

Amendment Number 0001

Broad Agency Announcement 11-023

“Autonomous Persistent Tactical Surveillance”

The purpose of Amendment Number 0001 is to provide answers to questions received under BAA 11-023, entitled “Autonomous Persistent Tactical Surveillance,” and provide additional information as follows.

Q#1: Will you accept white papers that address only Item #2 from this thrust area?

A#1: Yes.

Q#2: What type of data (e.g., imagery/video) or sensor platforms will be made available for development?

A#2: Those proposed under this effort.

Q#3: Are data collections or field campaigns part of this program?

A#3: Yes.

Q#4: Will you accept multiple white papers from the same company?

A#4: Yes.

Q#5: Is there an anticipated or allocated funding split (or range) among the three Topic Areas?

A#5: The funding split will be dependent on quality/technical merit of the full proposals.

Q#6: Is there a requirement that the technology developed under Thrust Area 2 be demonstrated in a full-scale, 40 nmi x 40 nmi field demonstration at the end of the Period of Performance?

A#6: There is no requirement.

Q#7: There are likely to be significant interactions among the three thrust areas, in that design elements, interfaces and other outputs from one would feed or inform into the others. How does ONR plan to coordinate the efforts across the three thrust areas?

A#7: Via judicial use of open architectures and government ownership of the technology.

Q#8: Is there a particular mission (concept) or conop that best represents the challenge problem or mission reference for Thrust 2 - Autonomous Information-Based Surveillance Control?

A#8: It should be multi-mission capable.

Q#9: Part 1: (Scalability) How many aggregate entities (diverse body of collection assets) should the technology be anticipated to manage simultaneously (i.e. combination of vehicles, sensors, (user) command nodes, (user) data clients, data servers)?

A#9: Part 1: As deployed resources vary, you can estimate between 1 and a few dozen.

Q#9: Part 2: How many simultaneous contacts should the system expect to track?

A#9: Part 2: Tracking is not a focus of this effort.

Q#10: (C2 Operator Inputs) Are the contacts to be tracked by the system provided mainly by human operators (via interpretation of sensor data), or by automated onboard target identification routines?

A#10: Automation is the preferred methodology.

Q#11: (Representation) In the block diagram on page 6 of the solicitation, the terms "World Order Model" and "Ordered Spatial Entropy" appear to indicate a specific representation framework in information-theoretic modeling? Can you provide a reference to this methodology? Or are they being used generically in the sense that a model of entropy is a model of the level of order in a system?

A#11: We are unaware of the existence of a theoretical information model for this effort. However, we anticipate such a model, either theoretical or empirical, could be developed.

Q#12: In the language, "Recognizing and projecting information deficits and priorities based on commanders' mission requirements", can you provide some examples of commanders' mission requirements?

A#12: Yes: 1) "I need to cross bridge (A) at noon." 2) "Please locate all yellow cars crossing bridge (A) at 1300." 3) "Confirm activity at Grid Square 55, 213." These are hypothetical examples.

Q#13: Part 1: In the language, "Assigning information weights derived from multiple sources as a function of performance metrics, space and time", what is meant by "performance metrics"?

A#13: Part 1: Please see answer for Q#11. above.

Q#13: Part 2: Would it be the case that in some circumstances considering "space and time" may be unnecessary, say, for example, when the information is as a PDF on target position?

A#13: Part 2: The expectation is that the PDF can be described in space and time.

Q#14: In the language, "Optimize dynamic sensor allocation to mitigate information deficits, within sensor, vehicle, time and space constraints", what would be the manner in which these constraints would be specified? In other words, given a vehicle position p_0 (including orientation) at time t_0 , not all p_1 would be realizable at time t_1 .

A#14: The resource constraints, environments, and threats are changing over time; optimizing surveillance is an objective of this BAA.

Q#15: Part 1: In the language, "Translation of collection hypotheses into open extensible multi-UxV primitives", can you provide some examples of "collection hypotheses"?

A#15: Part 1: There are n assets capable of collecting additional information, in an optimal sense which asset or assets minimize the entropy within the information framework.

Q#15: Part 2: Can you also provide examples of "open extensible multi-UxV primitives"?

A#15: Part 2: There are many examples of UxV control primitives available via the web. We have not selected one at this time.

Q#16: In the language, "Develop algorithms for bandwidth-limited exploitation of multi-modal sensors across the distributed information space. These algorithms should provide an efficient means, in the construct of a distributed database, to store and forward content, exfiltrate highest tactical value first; reduce information flow offboard and recognize information by context.", does distributed generally refer to an objective of maximizing autonomy and minimizing bandwidth requirements for sensor connection?

A#16: No, this refers to the fact the information resides on multiple platforms in multiple data bases, in contrast to ISR systems that attempt to process all data at a single location. However, bandwidth should be used to synchronize the information with highest value first.

Q#17: With regard to multi-modal sensors, can you characterize the outputs of sensors that must be supported for this effort?

A#17: Yes, the characterization of sensor information value would be part of this BAA.

Q#18: Part 1: While our focus is currently Thrust Area 2, our approach contains architectural considerations that would fall under Thrust Area 1. Is this acceptable?

A#18: Part 1: Yes.

Q#18: Part 2: Should we mark the White Paper as touching both?

A#18: Part 2: Yes.

Q#18: Part 3: Should we consider two White Papers?

A#18: Part 3: Yes.

Q#19: The BAA's use of "entropy-based control" suggests the approach described in the MITRE paper (Ref http://www.mitre.org/work/tech_papers/tech_papers_07/07_0551/). Is this approach preferred by ONR?

A#19: Not preferred.