***DRAFT* White Paper:** NIUVT Global Program (*NIUVT Global*)

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A. Technical Concept

The dynamic nature of national defense and global security requires alliances to evolve and expand to meet the challenges and threats from international adversaries intent on gaining ground. The trilateral security pact between Australia, the United Kingdom, and the United States (AUKUS) represents the strengthening of U.S. defense collaboration and cooperation in the Indo-Pacific region and creates a global approach to technology innovation and the sharing of undersea capabilities (Peyronnet, 2021) (Hanson & Cave, 2021).

> "The United States is committed to an Indo-Pacific that is free and open, connected, prosperous, secure, and resilient. To realize that future, the United States will strengthen our own role while reinforcing the region itself. The essential feature of this approach is that it cannot be accomplished alone: changing strategic circumstances and historic challenges require unprecedented cooperation with those who share in this vision." (The White House, 2022)

The National Institute for Undersea Vehicle Technology (NIUVT) is uniquely situated to facilitate global training and research collaboration through AUKUS between naval units, naval industries, and higher education institutions due to its established success in creating and developing research areas aligned with the strategic needs of the U.S. Navy. The initial phase and central pillar of AUKUS is focused on providing to Australia nuclear powered submarines and propulsion technology over the short and long-term (Peyronnet, 2021). Using an 18-month window for identifying the strategy to implement this phase, analysis will be conducted to identify the current capacity of the three stakeholders, and capacity requirements within the Australian navy, skilled workforce, and industrial supply chain (Peyronnet, 2021). Following the initial six months of the AUKUS agreement, the AUKUS leaders released a statement reaffirming their commitment to sharing naval propulsion technology, commencing cooperation, and expanding information sharing and innovation (The White House, 2022).

As referenced in recent AUKUS statements in April 2022, the second phase of AUKUS focuses a trilateral commitment to strengthening infrastructure, innovation, and information and technology sharing in the areas of military and nuclear technology, artificial intelligence, and quantum technologies (Randev, 2022) (Hanson & Cave, 2021) (The White House, 2022). The NIUVT, founded in 2017, is a partnership between the University of Connecticut (UConn), University of Rhode Island (URI), and General Dynamics Electric Boat (EB), and is in collaboration with the Naval Undersea Warfare Center, Newport (NUWC), the Undersea Warfighting Development Center (UWDC), and others in the Naval Research Enterprise (NRE). The goals of this proposed *NIUVT Global* project are to facilitate NIUVT as a strong global partner in strengthening and advancing technology important to national and international defense and regional economic development. NIUVT will facilitate this *NIUVT Global* by providing an organizational construct that accelerates innovation in submarine and unmanned undersea vehicles by bringing together higher education and undersea partners in the U.S. and Australia (and potentially the U.K.) for well-defined activities to help ensure a sustainable research and industrial base.

The University of Connecticut currently has a portfolio of approximately 159 international partnerships in 46 countries. Since 2014, UConn has been cultivating increasingly strong strategic partnerships with our partners in Australia and United Kingdom, including University of Melbourne (UM), University of Queensland (UQ), and University of New South Wales (UNSW) in Australia, and the University of Birmingham, the University of Edinburgh, University of Glasgow, and University of Nottingham in the United Kingdom. In addition, current academic and research partnerships exist between UConn and many other U.S. allies, providing potential critical defense and security opportunities for future collaboration engaging other allies and close partners of the U.S. within the framework of potential expanded AUKUS cooperation initiatives (AUKUS Working Group, 2022) (The White House, 2022).

This project proposes four tasks over 3 years that specifically leverage the prior and current support and success of NIUVT to attain the goals of global exchange, training, and research in undersea vehicle technology between the U.S. and Australia.

NIUVT Global will identify & develop academic and naval partnerships critical to sustained success; expand existing partnerships; and ensure academic & research alignment.

