TENTATIVE PROGRAM INFORMATION
The program information provided below is from a **DRAFT** excerpt of the O-Circuit program solicitation (PS). The information listed below (and throughout) is tentative **and subject to change** when the final solicitation is posted. **The details outlined in the official program solicitation will take precedence over any information contained in this special notice.**

Defense Advanced Research Projects Agency (DARPA)
Organoid Cytomorphic Intelligence Resulting from Convergent Understanding and Information Transfer (O-Circuit)

1. PROGRAM INFORMATION

1.1. Background

Semiconductor technology currently governs computation for all forms of information management from communications, entertainment, and transportation to finances, healthcare, and energy. While semiconductor-based computation is readily deployed in well-resourced environments, it is challenged by sustained applications in low resource, field environments (i.e., 'at the edge') due to inherent power inefficiencies. This is a particular limitation for the military when operating in austere settings, especially if trying to deploy high end artificial intelligence and machine learning (AI/ML) algorithms which have high energy demands, particularly for algorithm training/learning. New physical computing architecture paradigms could fundamentally alter our ability to create more efficient computational capabilities.

In contrast to the high-power needs of semiconductor-based computing, biological computing is a basic function of living systems that has been optimized over 3.5 billion years to efficiently interrogate the environment, process information, and perform useful activities (Sense-Compute-Action). Biological neural architectures achieve their extraordinary efficiency through natural molecular parallelism, conducting trillions of biological reactions simultaneously to minimize energy usage (the human brain as a whole consumes only ~20 Watts, representing orders of magnitude difference in energy requirements as compared to digital processing). In addition, biology can self-assemble, self-repair, and excels at generalizable, adaptable learning.

Neuromorphic computing attempts to emulate biological neural computations and has made impressive advances yet is still limited compared to biological computation. Notably, neuromorphic computing is limited in how closely it can mimic neural architectures, how well the biological computations that are being emulated are understood, by challenges of scale, and by the need to embed biological functionality in nonbiological mediums. Rather than attempting to emulate neural computing *in silico*, it may be possible to directly leverage biological neurons to engineer highly energy efficient biological processing units (BPUs) for specific computational purposes.

While such BPUs for advanced computations have previously been theorized, they are becoming realizable. Significant interest in creating alternatives to animal research and building better model systems for therapeutics development and neuroscience research have motivated recent advances in neural cell culturing and more complex organoids, assembloids, and connectoids. Studies have also shown that neural cell cultures are capable of basic computational functions when given structured information as an input (e.g., playing 'Pong', classifying input patterns). However, such demonstrations have been limited to relatively simple tasks and do not retain performance over time (i.e., 'computational memory'). It is hypothesized that the low complexity of the neural cultures

relative to brains of mammals or even insects may be a major impediment and, perhaps, using more biologically relevant and complex architectures in BPUs could significantly increase their capabilities.

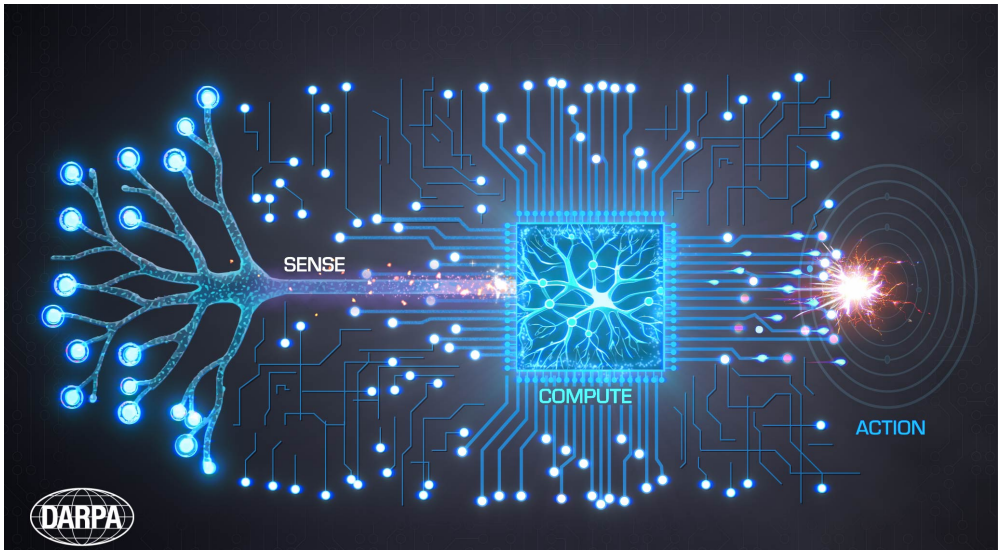
This program will create BPU architectures that are capable of learning to interact with dynamic, simulated and real-world environments, and retain this learning over multiple days. BPUs will be assessed in simulated game environments, and, when integrated with biological receptors and a drone platform, real-world environments to detect, identify, and autonomously locate volatilized chemical odorants.

This Program Solicitation (PS) calls specifically for Abstracts to be submitted by **May 11, 2026, 5:00 PM (Eastern Time)**. Abstracts will be reviewed by the Government; if selected, the proposer will be asked to provide an Oral Proposal Package. Oral Proposal Packages will be reviewed by the Government, and if selected, may result in an Other Transaction for Prototype Agreement.

This PS encourages solutions from all responsible sources capable of satisfying the Government's needs, including large and small businesses, *nontraditional defense contractors* as defined in 10 U.S.C. § 3014, and *research institutions* as defined in 15 U.S.C. § 638.

1.2. Program Description/Scope

The O-Circuit program is a 42 month, three-Phase, effort that seeks to build BPUs capable of learning retention and integrated Sense-Compute-Action functions. The program will enable unconventional biological computation to not only augment traditional *in silico* methods for computing and sensing, but also out-perform them in austere or electronically contested edge environments.



O-Circuit consists of two Task Areas (TA). Abstracts for both TA1 and TA2 are sought in response to this PS, and proposers are encouraged to submit to either TA1 or TA2. Only Phases 1 and 2 are being solicited at this time. In Phase 3 of the program, select performers under TA1 and TA2 will potentially combine to form an integrated superteam (see **Section 1.6**). Offerors may submit a proposal addressing both TAs, but it should be exceptionally strong in both areas and still accommodate potential integration in Phase 3.

1.2.1. Task Area 1 (TA1): Architecture

Under TA1, performers will develop novel BPUs that have the capacity to learn more complex functions and retain this learning as compared to state-of-the-art (SOA) BPU systems. Proposals must clearly describe the means by which they will revolutionize and improve BPU computational learning and memory. Such approaches could include (but are not limited to): creating complex BPU architectures (e.g., organoids and assembloids) that integrate memory, reward, and/or learning neural circuits inspired by naturally occurring brain regions; enhancing the BPU synaptic connectivity and plasticity by optimizing cell composition and ratios; and tuning metabolic processes with genetic modification and/or pharmacology. Novel ideas for creating effective BPU architectures are encouraged, with the above examples simply provided for illustrative purposes. In all cases, proposals must include clear rationales for why their proposed techniques will dramatically improve BPU computational learning and memory capabilities. These rationales should include both the conceptual basis of the improvement (e.g., the cell biology and/or neural architecture that is inducing or maintaining useful plasticity and learning), as well as estimates on how much improvement may be expected from the proposed mechanisms. Proposals will clearly lay out plans for how the computational learning and memory capabilities of the BPU constructs will be characterized, both at the cellular and functional levels. In addition to these physical characterizations, proposals will also include how their BPU will be immersed in a closed-loop virtual (e.g. video game) task for assessing task-based computational learning and memory capabilities.

The planned programmatic virtual test environment will be based on Ms. Pac-Man (see **Section 1.6**), which has been previously validated relative to both human capabilities and conventional *in silico* machine learning algorithms. Proposals should address how their BPUs will interface with the test environment, but proposals do not need to discuss the development of the test environment itself as it will be provided by the Government Test and Evaluation team (see **Section 1.8**). Proposals may suggest alternative environments to Ms. Pac-Man, but must clearly describe the benefits, and how the environment can be used to assess learning and memory capabilities relative to conventional *in silico* techniques using equivalent performance metrics to a Ms. Pac-Man paradigm (see **Section 1.6**). Note that human subjects research (HSR) is not part of this PS, including for collecting HSR data related to human baseline video game play.

