

Special Notice 12-SN-0028

**“2012 Basic and Applied Research in Sea-Based Aviation Aircraft Science and
Technology”**

Amendment 7

30 November 2012

The purpose of this Amendment is to update Section VII of the Special Notice, “Significant Dates and Times.” The date for Notification of White Paper Evaluation is changed to 4 January 2013. The date for Full Proposal Submission is changed to 21 February 2013. The date for Funding Decision Notification is changed to 28 March 2013. The approximate date for Grants in place is 24 May 2013. The approximate date for Contracts in place is changed to 26 July 2013.

There are no other changes to the Special Notice relative to the previous revision posted in Amendment 5. The complete, updated Special Notice follows.

There are no changes to the Question and Answer list. For reference, the complete Question Answer list is attached following the updated Special Notice.

Special Notice 12-SN-0028
Office of Naval Research
Special Program Announcement
“2012 Basic and Applied Research in Sea-Based Aviation Aircraft Science
and Technology”

I. INTRODUCTION:

This announcement describes a research thrust entitled “Basic and Applied Research in Sea-Based Aviation Aircraft Science and Technology,” to be launched under the ONR BAA 13-001, “Long Range Broad Agency Announcement (BAA) for Navy and Marine Corps Science and Technology” which can be found at <http://www.onr.navy.mil/Contracts-Grants/Funding-Opportunities/Broad-Agency-Announcements.aspx>. The research opportunity described in this announcement specifically falls under numbered paragraph 1 of the “Naval Air Warfare and Weapons (Code 35)” sub-section of BAA 13-001, Section I, item 6, Research Opportunity.

The purpose of this announcement is to focus attention of the scientific community on (1) the area to be studied, (2) opportunities for dialogue among those interested in this area, and (3) the planned timetable for the submission of white papers and proposals.

II. TOPIC DESCRIPTION: BASIC AND APPLIED RESEARCH IN SEA-BASED AVIATION AIRCRAFT SCIENCE AND TECHNOLOGY

Background:

ONR established National Naval Responsibilities (NNRs) to highlight S&T areas where the Navy and Marine Corps depend primarily on Department of Navy-funded research products. The Sea-Based Aviation (SBA) NNR was initiated in 2011 to maintain the health, currency, and technical superiority of Sea-based Aviation S&T. Three focus areas have been identified under the SBA NNR and are: 1) Aircraft Research, 2) Structures and 3) Propulsion. The Aircraft Research Focus area of the SBA NNR will provide innovative research and technology in five research thrust areas: Virtual Dynamic Interface, Advanced Handling Qualities and Control, Improved Fixed-Wing High Lift Aerodynamics, Enhanced Fixed Wing V/STOL Operations, and Autonomous Deck Operations. This Special Notice addresses the Aircraft Research Focus Area. ONR seeks to initiate 6.1 Basic Research and 6.2 Applied Research efforts beginning Government Fiscal Year 2014.

Objective:

The Office of Naval Research (ONR) is interested in receiving initially white papers and eventually proposals from selected Offerors for the Sea-Based Aviation National Naval Responsibility (SBA NNR) Aircraft Research Focus Area.

Projects should advance fundamental understanding and the state of the art, and should align with and produce measurable progress towards the long range S&T goals that support SBA, as outlined below. Research projects should comprise either Basic or Applied Research only. Interaction and collaboration among Industry, Universities, and Government Labs is encouraged.

White papers and proposals should identify a technical baseline representative of the current State of the Art (SOA) and explain how the proposed research will advance the technology. Projects aimed at developing high-fidelity physics-based models should include validation of analytical methods using new or existing experimental data.

The five research thrust areas are:

Virtual Dynamic Interface (VDI)

The Virtual Dynamic Interface research thrust area addresses the coupled interactions between ship and aircraft.

The Navy seeks to develop physical and numerical modeling capabilities that will lead ultimately to fast, full-fidelity ship/aircraft Dynamic Interface (DI) simulations. This thrust area envisions long-range S&T goals of

1. Real-time piloted simulation of fidelity sufficient to permit initial and recurrent pilot training, initial evaluations of evolving aircraft and/or ships, determination of shipboard operating limitations to augment flight testing, and evaluation of new automatic guidance and control systems and displays
2. non-piloted simulations running in real-time or faster in support of ship and air vehicle system design optimization, flight testing and evaluation of autoland systems and landing aids.

