DARPA-RA-18-02 Young Faculty Award (YFA)
Topic Area (TA)
Frequently Asked Questions (FAQs)
as of 11/09/18

Topic Area 1:

1Q:What are the spatial and temporal scale of interest? E.g., is there a rough-order-of-magnitude (ROM) of the size of the underwater vehicle(s) of interest, and the duration over which vehicle is to stay underwater?

1A: We are interested in technologies that may be applicable across the portfolio of DoD underwater vehicles, implying that this ranges from 6" diameter up to submarines.

2Q: Is the primary focus on a single independent vehicle or are teams multiple cooperative vehicles of interest?

2A: The primary focus is to develop solutions for a single independent vehicle, but if solutions require multiple vehicles then we will consider them.

3Q: Is the focus on the development of new sensor hardware or on the use of off-the-shelf sensors? Is there a preference for active or passive sensors? If active sensors are to be considered, are there ROM estimates of the power available?

3A: The focus is on development of new sensor hardware. There is no preference for active vs passive sensors. However, realistic space, weight, and power concerns should be taken into consideration relative to the host platforms.

4Q: Are there ROMs for the desired positioning accuracy and/or drift?

4A: Positioning accuracy should be comparable to that found in nature - marine organisms are able to return to spawning sites with accuracy on the order of 10s of meters. The notion of drift is an artifact of engineered systems and not germane to the designs envisioned. In general, the ability to localize should be sufficient to understand position without GPS fix, bottom lock, or feature recognition after multiple months submerged. The envisioned research will be a departure from classical positioning sensors, and may not be evaluated by the same metrics as off-the-shelf sensor systems.

5Q: Is the presence of an acoustic positioning system such as the planned POSYDON to be assumed? Or is the desired system supposed to completely independent of such positioning systems?

5A: No - research is aimed at developing independent systems.

6Q: Are there specific planning tasks of interest, e.g. "go from A to B," or "localize a source," etc?

6A: No, though these may be proposed as demonstrations of concept.

7Q: Is bathymetric data presumed available?

7A: No

Topic Area 2:

1Q: Is DARPA interested in submissions that focus on prophylactic immunity, methods to boost immune response, and ways to identify biomarkers that do not include bioelectronics or neuromodulation, or are those touchstones of this topic area?

1A: Yes, DARPA would be interested in prophylactic immunity as well as the capability to identify biomarkers that indicate that prophylactic immunity has been achieved. Additionally, DARPA would be interested in other unconventional means to boost immunity that still engage the peripheral or central nervous system to achieve an enhanced immune response.

Topic Area 4:

1Q: Is one of the goals of TA 4 to speed up protein synthesis?

1A: Yes, one of the goals of this topic is to develop method/tools/technology to speed up protein synthesis.

2Q: Is there a particular category or family of proteins that you are looking to affect?

2A: It is up to the proposer to propose what proteins are affected by their approach however preference will be given to an approach that is agnostic to the category or family of protein.

Topic Area 6:

1Q: For Topic 6, does "team" refer to human-only teams or human-machine teams?

1A: This is up to the offeror, as both can be of interest. However, justification for either/both should be provided.

2Q: Is there a preferred or suggested size of the team that DARPA is interested in?

2A: Size of teams is at the offeror's discretion, but issues of DOD relevance and generalizability of results should be considered when justifying the proposed approach.

Teams should consist of individuals/agents working deliberately together towards a common goal and is amenable to exploring potential biological mechanisms per the topic description in the RA.

3Q: The topic mentions several factors which may be important for team performance. Do the identified biological mechanisms have to affect all of the factors mentioned in the topic description?

3A: The specific constructs to be addressed should be chosen and justified by the offeror and emphasis should be placed on identifying the plausible biological mechanisms of team performance. Again, issues of DOD relevance and generalizability should be considered.

Topic Area 7:

1Q: The RA says, "This topic is interested in examining the use of existing smart city platforms for compact, high sensitivity (~ppb-level or better), and high selectivity sensors for the detection and identification of chemical and explosive weapons of mass destruction (WMD) threats." Does this mean that the program manager is interested both in using existing platforms and also in creating new sensors, or does it mean that they're mainly interested in using existing platforms that use existing sensors?

1A: DARPA wishes to leverage as appropriate existing smart city platforms. The detectors can be existing or new, but pure individual sensor development efforts would not fulfill the intended scope of the call.