Proposals should provide conceptual or quantitative justification for why the proposed BPU architecture, structure, and test environment training strategy has the potential for significantly improving computational learning and memory capabilities. Proposers are encouraged to describe approaches on how they plan to effectively quantify learning. Some examples include: how quickly one or multiple behaviors can be adopted in the environment (e.g., one-shot or zero-shot learning feasibility, how many training samples are necessary); learning generalization between states; and direct encoding of a behavior into predetermined biology circuits versus supporting gradual reinforcing of a function into a generalized neural architecture. These examples are illustrative only and proposers are encouraged to provide novel approaches.

Proposers should consider the timelines necessary for creating and maintaining cells, organoids, and assembloid structures to enable iterative testing of BPUs. Clear strategies, such as combinatorial and/or parallel iterating and testing approaches, that support sufficient design/build/test/learn cycles to quantify progress relative to the Phase 1 Milestones should be proposed (**Table 2)**.

1.2.2. Task Area Two (TA2): Action

Under TA2, performers will develop biological 'wetware' architectures that can integrate a BPU with a biological odorant sensor array and drone-based navigation platform to enable a biological Sense-Compute-Action system. Proposals will include an odorant sensor array that is fully biological (e.g., using heterologous expressed olfactory receptors or olfactory receptor neurons) and tailored to respond to a custom panel of odorants. Proposals will include an odorant panel selected for ease of use but also operational relevance, such as association with industrial manufacturing (see **Section 1.6** for additional details regarding the odorant panel).

Proposers are encouraged to submit novel integrated biological sensor array/BPU solutions capable of responding to a diverse odorant panel. These strategies may include, but are not limited to, heterologous expression of olfactory receptors in BPU or bioengineered components, integration of olfactory sensory neurons or olfactory tissues into BPUs, or generation of olfactory sensory organoids. Proposers may consider leveraging olfactory receptors and/or olfactory organs from various species and/or developing synthetic receptors with engineered binding sites to generate arrays with suitable receptive and dynamic ranges for combinatorial coding and extensible/expandable sensing capacity. Biology-inspired solutions for concentrating odorants at the detection interface may also be proposed. Biological sensor arrays may be integrated with the BPU biologically or through an electronic interface. Proposals should provide theoretical or quantitative justification for why the proposed odorant sensor array and BPU design has the potential for detecting a wide range of odorants and localizing an odorant source.

Proposals will describe how their BPU integrates with the odorant sensor array with sufficient complexity such that the BPU system can navigate a drone to the location of a target odorant source within a designated time window (see **Section 1.6**). Some level of *in silico* signal processing/decoding can be used as part of the Sense-Compute-Action processing pipeline and should be specified. However, given the O-Circuit goal of maximizing the energy efficiency benefits of biological processing, proposals that *maximize biological processing* and *minimize conventional in silico computing* (for both TA1 and TA2) will be favored.

The Test and Evaluation (T&E) team will provide the make and model of an aerial and a ground drone system with at least 10 lb cargo capacities that performers will use for the end of Phase Capability Demonstrations at the T&E site (see **Section 1.5.5**). Proposals can include the use of performer drone systems (either commercially modified or custom built) in addition to the T&E specified system as part of their development strategy, however, only the T&E specified system will be used during the end of Phase Capability Demonstrations. The T&E team will provide the specific makes and models of the drones at or before the first month of the program.

Animal Subject Research (ASR) is within scope of this effort if strategies involve the acquisition and use of relevant biological materials. Performers who will be conducting ASR must plan for initial approvals of experimental protocols by their Institutional Animal Care and Use Committee (IACUC) and secondary review by the U.S. Army Medical Research & Development Command's (USAMRDC) Animal Care and Use Review Office (ACURO). No ASR can begin prior to ACURO approval. Please note recent updates to the National Defense Authorization Act (NDAA) regarding limits on painful research involving domestic dogs and cats (FY26 NDAA SEC. 732). More information about DARPA regulations on ASR can be found at:

https://www.darpa.mil/policies/human-animal-research.

1.3. Areas specifically not of interest under O-Circuit include:

- Biological processing approaches that are not centered around neural tissue (e.g., DNA computation, bacterial computation)
- Approaches that are focused on developing methods of computing that are based on/inspired by biology, but are implemented *in silico* (e.g., neuromorphic computing, memristor chips)
- Proposals in which the primary focus is on advancing neural culture interface infrastructure for its own sake (e.g., novel multielectrode arrays/MEAs, advanced organoid microfluidics) without clear rationale, testing and demonstrations that such designs will dramatically improve BPU computational learning or memory capabilities
- Proposals in which the primary focus is on advancing cellular support infrastructure (e.g., microfluidics). With that said, some work dedicated to modifying and/or advancing such technology to accomplish specific computation goals can be in scope (e.g., ensuring microfluidics are capable of supporting a chemical reward function for learning, or ensuring sufficient nutrients are available to an organoid BPU that is larger or more complex than what SOA systems can support), so long as such development is critical to support the computation capabilities that are the central focus of the proposal
- Similarly, proposals that are primarily focused on non-biological hardware research and development for the drone and sensor goals of TA2 are out of scope. While physical hardware will be necessary to achieve TA2 objectives, proposers are encouraged to leverage preexisting drone and drone navigation systems. Some degree of hardware modification and advancement may be acceptable, if this work improves integration of the hardware and wetware systems
- For TA2, approaches where the biological sensor array is not signaling through the BPU
- Approaches that leverage *in vivo* neural processing in animals or insects to accomplish computational tasks (e.g., biobot-based approaches, real-time interfacing with behaving rodents)
- Basic science research exclusively focused on advancing our understanding of neural computation

1.4. Acquisition Strategy

The Government's aim is to lower the administrative burden to entry, reduce program risk, foster competition, and have performing teams begin work faster. To facilitate this objective, the Government will use the following acquisition process for O-Circuit:

1. **Abstracts:** Through this solicitation, the Government requests each proposer to submit a single Abstract (see **Section 4.2**) in response to either TA1, TA2, or both TAs. The Government will review all submitted Abstracts for technical comprehension and ability (see **Section 4.3**). The current solicitation is only for Phase 1 and Phase 2, i.e., proposers must provide fully detailed technical and cost proposals for the Phase 1 Base effort, and Phase 2 Option. Selected proposers will be invited to provide an Oral Presentation (see **Section 4.4**) to the Government.
2. **Oral Proposal Package:** Upon the Government's request, proposers may have the opportunity to present their proposal to the DARPA program team. The Government will evaluate all Oral Proposal Packages (see **Section 4.5**) and anticipates that selected performers will be given an Other Transaction (OT) for Prototype award with a 32-month (18-month base, 14-month option) period of performance.

3. **Phase 1 Base (18 months):** Performers will develop and test novel BPU architectures and the biological Sense-Compute-Action drone systems that leverage odorant sensor arrays.
4. **Phase 2 Option (14 month):** Performers who advance to Phase 2 will refine BPU architectures and the odorant sensor arrays to develop more advanced compute and sense capabilities. Phase 2 selection decisions are at the sole discretion of the Government and will be based on: performance against the program goals and metrics (see **Table 1 & 2**); overall progress towards program objectives such as revolutionary advances in BPU capabilities; each performer's individual programmatic objectives; and the availability of funds. The Government retains the right to award all, some, one, none, or portions of the proposed Phase 2 options to support additional technology development.
5. **Phase 3 (notionally 10 months):** Phase 3 is not currently being solicited. Notionally, BPUs developed under TA1 will be integrated into the TA2-developed Sense-Compute-Action system and the combined system tested for performance enhancements when localizing multiple odorant sources in the Gradient Descent environment (see **Table 1, Section 1.6**). Information regarding Phase 3 activities and associated costs is not required at the abstract submission stage. However, proposers invited to submit an Oral Proposal Package will need to include a rough order of magnitude (ROM) cost estimate for Phase 3. For planning purposes, further optimization of learning and memory capabilities of TA1 architectures and further enhancing TA2 odorant sensor array capabilities is not anticipated during Phase 3 (see **Table 1**). Thus, the Phase 3 ROM cost estimates will only need to be based on the core Phase 3 tasks of: integrating TA1 and TA2 systems and evaluating improved enhancements around the Gradient Descent capability demonstrations (**Table 1**). Additionally, the Phase 3 ROM will only need to reflect integration and testing costs for the portion of the Phase 3 effort that would be completed by a respective Phase 1/2 proposer team (i.e., if a proposer is submitting only for TA1 or TA2, they will only need to provide a ROM cost estimate for the Phase 3 costs associated with that same TA). More detailed instructions will be included in the OPP invitation notice.

