46Q: Are teams allowed to use cloud storage services to store ITAR/export-controlled program data?

46A: As described in BAA Section III.D.1, all TA 1 proposals indicating Controlled Unclassified Information (CUI) requirements must include a draft CUI protection plan detailing how CUI will be protected at performer sites as well as at subcontractor locations. Cloud storage solutions must therefore be certified for storing CUI information (i.e., compliant with NIST SP 800-171 per DFARS 252.204-7012).

45Q: It is reasonable to assume that the 'virtual sensors' are 'image processing or machine learning algorithms (to be proposed by the performers)' that convert the measured ground truth infrared image data (using for example 3rd Gen FLIR for TA1) or simulated ground truth infrared image data (based on a novel measurement sensor to be designed for TA2) into either 3D point clouds or 3D scene reconstructed images?

45A: Performers may use virtual sensing modeling to characterize and predict performance of their own sensors before creating physical systems.

This is distinct from the Virtual Tradespace Exploration task, which will develop advanced techniques for quantifying, visualizing, and understanding the tradespace of 3D vision performance as a function of environment and sensor specifications. A specific technology proposed under TA 1 or TA 2 will fit inside this tradespace, but the tradespace itself is expected to be much larger. The Virtual Tradespace must help illuminate the fundamental limits that physics imposes on the problem and the space of possible approaches, apart from any specific approaches proposed to either TA 1 or TA 2. Please see BAA Section I.F.3 for a detailed description of this task.

44Q: Given the impeding proposal due date, do you folks have an estimate on when you will be planning on providing feedback on submitted abstracts?

44A: All abstract feedback letters have been sent out as of 5/27/2020. Please note, the FAQ deadline has been extended to June 10, 2020 and the full proposal submission deadline has been extended to June 24, 2020.

43Q: The BAA states "proposers should account... for the necessary costs to accept, store, and use [petabytes] of data." Given that 1PB of storage has budgetarily significant costs per month,
can DARPA specify when and how proposers should anticipate delivery? The costs of storing 3PB of data for 18 months (in Phase 1) would be very different from storing 1PB of data for the first 6 months, 2PB for the next 6 months, and 3PB for the last 6 months.

43A: For purposes of estimating costs, please assume teams will receive 10 TB of data delivered at the beginning of every quarter in Phase 1 and 50 TB of data delivered at the beginning of every quarter in Phase 2.

42Q: In the BAA section G, above table 3: "Proposers are required [emphasis added] to provide a similar chart [similar to table 3] listing detailed performance metrics for their system that support all of the vehicle speeds listed below." Is this chart required as part of the proposal or as a deliverable as a result of the research effort? Thanks.

42A: Table 3 shows an example set of performance metrics assuming a LIDAR-like approach. A similar table is required as part of the proposal. The table must list metrics that are appropriate to your particular technology, and indicate how you expect them to support the given vehicle speeds once your technology is developed.

41Q: How important is developing a system with low size, weight, or power (SWaP)?

41A: The primary goals of the Invisible Headlights program are to 1) understand the useful information contained in ambient thermal emissions, and 2) enable passive 3D vision for autonomous navigation. Ideally, proposed technologies should be able fit onto a vehicle for testing in Phase 3, and show potential for SWaP reduction in the future. Proposers should not compromise their ability to answer the key scientific questions in order to optimize their systems for SWaP considerations.

40Q: How should proposers allocate their proposed effort between Phase 1 and Phase 2?

40A: The level of funding for individual awards made under this BAA will depend on the quality of the proposals received and the availability of funds. Based on the required milestones and deliverables outlined in the BAA, DARPA anticipates that for most teams Phase 1 costs will be significantly lower than Phase 2 costs.

39Q: Is there any other metadata (e.g. IMU outputs from the moving platform) that will accompany the thermal-Lidar data?

39A: Proposers are encouraged to indicate in their proposals what kinds of ground truth data would best enable their research and at which stage in the program they would need such data. Capturing vehicle pose data is a possibility for new data set collections, but may not be available for data already collected.

38Q: Will there be any semantic labels provided for the thermal images to facilitate training of semantic segmentation – or would we have to generate these ourselves?
38A: Given that DARPA reserves the right to determine which data requirements and requests will be collected and supplied to performer teams as GFI, it is reasonable to include annotation costs in the proposal. DARPA would request that performers share their annotations with other teams to avoid duplication of effort.

37Q: Will they be supplying RGB images in addition to thermal images? If so will these be generated under any form of illumination (especially for night-time, caves, etc.)

37A: The ground truth database will grow over time, comprising data sets that are already available plus newly captured data. Proposers are encouraged to indicate in their proposals what kinds of ground truth data would best enable their research and at which stage in the program they would need such data. Collecting RGB images is a possibility. These data are/will be collected at a variety of locations and conditions. The goal for the program is for sensors to perform under extremely low contrast situations without external illumination.