“Full-fidelity” in this context means that all physical phenomena of potential significance to the outcome of the simulation are included to a consistently high level of fidelity. At a minimum, this implies that simulations capture the following in physics-based models:

- fully-coupled, unsteady, and nonlinear aerodynamic interaction between ship airwake and aircraft
- flight mechanics of aircraft including control laws, handling qualities, pilot workload
- for helicopters, coupled rotor/fuselage dynamics

- deck motion, nonlinear contact dynamics, and limiting events (hard landings, sliding, rollover).
- propulsion system dynamics

The VDI research thrust seeks proposals in research topic areas that are expected to provide incremental progress towards the ultimate goal outlined above. The specific topic areas of interest are:

1. Fast, high-fidelity physics-based simulation of coupled aerodynamics of moving ship and maneuvering rotorcraft. Progress in this area is expected to derive from (1) innovative numerical methods and (2) novel approaches to massively parallel computing.
2. Fixed wing vehicle / ship airwake coupled dynamics simulation and experimentation with the goal of accurate prediction of aircraft controllability and recovery success rate.
3. Fast, moderate fidelity methods – innovative reduced order computational techniques that capture essential physics while executing much faster than high-fidelity methods. This topic area includes for example reduced order post-execution representation of CFD results (Proper Orthogonal Decomposition, surrogate modeling, etc.) and reduced-order physical models (free wake, finite state inflow, etc.)
4. Adaptive gridding of computational fields – computational methods for capturing, resolving, and propagating ship airwake flow features downstream into the aircraft approach path, and resolving unsteady airloads of aircraft maneuvering in ship airwake for approach.
5. Rotor wake modeling – fast, high fidelity tools to support complete analysis of rotor wake properties over a non-uniform moving ground plane representing major ship features.

Proposals in other research topic areas that support VDI thrust area goals will be considered as time and funding permit.

Advanced Handling Qualities (HQ) and Control

The Advanced HQ & Control research thrust area is intended to develop enabling S&T for highly effective control systems for shipboard operations in degraded weather and in the presence of significant deck motion, as well as other maritime operations.

This area supports the following long-range S&T goals:

- Efficient, precise UAV launch and recovery requiring little or no human intervention
- Reduced-workload launch and recovery of piloted aircraft. Improved operations with towed minesweeping systems.

Proposals are sought in the following topic areas.

1. Maritime rotary wing control laws – control laws for precision landing and reduced pilot workload in turbulent airwakes and with large ship motions, with associated verification / validation tools. Advanced control systems that use relative position sensors and advanced pilot-vehicle interfaces to enable carefree handling in shipboard operations, with greatly reduced workload and improved safety (note, however, that this topic does not include sensor development).

While significant progress in this area relies on effective modeling and simulation (M&S), improved M&S is not a direct goal of this research topic. Rather, state-of-the art models of appropriate fidelity may be used, augmented as appropriate with improved modeling capabilities developed under other SBA efforts, or elsewhere.

Mission Task Elements (MTEs) may be used to support research in this topic area, in which event existing MTEs may be used or new ones proposed. White papers and proposals should identify and describe any MTEs to be used.

2. Dynamics of towed systems – modeling and testing of rotorcraft towing submerged vehicles. Control strategies for low-workload handling and precise sweep pattern.

Improved Fixed-Wing (FW) High Lift Aerodynamics

The Improved Fixed-Wing High Lift Aerodynamics thrust area seeks to improve the Navy's understanding in the area of aerodynamics of fixed-wing vehicles in approach configuration (flaps and landing gear extended) and airspeeds. Long-range S&T goals include

- Reduced approach speed and high precision flight control during fixed wing aircraft approach to and landing on aircraft carriers
- Direct Lift Control and reduced control surface area with current levels of pitch/roll/yaw control.

As with the VDI thrust area, this area is aimed in part at the development of fast, high-fidelity simulation capabilities. However, it differs from VDI in its specific focus on S&T issues related to low-speed aerodynamics of fixed-wing vehicles, with less emphasis on ship airwake/vehicle coupling issues. Both existing aircraft and advanced concepts (for example, flying wing configurations) are of interest. Proposals are sought in the following topic areas:

1. Thrust vectoring for recovery operations - combined and/or partitioned thrust vectoring and flap systems for control authority with reduced control area, and direct lift control.
2. Innovative approaches to passive and/or active flow control systems to provide high lift and control at low speeds. In particular, designs and modeling techniques for advanced tailless configuration effectors and active adaptive systems.
3. CFD methods enabling robust prediction of highly nonlinear and unsteady aerodynamic behavior in approach, for example stability derivatives, pitchup, wing drop, and separation over highly deflected and/or moving control surfaces.

Enhanced Fixed Wing V/STOL Operations

A theme that emerges frequently in advanced vertical lift concepts intended for Naval use is the desire to combine the speed and cruise efficiency of a fixed-wing aircraft with the hovering capability of a helicopter. Aircraft capable of vertical takeoff and landing typically incur significant performance compromises at either end of their operational range. Helicopters set the standard for hover capability, but are limited in cruise speed; direct-lift and lift-fan aircraft, on the other hand, excel in forward flight but are limited in their hover performance.