For all phases, participation in any given phase does not guarantee funding in a subsequent phase. The process and requirements for Abstract and Oral Proposal Package submissions are detailed in **Section 2.1** of this PS.

1.5. Program Structure

O-Circuit will be executed in three Phases over 42 months (see **Figure 1**). Phase 1 (18 months) and Phase 2 (14 months) are being solicitated at this time. Instructions for Phase 3 (10 months) may be released to Phase 2 performers during Phase 2 (see **Section 2.1**). For planning purposes, Phase 1 is estimated to begin in November 2026. Phase 1 is focused on developing and testing the initial BPU cultures, with TA1 focused on BPU architectures that provide significant computational learning and memory capabilities and TA2 focusing on BPUs integrated with an odorant sensory array and a drone navigation system that provide multiplexed odorant detection capabilities and chemotaxis. In Phase 2, both TAs will refine their BPU systems to provide increased performance (e.g., improved learning and longer memory for TA1, and expanded odorant detection and accuracy for TA2, see **Table 1**). Also during Phase 1 and 2, the TA1 and TA2 performers will work with each other to identify possible teaming strategies that will support building an integrated Phase 3 effort that combines TA1 and TA2 BPUs into a single, highly capable Sense-Compute-Action system. There will need to be technical exchanges between both the TA1 and TA2 performers during Phase

1 and Phase 2 to support this team building (see **Table 2**). The Government will lead these exchanges to ensure that TA1 data sharing supports identifying clear opportunities to enhance the overall capabilities of the TA2 olfactory and drone systems, and vice versa. Non-disclosure agreements (NDAs) or Associate Contractor Agreements (ACAs) may be required to facilitate these interactions.

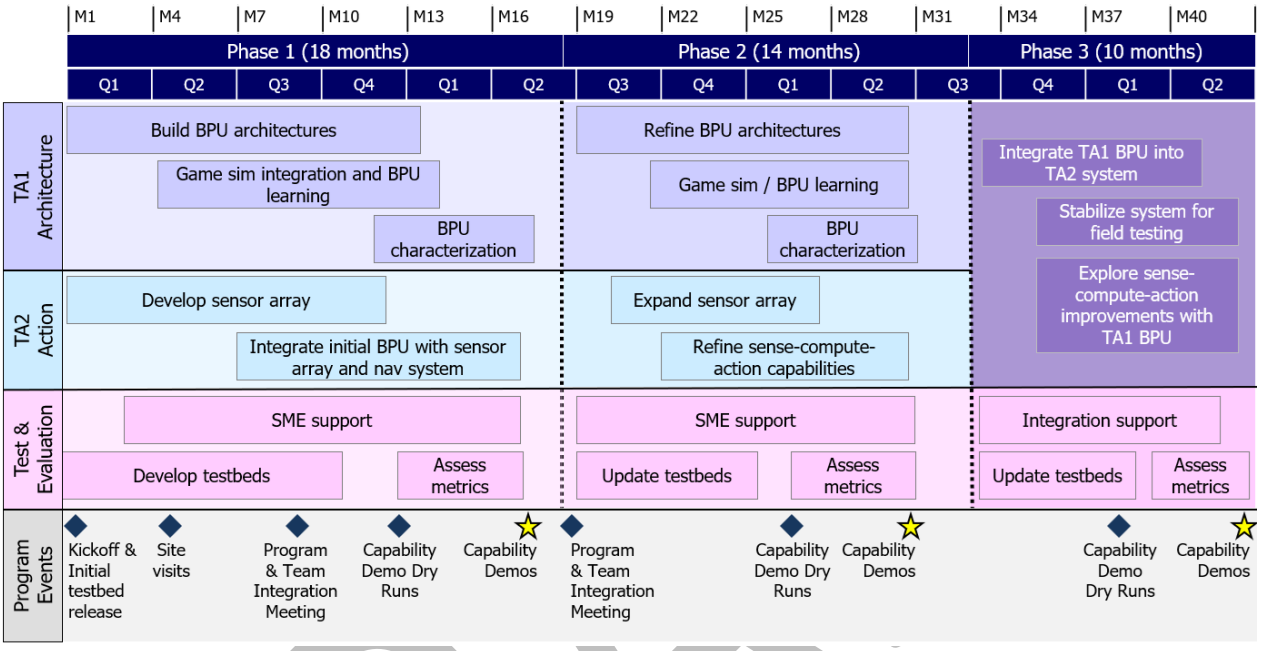


Figure 1. *Program Schedule*

1.5.1. Phase 1

In Phase 1, TA1 performers will focus on exploring new BPU architectures and quantifying their capacity for learning and memory. Neural cultures do not have learning nor memory in the traditional sense, as such, for the purposes of this solicitation *learning* is defined as the ability to receive encoded inputs describing the current state of a real or virtual environment and to produce goal-directed outputs that effectively update the environmental state. Specifically, this goal-directed information processing will involve effectively controlling the video game, 'Ms. Pac-Man'. *Computational memory* is defined as the ability of a BPU to retain this learned capability over time.

It is expected that multiple avenues by which learning and computational memory can be enhanced in BPUs will be explored by performers, such as increasing the size and complexity of neural cultures (e.g., organoids, assembloids, connectoids) by integrating neural circuits into the cultures that could provide learning, reward, or memory functions (e.g., inspired by the naturally occurring circuits in brains); providing a more robust mix of cell types (e.g., cell type combinations more likely to encourage robust synaptic communication, growth and pruning); providing well-structured reward functions (either biologically within the BPU or provided externally); novel methods of encoding information to the BPU; new mechanisms of stimulating BPU neurons (e.g., leveraging high electrode count encoding, precise electrical stimulation, optical stimulation, microfluidics and chemical stimulation); improved approaches to increase nutrient and gas exchange; and novel closed loop paradigms to reinforce behaviors.

All TA1 performing teams will use a common simulation environment to explore BPU learning

and memory improvements: a Ms. Pac-Man Atari game emulator. The T&E team will be providing, updating, and maintaining this software environment. The first release will be made available to performer teams during Month 1 of Phase 1. Additional releases may occur throughout Phase 1 (and potentially Phase 2) to refine the environment. To this end, performers should account for regularly interacting with the T&E team to provide feedback and data regarding desired updates (e.g. to support their BPU training strategies) so that the software environment can be successfully refined for program goals (note: the Government team will be the final arbitrator on what is considered a necessary update). The Ms. Pac-Man environment will also be used to conduct end-of-phase metrics assessments and Capability Demonstrations, as coordinated by the T&E team (see **Table 2** and **Section 1.8**), at the T&E site.

In Phase 1, TA2 performers will begin developing their Sense-Compute-Action systems with integrated odorant sensor arrays. The integrated system will provide sufficient neural processing (e.g., via some form of BPU) to support accurate detection of a broad panel of odorants. Odorant panels will be proposer-selected, but will include three specific odorants specified by the T&E team (see **Section 1.6**) that will be used for Capability Demonstration purposes.

The T&E team will provide each TA2 performer with information regarding the specific drone systems, aerial and ground, in Month 1 that will be used for the end of Phase Capability Demonstrations. Teams are strongly encouraged to purchase at least one such system as soon as possible in Phase 1 (approximately $50,000 per drone). If desired, TA2 performers can use different drone system(s) for their own internal development processes, but only the T&E selected systems will be available for the end of Phase Capability Demos. Due to T&E site restrictions, performers will not be able to bring their own internal drone system(s), even if the system is the one specified by T&E, to the Capability Demos. Instead, performers will be provided with a test drone by T&E. This will require performers to develop a modular olfactory enabled BPU design that can be readily moved between drone systems of the same make and model as specified by T&E.

While some degree of hardware development may be needed for effective integration of the drone(s) with the biological receptor array and with the BPU-driven navigation, proposers are encouraged to leverage existing drone platforms and technologies to avoid excessive focus on hardware development. Performers are expected to propose their own methods of collecting auditable data to validate their capabilities relative to program metrics for both TA1 and TA2. Additionally, there will be at least one opportunity prior to the end of Phase demonstration for ‘dry run’ testing at the T&E site to address logistical challenges (e.g., transportation and setting up of the TA1 and TA2 BPU systems). For planning purposes, the location can be assumed to be on the West Coast, with several days dedicated to both the dry run and the final demonstration.