Task 1: "NIUVT Global" Program Development: The requested funding in year one is for the identification and development of university, naval institute, and defense industry partners with applied research capability; conducting site and location assessment aligning with potential Navy workforce; identifying timeline and capacity of academic and experiential programs for students and faculty in engineering and Navy STEM fields. Funding will support: naval and defense institute partnership development between NIUVT and prospective Australian institutions and institutes including identified partners to support the AUKUS pillars such as Australian Maritime College, University of Tasmania, Defence Science Institute, Defence Research Institute at UNSW Canberra, and their associated industry research partners; expansion between existing UConn partners in Australia with the identification of parallel academic departments; and research alignment in STEM and NIUVT research and capability technical areas, including both UQ, UW, and the UNSW. Facilitated with UConn Global Affairs, funding in year one will support two site visits to Australia (at roughly 3 months and 9 months into the project) for a group of 10 U.S. participants including

NIUVT leadership, research faculty, technical leads, and designated industry partners at General Dynamics Electric Boat, to develop targeted academic alignment with research topics, capacity building, and AUKUS initiatives. NIUVT will leverage existing infrastructure within NIUVT and at UConn to ensure all export control is appropriately handled. NIUVT will host our Australian counterparts in the U.S. pending Australian financial support. Year one assessment and collaboration will support the creation of key workforce development areas, workshop focus areas, and curriculum alignment to be implemented in funding years two and three.

Task 2: Workforce Development & STEM Student Mobility/Exchange: The requested funding in year two will support promoting undergraduate and graduate education between NIUVT academic institutions and the Australian Navy research enterprise and workforce through engagement in basic research efforts being conducted in the U.S. and Australia and promoting graduate and undergraduate academic and experiential mobility opportunities. It is anticipated that ten (10) U.S. graduate/undergraduate students working on NIUVT projects in each of years 2 and 3 will be provided travel funding to conduct research at an Australian laboratory (university, government, or industry) for 30 days. It is anticipated that the basic research will be related to current NIUVT projects through which the students are being funded. U.S. faculty will serve as hosts to potential Australian students selected by and funded through the Australian government.

NIUVT Global will facilitate student-based mobility and experiential learning through highly integrated classroom, internship, and certificate activities leveraging the unique partnerships of NIUVT & AUKUS.

Funding is sought to allow participation of a UConn Senior Design team in an international university-level competition such as the Maritime RobotX Challenge (https://robotx.org/). The expansion of STEM bi-lateral student mobility through existing academic exchanges at the undergraduate and graduate level with UNSW, UQ, and UM, will be facilitated through travel support for students. Expansion will include the development of curriculum alignment between partners in targeted research focus areas and the integration of NIUVT research or internships into semester or academic year student exchange with NIUVT scholarship or grant funding. As learning outcomes of experiential education and student mobility, the cross-cultural skills acquisition in Australia and the Indo-Pacific region will provide a culturally competent workforce capable of sustainable mobility within the global defense and industrial complex.

This task will support the development of *Down-UnderTech*, an Australian-focused interdisciplinary engineering program for undergraduate or graduate students. The proposed *Down-UnderTech* program will be modeled after the highly successful and long-running academic and experiential mobility program *EuroTech*, a dual-degree German International Engineering program at UConn (https://internationalengineering.uconn.edu/german/). The *Down-UnderTech* program is envisioned to consist of *combined* academic coursework in AUKUS industry-relevant engineering fields with internship or research opportunities at naval industry partners for semester or academic year-based experiential learning.

This task will also develop NIUVT Tech Certificate Programs to leverage the unique knowledge-base of AUKUS partners and to foster workforce development through the creation of short-term, stackable technical area certificate programs for the current workforce to obtain required and/or additional technical training where there are specific skill gaps in regional workforces.

Task 3: Exploring Applied Research Opportunities: To efficiently *allocate* resources and *accelerate* advances in undersea vehicle innovation and technology, this task will explore opportunities for high impact applied research projects through collaboration of U.S. and Australian faculty researchers. In years two and three, the requested funding will support the collaboration and exploration in a series of workshops focusing on topics such as cyber security, additive manufacturing, shock/survivability, and artificial intelligence. Each workshop topic will include one workshop in the U.S., and one workshop in Australia. Funding will also support 2–4-week faculty research collaboration and mobility visits between Australian and U.S. partners. It is anticipated that 5 U.S. faculty each year will be funded in this program during years 2 and 3 of the project to visit a laboratory in Australia. The result of this task will be identification of collaborative applied research projects between the U.S. and Australian faculty researchers and their industry and government counterparts. U.S. researchers will be encouraged to submit proposals to NIUVT funding mechanisms and directly to ONR. Australian researchers will be encouraged to apply for funding through ONR Global.

Collaboration, research & innovation to accelerate the exploration and transition of new technologies in undersea vehicles will be enabled through NIUVT Global technical workshops and faculty exchanges.

