

# Review of the Fiscal Year 2009 - 2034 Unmanned Systems Integrated Roadmap: Relevance to Hampton Roads

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## Background/Purpose

In today's military, unmanned systems are highly desired by combatant commanders (COCOMs) for their versatility and persistence. Hampton Roads is uniquely situated to be associated with unmanned systems development because of the co-location of unmanned systems applied engineering centers and operational testing activities of DoD and other federal organizations located in the region, including:

- U.S. Joint Forces Command (JFCOM)
- Navy Surface Warfare Center (NSWC), Dam Neck
- Army Aviation Applied Technology Directorate (AATD), Fort Eustis
- Navy Expeditionary Combat Command (NECC)
- Carderock Navy Combatant Craft Division (CCD) Detachment, Little Creek
- NASA Langley Research Center
- Coast Guard C2 Center

Investment and funding for unmanned systems research, development, and procurement is expected to remain robust into the foreseeable future. The funding chart below is from the unmanned systems roadmap:

PORs FY09PB (\$M)	Funding Source	FY09	FY10	FY11	FY12	FY13	TOTAL
UGV	RDT&E*	\$1291.2	\$747.5	\$136.2	\$108.7	\$68.9	\$2,353
	PROC*	\$33.4	\$42.3	\$53.5	\$59.5	\$21.1	\$210
	O&M*	\$2.9	\$3.9	\$3.0	\$12.8	\$10.1	\$33
UAS	RDT&E	\$1347.0	\$1305.1	\$1076.4	\$894.0	\$719.5	\$5,342
	PROC	\$1875.5	\$2006.1	\$1704.7	\$1734.3	\$1576.2	\$8,897
	O&M	\$154.3	\$251.7	\$249.0	\$274.9	\$320.2	\$1,250
UMS	RDT&E	\$57.3	\$73.8	\$63.2	\$70.1	\$76.9	\$341
	PROC	\$56.7	\$78.4	\$95.9	\$91.6	\$103.7	\$426
	O&M	\$5.0	\$4.5	\$11.3	\$13.5	\$13.9	\$48
<b>TOTAL</b>		<b>\$4,823</b>	<b>\$4,513</b>	<b>\$3,393</b>	<b>\$3,260</b>	<b>\$2,911</b>	<b>\$18,900</b>

\* RDT&E = Research, Development, Test, and Evaluation; PROC = Procurement; O&M = Operations and Maintenance

**Table 1. FY2009–13 President's Budget for Unmanned Systems**

The Unmanned Systems Integrated Roadmap represents the Department's first truly synchronized effort that increases the focus on unmanned systems, and through interoperability with manned systems, establishes a vision in support of our Warfighters. The Roadmap projects the types of missions that could be supported in the future by unmanned solutions, and the improvements in performance that can be expected as a result of investment into identified critical unmanned technologies. Its overarching goal is to focus military departments and defense agencies toward investments in unmanned systems and technologies that meet the prioritized capability needs of the Warfighter.

The Roadmap lays out a recommended unmanned systems vision across a 25-year period. It encompasses all three environmental domains: air, ground, and maritime. It captures those unmanned systems that are already funded through the 2009 President's Budget (PB09) and offers speculation as to what types of systems could be feasibly developed and employed outside the Future Years Defense Plan (FYDP) through 2034. It identifies the types of tasks that could be accomplished using unmanned systems within the Joint Capability Areas (JCAs) and highlights the multi-functional nature of such systems as appropriate. It represents a reasoned projection of how the Department might employ unmanned systems across a variety of mission areas, but it does not imply that decisions have been made to pursue such systems or that funding has been programmed against these projections.

*The vision for the DoD is that unmanned systems will provide flexible options across operating domains, enabling the Warfighter's execution of assigned missions. Unmanned systems will be integrated across domains and with manned systems, providing the Joint Force Commander (JFC) with unique and decisive capabilities.*

### **Relevant Aspects of Unmanned Systems Roadmap for Hampton Roads**

In its executive summary, the roadmap list Chemical, Biological, Radiological, Nuclear (CBRN) Reconnaissance as one of its four main focus areas. This is significant for Hampton Roads, in that with Congressional and Secretary of Defense support; HRMFFA and Robot Venture are working with the Virginia National Guard to establish a First Responders Training Center at Camp Pendleton to train teams in CBRN incidents using unmanned systems.

In addition to the focus areas, the Secretary of Defense has established 8 broad goals with regards to unmanned systems, most of which have implications for Hampton Roads military activities, regional research universities, and technology companies:

**Goal 1** – Improve the effectiveness of COCOM and partner nations through improved integration and Joint Services collaboration of unmanned systems.

- JFCOM has key responsibilities in joint services collaboration.

- NSWC, Dam Neck; AATD, Fort Eustis; CCD, Little Creek; and NASA Langley Research Center are all integrally involved in the fielding of their respective services unmanned systems. Their co-location in Hampton Roads makes the region a natural location for ongoing joint interoperability development of unmanned systems.
- NATO Allied Command Transformation in Norfolk is a venue for interactions with partner nations regarding unmanned systems.
- Gain further understanding of Coast Guard, NOAA, and Department of Homeland Security initiatives and facilitate cross-awareness with military activities in the region.

