



Special Notice N00014-21-S-SN07 for 2021 London Tech Bridge Research Opportunity: Pathfinder Challenge Series – APEX Undersea Challenge

I. INTRODUCTION

The London Tech Bridge is a joint U.S. Department of the Navy and U.K. Royal Navy partnership for innovation, development, and acquisition. This notice announces the first in the London Tech Bridge Pathfinder Challenge Series – APEX Undersea Challenge and describes new funding to be awarded under the authority of N00014-21-S-B001, Long Range Broad Agency Announcement for Navy and Marine Corps Science and Technology which can be found at the following link: <https://www.onr.navy.mil/work-with-us/funding-opportunities/announcements>.

The submission of white papers, proposals, their evaluation and the placement of research grants will be carried out as described in the above Long Range Broad Agency Announcement (BAA) and this announcement. In partnership with the London Tech Bridge, the Office of Naval Research Global (ONR Global) expects to issue only research grants from this announcement.

The APEX Undersea Challenge is open to academia and industry, with Novel and Small to Medium Size Enterprises strongly encouraged to participate alongside the traditional Defense suppliers.

Challenge grant proposals are sought with a value up to £50,000 (~\$70,000) for a 6-month period of performance. In partnership with the London Tech Bridge, ONR Global may award one grant or multiple grants addressing a single challenge area, or multiple grants addressing each of the challenge areas described in this announcement below. The number of grants and amounts of funding for each grant will depend on proposals submitted. ONR Global reserves the right not to award any grants under this announcement. Successful teams may also receive an invitation to demonstrate their concept on an international stage as part of the NATO Robotic Experimentation & Prototyping augmented with Maritime Unmanned Systems (REPMUS) Exercise September 2021 in Portugal. London Tech Bridge expects successfully demonstrated concepts will attract additional funding from other sources for potential follow-on accelerated research efforts under a separate agile acquisition mechanism; however, this does not imply the promise of additional funding.

The purpose of this announcement is to focus the attention of the international scientific community on (1) the challenge areas of interest; (2) an APEX Undersea Challenge Kick-off Webinar recording from 17 February 2021; and (3) the planned timetable for the submission of white papers and full proposals.

Recordings of the Kick-off Webinar, helpful links and supplementary information such as APEX Undersea Challenge Guidelines and any Frequently Asked Questions (FAQs) are available on <https://onr.navy.mil/londontechbridge/pathfinderchallengeseries> .

II. CHALLENGE DESCRIPTIONS

Background:

The London Tech Bridge Pathfinder Challenge Series is a set of challenges aimed to discover, disrupt, and ultimately provide a stimulus for later development and delivery of revolutionary capabilities to the U.S. Department of the Navy and U.K. Royal Navy, the commercial marketplace, and the public. The Pathfinder Challenge Series focuses on early and applied research areas leading to concept development and basic working models/prototypes or demonstrations. Each challenge in the series will be announced separately, with problem statements, objectives, and timeframes specific to that challenge.

This announcement launches the APEX Undersea Challenge as the first in the Pathfinder Series. An apex predator is a predator at the top of a food chain, occupying the highest trophic levels. The apex predator is a master in its environment and in some cases works seamlessly with others to attain its prey. The expected outcomes of this APEX Undersea Challenge are promising, possibly game-changing, concepts employing critical undersea technologies that enable unmanned undersea vehicles to achieve apex level capabilities. The demonstrated concept's technology maturity may be accelerated under separate agile follow-on technology development efforts.

Joining the London Tech Bridge as members of the APEX Undersea Challenge evaluation panel are the Office of Naval Research Global, Office of the Chief Technology Officer Royal Navy, NATO Maritime Unmanned Systems Innovation and Coordination Cell (MUSIC2), Imperial College London Institute for Security Science and Technology (ISST), and U.K. MoD Defence and Security Accelerator (DASA). All APEX challenge evaluation panel members will be covered under a non-disclosure agreement and will certify no Personal or Organizational Conflicts of Interest exist.



Objective:

The London Tech Bridge is interested in promising concepts that deliver rapid capability advances with both military and commercial value in the multidisciplinary technology challenge areas described below. Specifically excluded are approaches that are already funded by existing U.S./U.K. research programs.

The APEX Undersea Challenge provides an opportunity for researchers to collaborate, generate novel approaches and demonstrate these ideas will succeed. The London Tech Bridge invites outstanding international researchers to form multi-national, multidisciplinary teams to address the capability challenges. Individual researchers may participate on more than one team. Teams are responsible for establishing non-disclosure agreements among team members, if necessary. Teams whose proposals are selected for funding may receive an invitation to demonstrate their concept on an international stage as part of the NATO REPMUS Exercise 2021 in Portugal on approximately September 20, 2021.

Researchers from academia and industry from any country may participate. Each team shall designate a lead Principal Investigator (PI) whose research organization will submit the white paper or proposal, and that will distribute funding to co-PIs and other sub-recipients. For a given project team, one award is made to the PI's organization. Only the PI's organization will be the prime awardee, and that institution is responsible for all aspects of the grant, including conditions on the use of funds and other terms and conditions of the grant.

