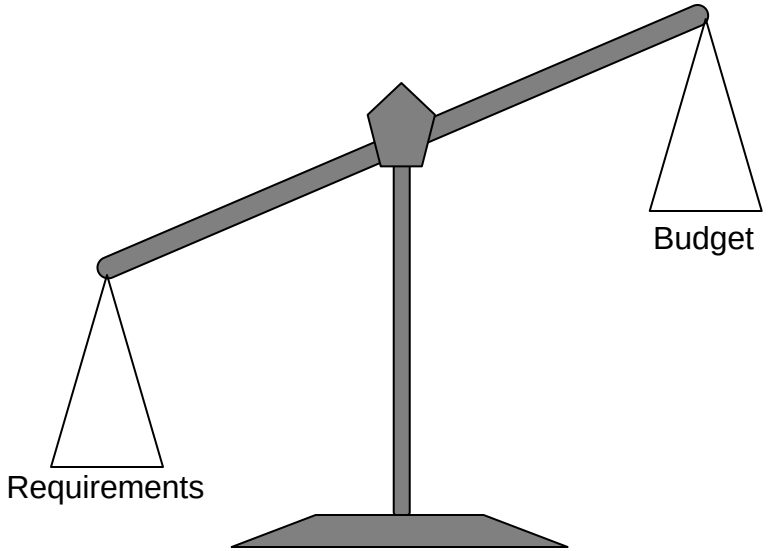
- **Executive Summary**
- **Chapter 1 – Introduction**
- **Chapter 2 – Strategic Planning and Policy**
- **Chapter 3 – Interoperability and Standards**
- **Chapter 4 – COCOM Mission and Capability Needs**
- **Chapter 5 – Organizational Efforts**
- **Chapter 6 – Technologies for Unmanned Systems**
- **Chapter 7 – International Cooperation**

- **Annex A – Unmanned Aircraft Systems**
- **Annex B – Unmanned Ground Systems**
- **Annex C – Unmanned Maritime Systems**
- **Annex D – Unmanned Systems POCs**
- **Annex E – Mission Area Definitions**