Topic Area 10:

1Q: Are information extraction techniques (for example, extracting entities and their relationships from text data) within the technical scope of TA 10?

1A: Yes

2Q: In addition to crowd sourcing and active learning, will methods leveraging weak human supervision (such as human-curated knowledge based, handwritten patterns and constraints) or other human prior knowledge be of interests to TA 10?

2A: The main interest for this topic is agents that can leverage crowds. Other methods that add to this are welcome.

Topic Area 11:

1Q: What type of malicious implants are addressed by the CLEAR topic area?

1A: Any type of modification ("implant") impacting trustworthiness is of interest.

2Q: Is it malicious circuitry in the hardware of a computer? Is it malicious firmware implants in the I/O device controllers, such as disk controllers, keyboard controllers, network controllers, and so on?

2A: A trustworthy initial system state can be presumed. If circuitry is trusted, your CLEAR proposal's system model's assumptions about what comprises mutable state would include firmware on the processor and associated controllers (e.g., those with that are attached to system busses, that can perform direct-memory access operations, etc.). If circuitry is untrusted, your CLEAR proposal's system model would assume that no pathway to the malicious circuitry is present in the trustworthy initial state and that recovery would restore that condition.

3Q:Does the scope of the CLEAR topic area include detection of malicious implants? Or is it the case that we assume that the presence of a malicious implant is confirmed, and thus need to focus only on trustworthy recovery from unknown malicious implants running on one of the computer components, i.e. specific hardware or I/O device controller?

3A: If your proposed CLEAR approach requires detection, then a detection method consistent with your recovery scheme should be proposed.

Topic Area 13:

1Q: The title of the topic says "Device-centric detection of security and privacy attacks against cellular networks". Does the "device-centric" mean you are looking for a host-based or device-based lightweight intrusion detection method? Does it mean all the work including model training and detection should be based on the device itself? Does it exclude any usage of assistance or resource beyond the devices themselves? For example, is it possible to use external resources (only as assisting roles) from other nearby devices, from mobile edge computing (MEC) servers, or from remote clouds to assist the resource-intensive model training? In this case, the detection will still be carried out on the devices and be device-centric, but the devices will use some external assistance to accelerate the detection speed and improve the detection accuracy.

1A: The intention is to have mobile devices be able to determine whether or not they can trust their cellular network (e.g. are they being attacked through the network). The approach needs to work on COTS devices; hardware modification or enhancements are out of scope. Pre-deployment processing and configuration may occur off-board. Off-

board post-deployment processing is not out of scope, but is not preferred. Justification for such processing needs to include the rationale for establishing trust, and a clear explanation of the benefits of the off-board processing.

Topic Area 14:

1Q: Given the use case of multi-user scenario, can we consider a use-case with the users spatially different but located in the same frequency channel.

1A: In general, this topic is not about beamforming. While spatial separation of users/signals is a valid technique, this TA is looking for solutions that do not involve multi-antenna techniques.

2Q: What is the range of carrier frequency, the modulated bandwidths and the frequency resolution that the instinctual RF detection and prediction logic and the RF receiver is desired to work?

2A: None of these things are specified and the topic is specifically left broad to cast a wide net and capture new technology directions that may be able to help manage interference.

3Q: Can the MuSIC/MuD algorithms be implemented using a software solution/FPGA for the scope of this project?

3A: The intent is not to literally implement MUSIC/MUD, these are simply examples of algorithms that need some training and this topic is seeking solutions that are more instinctual and need little or no training. Besides, MUSIC/MUD are implemented after the signal is digitized but this topic is focused on reducing the interference very near the front-end of the radio as stated in the BAA.

Topic Area 15:

1Q. Will computational materials designs proposals be considered, or must the proposals contain experimental aspects?

1A: It is expected that the development and demonstration of highly-efficient nonlinear integrated photonics will have an experimental component, including the fabrication and characterization of proposed components.

2Q: Are there any specific device applications or classes of materials that are of primary interest to DARPA for this grant program?

2A: While there is no specific application or class of materials that is a primary focus for this call, DARPA is interested in integrated photonics as an enabling technology for many DoD and commercial applications, including computing, communications and sensing. Proposals should specify which devices will be explored in the program, include specific quantitative device metrics for the proposed components as well as a description of the benefits to a target application.