36Q: We are a foreign non-profit organization. Can we use a local TIN (European Union) number instead of a US number? As we don’t currently have any operations in the US we don’t have a US TIN number either.

36A: Please see Section III of the BAA for Foreign Participation or contact the Federal Service Desk for assistance with registration in System for Award Management (SAM).

35Q: I was wondering what was the timeline to hear feedback about our proposal abstract? Time is short for the full proposal deadline, and I want to make sure we get the efficiency advantage of hearing back from you about whether you think our ideas are useful to you or not.

35A: While it is DARPA policy to attempt to reply to abstracts within thirty calendar days, proposers to this solicitation may anticipate a response within approximately three weeks. These official notifications will be sent via email to the Technical POC and/or Administrative POC identified on the abstract coversheet.

34Q: The Cost Proposal Spreadsheet requests that costs associated to Virtual Tradespace work be broken out from the other phase costs. Is that the only breakdown of costs required? Are we required to break the costs down by tasks?

34A: The proposal should contain a clear statement of work (SOW) that outlines the tasks to be performed. The task structure must be consistent across the proposed Schedule, Statement of Work, and Cost Volume. Please see Attachments E and F of the Cost Volume – Attachment F specifies to “Create a Task sheet for each proposed Task,” describing costs for that individual task. Work on the Virtual Tradespace is expected to be a task, but will not be the only task.
33Q: In the Proposal Template Volume 1 - Tech and Management, can you confirm that the Proposal Summary, item b Discussion should be a narrative description within the technical volume? Does it count toward the page count? Are you looking for an executive summary?

33A: Per Attachment D Volume 1: Technical and Management Volume – the Proposal Summary Slide does NOT count toward the 25 page limit and includes the following instruction on page 3 – Using the Proposal Summary Slide template provided as an attachment to the BAA, provide a summary in PowerPoint that effectively and succinctly conveys the main objective, key innovations, expected impact, and other unique aspects of the proposed project. Include the PowerPoint slide as a separate attachment to this document.

32Q: Can the Abstract and/or BAA deadlines be moved to account for delays due to COVID-19?

32A: At this time the Government has no plans to move these deadlines.

31Q: I have a question about the DARPA slides:
If the ground truth data was collected by actual sensors, how could they be "filtered" by virtual sensors? For example if the ground truth data was collected with a bandlimited sensor, the information in that frequency band is already gone, and there is no way to simulate the output of a virtual sensor whose band exceeds that of the sensor that was used to create the ground truth. Can you elaborate exactly how you plan to collect ground truth database?

31A: DARPA will collect data using a set of state-of-the-art sensors that are too large, too expensive, and too slow to use for autonomous driving. The database is expected to contain high spatial resolution, many spectral bands, and polarimetry data, all referenced to the 3D world. Performers must analyze this data to help illuminate the fundamental limits that physics imposes on the problem, and use it to define the space of possible approaches.

However, the questioner is correct that virtual sensors will definitely not be able to “filter” the ground truth database in a way that increases its fundamental spectral/information content. Virtual sensors can, however, reduce the number of spectral bands and the corresponding information content in order to probe how an imperfect sensor would see a particular scene. The Government team will work to create the most useful ground truth database possible, and will take performer input into account during that process.

30Q: Within the RFP and Phase I Template, there is conflicting statement about including a ROM & POP for Phase III.

RFP Page 8:
Proposers should also provide a Rough Order of Magnitude (ROM) for Phase 3 including ROM costs, a draft statement of work (SOW), and any additional information on anticipated program plans. Proposals that do not address these Phase 3 goals may be deemed nonconforming.

From the Phase I Template

[Provide a cost estimate for resources (e.g., labor, materials) and any subawardees over Phases 1 and 2 of INVISIBLE HEADLIGHTS (Base + Option 1), broken down by Government Fiscal Year. Do not include cost and schedule for Phase 3.]

Please advise which one is correct.

30A: Both statements are correct. Performers should provide a detailed cost estimate for Phases 1 and 2, and rough-order-of-magnitude (ROM) costs for Phase 3.

29Q: For TA 2, does Phase 1 consist purely of paper studies and algorithm development associated with the tradespace exploration, or would it be appropriate to also be doing experiment design & testing during that phase?

29A: TA 2 will focus on creating completely new types of sensors capable of measurement hyperdiversity. All TA 2 teams are expected to perform experimental design and testing during Phase 1. In order to successfully fulfill the Phase 1, TA 2 scaling milestone listed in Table 2, page 17 of the BAA, performers should take measurements from experimental systems, and extrapolate out from these measurements what performance will be possible by the end of the program.