1.5.2. Phase 2

In Phase 2, TA1 performers will continue refining their BPU architectures and training strategies to further increase learning and memory capacity, as captured by performance scoring targets approaching human level proficiency within the simulated environment task (see **Section 1.6**). TA2 performers will expand the capabilities of their BPU architectures and odorant sensor arrays to increase the number of odorants detected and the accuracy by which they are discriminated (see **Section 1.6**). Performers are expected to collect sufficient data at their own research sites to quantify their progress relative to program metrics, and an end of Phase Capability Demonstration administered by the T&E team will take place at the T&E test site. There will be at least one opportunity prior to the end of Phase demonstration to do ‘dry run’ testing with the T&E team in order to address logistical challenges (e.g., transportation and setting up of the BPUs). For planning

purposes, the location can be assumed to be on the West Coast, with several days dedicated to both the dry run and the final demonstration.

1.5.3. Phase 1 & 2 Program Meetings

Periodically in both Phase 1 and Phase 2, all the TA1 and TA2 performers will participate in joint program meetings (**Table 2**). These meetings will include technical exchanges in which all performers (both TAs) will share results illustrating current progress and capabilities towards program goals. Teams will also begin work in developing teaming strategies that will support the Phase 3 goal of integrating the TA1 and TA2 capabilities. While the Phase 3 strategy does not need to be finalized until the end of Phase 2, following each technical exchange, performer teams will be required to submit a short teaming strategy update report that captures their interactions with other performer teams and outlines possible teaming strategies for Phase 3 (to include both technical goals of integrating BPUs into a single system, as well as other goals such as necessary IP and data sharing considerations; see **Table 2**). These reports are expected to become more detailed with each iteration. To account for research uncertainties, there will not be a need to describe exclusive teaming privileges early in the program (i.e., it will not be necessary for one team to exclusively commit to teaming with another team(s) early in the program). During the latter stages of Phase 2, performer teams that were selected to be eligible for Phase 3 will be eligible to submit an updated joint TDD to the Government for Phase 3 in response to the specific Phase 3 guidance to be released during Phase 2. This plan will include proposed pricing structure, payment terms, data rates, intellectual property terms, etc. Team performance, readiness, and proposed Phase 3 plan will be assessed along with other solicitation requirements to determine which, if any, team will receive a Phase 3 award.

1.5.4. Phase 3 (for planning purposes: not solicited at this time)

In Phase 3, it is anticipated there will be one performer team that further refines and integrates TA1 and TA2 technologies into a single Sense-Compute-Action system. Details for Phase 3 will be released during Phase 2, but notionally the Phase 3 combined team will incorporate the best BPU advances from TA1 with the most advanced odorant sensing, drone navigation and localization system from TA2 (see **Section 1.6: Program Goals/Metrics**). It is anticipated that the Phase 3 team building will be based on the Phase 1 and Phase 2 performer technical exchange interactions. It is also anticipated that Phase 3 will not include further refinement of the TA1 BPU architectures, nor the TA2 odorant sensor arrays.

1.5.5. Capability Demonstrations

Capability Demonstrations will be held at the end of each Phase where TA1 and TA2 performer progress against the program metrics will be evaluated and compared by the T&E team. The detailed Capability Demonstration plan for Phase 1 and Phase 2 will be released by the T&E team at the program kickoff event. Notionally, the demonstrations will have performers travel with their BPU systems to the West Coast T&E site for assessment against program metrics.

1.6. Program Goals/Metrics

1.6.1. Table 1. O-Circuit Program Metrics

	Metric	Phase 1	Phase 2	Phase 3 (notional)
TA1 (Architecture)	'Ms. Pac-Man' Score	>2200	>16,000	5 min 3 odorants
	Daily Energy Consumption	10 mWh	10 mWh	

	Memory Persistence	24 hrs	72 hrs	
TA2 (Action)	Odorants (*n* @ 1 ppm)	50	100	
	Discrimination Accuracy	>70%	>90%	
	2D+ Gradient Descent (50m distance)	1 odorant	15 min 2 odorants	

1.6.2. Table 2. O-Circuit Program Milestones

Phase	Milestone (ACA*)	TA1	TA2
Phase 1	1	Kickoff Meeting ACURO submission (if applicable) T&E team releases ver 1.0 T&E Sim environment	Kickoff Meeting ACURO submission (if applicable) T&E team releases odorant test plan T&E team releases nav testing plan
	4	T&E team releases updated sim environments and test plans	
	6	-	Submit odorant panel and drone plan to T&E team
	8	Program Meeting: technical updates & developing proposed Phase 3 teaming strategies	
	10	T&E team releases of updated Capability Demonstration test plan (if applicable)	
	11	Phase 1 Interim progress report update: current status relative to program metrics and Phase 3 teaming strategy update	
	13 or 14	Dry Run (optional) at T&E Site for Capability Demonstrations	
	16	Phase 1 Capability Demonstrations (at T&E site) Data package submission for status relative to all program metrics	
	18	Phase 1 final report	
Phase 2	19	Program Meeting: Phase 2 kickoff & updated Phase 3 teaming strategies	
	25	T&E team releases updated test plans (if applicable)	
	26 or 27	Dry Run (optional) at T&E Site for Capability Demonstration	
	29	Phase 2 Interim progress report update: current status relative to program metrics and update on Phase 3 teaming strategy Phase 2 Capability Demonstration (at T&E site)	
	30	Phase 3 submissions (combined TA1 and TA2 efforts)	
	32	Phase 2 final report	
Phase 3	33	Phase 3 kickoff (virtual)	
	36	T&E team releases of updated Phase 2 Capability Demonstration test plan (if applicable)	
	38	Dry Run (optional) at T&E Site for Capability Demonstration	
	42	Phase 3 Capability Demonstration (at T&E Site) Final Program Report	

*ACA: (Month) After Contract Award

1.6.3. Phase 1 Metrics

Functional learning and computational memory of the TA1 architectures will be quantified using a common virtual simulation environment. This environment will be constructed by the T&E team to emulate the Atari arcade game, 'Ms. Pac-Man' (**Table 1**), and will be provided during the first month of the program (**Table 2**). The computational memory metric "memory persistence" will be based on measuring 'Ms. Pac-Man' performance 24 hrs (Phase 1) following the BPU training/task encoding period. Any amount of time can be used for encoding the BPU with 'Ms. Pac-Man' capabilities (i.e., the 'training' period), however, once that encoding period ends there must be a

gap of time (24 hours) at which point gameplay will be reassessed to evaluate functional memory by the score the BPU achieves. It is not required for the BPU to be entirely inactive during this gameplay gap. A gameplay score at any time following encoding/training that meets the 'Ms. Pac-Man Score' metric will be accepted even if the memory persistence metric is not met (**Table 1**). All gameplay scores must be repeatable and statistically significant against an untrained BPU.

Performers may use any number of novel strategies for constructing, training, and quantifying learning and memory in their BPU development, all of which can (but do not have to) be separate from the T&E provided virtual environment, 'Ms. Pac-Man'. Performer proposals can suggest an alternative to 'Ms. Pac-Man', but this environment has historical usefulness for comparing to human performance (random score: ~310; average human score ~16,000 given 2 hrs of training and 5 min/match) and to *in silico* ML models. As such, there must be a very clear and strong set of justifications that lay out the advantages, as well as clear basis for a set of metrics that are as challenging (or more challenging) than those delineated in **Table 1**. Any alternatives to the 'Ms Pac-Man' environment must be clearly presented in the submission abstract. The T&E simulation environment will include parameter settings that enable different levels of complexity for the 'Ms. Pac-Man' environment such that different training strategies and levels of difficulty can be used. Proposers are encouraged to suggest configurable parameters as part of their proposals so they can be considered for inclusion in the initial software environment release.

In addition to learning and computational memory, TA1 efforts will need to measure the amount of energy consumed by the BPU on a daily basis (including time periods in which the BPU is actively engaged in learning/memory tasks). Specifically it is the energy consumption of the BPU (e.g., via measuring nutrients consumed only) that is the main program metric (**Table 1**), but efforts will also be expected to report on the overall bill of materials that is used to support the BPU system (e.g., total fluids involved, life support power, etc.) to provide clarity on the overall system SWaP.