**Goal 2** – Support research and development activities to increase the level of automation in unmanned systems leading to appropriate levels of autonomy, as determined by the Warfighter for each platform.

- Members of the Hampton Roads Research Partnership, particularly the National Institute of Aerospace (NIA) and Old Dominion University, have research focus areas significant to unmanned systems integration.
- The Hampton Roads Technology Council is a consortium of technology companies that are increasingly turning to unmanned systems related research.
- The Navy’s Autonomous Maritime Navigation capability has a persistent spiral testing and evaluation effort in the region.
- NASA unmanned missions rely on cutting edge autonomous technologies which are a source for cross-domain application developments.

**Goal 3** – Expedite the transition of unmanned systems technologies from research and development activities into the hands of the Warfighter.

- NSWC, Dam Neck; AATD, Fort Eustis; NECC; and CCD, Little Creek are all actively involved in rapid prototyping of unmanned systems technologies and rapid fielding of breakthrough achievements.

**Goal 4** – Achieve greater interoperability among system controls, communications, data products, data links, and payloads/mission equipment packages on unmanned systems, including TPED (Tasking, Processing, Exploitation, and Dissemination).

- JFCOM; NSWC, Dam Neck; AATD, Fort Eustis; and CCD, Little Creek are all actively engaged in unmanned systems technical interoperability.
- Regional Universities and Hampton Roads Technology Council as a consortium of technology companies are increasingly turning to unmanned systems technical interoperability solution development

**Goal 5** – Foster the development and practice of policies, standards, and procedures that enable safe and effective operations between manned and unmanned systems.

- AATD, Fort Eustis is actively engaged with the Army’s program of the manned and unmanned teaming concept.

- NIA's Center for Autonomous Vehicle Interoperability and Advanced Research (CAVIAR) is pursuing a focus area for a portable test facility for safe vehicle interoperability.
- Fort Lee is actively involved in the Army's leader – follower manned/unmanned convoy concept.

**Goal 6** – Implement standardized and protected positive control measures for unmanned systems and their associated armament.

- AATD, Fort Eustis is actively engaged with the Army's program of positive control measures for unmanned aviation systems and their associated armament.
- JFCOM Test and Evaluation responsibilities include informing standards for joint systems including unmanned systems.

**Goal 7** – Ensure test capabilities support the fielding of unmanned systems that are effective, suitable, and survivable.

- NIA's CAVIAR is pursuing a focus area for a portable test capability for all aspects of unmanned systems.
- CCD, Little Creek and AATD, Fort Eustis are actively involved in testing capabilities of unmanned systems.

**Goal 8** – Enhance the current logistical support process for unmanned systems.

- JFCOM is a stakeholder in the development of common system components for unmanned systems which simplifies logistical support.

### **Possible Challenges**

- Clash of cultures/force structure issues.
- Inefficiencies created by duplicative activities for similar functions.
- Coordination across current activities/domains is not robust (often stakeholders unaware of other's efforts)/Parochialism.
- Pockets of advocacy/no broad spectrum of acceptance/no consistent top level advocacy (at Service Headquarters level).
- Trust of unmanned systems is still in infancy in ground and maritime domains. Stronger in air domain, but still difficult to fly in U.S. airspace (trust of military, as well as civilian populations).
- Industry lacks full understanding of DoD unmanned systems needs.
- Lack of stable and robust industrial base.
- Shortage of qualified engineers in pipeline to replace aging workforce.

## **Recommended Actions**

In reviewing the unmanned systems roadmap, there are two major areas that HRMFFA and Robot Venture can seek to further integrate unmanned systems activities in the region:

1. Continue actions that support joint interoperability, including:
  - a. Hosting informative meetings and forums that attract key personnel from the various military services, JFCOM, and other federal agencies that promote further shared awareness of unmanned systems activities in the region.
  - b. Facilitate ongoing interactions that promote further understanding amongst peers from the services which promotes problem solving for interoperability challenges.
  - c. Develop understanding on how the presence of the Navy's new Littoral Combat Ship in Norfolk will bring with it increased activities with unmanned underwater vehicles, unmanned surface vehicles, and unmanned air vehicles that will often interact with joint forces in the littoral environment.
  - d. Continue championing establishment of a DoD Technology Outreach Center for First Responders in the region at Camp Pendleton. Seek alignment of this effort with the JFCOM Small Unit Center of Excellence.
  - e. Facilitate, where possible, the recurrence of Naval Postgraduate School technology and experiments off of Fort Eustis which by its very nature promotes further understanding of unmanned systems relevant research efforts between the Navy and the Army.
  
2. Continue actions that further promote unmanned systems research in the Hampton Roads region:
  - a. Promote with military stakeholders the National Institute of Aerospace's Center for Autonomous Vehicle Interoperability and Advanced Research (CAVIAR) as a valuable research resource.
  - b. Provide further awareness to unmanned systems relevant researchers from Hampton Roads Research Partnership institutions on military needs by promoting academic and military stakeholder forums.
  - c. Increase public awareness campaigns on the nature of unmanned systems and the value of research to the region.
  - d. Continue to promote engineering centered STEM initiatives for K-12 programs to home grow the next generation of unmanned systems researchers for the region.
  - e. Seek to have the University Autonomous Surface Vehicle Competition to return to the Hampton Roads region.

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