Topic Area 16:

1Q: I would like to know a scale of devices/structures realized using the multi-functional materials. Is the Multi-functional materials for the realization of multi-functional nano, micro, or bulk structures?

~~1A: We are interested in multi-functional materials for devices and structures of all size scales, but we are currently particularly interested in structures in the range of 10 um to 10 mm.~~

1A: We are interested in multi-functional materials for devices and structures of all size scales, but we are currently particularly interested in structures in the range of 1 um to 1 mm.

2Q: In the proposal call, it specified that "Emphasis should be on synthesis and integration approaches that extend the existing list of materials common to additive manufacturing." While focusing on the materials synthesis/integration, do we need to plan to demonstrate the functionality within the scope of the proposal, as a working device? Is it better to focus on the materials?

2A: The emphasis will be on the synthesis and integration approaches but proposers should also consider how they will measure material properties. If a device makes sense to measure the material properties or illustrate the functional materials capabilities, then it should be described accordingly.

3Q: In the description, it is written that emphasis should be “synthesis and integration approaches that extend the existing list of materials common to additive manufacturing”. Which of the following examples aligns with the emphasis?
1) Additive manufacturing of one multi-functional material by covering synthesis, 3D printing, characterizations, etc.
2) Additive manufacturing of a couple of different multi-functional materials by covering synthesis, 3D printing, characterizations, etc.
3) Additive manufacturing of one multi-functional material (by covering synthesis, 3D printing, characterizations, etc.) and its application to multifunctional structures/devices through 3D printing.

3A: All three of these descriptions are valid.

Topic Area 17:

1Q: The title suggests that the focus should be on integrating IR materials on substrates with low-dislocation density. However, the description of the topic indicates that the focus should be on single-crystalline IR materials with low defect density. Indeed, the quality of the substrate is not mentioned in the description of the topic. Could you please clarify what the terms "low-dislocation density" refer to, in the title?

1A: This goal of the project is to take large area, commercially available substrates, e.g., Si, Ge, GaAs, etc. and deposit crystalline materials of military interest (e.g., HgCdTe, InAs/GaSb strained layer superlattices, etc.) whose mismatch to the underlying substrate is greater than 4%. As an example, HgCdTe and Si have a lattice mismatch of 19%. This lattice mismatch results in misfit dislocations that impact the electrical behavior of optical devices, particularly imaging devices.

2Q: The title mentions low-cost fabrication technologies but the description states the focus should be on developing growth strategies only and not on other processing techniques. Should the focus be on growth strategies only? In other words, will proposal focusing on other processes rather than growth be disqualified?

2A: This topic seeks research to reduce the dislocation density via novel growth techniques. The topic is solely interested in novel growth techniques.

3Q: Is there a target size when it comes to large-area substrate?

3A: While no substrate size is mandated for demonstrations, the research should focus on substrates that are available in diameters greater than 6 inches; however, it is acceptable to conduct the research in small sized substrates. E.g., if the ultimate starting substrate is silicon, the research could be conducted in 3-inch sizes.

4Q: Is there a desired defect density that we should target?

4A: < 10 ^5 per cm squared

5Q: Is epitaxial growth ruled out as the focus should be on low-cost fabrication technologies?

5A: Novel epitaxial growth techniques are encouraged.

Topic Area 18:

1Q: There is a reference to a “phased array” in this topic. Is scanning (off broadside) desired, required, or simply not required?

1A: Demonstration of beam forming and scanning of the planar array is required.

Topic Area 20:

1Q: Integrated analog photonics efforts could be primarily directed toward either C band (1550 nm regime) or O band (1310 nm regime). Does DARPA have any preferences for any particular band over the other? Are there any interests towards also non-telecom photonic integrated circuits? Relating to materials, is there any desired material platform (III-V, GaAs, InP vs SOI) for this TA?

1A: The C-Band would be preferred. Non-telecom photonics integrates circuits would be of interest. There is no preference on the material platform but the material platform should support the proposed circuits.

2Q. Given that DARPA is interested in non-telecom photonic integrated circuits, how is this non telecom area related to Integrated Analog Photonics?

2A: DARPA is interested in concepts that afford programmable integrated analog photonic circuits. Circuits leveraging both telecom technology and non-telecom technology will be considered.