28Q: In the BAA, TA 1 focuses on "Near-Term Passive 3D Vision". Can you describe more exactly what qualifies as "passive" in this case? Presumably if someone were only a few meters from a moving vehicle, the presence of the vehicle will be indicated by many observables (engine noise, vibration, thermal signature, cloud of dust, etc.) Would a proposed solution be considered responsive to the BAA if emissions from the proposed ranging system are not detectable beyond the range where the vehicle would otherwise be obviously detectable due to other observable factors? In this situation, could a system be considered "passive" even if it were in fact emitting *some* infrared radiation?

28A: The preferred approach for Invisible Headlights is a completely passive system. DARPA will consider solutions that employ extremely hard to detect active illumination. However, every team is required to fulfill all Virtual Tradespace Exploration milestones and goals. The primary goal of the Virtual Tradespace Exploration is to develop a quantitative understanding of the information contained in ambient thermal emissions, coupled with quantitative insight into what types of completely passive sensors can effectively exploit that information.

27Q: How many awards are anticipated?

27A: DARPA anticipates one or more awards in Technical Area 1 and one or more awards in Technical Area 2.
26Q: What is the total size of the program in $M?
   26A: DARPA is not releasing the total funding of the program. The level of funding for
   individual awards will depend on the quality of the proposals received and the
   availability of funds.

25Q: How can I be automatically alerted of announcements related to this program?
   25A: DARPA is not aware of any method for interested parties to be automatically
   notified of new announcements.

24Q: Where can I find the FAQ page in general?
   24A: FAQs are posted to the DARPA Opportunities page: http://www.darpa.mil/work-
   with-us/opportunities. (You may need to navigate to the second or third page to see the
   Invisible Headlights section.)

23Q: The response to FAQ #8 indicates the attachments list as updated in Mod 1. When will
   Mod 1 be made available? Specifically, PROPOSAL TEMPLATE VOLUME 2 COST
   VOLUME is missing.
   23A: Amendment one will be posted soon.

22Q: If TA1 performers have or buy/build unique sensor systems, will the government team
   include those performer sensor systems in government-run ground truth data collections?
   22A: After the start of the program, the Government T&E Team will work with
   performer(s) to optimize the Government Furnished Information (GFI) collected to
   maximize the chances of program success. DARPA reserves the right to determine
   which data requirements and requests will be collected and supplied to performer teams
   as GFI. Therefore, proposals should include the costs necessary to perform performers'
   own data collection in the event that DARPA cannot include their sensor(s) into data
   collection.

21Q: Are TA1 performers expected to buy/build prototypes of the sensor systems they plan to
   investigate during phase 1 and/or phase 2, or will the government be providing all needed data
   sets?
   21A: TA 1 will focus on modifying and extending existing sensors and developing
   related processing and perception techniques to enable passive 3D vision for autonomous
   navigation. DARPA does not currently have plans to provide Government-Furnished
   Equipment (GFE) on this program.
20Q: BAA Page 19, in "Demonstrations and Experiments," the BAA says that proposers should assume that one experiment will occur at either Twentynine Palms or Ft. AP Hill. For planning purposes, in which phase should we anticipate the experiment to occur?

20A: For Technical Area 1, the exact location of Government-Site Demonstrations for Phase 1 or Phase 2 has not been chosen. Proposals should choose a location for each Phase and estimate reasonable costs.

19Q: BAA page 9. GFI database: When during phase 1 should we plan to receive the first data set to be used in the virtual trade space?

19A: DARPA currently plans to release an initial data set at program kickoff. More data will be released at intervals during Phase 1, but the schedule for this is not finalized.

18Q: A related question is if there are companies making IR cameras interested in working with proposers on TA1? It will be the best if we can get direct readout data from the camera, and also work with the company to do the modification.

18A: DARPA cannot specifically help with teaming, and has not identified a list of equipment vendors relevant to this program.

17Q: Is it possible to acquire Gen 3 FLIR or similar mentioned in your talk, or the program can arrange such a camera for TA1 research? We are interested in proposing a TA1 project, and will modify the existing camera to accomplish our goals.

17A: DARPA will provide a Government-Furnished Information (GFI) database as described in Section 1.E of the BAA. DARPA does not currently have plans to provide Government-Furnished Equipment (GFE) on this program. Proposers should describe all equipment that is required to execute the effort, and describe the associated costs as detailed in Section IV.B.2 of the BAA.

16Q: Are there any expectations for (and/or limits on) the number of team members? Alternatively, is there an expectation for typical award size?

16A: Successfully completing all program goals, for either TA1 or TA2, is expected to require a multi-disciplinary team. However, there are no minimum or maximum team sizes. No information has been provided on the size of potential awards.

15Q: Can you give me feedback on my specific idea? [Description of idea follows]

15A: We are not providing technical feedback outside of the formal abstract and FAQ process, and are not engaging in technical discussions with potential proposers outside of this process.

