DARPA-RA-17-01 Young Faculty Award (YFA)
Topic Area (TA)
Frequently Asked Questions (FAQs)
as of 11/30/17

Topic Area 1:

1Q: What definition of simulation (virtual reality of large population vs simulation of a technology that is not yet developed) is this TA assuming, or is either OK?

1A: The specific kind of simulation or approach is left to the discretion of the proposer and their proposed solution.

Topic Area 2:

1Q: Is this topic area only soliciting proposals with an experimental component? Does it exclude proposals that are purely theoretical projects?

1A: Purely theoretical projects are not excluded. Work that is focused on the design and theoretical modeling of the properties of novel topological photonics systems is also of interest.

Topic Area 3:

4Q: Must the project include a validation step? Is DARPA still interested in computational materials science research on this TA?

4A: Some form of experimental validation is a requirement of this TA. This may be achieved by the primary institution or through collaboration as defined in the YFA solicitation. Please also note the material restrictions of this TA, as well as the requirement for data-driven, as opposed to model-driven, approaches.

3Q: Will "physical models" not be considered, or can they be a part of the approach, along with "prior knowledge and data"?

3A: DARPA cannot comment on the specific technical approach. However, for this topic, conventional computational models are of low interest. However, knowledge-based approaches (e.g., machine learning) that also leverage physical models are within scope.

2Q: Would DARPA consider within scope the development and validation of a novel approach that applies concepts of a certain established mathematical theory to materials design? AI could be used to further improve on the solutions, building on the mathematical foundations, but the majority of the work over the 2-year period would focus on assessing the feasibility of the approach itself to design improved materials.

2A: DARPA cannot comment on the specific technical approach. However, for this topic, conventional computational models are of low interest. However, knowledge-based approaches (e.g., machine learning) that also leverage physical models are within scope.

1Q: Is the TA limited to 2D-polymers only? Would larger, multi-functional lattice materials with graded, hierarchical and other design concepts be in scope, with the intent of using Additive Manufacturing to synthesize these materials and test their structural performance?

1A: The TA is limited to 2D polymers only.

Topic Area 5:

2Q: Is a research program based on optics experiments rather than Casimir force-type measurements of interest?

2A: Yes, provided the proposed research advances our understanding of the interaction between electromagnetic waves and matter, including the role vacuum fluctuations. Can optics experiments help determine how the vacuum energy density varies in the presence of matter and/or plays a role in defining fundamental properties of electromagnetic waves? We seek testable hypotheses that advance our understanding of the possibility of harnessing and/or harvesting the energy of the vacuum combined with tangible experimental plans that could verify and validate those hypotheses.

1Q: In the description it mentioned a tangible experimental plan. Does it mean that this topic area is only soliciting proposals with an experimental component? Does it exclude proposals that are purely theoretical projects?

1A: It is expected that theoretical advances are predictive in the sense that they are experimentally testable, but not that the YFA needs to personally be involved in those experiments, unless they wish to be

Topic Area 8

2Q: What types of applications for minimal plant technologies would be responsive to this TA? Can some examples be provided for the "unique DoD challenges" and "a defined environment and DoD-relevant use case" mentioned in the description?

2A: Plants are independent, ubiquitous in the environment, produce large molecules and secondary metabolites naturally, but these traits differ between species. In order to capitalize on innate positive plant traits, while limiting genomic technical bottlenecks, we challenge proposers to minimize their chosen plant species genome to the bare essentials. Rather than provide examples, we encourage proposers to identify a unique threat space that is compatible with their chosen plant species and define the environment to which their plant is compatible.

1Q: What types of biosynthetic pathways are the target for this TA (small molecules, proteins, or other)?

1A: The primary goal is to design a minimal plant. One approach could be the identification and removal nonessential genes. Once a minimal plant is verified, proposers may then choose to add a biosynthetic pathway to establish proof-of-concept. The type of biosynthetic pathway proposed should be in line with the performer-defined DoD use case, and/or meeting a unique DoD challenge, and be compatible with the chosen plant species.

Topic Area 9:

1Q: Antifouling Solutions for Large, Nonplanar Optical Surfaces. Are antifouling solutions for sensors located below the water line only of interest and if so, up to what depth range? Are sensors located above the water line in exposure to sea spray also of interest?

1A: Antifouling solutions on surfaces above the water line (spray zone) and below the water line to 3 meters depth are of interest.

