Unmanned Systems

-S-1248

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DoD Unmanned Systems

Vision: Seamless integration of diverse unmanned capabilities that provide flexible options for Joint Warfighters while exploiting the inherent advantages of unmanned technologies, including persistence, size, speed, maneuverability, cost, and reduced risk to human life. DoD envisions unmanned systems seamlessly operating with manned systems while gradually reducing the degree of human control and decision making required for the unmanned portion of the force structure.

DoD Unmanned Systems Focus Area

Challenge and Focus Areas

- Accelerated Acquisition
- Interoperability
- Cost Reduction
- Autonomy
- Secure Networks
- Human Machine Collaboration

- Operational Realities
  - Near-Peer competitor
  - Global terrorism threat
  - Cyber security threats
  - Readiness and maintenance of systems
  - Availability of commercial systems

- Real Challenges Ahead
  - Maintain and protect critical capabilities
    - Availability of systems and components
    - Reduced cost of ownership
  - Anti Access/Area Denial
  - Rapid development, prototyping, and experimentation of technology

Acquisition Challenges

- Need for Agility in the DoD Acquisition Process
  - Adversaries' access to technology
  - Rapid change in technology
  - Novel life cycle, maintenance, disposal challenges
  - Ability to leverage innovation
  - Utilize Defense Innovation Unit Experimental (DIUx), Other Transaction Agreements (OTAs)

- Programs Must Be Efficient and Affordable
  - Accelerated Acquisition strategies will be utilized to meet Cost, Schedule, and Performance needs while applying a assistance through the oversight process
  - Maintain a robust program of technological development to be on the leading edge of innovation

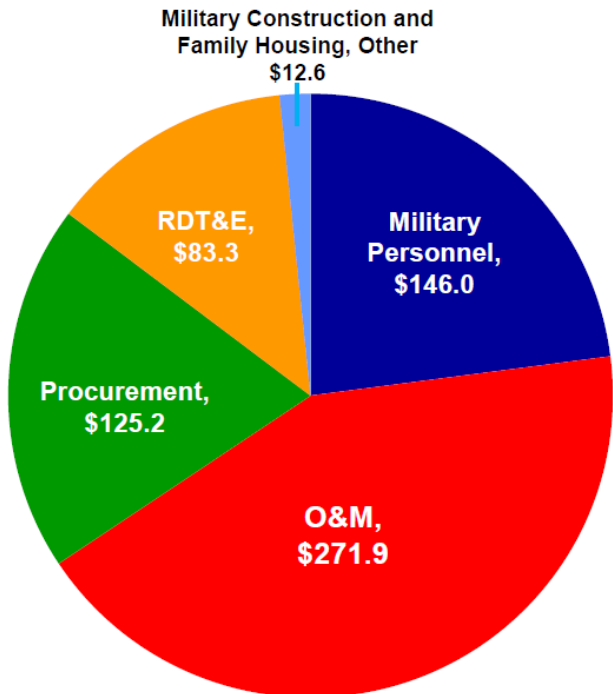- Premium on Interoperability, Data Rights
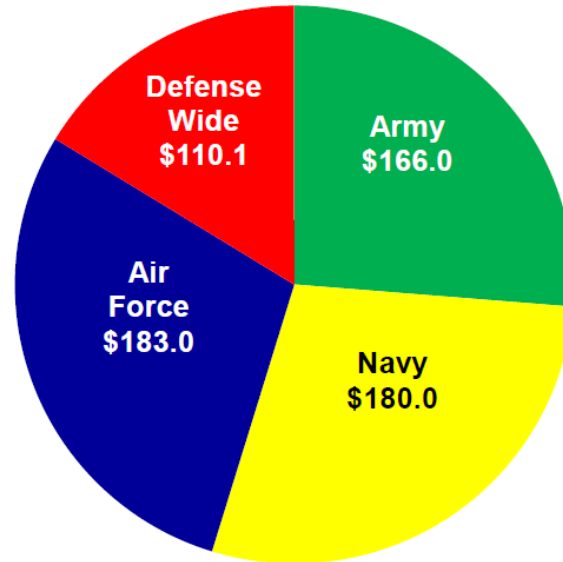
DoD FY18 Defense Budget

FY 2018 Total Base and OCO Funding

By Appropriation Title

- Military Construction and Family Housing, Other $12.6
- Military Personnel, $146.0
- RDT&E, $83.3
- Procurement, $125.2
- O&M, $271.9

By Military Department

- Defense Wide $110.1
- Army $166.0
- Air Force $183.0
- Navy $180.0

FY 2018 Request: $639.1 billion

Numbers may not add due to rounding

Focus on Technology Innovation

Funds science and technology innovation ($13.2 billion)
- Supports DoD, academic, and industry partnerships
  - Army Research Lab Collaborative Research Alliances ($58.7 million)
  - Defense Innovation Unit-Experiment (DIUx) ($54 million)
  - Pilot program with In-Q-Tel ($60 million)

Examples of technology initiatives
- Alternative navigation technologies (e.g., Assured Positioning Navigation, and Timing (Army), Atomic Clocks with Enhanced Stability (ACES) (DARPA))
- Electromagnetic spectrum technologies (e.g., Electromagnetic Maneuver & Control Capability (Navy))
- Low-cost unmanned systems (e.g., Low Cost Unmanned Air Systems Swarming Technology (LOCUST) (Navy), Perdix(Strategic Capabilities Office))
- Investment across DoD to counter illicit Unmanned Aerial Systems (UAS) and other multi-domain unmanned or autonomous threats