The Enhanced Fixed Wing V/STOL Operations thrust area seeks to develop technologies that ultimately enable V/STOL aircraft, for example jet lift (direct lift) and lifting fan aircraft, that combine

1. Extended hover performance adequate for launch and recovery on large- and small-deck ships and mission-specific hover operations (e.g. ASW, ASUW, or shore reconnaissance)
2. hover handling qualities (agility, gust response) suitable for shipboard operations in the ship's airwake and in the presence of significant deck motion
3. significant high-speed performance and cruise efficiency
4. payload adequate for mission-specific equipment

The Navy is interested in research projects that will enable advancement of the state of the art in V/STOL technology and improve understanding of the aeromechanics of these concepts. Long-term S&T goals include

- Improved V/STOL, transition, and cruise aerodynamics for lift-fan and direct-lift aircraft
- Robust, high-fidelity M&S for ship/aircraft flowfield interaction

Proposals are sought in the following **topic areas**:

1. Innovative computational and experimental methodologies for prediction and analysis of V/STOL vehicle aerodynamics in hover, transition, and forward flight. Specific topics of interest include for example lifting fan inlet, duct and blade aerodynamics, powered lift nozzles, fuselage interactions, dynamic jet/wake evolution, gust and control response, downwash/outwash flow field dynamics, wake reingestion and thermal profiles
2. High-fidelity predictive capability for V/STOL shipboard operations, including simulation of multiple jet mixing, aircraft/flow field interaction (reingestion, suckdown, control authority, etc.), deck heating, outwash, vehicle and ship dynamics, and airwakes.

Autonomous Deck Operations

Aircraft aboard the flight and hangar decks of aircraft carriers are handled in a series of complex processes involving aircraft, people, and equipment in a constrained, chaotic, loud, and hazardous environment with significant RF limitations. Deck operations include arresting gear

exit after recovery, taxi to parking after landing, refueling, payload handling, movement from pre-launch spot to the catapult for launch, and catapult hookup. Continually evolving deck space constraints, environmental conditions (lighting, wind, rain, deck motion etc.), safety issues, time-critical contingencies, and constraints on resources all combine to present significant challenges to efficient flow of aircraft through these deck handling processes.

Long range S&T goals in Autonomous Deck Operations research thrust area are:

1. Reduce manpower on the flight deck for both cost savings and safety/health purposes
2. Support seamless integration of increasing numbers of autonomous systems into mixed manned/unmanned carrier operations with minimal need for special procedures or training different from that required for manned aviation
3. Support efficient high operations tempo/sortie rates with mixed manned/unmanned aviation.

For purposes of this notice, the research focus is automated deck operations system capabilities used for safe and efficient movement of UAV's from their prelaunch parking spots to the catapult, and postflight, from the landing area to their final shutdown spot. Particular research efforts should assume a future objective of an overall system that would have the following attributes:

1. Includes a local segment that is mounted in, on, or near the UAV and provides local situational awareness only to the degree necessary to supplement the global segment
2. the local segment, if on-board an aircraft, has minimal impact on aircraft aerodynamics, flight control, signature, and maintainability, and have minimal size, weight, and power needs. If off-board the aircraft, it has appropriate characteristics for operations on a carrier deck (e.g., using large numbers of small ground systems would not be practical since they might be blown off the carrier deck and/or create a hazard in adverse weather).
3. Includes a global navigation, tracking, and command & control capability such that UAV position and status are known to some reasonable degree of precision for carrier decks and shared with other networked aircraft and supervisory controllers.
4. Includes provisions for supervisory control such that the vehicle and its moving parts, engine, and critical functions can be directly commanded in a contingency situation.
5. Has autonomous decision making capability based on local and global situational awareness and authorized decision authority.
6. Is capable of safe, efficient, and reliable operation
7. Is capable of operating in all naval environmental, electromagnetic emissions, and deck motion limits under which manned flight operations can be conducted.

Specific **topic areas** include:

1. Improved deck operations leveraging an affordable tracking system so that position/orientation/status of aircraft, equipment, and personnel is known. Leverage passive sensors such as vision and RF ID tags to greatest extent possible. Increasingly shift flight deck functions to central coordinators with flight deck personnel

- remaining in more of a supervisory role in the event of contingencies. Support rapid planning changes when necessary due to contingencies. Consider new ways to aid interaction between deck crew and autonomous deck systems (e.g., useful cues that deck crew are walking too close to a prop/rotor/intake). Eliminate the need for humans to perform specific carrier deck tasks via automation.
2. Autonomous control for direction and movement of aircraft and ground equipment on the carrier deck including validation of algorithms for safety purposes and leveraging of off-board tracking systems where feasible. Applied research for networked and/or central autonomous control concepts and enabling technologies to support direction of systems on the decks. Applied research for precision autonomous control tasks such as parking and final launch positioning after the deck crew brings the aircraft near the location with an appropriate mix of on-board and/or off-board sensing. Basic research to support perception-based control of UAS and ground equipment operations on the carrier deck under high-level human direction and supervision. Note that perception for this task could be based on sensors on the aircraft, sensors on the ship, or sensors on ground robotic equipment (e.g., ground robot leader, robot for nose wheel steering, etc). Autonomy for movement of deck equipment might support both regular operations and emergencies such as firefighting.

Research in this area should support unique aspects of operations in chaotic and constrained carrier decks and not general research in unmanned ground vehicle autonomy and tracking. Note that the focus of this effort is not on the development of new sensing, mobility, or human interaction hardware, but should consider how the existing/emerging state of the art in these areas could be leveraged.