Topic Area 10:

1Q: TA10 is asking for a single cell resolution (~20 microns). Is there a specific application in mind that would require that high of a resolution?

1A: There is not a specific application in mind. Rather, the goal is to reach a spatial resolution that would enable communication with a single cell and not adjacent cells. Consequently, 20 µm is a balance between the dimensions of cells and the resolution of current fabrication techniques.

Topic Area 11:

2Q: Is TA11 limited to nuclear genome or does it apply to mitochondrial DNA?

2A: No, proposers may address nuclear or organellar genome editing applications.

1Q: TA11 says DARPA is interested in in vivo technologies. Is there an interest in ex vivo technologies as well?

1A: No, ex vivo technologies are not considered of interest for a final demonstration of technology. Ex vivo or other appropriate systems could be used as an early proof of concept while working towards in vivo demonstration, but final in vivo application is a requirement of TA11.

Topic Area 12:

5Q: The topic area emphasizes "sub-micron-sized devices" and "nanolasers". According to literature convention, one laser design that can fall into either nano- or micro-laser is the photonic crystal laser (both the bandedge type and the defect type). Would photonic crystal lasers be of interest in the topic area?

5A: Yes, photonic crystal lasers are of interest provided that they meet the RA-identified objective of minimizing device footprint. Devices that are not arguably sub-micron in lateral dimensions are not of interest.

4Q: The call requests applicants to "outline paths to practical realization and real-world deployment." Do I need to identify a specific company that is interested in the research (and perhaps provide a letter of collaboration), or is the filing of a patent sufficient to satisfy this requirement?

4A: The RA does not specify requirements for outlining paths to practical realization and deployment, so neither a letter of collaboration nor a patent filing is required. Rather, proposals should identify how devices could potentially transition from being realized in basic research environments to being realized in practical environments, and how devices could potentially be deployed in real-world scenarios.

3Q: Topic 12 describes interest in sub-micron-sized optical modulators and nanoscale light emitters. Should my proposal focus on one of them, or on both modulators and light sources?

3A: DARPA seeks new innovation in high-efficiency active integrated nanophotonic devices. Of particular interest are fast small modulators, as well as high efficiency nanoscale emitters. Compelling proposals may focus on either modulators, emitters, or multiple technologies.

2Q: In Topic 12, are we expected to investigate integrated systems by combining modulators, light sources, detectors, etc. together?

2Q: While a key goal for DARPA is the demonstration of high efficiency active nanoscale devices, another stated goal is to accelerate the incorporation of nanophotonics into integrated photonic platforms. Integrated systems are not explicitly requested, but could represent one path to demonstrating how research could transition and provide practical impact to a manufacturable platform.

1Q: Are both "theory" AND "experiments" necessary for a proposal to TA12, or can proposers choose one or the other?

1A: For TA12, DARPA seeks to advance the state of the art in fieldable nanophotonics technology. As described in the call, this goal is expected to be achieved by combining theoretical studies with experimental efforts to validate innovative concepts and accelerate technology maturation. Successful proposals will include both theoretical and experimental components.

Topic Area 14:

1Q: Fentanyl is a controlled substance and therefore it is administratively difficult to work with. Would it be acceptable to develop a sensor using proxy chemicals, and later tailor the sensor to fentanyl?

1A: Yes. Please make clear in your proposal how the transition will be accomplished.

Topic Area 16:

4Q: Does DARPA anticipate that the applicant has established collaboration with a high-frequency GaN/InP foundry or identified a process to use? Or will DARPA help linking the awardee to a foundry?

4A: DARPA does not plan to help link the awardee to a foundry. Regarding the timing of the NDA with Keysight technologies, submit the full YFA proposal by the deadline including your research plan not including any proprietary data. If needed, explicitly state that amplifier performance metrics are based on transistor data which is proprietary.

3Q: Is there a requirement on the instantaneous bandwidth, i.e. minimum required modulation bandwidth a signal that can be amplified by the power amplifier?

3A: One approach to this YFA topic would be to implement a wideband amplifier as the title suggests, and in this case questions of instantaneous modulation bandwidth would be a moot point. This would be highly desirable for systems that require a broadband power amplifier to follow a wideband silicon chip that may contain the DAC and/or modulator. However, it is recognized that there could be benefits to implementing part or all of the modulator in the compound semiconductor and this YFA topic is also open to these solutions. In this case, for modulation rates, I would leave this up to proposers, however anything in the 10 - 1000 MHz would be of interest.