14Q: Is active illumination within the scope of the program if it appears like a black-body radiation for an outside observer?
14A: The preferred approach for Invisible Headlights is a completely passive system. DARPA will consider solutions that employ extremely hard to detect active illumination. However, every team is required to fulfill all Virtual Tradespace Exploration milestones and goals. The primary goal of the Virtual Tradespace Exploration is to develop a quantitative understanding of the information contained in ambient thermal emissions, coupled with quantitative insight into what types of completely passive sensors can effectively exploit that information.

13Q: Can you provide a link to view the archived Webcast?
13A: The webcast can be reached through a link on the DARPA Opportunities web site. Alternately, the direct link is:  
https://www.youtube.com/playlist?list=PL6wMum5UsYvZOSXwzz9HcdCrdzS7LgAh

12Q: If I submit an abstract to TA 1 individually, and *if you like the ideas*, will you help me connect with a potential team? Can I submit an entire proposal individually?
12A: DARPA cannot specifically help with teaming, or hold individual discussions with potential proposers outside the formal Abstract process. Collaborative efforts/teams are strongly encouraged, especially considering the multidisciplinary nature of the expected research. The Proposers Day contact list can be emailed upon request.

11Q: On the example given on the second paragraph of the TA 2 discussion on page 11, you show how measuring 1000 spectral channels and two polarization modes on each pixel would yield $10^{12}$ measurement rate. In that example are you implying that all 1000 spectral channels and both polarization modes would have to be measured simultaneously? Or would one be able sequentially measure the 1000 spectral channels and two polarization modes as long as the scene does not change during the sequential measurements?
11A: The example is for illustrative purposes only and does not represent a recommended approach. However, in that example, all 1000 spectral channels are measured for each polarization incident on each of 1 million pixels every 500th of a second. Again, that example is only meant to illustrate how to count the number of measurements per second; it is neither a proscribed nor a prohibited approach.

10Q: On page 10 of the BAA it states: "Performer(s) in TA 1 are not required to tie their approach to increased measurement diversity (i.e., measuring more colors, spatial modes, and polarizations); any effective technical approach that can meet the program metrics (see metrics in Section I.G) will be considered.” Does this mean that you are not interested in a method for increasing measurement diversity in TA1 or would you still consider a technology that tool a COTS/GOTS sensor and improved its measurement diversity?
10A: TA 1 will focus on modifying and extending existing sensors and developing related processing and perception techniques. DARPA is interested in all innovative
approaches to enable passive 3D vision that have the potential to meet the TA 1 metrics. DARPA will consider TA 1 solutions that increase measurement diversity as well as approaches that do not increase measurement diversity.

9Q: The FAQ says that the attendee list will be posted on the DARPA opportunities website but I did not find it there. I wonder if you can provide me with the list?
   9A: For security reasons, DARPA can no longer provide attendee or registration lists. The Proposers Day contact list can be emailed upon request.

8Q: I did not see Appendix F on the Beta Sam site. Did I miss it?
   8A: The attachments list on the SAM site was incomplete, but has now been corrected on Amendment 1.

7Q: When do you estimate the BAA will be released?
   7A: The BAA will be posted soon on the DARPA Opportunities page.

6Q: Is technology X within the scope of the program?
   6A: Please see the BAA for detailed information about what is and is not in scope.

5Q: Is there any limitations on the cooling requirements for the IR sensors used? For example, is operation at cryogenic temperatures excluded, or considered unfavorable?
   5A: Different technical areas will have different requirements. Some technical areas will not exclude cryogenic temperatures. Please see the BAA for more details.

4Q: I did not attend the Proposers Day. Can you share the information from the industry day with me, including the attendee list if possible?
   4A: The attendee list will be posted on the DARPA opportunities page.

3Q: Can we have technical discussions with you before the BAA is released?
   3A: We are not currently having private technical discussions with potential performers. Please see the upcoming BAA for more details, and feel free to send specific questions to InvisibleHeadlights@darpa.mil. Responses will be posted on the BAA FAQ pages.

2Q: Where the 6-th power of vehicle speed comes from?
   2A: Initial Government Team modeling led to this example of vehicle speed / 3D-vision scaling. We will not be sharing these models. Proposers are encouraged to consider what scaling rules they believe more accurately reflect physical limits on useful 3D Vision for autonomous navigation, and to explain why the example provided in the Proposers Day is inaccurate or incomplete.
1Q: Please let us know if a particular IR spectrum can be specified, such as a solution in the SWIR, or we can suggest solutions that mix SWIR/MWIR/LWIR spectra.

1A: Solutions should work in extremely dark conditions using ambient emissions only. Do not assume that external illumination, for example from starlight or moonlight, will be available. See the BAA for more details.