III. Proposer Workshop

ONR will hold a web-based workshop **on Friday, 28 September 2012, 1300 – 1500 EST** for those interested in proposing projects under this Special Notice. This will be a web-based workshop. Registration is required. **Register no later than 27 September 2012 at <https://secure.onr.navy.mil/events/regdetail.asp?cid=899>.** Registered participants will be provided with connection instructions a few days before the workshop. Participation in the Proposer Workshop is not mandatory for either White Paper or Proposal submission.

IV. WHITE PAPER SUBMISSION

White papers are desired and strongly encouraged for all offerors seeking funding. White papers should be submitted according to the format requirements found in Section IV, item 2a, of BAA 13-001.

White paper requirements for both Basic and Applied research are identical. The requirements for white paper format outlined in ONR BAA 13-001 apply. White papers should not exceed 4 single-sided pages, exclusive of cover page and resume of principal investigator. The cover page should be labeled “2012 Basic and Applied Research in Sea-Based Aviation Aircraft Science and Technology” and include the following information: title of the proposed effort, technical point of contact, telephone number, fax number, and e-mail address. The 4-page body of the white

paper should include the following information: (1) Principal Investigator; (2) Relevance of the proposed effort to the relevant research area(s) described in Section II; (3) Technical baseline, objective of the proposed effort, and expected advancement in the technology; (4) Technical approach that will be pursued to meet the objective; (5) A summary of recent relevant technical breakthroughs; and (6) A funding plan showing requested funding per fiscal year. A resume of the principal investigator, not to exceed 1 page, should also be included after the 4-page body of the white paper.

White papers should be submitted electronically to the program technical points of contact listed below. Files exceeding 10MB in size should not be emailed, but instead transmitted via a file transfer service, for example AMRDEC Safesite, <https://safe.amrdec.army.mil>, or mailed on CDROM or DVD. White papers shall be in Adobe PDF format (preferred) or in a Microsoft Word format compatible with MS Office 2007.

To ensure full, timely consideration for funding, white papers are encouraged by the date specified below in Section VII, Significant Dates and Times. White papers received after that date will be considered as time and availability of funding permit.

Each white paper will be evaluated by the Government to determine whether the technology advancement proposed appears to be of particular value to the Department of the Navy. Initial Government evaluations and feedback will be issued via e-mail notification from the Technical Point of Contact. Only authors of white papers that appear to be of particular value to the Department of the Navy will be invited to submit full proposals.

Detailed Full Proposals will be subsequently encouraged from those Offerors whose proposed technologies have been identified through the above referenced e-mail as being of “particular value” to the Government. However, any such encouragement does not assure a subsequent award. Full Proposals may also be submitted by any offeror whose white paper was not identified as being of particular value to the Government or any offeror who did not submit a white paper.

For white papers that propose efforts that are considered of particular value to the Navy but either exceed available budgets or contain certain tasks or applications that are not desired by the Navy, ONR may suggest a full proposal with reduced effort to fit within expected available budgets or an effort that refocuses the tasks or application of the technology to maximize the benefit to the Navy.

V. FULL PROPOSAL SUBMISSION AND AWARD INFORMATION

Full proposals should be submitted under ONR BAA13-001 by the date identified below in Section VII, “Significant Dates and Times.” Full Proposals received after that date will be considered as time and availability of funding permit. ONR anticipates that both grants and contracts will be issued for this effort. Full proposals for contracts, cooperative agreements, and/or other transaction agreements should be submitted in accordance with the instructions in BAA 13-001, Section IV, Application and Submission Information, item 2.b, Full Proposals. Full proposals for grants should be submitted in accordance with the instructions in BAA 13-001, Section IV, Application and Submission Information, item 5, Submission of Grant Proposals

through Grants.gov. All full proposals for grants must be submitted through www.grants.gov. The following information must be completed as follows in the SF 424 to ensure that the application is directed to the correct individual for review: Block 4a, Federal Identifier: Enter N00014; Block 4b, Agency Routing Number, Enter the three (3) digit Program Office Code (351) and the Program Officer's name, last name first, in brackets (John Kinzer). All attachments to the application should also include this identifier to ensure the proposal and its attachments are received by the appropriate Program Office.

ONR plans to fund multiple individual awards with nominal duration of two years plus a one-year option. For planning purposes, the scope of 6.1 Basic Research efforts submitted under this BAA Special Notice is expected to be equivalent to the scope of a single investigator grant. It is anticipated that the scope of 6.2 Applied Research efforts will be approximately one to three full-time equivalents per year. Although ONR expects the above described program plan to be executed, ONR reserves the right to make changes including the right to make no awards.

Anticipated dates for funding decisions and award dates are identified below in Section VII, "Significant Dates and Times."

Proposals should address all of the technical and programmatic considerations necessary for project execution and timely preparation of deliverables. Deliverables shall include, at a minimum, quarterly financial and technical progress reports, and a final report. In addition, where projects involve development of analytical methodologies implemented in software, a complete description of the methods including theory manual, user documentation, and source code should be provided to the Government under license with Unlimited Rights.