Different COCOM Needs

1. CENTCOM – FMV/ SIGINT
2. PACOM - MMTI
3. SOUTHCOM – FOPEN

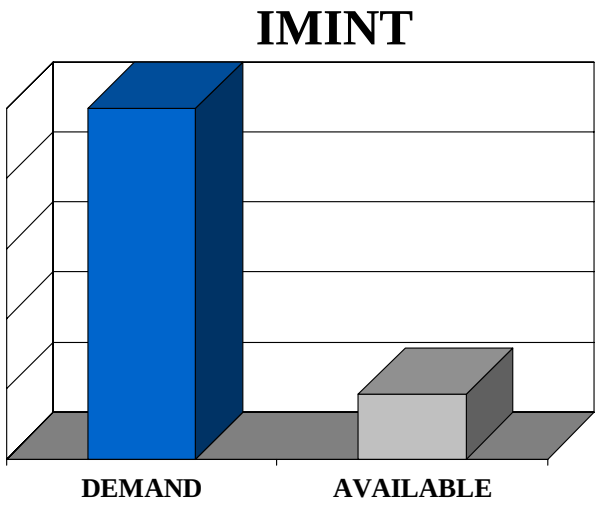


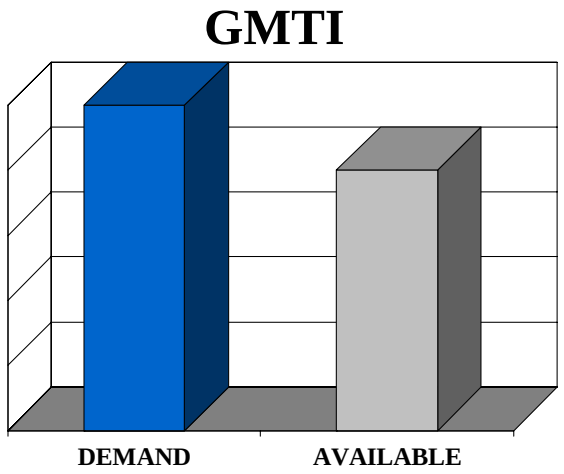


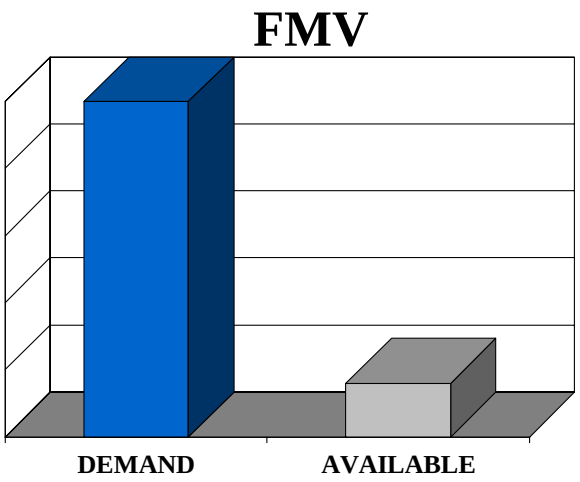
FOPEN Test Bed

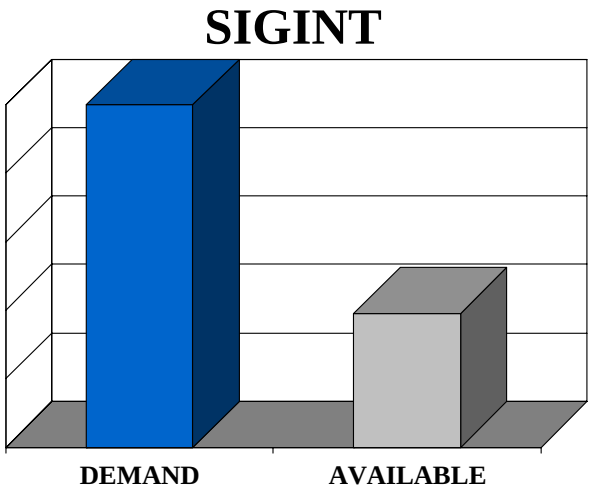
Prioritization differs tremendously between theaters

Global ISR Demand & Supply









UAS Reconnaissance

Full Motion Video (FMV)

- MQ-1B Predator
- RQ-2 Pioneer
- RQ-5 Hunter
- RQ-7 Shadow
- MQ-9 Reaper
- RQ-11 Raven B
- I-GNAT/ Warrior A

UAS Precision Targeting

Metric Sensor

- **MQ - 1B/ MQ – 1C/ MQ-9**
  - **Improved coordinates directly from MTS FMV at the aim point (cross-hair)**
  - **MTS FMV can be directly input to Gridlock, providing improved coordinates for multiple pixels on frame within seconds**
  - **Provides improved coordinates instantaneously for all pixels (precision view)**

Target Location Accuracy Improvement Stages

Mine Detection

Coherent Change Detection (CCD)

- **RQ – 4 Global Hawk is working on solution**

Infrared Surveillance Imagery

- **MQ – 1 Predator**
- **RQ-2 Pioneer**
- **RQ – 4 Global Hawk**
- **RQ-5 Hunter**
- **RQ-7 Shadow**
- **MQ-9 Reaper**
- **RQ-11 Raven B**
- **I-GNAT/ Warrior A**

Signals Intelligence (SIGINT)

Airborne Signals Intelligence Program (ASIP)

- **RQ – 4 Global Hawk Block 30 (FY-12)**

Tactical SIGINT Program (TSP)

