DARPA-BAA-16-56
Reconfigurable Imaging (ReImagine)
FAQ Document
November 2, 2016

Question #1: For the TA3 Phase 3 Option, the BAA states the following on page 20: "Operation should be demonstrated in a real-time camera model that responds to feedback from their algorithms and demonstrates the full capabilities advancement demonstrated in phases 1-2". The term "Model" can mean either Virtual or Integrated. Does the above verbiage state that we would build hardware in Phase 3 option, or is this stated as still an overall virtual systematic acquisition and processing environment?
Answer: No camera hardware is expected to be developed in TA3. All validation and testing should be done in a virtual environment.

Question #2: In Table 3 of the BAA it specifies that the pixel pitch shall be $\geq$ 10 μm for phase 1 and $\geq$ 8 μm for phase 2. Is this a typo? Do you really mean $\leq$ and not $\geq$?
Answer: This is not a typo, the minimum pixel pitch is provided so that proposers can develop appropriate integration strategies. The final pitch may be larger than 8 microns.

Question #3: [*Regarding multiple requests for additional specific information regarding the Tier 1 architecture, timing, I/Os, etc.*]
Answer: No additional information regarding the Tier 1 chip is forthcoming. We understand that many additional details are required to implement the ReImagine concept. However, a primary purpose of Phase 0 is for performers to refine their design and concepts based on a detailed description of Tier 1. Where additional information is needed to develop proposal concepts, proposers are encouraged to make and clearly state assumptions based on what they would consider likely and/or desirable, building upon the description in the BAA.

Question #4: The revised BAA has confused my understanding of the digital pixel and the inter-pixel communication between the analog and digital pixel. What exactly does Tier 2 Interface -1 bidirectional digital I/O per 4x4 pixel subarray mean? [one I/O per 16 pixels?] Do you mean that there can be unidirectional communication from analog to digital tier per pixel of about 4 per pixel? But a dedicated bi-directional line is only 1 per 16 pixel? What exactly do you mean by bi-directional I/O. It is not clear how we treat unidirectional I/O from analog to digital and vice-versa.
Answer: The BAA states that "Signal inputs from the detector array to the Gen-1 IC will be composed of 4x4 arrays of digital I/O pins addressable by Tier 2, with reconfigurable routing channels to an array of (32) 8-bit registers." Per Table 1, in addition to the signal I/Os, each 4x4 array will have 1 bidirectional digital I/O for control or other uses. Thus there are a total of 17 I/Os per 4x4 array. It is not necessary to use all 16 of the signal I/Os for larger pixel size applications, and not all I/Os have to be assigned to the (32) 8-bit registers equally.

Question #5: I see that ~$20M is allocated and multiple awards will be given. To help me identify the Level of Effort and associated capability can you identify "typical" funding levels for TA3 Phase 1, 2, 3?
Answer: No.

Question #6: Can identify some representative phenomenologies / scene dynamics / characteristics that our proposed software should be able to address?

Answer: Per the BAA, "Capability advancement must be defined by proposers in terms of objectively observable, numerical metrics." We are asking you to define these capabilities.

Question #7: We are a small business. If we have an FFRDC or government agency (e.g. NASA) as a subcontractor / collaborator, do these agencies still have to submit a letter stating their eligibility to compete with industry?
Answer: Yes. Section III(A) provides guidance on the requirements for FFRDCs and government agencies.

Question #8: Should the TA3 software development plan target utilizing the technologies coming out of TA1 and TA2? Or, is it more desirable for the software to be camera agnostic (but still usable by TA1 and TS2 cameras).
Answer: Per the BAA, "TA3 will not use ReImagine hardware or software provided as GFP/Information, or developed in TA1 or TA2. Instead, TA3 efforts are expected to develop camera models in software that can explore design parameters that may guide the development of future reconfigurable sensors."

Question #9: Tier 1 and Tier 2 can address large numbers of applications. However, the detectors (Tier 3) are very specialized and limit the number of modes that can be demonstrated. Is it enough to demonstrate that the Tier1/Tier2 combo can support multiplicity of applications or does it only "count" if we perform a complete demonstration (Tier 1/Tier 2/Tier 3).
Answer: The BAA states that "a clear strategy should be provided to validate operation of the Phase 1 prototype and test the multi-function imaging capability," and further, that "Gen-2 Demonstration proposals should address the same topics as Gen 1 Demonstration proposals, and should highlight advances made between Phases 1 and 2 demonstrations." Therefore, all proposed operations should be validated by a quantitative test metric.

Question #10: Are GFE detectors available?
Answer: No.

Question #11: For the temporal mode - is the intention to offer various frame rates (including high frame rates) or is there an expectation that we do frame to frame subtraction, or both? For the spatial mode - is the intention to offer small pixels, pixel to pixel subtraction, or both?
Answer: All expectations are stated in the BAA.

Question #12: Is it OK to attach multiple small detectors (Tier 3) to Tier2 either of the same type (to increase coverage) or of multiple types (to increase application diversity).
Answer: Per the BAA, "Tier 3 will consist of a detector layer suitable for the operational purpose of the imager." We have not limited the choice of detector type in any way.

Question #13: For many detector types, the detectors cannot be offered in 10 and 8 micron pitches without substantial investment. Is it OK to offer a larger pixel pitch and smaller format?
Answer: Per the BAA, "Proposals should note where a pixel pitch larger than 10 μm will be demonstrated, and whether this is due to a constraint in the optics or detectors, or whether it is to make use of more per-pixel resources."

Question #14: As part of the government-furnished development kit, will there be hardware/software resources to capture the output datastream from the Tier 1 layer or is that left to the proposer to develop?

Answer: The test board will include resources to capture the data stream. However, the format of the data stream will depend on the unique software created by the performers. Therefore, proposers should plan to develop appropriate software for the data interface.

Question #15: How are the Tier 1 external connections (e.g. Power, High Speed Channel Interfaces) routed to the external devices? Through Tier 2 and out or does Tier 1 have specific connections? We assume that these connections need silicon connections thru Tier 2.
Answer: The BAA states that Tier 1 wafers will be provided. Beyond that, the physical implementation should be part of the proposers' 3-D integration plan.

Question #16: Contingent upon obtaining any required export approvals, would the government permit off shore foundries as a source for the Tier 1 and Tier 2 wafer fabrication?
Answer: Tier 1 will be provided as GFE. All other fabrication services needed can be obtained from any source deemed necessary by the proposer - there are no associated restrictions in the BAA regarding where such fabrication services can be obtained. As noted in the question - export control is the performer's responsibility.

Question #17: Can we propose 8 um pixel pitch for both phases, as focusing both spins on the same design maximizes the results at the end of the program? In this case we won't do phase 1 hardware demo with GEN1 but we will still have 2 shots on the analog.
Answer: Proposals should address all aspects of each phase. One exception noted in the BAA allows proposers to skip the Phase 1 Demonstration tasks.

Question #18: To keep development cost down, can we propose a solution that is detector agnostic including Tier 2 and demonstrate in vis/SWIR and offer up as an option to do MWIR and/or LWIR?
Answer: As noted in the BAA, proposers should select a detector technology that is appropriate for the application and enables relevant testing.