TA2 efforts will need to develop biological sensor arrays that can accurately detect a wide variety of odorants (**Table 1**). These odorants should represent agents coming from multiple chemical categories. Proposals must clearly specify which categories they are proposing and should include 4-5 categories. Examples of different categories include, but are *not* limited to, pesticide/herbicide formulations, industrial chemicals (e.g., chemicals commonly associated with refining plants to produce fuels, solvents, plastics, and paints/coatings), common household items (e.g., natural gas additives), explosives precursors (e.g., 2-ethyl-1-hexanol, ammonia) environmental odorants, and food odorants. Note: O-Circuit is an unclassified program and proposals must be consistent with that status, but proposals will consider testing odorant panels that share characteristics with operationally relevant military chemical detection.

Performers are free to choose the set of odorants they wish to test (50 for Phase 1 and a total of 100 by Phase 2) and must clearly map those odorants to their proposed categories. The T&E team will be specifying 3 odorants that all teams are required to use (thus teams will need 47 additional odorants for Phase 1 and 97 for Phase 2). There should be a minimum of 3 odorants per category. The proposed odorant receptors must be biological, but performers are otherwise encouraged to utilize a wide range of novel receptors. The receptor array must be integrated with a sufficient degree of biological processing (e.g., some form of BPU architecture) such that it can generate signatures in response to all of the different odorants. It is not necessary to validate detection of all 50 distinct odorants in a single session (e.g., tests could be run periodically over multiple days). However, it is important that the BPU system would have been configured such that all odorants are detectable when assessing performance relative to the program metrics (i.e., it is not desired to

simply show that some form of a given design can be set up to detect 10 distinct odorants with that processing then being repeated 5 times, but rather the system has been constructed such that sufficient receptors and BPU processing are in place to detect all 50). Discrimination accuracy simply represents the BPU system's ability to reproducibly detect any of the 50 odorants in its environment. However, performers are also expected to report out the data regarding the individual signatures associated with all the selected odorants. This will be important to support the Phase 2 and Phase 3 goals that involve the drone system being able to navigate appropriately when there are multiple odorants present in the environment.

TA2 teams will use their own odorant test platforms to collect sufficient data to quantify their efforts relative to program metrics. Odorants are to be volatilized at 1 ppm or lower, and the detected concentration of the odorant in the test chamber is to be reported by performers for all odorants. Additionally, for the end of Phase 1 Capability Demonstrations (**Table 2**), performers will validate their systems against an odorant test platform that will be provided by the T&E team (which will reflect some or all of the same odorants previously tested by the performers). Performers will work with the T&E team prior to the end of Phase 1 Demonstrations to develop a strategy for using the T&E team test platform with the performer receptor sensor array BPU system.

Also in Phase 1, TA2 efforts must show that their BPU architecture is capable of processing the olfactory receptor input such that it can navigate a drone to the source of a given odorant (of the 50). This target odorant will be selected by the T&E team and will be one of the 3 pre-specified T&E odorants that will be provided prior to the Oral Proposals. The BPU architecture does not need to control all aspects of the drone platform, but rather simply needs to be capable of processing the sensory inputs and outputting navigation information appropriate to the drone platform (e.g., forward/back, right/left). Proposals should include a basic description and key details of the TA2 navigation environment strategy, including what, if any, navigation is controlled by an onboard silicon processor, and how the odorant space will be searched and the source located.

Tests must involve some series of evaluations that physically locate the source when the drone is up to 50 meters from the source (**Table 1**). Performers are expected to clearly quantify the performance of their system to show its efficiency in locating the odorant source. At a minimum, tracked parameters must include the following: time elapsed, distance, path traveled, and the source location accuracy (i.e., the error distance between the actual source and the location identified by the BPU system). During Phase 1, program performers will work with the T&E team such that details of the performer test environment can be configured to better prepare them for the end of Phase Capability Demonstrations that will occur at the T&E test site. Note that the olfactory sensor array/BPU system that is used for the navigation testing must be the same as the one used for the detection of the 50 odorants.

There are no specific SWaP requirements for the TA2 BPUs and receptor arrays. However, the sensor array/BPU system must be on board the drone to satisfy the gradient descent metric. Additionally, TA1 and TA2 efforts will be expected to report on the overall bill of materials used to support the BPU system and odorant receptors to provide clarity on the overall system SWaP.

1.6.4. Phase 2 Metrics

In Phase 2, TA1 efforts will improve the learning and memory capabilities of the BPU architectures. The overall increase in learning capabilities will be assessed relative to the BPU's improved ability to interact with the simulated video game environment, i.e. improving the score to a value reflective of a human's ability to play the game following a few hours of learning. Computational memory will likewise be assessed by testing the game play capability following a longer time window (72

hours) after the end of the training period. While the capability of the BPU systems should increase, the overall energy efficiency (as measured the by the energy consumption) should remain commensurate with natural brain processing (**Table 1**). Proposals should describe the plan for improving performance in these areas (e.g., updates to the architectures, cellular compositions, updates to the training or reward regimes, etc.).

TA2 efforts in Phase 2 will focus on increasing the total number of odorants that can be detected. By the end of Phase 2, 100 odorants should be detectable (97 plus the three specified by the T&E team). As in Phase 1, there should be at least 3 odorants from 5 DoW relevant categories. Proposals must list the proposed Phase 2 odorants and categories. Proposals should delineate how these improvements are planned to be accomplished (e.g., increasing the complexity of the odorant receptor array, greater complexity to the sensory processing, etc.). Similarly, the system's ability to manipulate the drone platform to better localize an odorant source should likewise be enhanced, such that it can differentiate and navigate between two different odorants. The ability of the system to localize the odorant source should also be improved, as reflected in the distance and time traveled, as well as the error odor source location.

TA2 performers will be expected to continue to maintain their own navigation environments for capturing sufficient data to quantify status relative to program metrics, but will also be required to conduct navigation tests at the T&E site as part of the end of Phase 2 Capability Demonstrations. Performers will have multiple opportunities to interact with the T&E group throughout Phase 2 to update their own testing environments to enable better preparation for the end of Phase Capability Demonstrations.

As in Phase I, for both TAs, research plans should include reporting on the overall SWaP profile of the systems.

1.6.5. Phase 3 Metrics

Phase 3 is not being solicited as part of this PS. Details for Phase 3 may be released during Phase 2. Notionally, this phase will focus on further improving the overall BPU system Sense-Compute-Action capabilities and demonstrating that this improvement leads to an enhanced ability to quickly traverse a 3-scent gradient to identify the location of a specific source. This will require integrating the improved learning and memory capabilities from TA1 BPU architectures into odorant sensory processing or to improve the drone's navigation ability in dynamic environments, or both.

1.7. Ethical considerations

The biological computational capabilities being developed under this solicitation are intended to significantly advance the field of biocomputing but are still far removed from natural brains. However, the growing field of biological computation could raise ethical concerns. As such, proposals should include a component that highlights any key bioethics considerations that may be relevant to the specific approach being proposed. Additionally, performer teams will be required to periodically reassess/update their ethical consideration assessment throughout the program (e.g., as part of their end of Phase reporting).

1.8. T&E: Government Independent Test and Evaluation

The O-Circuit program will include an independent T&E component as part of the Government team. The T&E team (not being sought in this solicitation) will be responsible for developing the simulated game environment used for assessing BPU capabilities for TA1. They will also provide drone platforms that will be used for the end of Phase Capability Demonstrations to TA2 performers

(making details of those platforms available to performers so that matching systems can be acquired if desired), develop a TA2 odorant testbed for assessing detection accuracy for both Phase 1 and Phase 2, and develop a drone navigation, odorant detection and gradient navigation testbed. The T&E team will be responsible for developing, planning, and running the end of Phase Capability Demonstrations and for assessing all performers against program metrics. Proposals should account for data sharing and interactions with the T&E team throughout all program Phases.

2. PS AUTHORITY

This PS may result in the award of an Other Transaction (OT) for Prototype agreement, which can include not only commercially-available technologies fueled by commercial or strategic investment, but also concept demonstrations, pilots, and agile development activities that can incrementally improve commercial technologies, existing Government-owned capabilities, and/or concepts for broad defense and/or public application(s) (for example, the latter could include creating a prototype process for creating and training BPUs). The Government reserves the right to award an OT for Prototypes under 10 U.S.C. § 4022, or make no award at all. In all cases, the Government agreements officer shall have sole discretion to negotiate all agreement terms and conditions with selected offerors. The OT agreement will not require cost sharing unless the offeror is a traditional defense contractor who is not working with a non-traditional defense contractor participating in the program to a significant extent.

