**4. TITLE AND SUBTITLE**
Future Naval UCAV Applications & Enabling Technologies

**6. AUTHOR(S)**
Julieta E. Booz

**7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)**
Naval Air Warfare Center Aircraft Division
22347 Cedar Point Road, Unit #6
Patuxent River, Maryland 20670-1161

**12a. DISTRIBUTION/AVAILABILITY STATEMENT**
Approved for public release; distribution is unlimited.

**13. ABSTRACT**
(Maximum 200 words)
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Julieta E. Booz
NAVAIR UCAV ADPO, AD DEPUTY
(301) 342-8574

CLEARED FOR OPEN PUBLICATION
JUN 4 1998

PUBLIC AFFAIRS OFFICE
NAVAL AIR SYSTEMS COMMAND
**Why Should the Navy Invest In UCAVs?**

- Drawdown in its force structure & dollars available
- An affordable alternative in acquisition & O&S costs
- State-of-the-Art computing power and flight control algorithms have us on the brink of this capability
- Potential to revolutionize Naval approach to warfighting by opening the design space:
  - Unusual attitudes & orientation
  - Operational duration & missions
  - Reduce or eliminate maintenance & training req'ts
  - Sustain higher g-forces and onset rates
  - Apply innovative manufacturing concepts
  - Expanded basing options
NAVAL UNINHABITED COMBAT AIR VEHICLE

HIGH PERFORMANCE MANNED AIRCRAFT  UNINHABITED AIR VEHICLES

- Multi-Role Uninhabited Lethal Vehicle
- Shipboard Launch and Recovery
- Urban/Rough Field Operation
- Enhanced Affordability
- Minimum Maintenance
- Capability for Full Autonomy
- Integrated System, not just Air Vehicle

HIGH PRECISION WEAPONS
Ongoing Programs & Efforts

- Navy - ONR UCAV Initiative
  CNO SSG UAV/UCAV XVI & XVII
  OPNAV UAV Payloads IPT
  DON UAV Workshop

- Marine Corps - Draft MNS for Strike UAVs

- Air Force/DARPA - UCAV ATD
  Phase I contracts awarded in April
  Phase II will build & fly demo UCAV

- Air Force/France - Integrated Tactical A/C Control
  Devel & eval cooperative flight operations

- NASA - Sponsored design studies for UCAV concepts
  Follow-on efforts addressing hyper-agility

- England - Virtual UCAV designs for con-ops development

- TTCP - Workshop “UAV’s on the Battlefield 2015”
Utility Study

Purpose - Identify Potential Naval UCAV Missions

Basis - Joint Vision 2010 - Navy Unique, First Days of War

Missions Considered -

• SEAD
• Close Air Support
  • Mobile/Moving Targets
  • ASW
  • ISR
  • Halt Invasion
  • No-Fly Zone

• ASUW
• Mining

• Chemical, Biological, Radiological

• Fixed Targets
  • Command & Control Centers
  • Information Suppression
  • Combat Air Patrol

Navy

AF/DARPA
UNSA Concept Designs

- Uninhabited Naval Strike Aircraft (UNSA) study comprises 3 tasks:
  1. **Configuration Definition**
     - Surface-ship Short TakeOff & Vertical Landing (STOVL)
     - Surface-ship Vertical Attitude TakeOff & Landing (VATOL)
     - Sub-launched VATOL
  2. **Vehicle Characteristics and Performance**
     - Design layouts, system/subsystem descriptions
     - Weight estimates
     - Aero-performance estimates, mission, point, and VTOL capability
  3. **Critical Technology Review**
- **Studies Conducted by:**
  - Lockheed Martin
  - Boeing
  - Northrop-Grumman
  - NAWCAD
- **Final oral reports April-Aug 98**
Ship Integration Study

APPROACH
Addressing DDG class ships & rotorcraft air vehicles by:
Developing, Integrating and Validating
- Ship Airwake Models
  - Apply current NASA Model, PENN State Model & Shipboard data
- Air Vehicle Models for Rotorcraft Vehicles
  - Validate with existing vehicles
- Develop a scaling model
  - Apply advanced concept vehicles (Canard Rotor Wing)
- UAV Pilot/Vehicle/TCS Control Req'ts.

TECH CHALLENGES
- Accurately modeling existing system for shipboard environment
- Scaling model to accurately predict ship airwake forces acting on vehicles varying from UAVs to full size manned vehicles

EXIT CRITERIA
- Validation with current rotorcraft flight test data
- Successful simulation of interaction of vehicle in operational environment
- Application & Validation of simulation with Boeing/DARPA CRW flight test data
ONR Programmatic Plan

Utility & Technology Program Development Studies

- Utility Study
- Navy V/STOL Design Concept
- Ship Integration
- Direct Future Technology Priorities

Tech. Maturation Programs

- Embodiment of Naval UCAV
- Demo O&S Reductions
- Demo Shipboard Capability

Naval UCAV Demo

- Naval overarching issues
- Simulation
- Flight demos
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<td><strong>• UCAV V/STOL Flight Controls &amp; Autonomous Decision Making</strong>&lt;br&gt;- Capability to perform Naval missions such as all-weather shipboard launch and recovery, aerial refueling, target ID, in-flight route planning, self-monitoring, etc.</td>
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<td><strong>• UCAV Affordable Unitized Structures</strong>&lt;br&gt;- Leverage concepts from weapon design, but capable for shipboard launch &amp; recovery</td>
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<td><strong>• Compact Virtual UCAV Control Station</strong>&lt;br&gt;- Control stations which meet the limited space constraints of a ship or truck</td>
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<td><strong>• V/STOL UCAV Urban Warfare Aerodynamics</strong>&lt;br&gt;- Flight requirements for flying between buildings</td>
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**UCAV SUMMARY**

- UCAVs Seen as Future Weapon System for Projection of Long Range, Sustainable, Lethal, Combat Power
  - Greatly reduced acquisition and O&S costs
  - Mix of manned and uninhabited systems envisioned
- Current USAF focus on lethal SEAD and fixed target attack
- Current Naval focus
  - Close Air Support
  - ASW
- Technology requirements continue to be identified
  - Many needs common with manned systems
  - Command and Control is key