ONR anticipates that grants, contracts, cooperative agreements, and/or other transaction agreements will be issued for this effort.

VI. POINTS OF CONTACT

In addition to the points of contact listed in BAA 13-001, the specific points of contact for this announcement are listed below:

Technical Points of Contact:

John Kinzer, Program Officer, john.kinzer@navy.mil (Air Vehicle Technology)

Judah Milgram, Program Officer, judah.milgram@navy.mil (Air Vehicle Technology)

Marc Steinberg, Program Officer, marc.steinberg@navy.mil (Autonomous Deck Operations)

Business Point of Contact:

Lynnette Desorcie, Contracting Officer, lynnette.desorcie@navy.mil

VII. SIGNIFICANT DATES and TIMES

<u>Event</u>	<u>Date</u>
White Paper Submission Date	08 Nov 2012
Notification of White Paper Evaluation	04 Jan 2012
Full Proposal Submission Date	21 Feb 2013
Funding decision notification	28 Mar 2013
Grants in place *	24 May 2013
Contracts in place *	26 Jul 2013

* These are approximate dates

VIII. Submission of Questions

Any questions regarding this announcement must be provided to the Technical Points of Contact and/or Business Point of Contact listed above. All questions shall be submitted in writing by electronic mail.

Answers to questions submitted in response to this Special Notice will be addressed in the form of an Amendment and will be posted to the following web pages:

- Federal Business Opportunities (FEDBIZOPPS): <https://www.fbo.gov/>
- Grants.gov: <http://www.grants.gov>
- ONR Broad Agency Announcement (BAA) Webpage:
<http://www.onr.navy.mil/Contracts/Funding-Opportunities/Special-Notices.aspx>

Questions regarding White Papers should be submitted no later than two weeks before the recommended date for receipt of White Papers. Questions regarding Full Proposals should be submitted after submission of White Papers and no later than two weeks before the recommended due date for receipt of Full Proposals. Questions received after the dates indicated will not be acknowledged and will be answered only as time permits.

Special Notice 12-SN-0028

“2012 Basic and Applied Research in Sea-Based Aviation Aircraft Science and Technology”

Questions and Answers

Updated 30 November 2012

All questions regarding the Special Notice must be provided in writing by email to the Technical Points of Contact and/or Business Point of Contact listed in the Special Notice.

Questions 1–12 were added in Amendment 1.

1. Can a white paper/proposal propose work comprising both Basic (6.1) and Applied (6.2) research?

No. Please submit separate white papers and proposals for the two elements of the project. Each should stand alone but may reference the other.

2. Can ONR decide to reclassify a proposed project to align better with budget activity (6.1/6.2)?

Yes.

3. Can one white paper/proposal contain tasking applicable to more than one research thrust area?

No. Please submit separate white papers and proposals for the two elements of the project. Each should stand alone but may reference the other.

4. Can ONR decide to reclassify a white paper from one research thrust area to another?

Yes.

5. What are suggested size and duration of projects?

Please refer to Section V of the Special Notice, which provides nominal duration and scope of awards for planning purposes. These are notional based on anticipated budget availability. White papers and proposals may propose projects of different duration and/or scope, if appropriate; however large departures from the notional duration and scope are discouraged.

6. If teaming on a 6.1 project, can multiple PIs be accommodated?

Yes – multiple PIs can be funded under a 6.1 project. See also question 5.

7. Can a 6.1 project include extra work above and beyond the notional scope stated in the Special Notice, for example to accommodate use of special experimental facilities?

Yes, however see also question 5.

8. How should technical questions be submitted?

Submit technical questions in writing by email to John Kinzer, john.kinzer@navy.mil, and Judah Milgram, judah.milgram@navy.mil. Questions related to the Autonomous Deck Operations research thrust area should also be submitted to Marc Steinberg, marc.steinberg@navy.mil.

9. Is teaming with Government labs allowed?

Yes. Funding allocated to the Government lab will be issued directly to that lab.

10. Interaction and collaboration is “encouraged” – is it required, does it improve our chances of selection?

Interaction and collaboration are encouraged based on the expectation that in many cases it will lead to the best possible technical outcome. There is no requirement to collaborate, nor will it be a direct factor in the evaluation of white papers or proposals. Collaboration should only be undertaken when it may be expected to improve the project outcome.

11. Some research topic areas seem already to be addressed by current Government-funded efforts. Is the goal here to extend and/or leverage these other efforts?

Proposers may leverage ongoing efforts to the degree they feel appropriate, but there is no requirement for them to do so. The Special Notice is not specifically intended to extend currently funded efforts.

12. When is the proposer workshop?

Friday, 28 September 2012, 1300-1500 EST. This will be a web-based workshop. Registration is required. Register at

<https://secure.onr.navy.mil/events/regdetail.asp?cid=899>

Registered participants will be provided with connection instructions a few days before the workshop.

Questions 13–17 were added in Amendment 2

13. Where is BAA 13-001?

BAA 13-001 will be released within the next few weeks. We don't expect significant changes from BAA 12-001, which can be found at <http://www.onr.navy.mil/~media/Files/Funding-Announcements/BAA/2012/12-001-Amendment-0001.ashx> . However, proposers are expected to obtain and comply with BAA 13-001 when it becomes available.