2.1. PS Procedure

In response to this solicitation offerors are asked to submit an **eight (8)-page abstract** as described in **Section 4.2**. This process allows DARPA to ascertain (1) whether the proposers understand the key challenges of the O-Circuit program, and (2) whether they are capable of executing a proposed concept. Specific evaluation criteria used to make the assessment can be found in **Section 4.3**. If DARPA finds that both conditions are met, it may request the offeror submit an Oral Proposal Package (OPP) as described in **Section 4.4**, and participate in an oral presentation to DARPA, where the proposed technical solution will be evaluated. After the Oral Presentations, DARPA will make a determination as to which offerors may be awarded an OT for Prototype agreement for Phase 1 of the program (with a Phase 2 option). The Government will not pay offerors responding to this PS for the costs associated with Abstract submissions or Oral Presentations.

DARPA will use the following process to facilitate the O-Circuit source selection:

a. **Proposers Workshop:** The Program Manager will hold a Proposers Workshop on **April 10, 2026**, where he will briefly describe the program and its goals and solicit questions from the audience in real time. Where possible, the Government will provide answers in real time, and a comprehensive list of questions and answers will be provided afterward via a question and answer (Q&A) document. Participation in the Proposers Workshop is optional and is not a requirement for proposers seeking to submit an abstract. Additional details about the Proposers Day are provided in Special Notice **DARPA-SN-26-58** separate from this PS and can be accessed here: (https://sam.gov/opp/5fac31291e664f4ca05ec202d143636f/view).

b. **Program Solicitation Questions and Answers (Q&A) (Informational Only):** DARPA will host a Q&A session during the O-Circuit Proposers Workshop and will post a consolidated Q&A document. The Q&A document will be available online at http://www.darpa.mil/work-with-us/opportunities. Following the Proposers Workshop, questions can be sent to O-Circuit@darpa.mil. DARPA will respond to any relevant and/or

PS clarification question(s) prior to the final abstract due date and post consolidated Q&As at the DARPA Opportunities page (http://www.darpa.mil/work-with-us/opportunities).

c. **Abstracts (Required)**: Abstracts shall be submitted as specified in **Section 4.2** of this PS. The Government will review all submitted abstracts for technical comprehension and ability (see **Section 4.3**). Selected proposers will be invited to provide an OPP and participate in an in-person oral presentation to the Government (see **Section 4.4**). Note that *proposers must submit an abstract(s) in response to this solicitation to be considered for participation in the O-Circuit program. Proposers will not be invited to submit an OPP, provide an oral presentation, or be included in any further progression of the program without participating in the abstract phase of the solicitation.*

d. **Oral Proposal Package (OPP) (Required if selected)**: Oral presentations are anticipated to take place approximately **four weeks** after notification of selection. OPP content and format is detailed in **Section 4.4**, however the final requirements, to include templates, submittal instructions for OPPs, and proposed presentation dates for oral presentations, will be provided in the invitation to submit an OPP and participate in an oral presentation. The Government will review all OPPs, which will not be made public or provided to other proposers. For Phase 1 and Phase 2, proposers must only propose an OT for Prototype with fixed payable Payment Milestones. (Note – Payment Milestones represent a completed event and do not necessarily correspond 1:1 to the Program Milestones listed in **Table 2**. Payment Milestone schedule is based on key observable events in the critical path to accomplish program objectives. Payments are triggered by successful performance of observable technical events. Fixed payable milestones are payments based on successful completion of the milestone accomplishments agreed to in the milestone plan.

e. **Phase 1 & 2 (32 months):** DARPA will review OPPs and oral presentations to determine which proposed solution(s) sufficiently meet the evaluation criteria. Upon favorable review, and subject to the availability of funds, the Government may award an OT for Prototype under 10 U.S.C. § 4022 with fixed, payable milestones for Phase 1 (base) and Phase 2 (option) selectees. The award will be to develop BPU architectures (TA1) and/or BPU action systems (TA2) with an 18-month Base period-of-performance (Phase 1) and 14-month Phase 2 Option. DARPA anticipates issuing proposal instructions for Phase 3 to selected Phase 2 performers at approximately month 30 during Phase 2 execution. Phase 2 and optional Phase 3 may be an add to the Phase 1 OTs, but DARPA reserves the right to negotiate new OT for Prototype Projects for Phases 2 and 3.

Abstracts (result if successful: invitation to participate in Oral Presentations)

Abstracts shall be submitted as specified in **Section 4** of this PS. The Government will evaluate abstracts against the criteria stated in this PS.

It is important to note that offerors *must* submit an Abstract in response to this solicitation to be considered for participation in either TA1, TA2, or both of the O-Circuit program. Offerors will not be invited to provide an Oral Presentation, or be included in any further progression of TA1/TA2 of the program, without participating in the Abstract phase of the solicitation.

Offerors responding to this PS may be invited to further explain their proposed approach and solution via an OPP. Oral Presentations will take place approximately **four weeks** after notification from the Government that an OPP is requested. Additional instructions (to include content due date

and presentation date/time) will be provided within the official invitation to participate in oral presentations.

Awards (for Phase 1 and Phase 2 option)

DARPA will review OPPs to determine which proposed solutions sufficiently meet the evaluation criteria stated in **Section 4.4**. Upon favorable review, and subject to the availability of funds, the Government may award an OT for Prototypes under 10 U.S.C. § 4022 with fixed milestones and payments for Phase 1 selectees.

Performers selected for Phase 2 awards may be provided with instructions to submit a Phase 3 continuation proposal prior to the end of Phase 2.

3. ELIGIBILITY INFORMATION

3.1. Eligible Applicants

3.1.1. Federally Funded Research and Development Centers (FFRDC) and Government Entities

3.1.1.1. FFRDCs

FFRDCs are subject to applicable direct competition limitations and cannot propose to this PS in any capacity unless they meet the following conditions: (1) FFRDCs must clearly demonstrate, with specific details, that the proposed work, expertise, and facilities are not otherwise available from the private sector, and (2) FFRDCs must provide a letter on official letterhead from their sponsoring organization citing the specific authority establishing their eligibility to propose to Government solicitations and compete with industry, and their compliance with the associated FFRDC sponsor agreement's terms and conditions. This information is required for FFRDCs proposing to be awardees or subawardees. FFRDC proposals that do not include these elements may be deemed non-conforming and removed from consideration.

FFRDCs proposing as prime awardees must be able to accept an OT for Prototype agreement as the award instrument. FFRDCs that can only be funded through their existing sponsor contracts should not submit an abstract directly to this PS.

3.1.1.2. Government Entities

Government Entities (e.g., Government/National laboratories, military educational institutions, etc.) are subject to applicable direct competition limitations. Government entities must clearly demonstrate that the work is not otherwise available from the private sector and provide written documentation citing the specific statutory authority and contractual authority, if relevant, establishing their ability to propose to Government solicitations, and compete with industry. This information is required for Government Entities invited to submit OPPs as either awardees or subawardees.

Government Entities submitting abstracts as prime awardees must be able to accept an OT for Prototype agreement as the award instrument. Government Entities that can only be funded through their existing sponsor contracts should not submit abstracts directly to this PS.

3.1.1.3. Authority and Eligibility

At the present time, DARPA does not consider 15 U.S.C. § 3710a to be sufficient legal authority to show eligibility. While 10 U.S.C. § 4892 (formerly 10 U.S.C. § 2539b) may be the appropriate

statutory starting point for some entities, specific supporting regulatory guidance, together with evidence of agency approval, will still be required to fully establish eligibility. DARPA will consider FFRDC and Government entity eligibility submissions on a case-by-case basis; however, the burden to prove eligibility for all team members rests solely with the proposer.

3.1.2. Other Applicants

Non-U.S. organizations and/or individuals may participate to the extent that such participants comply with any necessary nondisclosure agreements, security regulations, export control laws, and other governing statutes applicable under the circumstances.

3.2. Organizational Conflicts of Interest (OCI)

Without prior approval or a waiver from the DARPA Deputy Director, a contractor cannot simultaneously provide scientific, engineering, technical assistance (SETA), advisory and assistance services (A&AS), or similar support and also be a technical performer. As part of the OPP, all members of the proposed team (including any potential subawardees or consultants) must affirm whether they (their organizations and individual team members) are providing SETA or similar support to any DARPA office(s) through an active award or subaward. All facts relevant to the existence or potential existence of Organizational Conflicts of Interest (OCI) must be disclosed in the Administrative and National Policy Requirements document, should the proposer be invited to submit an OPP.