Task 4: Concept Development, Industry Engagement, and Innovation: To effectively *align* and *accelerate* new undersea innovation and technology, university faculty at UConn and URI will engage with our NIUVT undersea partners in the U.S. and our Australia counterparts in concept development to strengthen and reinforce innovative research thrusts that retain practical value to the Navy. The requested funding in years two and three will support two Concept Exploration (CONEX) events running two days apiece, the first year in the U.S. and second year in Australia. This funding is anticipated to support early career faculty along with engineers and researchers in industry and government. Travel funding is requested to send 15 faculty and industry engineers to Australia in year 3.

NIUVT Global early career faculty, engineers and researchers will investigate the roll of basic research to address the challenges faced by AUKUS partners under appropriate operational constraints.

B. Future Naval Relevance

The NIUVT Global program aligns with and advances the Department of the Navy mission through existing international and national university partnerships, Naval partnerships, and community partnerships. The objective of this project is to support the efforts of AUKUS initiatives for global and regional security by creating a large-scale workforce development and research program to support training and innovation for undersea vehicles, goals recently reaffirmed and expanded upon by the AUKUS Leadership (The White House, 2022). This project aligns with the U.S. strategic planning in the Indo-Pacific region by deepening engagement and collaboration within the Navy, university research, and defense-related industries. Future consideration for expansion of NIUVT Global to additional regions of AUKUS collaboration within the framework of U.S. allies and strategic partnerships can be implemented post assessment.

C. Metrics of Evaluation

Program-specific measures of evaluation will focus on the objectives of this project for program development, site and location assessment, research partnership development, concept and research innovation, and workforce development. Metrics will include the number of participants, number of partner sites and entities, resulting applied research projects, balance of student and faculty mobility and exchange, recruitment for graduate academic programs, workshop implementation, and CONEX event collaboration. Based upon successful programming between U.S. and Australia in years 1-3 of NIUVT Global, expansion of efforts to include other AUKUS allies in future programs would be included in future proposals.

D. Rough Order of Magnitude (ROM)

This three-year project will leverage prior and current support of NIUVT to engage approximately 100 students, faculty, and industry professionals from the U.S. along with a similar cohort from Australia, for a total anticipated cost of $1.6 million. This includes $100,000 to administer the program and indirect costs of 61%. A broad breakdown of projects tasks, schedule, costs, number of U.S. participants, and approximate funding level are provided in Table 1. Additional funding through participation in national and international grants will also be sought to leverage and further expand these efforts.

Table 1: Project Schedule

Task	Year 1			Year 2			Year 3			No. U.S. Participants	Approx. Level Funding
1: Program Development										15	$120,000
2: Student Mobility										25	$360,000
3: Research Exploration										45	$285,000
4: Concept Development										15	$120,000
									Admin. & Overhead	--	$640,000
									TOTAL	100	$1,600,000

References

AUKUS Working Group. (2022, April 06). AUKUS Working Group Issues Statement as New Details of the Trilateral Defense Alliance Emerge. *AUKUS Working Group: Courntney/Gallagher/Kilmer/Moore*, pp. 1-2.

Courtney, J. (2022, April 01). Reps. Courtney, Gallagher, Kilmer, and Moore Announce Formation of the New Bipartisan AUKUS Working Group, in Support of the Undersea Alliance Between the U.S., U.K., and Australia. *Seapower & Projection Forces Subcommittee*, pp. 1-6.

Hanson, F., & Cave, D. (2021, September 20). The Real Potential of AUKUS Is about Far More Than Submarines. *Australian Strategic Policy Institute*, pp. 1-2.

Peyronnet, A. (2021). The AUKUS Security Pact: Aligning Australia's Strategy with America's Geopolitical Vision. *Fondation Mediterraneenne d'Etudes Strategiques*, 1-7.

Randev, R. (2022). Reshaping the Indo-Pacific Construct throughStrategic Convergences: AUKUS as a Harbinger of a Multipolar Hegemony in the Region. *Journal of Indo-Pacific Affairs*, 2-8.

Swanstrom, N., & Panda, J. (2021). AUKUS: Resetting European Thinking onthe Indo-Pacific? *Institute for Security and Development Policy*, 14-27.

The White House. (2022, April 05). AUKUS Leaders' Level Statemen. *The White House Briefing Room*, p. 1.

The White House. (2022). *Indo-Pacific Strategy of the United States.* Washington, DC: Executive Office of the President National Security Council.