Teams must submit white papers with quad charts describing their concept and approach **by 23:59 GMT on 05 March 2021**. The APEX Undersea Challenge evaluation panel will review submitted white papers and on or before 12 March 2021, will invite teams with the most promising concepts to submit a grant proposal. Full proposals are due **by 23:59 GMT on 09 April 2021**. The London Tech Bridge will notify teams selected for award on or before 19 April 2021. ONR Global intends to award grants by 17 May 2021. Teams selected for award may be asked to demonstrate their concept during the NATO REPMUS Exercise in September 2021. The grant period of performance is expected to be six months.

A final research progress report is required in accordance with the terms and conditions of the grant. Financial and patent reports will also be required.

Challenge Problem Statements:

1. High Bandwidth Long Range Underwater Cooperative Network

True practical acoustic or other, high bandwidth underwater network to meet the needs of exploiting UUVs in support of naval operations. The solution would allow heterogeneous communication (UUV platform to platform and platform to C2 node) for collaborative mission management, mission monitoring and data transfer to decision maker.

Descriptive Attributes:

- Autonomous systems provide a unique opportunity for Allied Maritime Forces to conduct effective operations covering large maritime areas.
- Cooperative communications systems that provide the digital backbone underwater for data transfer, mission monitoring and mission management between autonomous underwater vehicles, in-water deployed networks, nodes or bouys.
- Network may use RF gateways, acoustic, non-acoustic or other technologies
- Achieve long-range application-specific connectivity ranging from 500m up to 1000km.

- Solutions will need to interface with, (or exploit) above water networks to form end-to-end solution.
- Achieve high bandwidth speeds of at least 1 kbps going to 100 bps at extended ranges.
- Representative information content needs to be presented to the network in the most efficient form possible, to reduce demand on the network.

Potential Enabling Technical Disciplines:

- Communications (Acoustic, Optical, RF, Magneto-Inductive, Other)
- Autonomy
- Information Theory
- Acoustics
- Artificial Intelligence/Machine Learning
- Physics
- Ocean Physics/Oceanography
- Networking and network security
- Computer Science
- Software Engineering.

2. Sense and Avoid of underwater obstacles for UXV (UUV and USV)

Detect, classify, and automatically defeat/avoid static underwater obstacles, such as nets, and uncharted wrecks, and dynamic surface and near surface obstacles, such as props, keels, and containers, which pose mission fail threats to UUV and USV operations.

Descriptive Attributes:

- Robust in operation with detection at extended ranges and at speeds up to 20 knots in potentially unknown and challenging environmental conditions (high traffic flow, low visibility, turbulent water flow, shallow, etc).
- Obstacles can be near the seabed, midwater or near the surface; natural or man-made.
- Avoidance could be achieved by re-routing, removal or un snagging of the obstacle.
- Assess real-time the associated obstacle risks to the vehicle/mission and identify various courses of action and provide alternative routing around the obstacles while the vehicle is at operational speed.
- Obstacles may include, but are not limited to, seamounts, pinnacles, cliffs, fixed installations, flotsam, nets, deliberately placed obstructions, uncharted wrecks, and surface and near surface obstacles for surfacing UUV and USVs.
- Multi use solutions are highly desirable e.g. obstacle detection system that also supports mission objectives (e.g. Mine detection).

Potential Enabling Technical Disciplines:

- AI & ML
- Oceanography
- Acoustics (Sonar & Sonar processing)
- Power & energy

- Automatic target recognition systems
- LED and LASER.

III. APEX UNDERSEA CHALLENGE KICK-OFF WEBINAR

London Tech Bridge held an APEX Undersea Challenge Kick-off Webinar on 17 February 2021. This webinar was open to any interested party and the recording is placed on the London Tech Bridge Pathfinder Challenge Series website (<https://onr.navy.mil/londontechbridge/pathfinderchallengeseries>). You did not have to participate in the webinar to submit a white paper or proposal.

IV. WHITE PAPER SUBMISSION

White papers are highly encouraged for all applicants seeking funding from this APEX Undersea Challenge. The APEX Undersea Challenge evaluation panel will review how well each white paper submitted achieves the capability described in the technology challenge areas above. London Tech Bridge will invite those teams submitting white papers with the most promising concepts to submit a full proposal. Invitations to propose and feedback will be issued via e-mail notification from the Technical Point(s) of Contact or their designee(s). However, any such invitation does not assure a subsequent award. Full Proposals may be submitted by any applicant in response to this announcement, whether or not a white paper was submitted or evaluated by the APEX Undersea Challenge evaluation panel.

White papers shall follow the format provided in this announcement (see announcement attachments 1 and 2). White papers shall not exceed four single-sided pages. White papers must include an additional one-page quad chart, which is not part of the white paper page limitation. White papers should be submitted in Adobe PDF format (preferred) or in Microsoft Word and Microsoft PowerPoint format.