If SETA, A&AS, or similar support is being or was provided to any DARPA office(s), the OPP must include in the Administrative and National Policy Requirements document:

- The name of the DARPA office receiving the support;
- The prime contract number;
- Identification of proposed team member (subawardee, consultant) providing the support;
- and
- An OCI mitigation plan.

Under this section of the OPP, the proposer is responsible for providing this disclosure with each OPP submitted. The disclosure must include the proposer's OCI status, and as applicable, proposed team member's OCI mitigation plan. The OCI mitigation plan must include a description of the actions the proposer has taken, or intends to take, to avoid, neutralize, or mitigate such conflict, prevent the existence of conflicting roles that might bias the proposer's judgment, and prevent the proposer from having unfair competitive advantage. Prior to the start of OPP evaluations, the Government will assess potential conflicts of interest based on the OPPs submitted. DARPA will promptly notify the proposer if any appear to exist. The Government assessment does NOT affect, offset, or mitigate the proposer's responsibility to give full notice and planned mitigation for all potential organizational conflicts.

If, in the sole opinion of the Government after full consideration of the circumstances, a proposal fails to fully disclose potential conflicts of interest and/or any identified conflict situation cannot be effectively mitigated, the OPP will be rejected without technical evaluation and withdrawn from further consideration for award.

If a prospective proposer believes a conflict of interest exists or may exist (whether organizational or otherwise) or has questions on what constitutes a conflict of interest, the proposer should send his/her

contact information and a summary of the potential conflict via the specific email address identified in this PS before time and effort are expended in preparing an OPP and mitigation plan.

4. GUIDELINES FOR ABSTRACTS, ORAL PRESENTATIONS, AND PROPOSALS

4.1. General Guidelines

a. Do not include elaborate brochures or marketing materials; only include information relevant to the submission requirements or evaluation criteria.

b. Use of a diagram(s) or figure(s) to depict the essence of the proposed solution is permitted.

c. All Abstracts, Oral Presentations, and supporting documents shall be unclassified.

d. Offerors are responsible for clearly identifying proprietary information. Submissions containing proprietary information must have the cover page and each page containing such information clearly marked with a label such as "Proprietary" or "Company Proprietary." NOTE: "Confidential" is a classification marking used to control the dissemination of U.S. Government National Security Information as dictated in Executive Order 13526 and should not be used to identify proprietary business information.

e. Questions can be sent to O-Circuit@darpa.mil by **April 24, 2026 5:00 PM (ET)**.

f. Send Abstracts to O-Circuit@darpa.mil by **May 11, 2026 5:00 PM (ET).** Files containing Controlled Unclassified Information (CUI) must be encrypted when sending over the Internet.

g. Submissions sent through other mediums, channels, or after the prescribed PS deadline will not be considered, reviewed, nor evaluated.

h. Offerors providing Abstracts that are not invited to an Oral Presentation will be notified in writing as soon as practicable.

i. Abstracts and oral presentations should inherently address all of the Heilmeier questions as described here: https://www.darpa.mil/work-with-us/heilmeier-catechism

4.2. Abstract Content

a. Abstracts should not exceed eight (8) single-sided 8.5" by 11" written pages using 12-point Times New Roman font with 1" margins all around.

b. Abstracts must include the following:

1. ***Title page*:** Offeror Name, Title, Date, Point of Contact Name, E-Mail Address, Phone, Address, CAGE Code, Phase 1 and Phase 2 ROM, and TA(s) being proposed to (The Title Page does not count against page limits).

    - The offeror shall include a statement that no people on the offeror's team work for DARPA as Scientific Engineering Technical Assistance (SETA), Advisory and Assistance Services (A&AS) or similar support services, as DARPA has a

policy prohibiting such people from working as a technical performer. Include this statement on the title page; it will NOT count as part of the total written pages limit.

2. ***Technical Understanding*:** Provide a summary of the technical goals of O-Circuit. This summary shall be stated in the offeror's own words without any "copy and paste" of this solicitation. The goal is for the offeror to demonstrate clear understanding of O-Circuit's purpose and goals. The summary shall be no more than 1-page, and is included in the eight (8) written page limit.

3. ***Technical Approach:*** Provide a summary of the technical vision for achieving the goals of the program. This includes identifying the primary risks and specific technical challenges faced in O-Circuit program and describing the proposed approach to address those challenges and meet the goals and milestones of the Phase 1 and 2 (inducing specific tasks outlined to meet the milestones). Presentation of, not just reference to, unpublished data that establishes technical feasibility of the work is welcome. This shall be no more than 5-pages, and is included in the eight (8) written page limit.

4. ***Technical Ability*:** Detail why the offeror's team and organization believes they have the ability to be successful at achieving the goals, if selected, for O-Circuit. The offeror may include past experience, organizational capabilities, team members' qualifications, or anything else that demonstrates competence in designing and executing on the O-Circuit goals. This shall be no more than 1-page, and is included in the eight (8) written page limit.

5. ***Budget Estimate:*** Please include an estimate of the total project cost including cost sharing, if applicable. The estimate should include a breakdown (by Phase) of the work by direct labor (fully burdened), labor hours, subcontracts, materials, equipment, other direct costs (e.g., travel), indirect costs, profit, cost sharing, and any other relevant costs. This may be presented as no more than a 1-page narrative or table and is included in the eight (8) written page limit.

The table below may be used for this breakdown:

Categories	Phase 1 Amount	Phase 2 Amount	Total Amount
Direct Labor (fully-burdened)			
Labor hours			
Subcontracts/Consultants			
Materials			
Equipment			
Travel			
Other Direct Costs			
Indirect Costs			
Profit			
Total			
Cost Sharing (if applicable/appropriate)			

6. ***References:*** Provide a list of citations, references, or end notes. References are not included in the page limit.

4.3. Abstracts – Process and Basis of Evaluation

Abstract evaluation criteria are listed in order of importance. Individual Abstracts will be evaluated against the evaluation criteria described below:

a. **Problem and Solution Space Comprehension**: The proposed technical understanding is accurate, key challenges and risks are identified, and a plausible strategic plan is presented for achieving program goals within the specific timelines.

b. **Execution Capability:** The offerors demonstrate an ability, if selected, to achieve the defined goals of the O-Circuit program.

c. **Cost Reasonableness:** The estimated costs align with the proposed technical scope and project plans.

Abstracts will be evaluated by DARPA using the evaluation criteria listed above. DARPA will use the evaluation criteria to assess similarities, differences, strengths, and weaknesses of the competing abstracts and, ultimately, use that assessment to determine the selection of those proposers offered the opportunity to proceed to Oral Presentations. The Government will endeavor to complete the evaluation of Abstracts within **10** business days of the closing of the submittal period. As stated above, offerors are required to submit an Abstract for evaluation by DARPA to minimize effort and reduce the potential expense of preparing an unsuccessful proposal. DARPA will respond to the Abstract with a statement as to whether DARPA is interested in seeing an oral presentation (tentatively planned as 1 hour: ~40 minutes presentation, ~20 minutes question and answer period). If DARPA is not interested in an oral presentation, it will state this in an email to the offeror. Upon review of Abstracts, the Government may elect to invite all, some, or none of the offerors to submit Oral Proposal Packages and to oral presentations. *Only Abstract offerors invited by DARPA to participate in Oral Proposal Packages are eligible to provide one.*

4.4. Oral Proposal Package Content

If DARPA expresses interest in an Oral Proposal Package, the offeror will be asked to provide a

presentation to provide further details on its proposed solution. Specific instructions (including content submission guidelines) will be provided in the invitation to participate. Tentatively, if selected, offerors can expect to be asked to provide information (for both Phase 1 and Phase 2) regarding: Team introduction/overview, Technical Approach (qualifications, description of innovations and how they will support achieving objectives/metrics, etc.), risks/mitigation plan, cost proposal, data rights, and any additional information or detail requested with respect to its Abstract. Oral presentations are anticipated to be evaluated by the O-Circuit Program Manager with support from a panel composed of Government subject matter experts (SMEs).

After completing evaluation of Oral Proposal Packages, DARPA will: 1) make a 18-month award for Phase 1 of the program (with a 14-month Phase 2 option); or 2) inform the offeror that its proposed concept/technology/solution is not of continued interest to the Government and they are no longer considered for participation in the program. If DARPA does not intend to issue an award for the Phase 1 effort to an offeror, DARPA may provide brief feedback to the offeror regarding the rationale for the decision.