2Q: Please elaborate on "a peak efficiency of >50%". I assume that this means that the peak efficiency should exceed 50% over the entire 30-100 GHz bandwidth?

2A: Yes.

1Q: Is there any target requirement on the modulation that the power amplifier should support? Specifically, what are the target modulation scheme, linearity (EVM and ACPR), and modulation speed for this wideband power amplifier?

1A: There are no specific modulation requirements, however the 6 dB power back-off that is mentioned is indicative of the desire to support complex modulation schemes that typically have peak-to-average ratios of 6-8 dB. For linearity, specifically EVM, it is expected that it should be sufficient to support the chosen modulation schemes. For modulation rates, I would leave this up to proposers, however anything in the 10 - 1000 MHz would be of interest depending on the specific application.

Topic Area 17:

1Q: I believe the number given for the force-displacement characteristic [10E-08 (N-m)] refers to the energy of contraction/elongation (area under force-displacement curve of the actuator). Without further information on the size, volume or weight of the actuator I am not sure how to interpret this performance number. Could you please clarify the stated performance requirement?

1A: For clarification, we are referring to the energy of the contraction/elongation of the actuator. We have not specified a size, weight, nor volume of the actuator. However, we did specify the actuator should "have the ability to also integrate their own power supply and necessary power electronics without adversely affecting actuator performance." This later part needs to be taken into consideration to address the overall size, weight, and volume.

Topic Area 20:

6Q. Is summarization of semi-structured data, e.g., JSON format, not of interest to for Topic 20?

6A. No, it is not of interest.

5Q. Do online methods that are not explicitly summarizing data but rather speed-up queries over the data, e.g., online aggregation, qualify for Topic Area 20?

5A. No, The intent of this topic is for summarization.

4Q. The FAQ mentions "Tabular, numeric, graph data, videos, and experimental datasets" as being in the RA scope. Are any of these types of data more important than others?

4A. The intent is to address information from the data that does not have a pre-defined data model, or is not organized in a pre-defined manner.

3Q. It is often the case that data synopses for a specific query are more efficient (in time and space) than general-purpose ones. Are there specific queries you are interested in executing over the data summaries?

3A. We do not want to constrain the types of queries a priori and would like the proposer to suggest what types of queries would be possible with the proposed method. In the proposal, describing the types of queries and providing a specific example the method can query is encouraged.

2Q: TA20, "seeks development of technologies to summarize large non-textual datasets." Which kind of non-textual data is referred to here?

2A: Tabular, numeric, graph data, videos, and experimental datasets would all fall in scope.

1Q: Is research on summarization and visualization of big biological data (genomics, transcriptomics, etc.) relevant for this topic, or should the proposed research be applicable to both biological and non-biological contexts?

1A: Yes, summarization and visualization of big biological datasets are relevant. Generalization to non-biological contexts is also of interest, but it is not required.

Topic Area 21:

2Q: Are there specific operational scenarios, environments, performance metrics, sensors, or autonomous systems specifically of interest to TA21?

2A: The preference is not to limit the topic by biasing towards any specific mission, performance metrics, sensors, or platforms.

1Q: Is TA21 more interested in theoretical advances or practical demonstrations, i.e., what is the expected Technology Readiness Level (TRL)?

1A: The preference is not to tie the topic down to a specific TRL. Of interest are theoretical advances in which the utility can be demonstrated in simulations of "reasonable" fidelity. Live demonstrations are not needed, nor is a high-fidelity simulation. TRL is not expected to be high.

Topic 24

1Q: Topic 24 states “Techniques may assume limited a priori models of a target site (e.g., street geometry but not vehicle placement) and will need to perform precise localization in three dimensions with respect to elements of the scene”? Is the “vehicle placement” referring to the UAVs to be controlled, or the enemy vehicles we are trying to identify and locate?

1A: “Vehicle” in this instance, refers to any third party vehicle in the scene - not the UAV to be controlled. The limited a priori models of the scene will contain the major elements, such as buildings, but will not contain minor or movable items, such as cars or dumpsters. The UAV will need to be able to locate itself in the scene and avoid collisions with fixed or mobile obstacles. Also, please note that the topic is not about locating and identifying other vehicles (ground or air), it is about developing stealthy behaviors (e.g., hide, be quiet, go low or fast, select a low probability of detection route, etc.) that would allow crossing a scene without being detected, and employing them in a reactive manner exploiting the terrain or unmapped elements within it.