14. Would a live data collection study to help develop and validate the simulated environment be appropriate for the Virtual Dynamic Interface thrust area?

The VDI roadmap identifies "Innovative experimental methods" as a future topic area. However if the proposed study supports validation efforts we'll consider it now.

15. Is the basic/applied funding mix different for any particular topic in the solicitation?

There is no specific 6.1/6.2 funding mix envisioned for individual topic areas. In the proposer workshop briefing, topic areas have been designated notionally as "basic" or "applied," however this is more of an initial assessment of where the research lies than a rigid requirement.

16. What level of focus do you expect on basic and applied aspects? For example, in topic area #2 under the "Autonomous Deck Operations," would a proposal targeting this area need to focus on actual deck operations, or would it be OK to propose basic research using scenarios (physical and simulated) that mimic deck operations?

Basic research needs to be relevant to the naval problems defined in the special notice. We encourage creative design of appropriate experiments that can be done in a cost effective manner to address the research questions of interest. There are no specific requirements for what those need to be. It will be up to proposers to make the case for the value and relevance of experiments proposed.

17. In topic area #2 of "Autonomous Deck Operations" does "high level human direction and supervision" imply a specific level of human involvement? Will you be willing to consider varying levels of human supervision depending on task complexity and human expertise?

We are open to different ideas for how humans would interact with these systems as long as they are appropriate to the unique challenges of autonomous naval deck operations.

Questions 18-24 were added in Amendment 3

18. How many awards does ONR anticipate?

We anticipate multiple awards across all research thrust areas. The actual number will be based on funding availability and the quality of the proposals received.

19. For budgeting, what is meant by "scope of a single investigator grant?" What is the approximate dollar amount that ONR applies to a "full time equivalent?"

A "single investigator grant" is nominally a professor directing a graduate research assistant. A "full time equivalent" is nominally a researcher working full time or nearly so. ONR does not propose target costs for these budgeting elements.

20. Is [our technical approach] of interest?

Any approach that effectively addresses research topic goals is of potential interest. White papers should establish the relevance of the proposed technical approach to the research topic goals described in the Special Notice.

21. Can the same prime submit multiple white papers for different topics?

Yes.

22. Is teaming allowed with government agencies other than Navy Labs (for example, AFRL, AFOSR, AFDD)?

Yes.

23. In the "Enhanced Fixed Wing V/STOL Operations" research thrust area, are you interested in vehicular concepts that could support some of the topics, like high speed VSTOL, or are you focusing on technology that could enable those concepts?

The latter – in particular, the two topic areas presented in that research thrust area.

24. Can Government labs submit white papers and full proposals?

Yes. White paper requirements are identical to those for other proposers. However, rather than submitting full proposals under BAA 13-001, PIs will submit Project Execution Plans (PEPs) by email to the Technical Points of Contact, in format to be provided.

Questions 25 – 54 were submitted at the Proposer Workshop on 28 Sept. 2012 and added in Amendment 3 of the Special Notice

25. Are you interested in V&V approaches for "active adaptive systems" for FW high lift aero? Is this more focused on UAS or piloted operations?

Any approach that effectively addresses research topic goals is of potential interest – see also Question 20. This research thrust area directs no specific focus on either UAS or piloted operations.

- 26. A Government lab and a private company are interested in developing related technologies, sharing their technologies and doing experiments independently. Both organizations plan to submit each proposal independently. Do you see any problems with this collaboration?**

Collaboration with Government labs is permitted. If the two efforts are distinct and stand alone, please submit two white papers. They may reference each other. If the performers are working closely together on a single effort, submit a single white paper. This would apply as well to a collaborative effort between a Government lab and a university.

- 27. The Special Notice suggests that new sensor development is out of scope, but the Basic Research discussion for Carrier Deck Operations mentions advanced sensors. Can you clarify the extent to which development of advanced sensing technologies is of interest?**

Existing and emerging sensors may be required for a particular research project, but we are not interested in funding sensor development.

- 28. What GFE would be made available (e.g. ship access for a demo)?**

There are no specific plans for making GFE available. This could be arranged directly with a collaborating Government lab. We would do our best to facilitate access but any costs would have to be included in the project cost estimate.

- 29. Are there any classification restrictions on submissions?**

Responses should in general be unclassified. We do not anticipate making awards for classified projects.

- 30. Are projects limited to participation by US citizens only?**

Proposers are responsible for their own compliance with the applicable export control regulations. If in doubt, talk to the ITAR POCs in your own organization. We may offer an opinion after we see the white papers.

- 31. For autonomous deck ops, are there any constraints on navigation sensing being active (potentially detectable by enemy forces - lidar/radar) or passive (vision)?**

Both active and passive sensing are acceptable. If active, some consideration needs to be given to compatibility with EMCON restrictions.