Submit white papers to ONRG.GrantProposals@mail.mil by **23:59 GMT on 05 March 2021**. White papers received after the deadline will not be considered. The subject line of the email shall read: “*N00014-21-S-SN07 APEX Undersea Challenge White Paper Submission*”. Do not send ZIP files or provide links to “Dropbox” type applications as they will not be reviewed. Password protected files will not be reviewed. Please notify ONRG.GrantProposals@mail.mil at least 7 calendar days before the white paper deadline to make arrangements for submitting white papers with a total file size larger than 10MB. E-mails with sizes greater than 10MB might not be received by ONRG.GrantProposals@mail.mil, so special file transfer accommodations will be made to ensure receipt of the white paper.

By 12 March 2021, the London Tech Bridge will invite teams with the most promising concepts to submit a full grant proposal.

V. FULL PROPOSAL SUBMISSION AND AWARD INFORMATION

Offerors notified that their white papers are deemed to be of particular value to the London Tech Bridge should submit a full grant proposal at www.grants.gov under BAA number N00014-21-S-Special Notice N00014-21-S-SN07

SN07 by **23:59 GMT on 09 April 2021**. The APEX Undersea Challenge evaluation panel will not consider Full Proposals received after this date. See Appendix 1 of BAA N00014-20-S-B001 for Full Proposal requirements and instructions on submitting grant proposals via grants.gov. The APEX Undersea Challenge evaluation panel will evaluate Full Proposals in accordance with Section II (E) of BAA N00014-20-S-B001.

London Tech Bridge will notify teams selected for award by 19 April 2021 and intends to award grants by 17 May 2021. London Tech Bridge expects selected teams to demonstrate their concept will likely meet proposed objectives in order to be invited to the NATO REPMUS Exercise 2021 in Portugal. The grant period of performance is six months. A final research progress report is required in accordance with the terms and conditions of the grant. Financial and patent reports will also be required.

Although the London Tech Bridge expects the above plan to be executed, London Tech Bridge reserves the exclusive right to make changes or cancel this APEX Undersea Challenge, as necessary. This announcement does NOT imply any promise of award.

VI. SIGNIFICANT DATES AND TIMES

Event	Date	Time
White Paper Submission Date	05 March 2021	23:59 GMT
Notification of White Paper Valuation*	12 March 2021	17:00 GMT
Full Proposal Submission	09 April 2021	23:59 GMT
Notification of Selection: Full Proposals *	19 April 2021	17:00 GMT
Grant Awards *	17 May 2021	17:00 GMT

Note: * These are approximate dates.

VII. POINTS OF CONTACT

The specific points of contact for this announcement are listed below:

Technical Points of Contact:

- Cdr Alex Bingham, RN - Alex.Bingham353@mod.gov.uk
- CDR Albert Arnold, USN - albert.e.arnold2.mil@mail.mil

Business/Admin Point of Contact:

- ONR Global Grants Team, ONRG.GrantProposals@mail.mil

VIII. SUBMISSION OF QUESTIONS

Any questions regarding this announcement must be provided to the Business Point of Contact listed above. Please submit all questions in writing by electronic mail.

Answers to questions submitted in response to this announcement will be addressed in a Frequently Asked Questions (FAQ) document posted on <https://onr.navy.mil/londontechbridge/pathfinderchallengeseries> .

Questions regarding **White Papers or Full Proposals** should be submitted no later than 5 working days before the dates recommended for receipt of White Papers and/or Full Proposals. Questions received after this date may not be answered.

APEX Undersea Challenge Grant White Paper (4 pages max)
(Title)

Date:

APEX Undersea Challenge Area:

Principal Investigator:

E: [email address]

M: [mobile #]

Country & Organization:

Teaming Countries & Organizations:

Does this project involve the study of humans, animals or environmental/biosafety issues?

Yes / No

Executive Summary/Abstract:

[Just one paragraph that clearly states what is novel in your proposal and how it will overcome specific technical challenges and advance the state of the art]

Proposed Period of Performance:

Rough Order of Magnitude Costs:

[This is not a detailed budget. Include costs for the entire period of performance. Indicate the type and numbers of researchers (e.g. researcher, post-doc, graduate students) who will be funded. If costs will be shared, indicate the shared amount.]

Background:

[Briefly describe state of the art and technical/knowledge gaps]

Hypothesis and Specific Objectives/Outcomes:

[What problem(s) and/or question(s) will your research seek to solve/answer?]

Technical concept and approach:

[Describe the technology innovation and risks and how your proposed effort will close the technical/knowledge gaps and advance the state of the art. Describe your proposed concept demonstration during the initial research period and what you intend to accomplish in a proposed optional research period. What is novel or different about your approach? What technical disciplines will you use to accomplish your objectives?]

Potential Military and Commercial Value:

[Describe how your revolutionary concept may affect future naval capabilities and provide new commercial products or services. What transition paths do you plan to pursue if your concept demonstration is successful?]

References:

[Just those cited in your white paper]



Project Title



APEX Undersea Challenge Area:

Technical Objectives:



Approach:

Team Members:

- PI, organization
- Co-PI, organization
- Co-PI, organization

Proposed Concept Demonstration:

Cost Estimate/Sharing:

Potential Naval Impact/Commercial Viability :