- **MQ – 5B Hunter**
  - **Capability was demonstrated**
- **MQ – 8 Fire Scout**

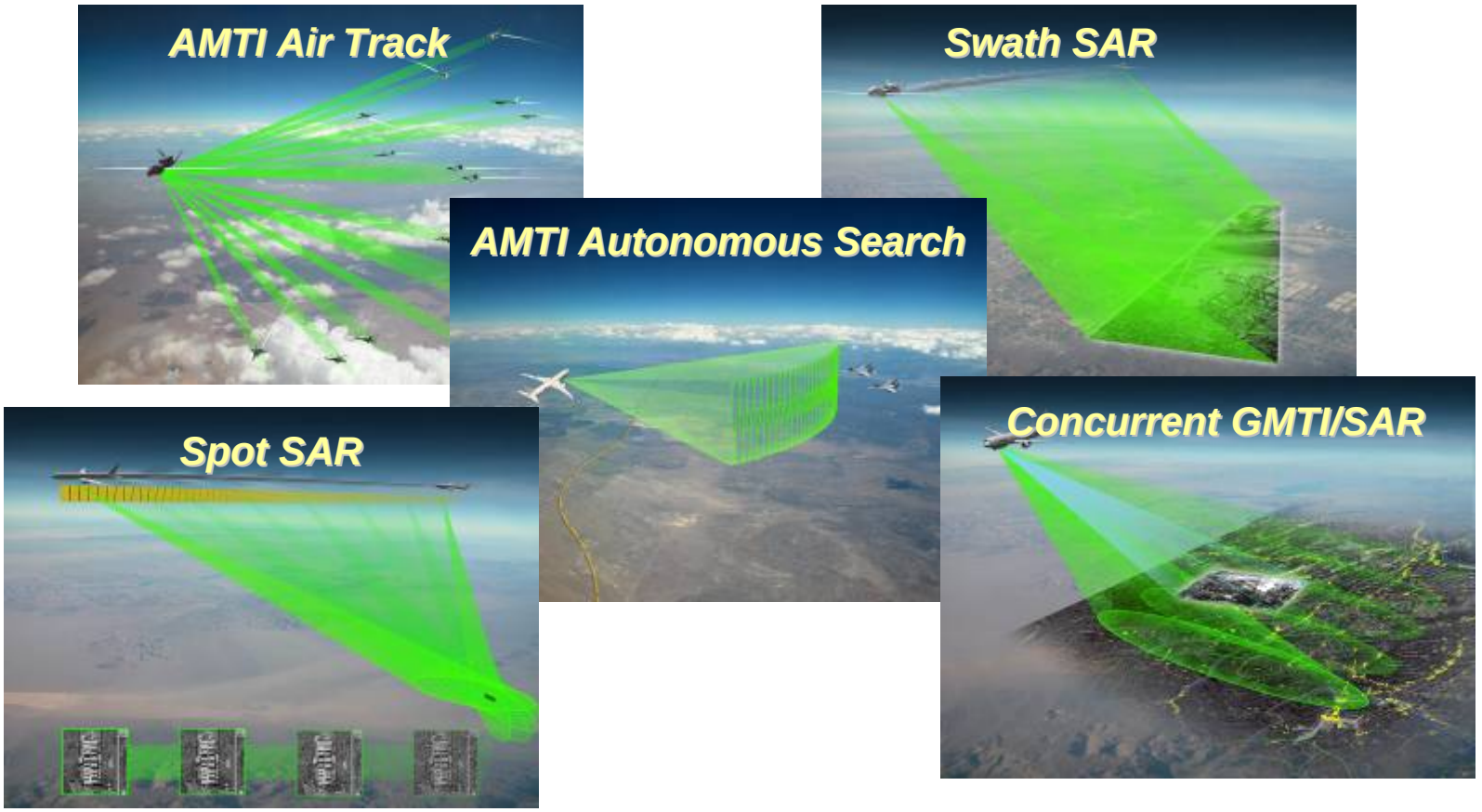
SIGINT solutions being evaluated for fielding

- **MQ – 1B Predator**
- **MQ – 1C Warrior**
- **MQ – 9 Reaper**

Battle Management

Multi Platform – Radar Technology Insertion Program

- **Global Hawk Block 40**



Future Look

- **Communications Relay Packages**
  - **Unmanned and manned platforms**
- **See/Track Laser Spots/designators**
- **Simultaneous spotlight and wide area surveillance (currently one or the other)**
- **Ability to employ multiple EO/IR/RF sensors simultaneously**
- **Ability to employ range of weapons**
  - **UAS cueing of other platforms weapons**


Questions?