32. Can you please clarify again what is the PI/Co-PI limit on 6.1 vs. 6.2 type research?

There is no limit. The examples given (e.g. “professor directing a graduate student”) are notional and provided for scoping guidance only.

33. Will there be publication restrictions on research grants to universities?

All 6.1 and most 6.2 performed at universities is “contracted fundamental research.” DOD policy is generally not to restrict disclosure of the results of such efforts. Proposers are responsible for their own compliance with export control regulations.

34. Do you want to use the high fidelity physics based simulation of aircraft/ship interaction to be used directly for pilot training?

Ultimately, yes. We do not however expect to achieve this within the scope of a single effort funded under this opportunity.

35. Are cost-sharing options available for working with Navy labs, or is all funding to be covered under these grants?

Cost sharing (for example under a CRADA) with Navy or other Government labs is permitted.

36. With regard to the ship wake impact on aircraft. Can you comment on the impact these effects have on the pilot/crew? That is, for a helicopter and fighter jet what would the pilot/crew experience?

Crew comfort is a consideration, especially for helicopters, which have a higher vibration environment and can be subjected to ship airwake for some time.

37. Would interaction between meso-scale atmospheric flow features and ship/aircraft aerodynamics be of interest?

Yes. We intend to initiate work in this area in a future effort, but will accept proposals now if there is particular merit to the approach. Note that we are not interested in researching maritime meteorology or atmospheric physics per se. However, integration of Atmospheric Boundary Layer models and wind and wave effects etc. into the dynamic interface simulations would be of interest.

38. Are autonomous deck ops only for taxiing UAV to takeoff and back from landing, or do they also include other equipment on deck such as tow tractors?

Principal focus is on taxiing UAV to takeoff and from landing. Applicability of the technology to tow tractors or other equipment is a plus, but not required and should not restrict the capability of the UAV system.

- 39. Is a project that focuses on safety of deck ops (assuming local and global positioning and tracking exist) of interest? Example, a system to notify UAV of personnel that they may collide or move into unsafe area.**

Safety should be a consideration in the design of a system for UAV movement, but does not stand alone.

- 40. Are data on EMI of the carrier environment publicly available and are there limitations stated anywhere on allowable frequencies/signals?**

We will investigate to see what data can be provided. But assume for now that we will not be able to provide specific information on this.

- 41. Are there limitations to where sensors may be located onboard the UAV?**

It's important to consider that deck movement is a very limited function, and that aircraft designers will be reluctant to make compromises just for that. Thus the sensors must be designed to have minimal impact on important aircraft design features, such as aerodynamic performance, radar signature, structural robustness, reliability and maintainability, and size/weight/power/cost.

- 42. Can some level of data connectivity be assumed between ship and UAV?**

If connectivity is needed, some explanation must be provided as to how it could be obtained.

- 43. Will there be further opportunities for Q&A before the date that white papers are requested?**

Yes. Submit questions in writing up to two weeks before the requested white paper submission date (i.e. up until Oct. 18). Answers will be posted as amendments to the SN. Questions may be submitted after that date but will be answered only if time available.

- 44. What do you mean by fixed wing vehicle/ship airwake experimentation (slide 4 of the Proposer Workshop briefing)? Are you talking about physical experiments or computational experiments? Or both?**

Both.

- 45. On the "Autonomous Deck Operations" topic, what kind of deck would the UAVs land on? Carriers?**

Carriers.

- 46. Could you please confirm that for each topic the offeror should select whether he is submitting a basic research or applied research proposal?**

Yes. In some cases we may amend this selection for better alignment with budget activity.

47. What TRL do you expect to start and end for the Autonomous Deck Operations topic?

Starting with TRL 2-3, ending with TRL 4

48. What kind of environmental conditions should we assume for the deck ops scenario?

Environmental scenarios could include any condition that would normally be experienced on a ship deck at sea. This would include all degrees of light / dark, heavy rain, snow, fog, and steam from catapults.

49. Is human-machine interface (HMI) a desirable aspect of autonomous deck ops?

HMI should be addressed, but should not be a major cost element.

50. Could you please comment on demonstration requirements for autonomous deck ops?

A lab or “parking lot” demonstration is acceptable. Ship demonstrations are not required.

51. If a corporation wants to submit a proposal for a 6.1 research topic, is the size of the project still limited to a single investigator grant? Can a corporation obtain a contract rather than a grant for 6.1 research?

Contracts for 6.1 research are permissible. For scoping a 6.1 project at a company we would suggest something analogous to a university single investigator grant.

52. It was mentioned that the interaction of a ship's wake with a fixed wing aircraft on approach is less important than the effects felt by a rotorcraft on approach or during landing. So is it important to investigate the effects of a ship's wake on a fixed wing aircraft during approach?

Yes, we are interested in airwake effects on fixed wing aircraft. It would be interesting to explore the sensitivity of fixed wing landing precision to the range of airwake effects to truly understand its importance.

53. On slide 5 of the Proposer Workshop briefing, are you looking for a CFD solution of the rotorcraft and towed system together?

We don't know that it has to be CFD and not some other analytical or experimental approach, but “together” is important.