Interoperability

- Challenges:
  - Vendor-proprietary solutions, "closed" systems utilizing proprietary interfaces, increase life-cycle costs, and impede technology insertion
    - Difficult to upgrade and enhance capability
    - Unable to leverage small business R&D
  - Government technical data package access
  - Interoperability will force a capability reduction

- Progress:
  - SAE AS-4 UAS Common Segment (SAE 3.4 Published Feb 2017)
  - Joint Autonomous Unmanned System Architecture
  - Open Architecture - Interoperability Profiles (IOP)
  - FACE – Future Airborne Capability Environment – NATO multi-domain alignment

- Way Forward:
  - Migration of current and developing systems to OA
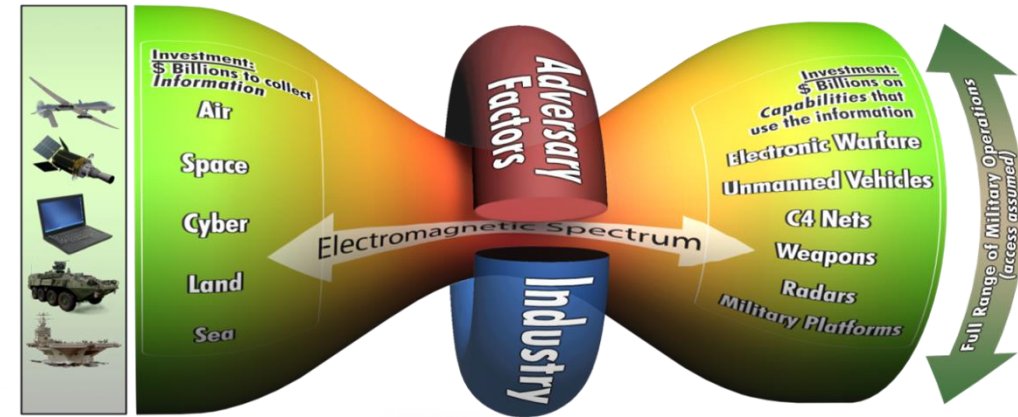 - Collaboration among Government, industry, and academia to develop standards

2017	NEAR-TERM	MID-TERM	FAR-TERM 2042
Common/Open Architectures	-Standardized C2 & Reference Architectures	-Support Seamless, Agile, Autonomous Human-Machine Collaboration	
Modularity & Parts Interchangeability	-Retrofit Existing Systems -Plan Modularity into New Systems	-Rapid Upgrades and Configuration Changes	
Compliance/ Verification & Validation	-New TEVV Approach -New V&V Tools & Techniques	-Highly Complex Autonomous Systems TEVV	
Data Rights	-Secure Needed Data Rights -Evolve Data Rights Policy	-Maximum Mission Support Flexibility	

Secure Network

- Challenges:
  - Emerging Cyber threats
  - Worldwide competition for a finite spectrum
  - Operating in anti-access/area denial (A2/AD) environment
  - Certified data at rest encryption devices
  - Information Assurance
- Progress:
  - CDL & ISR Data Link Standard
  - 2017 DoD Electronic Warfare Strategy
  - Joint Communications Architecture for Unmanned Systems (JCAUS)

- Way Forward:
  - Continue to collaborate with Government partners, industry and academia to balance improved interoperability, increased agility, and integrated security.

	2017 NEAR-TERM	MID-TERM	2042 FAR-TERM
Cyber	-Defense in Depth -Vulnerability Assessment	-Transition to Cyberattack Resilience -Autonomous Cyber Defense	
Information Assurance	-Private Sector Collaboration	-Develop & Evolve IA Policies, Procedures, Techniques -Suite of IA Products/Technologies for Unmanned Systems	
Spectrum/ Electronic Warfare		-More Efficient, Flexible, Adaptable, Agile Spectrum for Sustained Operations -Hardened Robust Electronic Protection	

Human Machine Collaboration

- ## Challenges:
  - Commercial technology is being developed at an accelerated rate
  - Ability to interact with environment, networks, and humans in congested environments.
  - Establish Warfighter trust
  - Computing and Network resources

- ## Progress:
  - Robotics Collaborative Technology Alliance
  - Defense Innovation Unit Experimental

- ## Way Forward:
  - Policy
  - New V&V methods
  - CONOPS & TTPs

	2017 NEAR-TERM	MID-TERM	2042 FAR-TERM
Human-Machine Integration	-Control Multiple Systems -Human-Machine Roles/Cues	-Human-Machine Dialog -"What-If" Scenario Processing -Task Sharing Mission Mgmt	-Infer Human Intent -Deep-Learning Machines
Human-Machine Teaming	-Load Lightening -Reduce Sorties -Certain Maintenance Tasks	-Fully Integrated Robot Teammates -Reduce Warfighter Cognitive Load	
Data Strategies	-Automatically Collect & Process Data -Adjust Data Strategies Autonomously	-Deep Neural Networks -Agile, Responsive, Adaptive	

- Systems must be modular with open architecture to provide flexibility, agility, and reduced costs.

- The fiscal and strategic environment challenge DoD and Industry to evolve acquisitions processes to meet future requirements

- Future unmanned systems programs must be efficient, affordable and be requirements driven

- The Department will continue to advocate unmanned systems and support technology to provide unmatched unmanned capabilities to the war fighter

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