5. AWARDS

5.1. General Guidelines

Upon favorable review of the proposal and subject to the availability of funds, the Government may choose to award an OT for Prototypes agreement for Phase 1 and Phase 2 option.

The Agreements Officer reserves the right to negotiate directly with the offeror on the terms and conditions prior to execution of the resulting OT agreement, including payment terms, and will execute the agreement on behalf of the Government. A copy of the draft OT agreement is attached to this PS for review. In order to speed up negotiations, offerors selected for oral presentations will be required to either attest to compliance of all OT agreement articles or note those they take exception to. Be advised, only a Government Agreements Officer has the authority to enter into, or modify, a binding agreement on behalf of the United States Government.

In order to receive an award:

a. Offerors must have a Unique Identity ID number and must register in the System for Award Management (SAM). Offerors are advised to commence SAM registration upon notification of entry to Phase 1.

b. Offerors must also register in the prescribed Government invoicing system (Wide Area Work Flow: https://wawf.eb.mil/xhtml/unauth/registration/notice.xhtml). DARPA Contracts Management Office (CMO) personnel will provide assistance to those offerors from whom a proposal is requested.

c. Offerors must be determined to be responsible by the Agreements Officer and must not be suspended or debarred from award by the Federal Government nor be prohibited by Presidential Executive Order and/or law from receiving an award.

d. Being asked to submit a proposal does not guarantee that an offeror will receive an award. The Government reserves the right not to make an award.

5.2. Controlled Unclassified Information (CUI) and Controlled Technical Information (CTI) on Non-DoD Information Systems

As of the date of publication of this solicitation, the Government expects that CUI and CTI will not be necessary, and that program goals as described herein may be met by proposed efforts for

fundamental research and nonfundamental research. Some proposed research may present a high likelihood of disclosing performance characteristics of military systems or manufacturing technologies that are unique and critical to defense. Based on the anticipated type of proposer (e.g., university or industry) and the nature of the solicited work, the Government expects that some awards will include restrictions on the resultant research that will require the awardee to seek DARPA permission before publishing any information or results relative to the program. For additional information on fundamental research, please visit www.darpa.mil/about/offices/contracts-management/proposer-general-terms.

Proposers should indicate in their proposal whether they believe the scope of the research included in their proposal is fundamental or not. While proposers should clearly explain the intended results of their research, the Government shall have sole discretion to determine whether the proposed research shall be considered fundamental and to select the award instrument type. Appropriate language will be included in resultant awards for nonfundamental research to prescribe publication requirements and other restrictions, as appropriate. This language can be found at www.darpa.mil/about/offices/contracts-management/proposer-general-terms.

For certain research projects, it may be possible that although the research to be performed by a potential awardee is non-fundamental research, its proposed subawardee's effort may be fundamental research. It is also possible that the research performed by a potential awardee is fundamental research while its proposed subawardee's effort may be non-fundamental research. In all cases, it is the potential awardee's responsibility to explain in its proposal which proposed efforts are fundamental research and why the proposed efforts should be considered fundamental research.

5.3. Representations and Certifications

All offerors are required to submit DARPA-specific representations and certifications for Prototype OT awards in order to be eligible to receive an OT award. See http://www.darpa.mil/work-with-us/reps-certs for further information on required representations and certifications for Prototype OT awards.

5.4. Competition Sensitive Information

DARPA policy is to treat all submissions as competition sensitive, and to disclose their contents only for the purpose of evaluation. Restrictive notices notwithstanding, during the evaluation process, submissions may be handled by support contractors for administrative purposes and/or to assist with technical evaluation. All DARPA support contractors performing this role are expressly prohibited from performing DARPA sponsored technical research and are bound by appropriate nondisclosure agreements. Input on technical aspects of the proposals may be solicited by DARPA from non-Government consultants/experts who are strictly bound by the appropriate non-disclosure requirements.

5.5. Intellectual Property / Data Rights

The Government will require Government purpose rights, as defined in **Section 6** of this PS, to intellectual property (IP) developed under the program.

5.6. Procurement Integrity Act (PIA)

All awards under this PS shall be treated as Federal Agency procurements for purposes of 41 U.S.C. Chapter 21. Accordingly, the PS competitive solicitation process and awards made thereof must adhere to the ethical standards required by the PIA.

6. PS DEFINITIONS

"Data" refers to recorded information, regardless of form or method of recording, which includes but is not limited to, technical data, software, mask works and trade secrets. The term does not include financial, administrative, cost, pricing or management information and does not include inventions.

"Government Purpose" means any activity in which the United States Government is a party, including cooperative agreements with international or multi-national defense organizations, or sales or transfers by the United States Government to foreign governments or international organizations. Government purposes do not include the rights to use, modify, reproduce, release, perform, display, or disclose technical data for commercial purposes or authorize others to do so.

"Government Purpose Rights" means the rights to use, duplicate, or disclose Data, in whole or in part and in any manner, for Government Purposes only, and to have or permit others to do so for Government Purposes only.

"Limited Rights" means the rights to use, modify, reproduce, release, perform, display, or disclose Data, in whole or in part, within the Government, to include Government support contractors.

"Nontraditional Defense Contractor" is defined in 10 U.S.C. § 3014 as an entity that is not currently performing and has not performed, for at least the one-year period preceding the solicitation of sources by the DoD for the procurement or transaction, any contract or subcontract for the DoD that is subject to full coverage under the cost accounting standards prescribed pursuant to 41 U.S.C. § 1502 and the regulations implementing such section. This includes all small business concerns under the criteria and size standards in 15 U.S.C. § 632 and 13 C.F.R. Part 121.

"Other Transaction" refers to the type of OT that may be awarded as a result of this PS. This type of OT is authorized by 10 U.S.C. § 4022 for prototype projects directly relevant to enhancing the mission effectiveness of military personnel and the supporting platforms, systems, components, or materials proposed to be acquired or developed by the DoD, or for theimprovement of platforms, systems, components, or materials in use by the armed forces.

"Prototype Project" is described in the DoD Other Transactions Guide (Version 1, Nov. 2018) issued by the Office of the Under Secretary of Defense for Acquisition and Sustainment: https://www.dau.edu/guidebooks/Shared%20Documents/Other%20Transactions%20(OT)%20Guide.pdf.

"Restricted Rights" applies only to noncommercial computer software and means the Government's right to use, modify, reproduce, perform, display, release disclose or transfer computer software are restricted, except that the Government may use a computer program on a limited number of computers and make the minimum number of copies of the computer software required for safekeeping (archive), backup, or modification purposes. The Government will not transfer the software outside of the Government or for any purpose other than the O-circuit program, except that the Government may allow the use of the noncommercial computer software outside of the Government under a limited set of circumstances, including use by a covered Government support contractor in performance of its covered Government support contract (management and administrative support), and after the contractor or subcontractor asserting the restriction is notified in writing as far in advance as practicable that a release or disclosure to particular contractors or subcontractor is planned to be made.

"Small Business Concerns" is defined in the Small Business Act (15 U.S.C. § 632).

7. ACRONYMS

A&AS	Advisory and Assistance Services
ACA	(Month) After Contract Award
ACURO	Animal Care and Use Review Office
AI/ML	Artificial Intelligence and Machine Learning
ASR	Animal Subjects Research
BOE	(Budget) Basis of Estimate
BPU	Biological Processing Unit
BTO	Biological Technologies Office
CTI	Controlled Technical Information
CUI	Controlled Unclassified Information
DARPA	Defense Advanced Research Projects Agency
DFARS	Defense Federal Acquisition Regulation Supplement
DoD	Department of Defense
DoW	Department of War
ET	Eastern Time
FAR	Federal Acquisition Regulation
FFRDC	Federally Funded Research and Development Center
FOIA	Freedom of Information Act
IP	Intellectual Property
MEA	Multi-Electrode Array
NDA	Non-Disclosure Agreement
NDAA	National Defense Authorization Act
OCI	Organizational Conflict of Interest
OPP	Oral Proposal Package
OT	Other Transaction
PI	Principal Investigator
PM	Program Manager
PS	Program Solicitation
SETA	Scientific Engineering Technical Assistance
SOA	State-of-the-Art
SWaP	Size, Weight, and Power
TA	Task Area
TDD	Task Description Document
T&E	Test and Evaluation
U.S.C.	United States Code