54. Is experimental work on Improved FW High Lift Aerodynamics limited only to applied research? It appears that basic research is limited to CFD.

Basic research in this area not limited to CFD and may include experimental efforts.

55. When submitting a proposal with Co-PIs should we include a 1 page resume for each or should we squeeze all resumes onto a single page?

At proposer's option, use up to one full page for each PI/Co-PI. These pages will not be counted against the 4-page white paper limit.

56. The Virtual Dynamic Interface area has two long-range goals. Does a white paper have to cover both aspects or can it focus on just one of the long-range goals?

The long term goals in the SN are presented to help establish context for the specific topic areas. White papers should address the specific topic areas listed for each research thrust area. For example, in the Virtual Dynamic Interface research thrust area, there are five specific topic areas of interest listed.

Question 57 was posed in the Sept. 28 Proposer Workshop and added in Amendment 4 to the Special Notice

57. Will preference be given to proposals that leverage other DOD development efforts, such as CREATE-AV (Air Vehicles), or that utilize open-source tools?

Proposers should select those software tools that allow them to address the research topic areas most effectively. Note that where projects involve development of analytical methodologies implemented in software, a complete description of the methods including theory manual, user documentation, and source code should be provided to the Government under license with Unlimited Rights (see Section V of the Special Notice).

Questions 58 – 60 were added in Amendment 4 to the Special Notice

58. Our team has been working on [a specific technology]. Which category does this fall under – Basic or Applied Research? According to the relevant thrust area description slide presented at the proposer workshop, research in this area seems to be Applied [or Basic] Research.

We suggested Applied [or Basic] Research in this area because that is where we anticipate the Naval unique S&T problems will be addressed. But if your work addresses these problems, we would be interested in a white paper, regardless of the basic/applied distinction. See also Questions 1 and 2.

59. Can someone on a H1 visa be a PI or does it have to be a permanent resident, or a citizen? Are there any restrictions on nationalities of students who could work on this project?

Assuming the topic is not classified, there are no restrictions, provided these personnel are able to work legally. However, some topics may cover export controlled technologies.

Research in these areas is limited to “U.S. persons” as defined in the International Traffic in Arms Regulations (ITAR), 22 CFR § 120.1 et seq. Proposers are responsible for their own compliance with the applicable export control regulations. If in doubt, talk to the ITAR POCs in your own organization. We may offer an opinion after we see the white papers. See also Question 30.

60. Please clarify the terms, “research thrust area,” “long-range S&T goal,” and “research topic area” as used in the Special Notice

Research thrust areas are broad technology areas associated with Naval Unique S&T challenges. Each research thrust area is directed at specific long-range S&T goals, and incorporates a number of research topic areas that are intended to lead to progress towards achieving these goals.

The five subsections (“Virtual Dynamic Interface,” “Advanced Handling Qualities and Control,” etc.) each describe a research thrust area. Each subsection lists both long-range goals and research topic areas.

White papers and proposals should focus on the specific research topic areas. However, proposers should remain mindful of the long-range goals when planning their projects.

Questions 61 – 63 were added in Amendment 5 to the Special Notice

61. Section IV of the Special Notice enumerates six items of information that the white papers should include (Principal Investigator, Relevance, etc.). Must these be separate sections, or may we (for example) combine items 3 (Technical baseline, objective of the proposed effort, and expected advancement in the technology) and 5 (A summary of recent relevant technical breakthroughs)? Discussing the recent developments at the end interferes with the flow of my narrative.

There is no requirement to cover these items in separate sections or in the order listed. It will however facilitate the evaluation if it is clear how and where the points are addressed.

62. We are planning a project in Virtual Dynamic Interface. This research thrust area does not call for control law development, yet we will need to implement an aircraft model, including control laws, in order to exercise our innovative modeling techniques. Is this allowed?

Yes, as long as it doesn’t dominate the overall effort and the modeling techniques are not closely tied to the aircraft being modeled.

63. Has my white paper been received?

Starting October 25, white papers will be acknowledged within three days with a log number. Please refer to the log number in subsequent correspondence. If you do not receive acknowledgement within three days, please contact us.

64. Which TPOC?

Email white papers to Judah Milgram (judah.milgram@navy.mil) with copy to John Kinzer (john.kinzer@navy.mil). Send questions or inquiries about white paper receipt to Judah Milgram.

Questions 65 – 67 were added in Amendment 6 to the Special Notice

65. What happens if a white paper fails to identify the intended research thrust area and/or budget activity (6.1 vs. 6.2)?

We will group the white paper by research thrust area and budget activity as best we can, but cannot guarantee that the result will match the proposer's intent.

66. May a white paper contain proprietary information?

Yes. Please mark each page accordingly.

67. I would like to demonstrate an analytical method using a representative ship/rotorcraft configuration. Will ONR be able to provide information about representative geometries and conditions for such demonstrations?

No. Such information could come from the public domain or from collaborators. Since the intent is to demonstrate a method rather than model a specific ship or aircraft, we do not expect geometries to include detail beyond what is necessary to demonstrate the method and its sensitivity to modeling detail.