"Is this primarily a swarming control algorithm development project, or also swarm hardware project? The RFP implies that no hardware is involved."

"Does the solution need to focus on drone autonomy (lower-level controls) or drone swarm behavior (high-level controls)"

Phase I: Please clarify ‘design documents’: does that refer to detailed tech. approach beyond what is in the proposal?

Phase I: Proof of principle: Is it sufficient to focus on sims in 2-d for Base research and extend to 3-d in the Option part?

Phase I: What type of swarms are anticipated: ground, air, water, space?

Phase I: If air, is fixed wing, rotorcraft or both anticipated?

"Phase I: Objective 1- Adversary behavior based on sensor data:-> are stationary sensors envisaged communicating with both the hostile and friendly swarms, eg: locating hostiles’ positions and transmitting them to the friendlies?"
8. Phase I: Objective 1- Adversary behavior based on sensor data: what kind of sensors envisaged?  
   a: single mode (eg: IR, radar, etc)  
   b: multi-mode (eg: IR + radar, etc)  
   c: if multimode, do we need to consider data fusion for better/improved resolution?"  

Phase I: Objective 2- Input into friendly swarm: how many swarm elements are anticipated for hostiles & friendlies: tens, hundreds, thousands?  
   a) what is the anticipated ratio # of friendlies/ hostiles?"  

Phase I: Objective 3- Friendly swarm dynamic response to hostiles: can friendlies have on-board integrated sensors for direct acquisition of hostile swarm data or does hostile data need to be acquired by separate sensors."  

Phase I: Are targets of hostile swarm attack stationary or mobile?  

Phase I: Both friendlies and hostiles: any restriction on speed? Eg: need to stop/refuel/reevaluate?"  

Phase I: Can hostiles detect friendlies?  

Phase I: Can hostiles’ behavior be adaptive (avoid friendlies)?  

Phase I: What happens when a friendly interacts with a hostile: both destroyed?  

Phase I: How to measure/quantify the effectiveness of the encounter/interception? Destruction of hostile? Destruction of both friendly & hostile?"
1/21/2020

"Phase I: Should we design-in ‘human-in-the-loop’ capabilities (in case something goes wrong & attack modification is required)?"

1/21/2020

Do we need to address security issues (eg jamming, spoofing, etc) for drone-drone & drone-sensor for communications?

1/21/2020

What are the primary programs to which this topic is targeted?

1/21/2020

"Can you provide more information on the applications operational environment?

• How will the technology be used in the end application: is there a specific program or initiative (other than listed in the RFP, and DARPA research) that we can refer to?

• What environmental factors should the solution address explicitly, that could affect the performance of the solution? Should that be addressed in Phase I?

• Are there stringent SWAP-C or safety requirements to be addressed in Phase-I?"

1/21/2020

What do you consider the most difficult or most important technical requirement to meet?

1/21/2020

"Clarification on the Phase I deliverables –

a) ‘simple swarm pattern’:-> does this refer to hostile attackers?

   b) will it be provided?

   c) how many attackers

   d) do defenders launch from the same point?"
The topic description mentions "the threat swarm scenarios." What are these scenarios? Can you elaborate more?

Since we are expected to do counter-swarming, what are the designated properties of the "adversary swarm"? Are they just bunch of vehicles that operate in a decentralized manner? or they run a cooperative, distributed algorithm?

Do you have any preference with regard to forms/sizes of UAVs/drones? Fixed-wing? Rotary wing? VTOL? etc.

The topic calls only for simulation. I am aware of a large indoor UAS flying space, with RF shielding etc., being constructed _inter alia_ for swarm experiments. Would experimentation in such a space be in scope in Phase II?

Are you interested not only in Counter-Swarm but also Counter-Counter-Swarm? I.e., Counter-Swarm techniques will be developed not only by us but also by potential adversaries, so blue swarms ideally should behave in ways that adversarial systems find difficult to, in the words of the solicitation, "decipher" and counter.

"Your topic states ""The focus of the prototype should be the development of the algorithms that can decipher the swarm behavior of the adversary swarm, develop its own expert and effective Counter swarm algorithm and then implement its own swarm that targets the adversary swarm.""

“Does this mean develop one counter swarm algorithm or multiple?”
Does this mean that the humans involved in the R&D should develop such algorithms, or that the system itself should develop them, e.g. using Genetic Programming or other automated algorithm synthesis techniques?

If the answer to the previous question is that counter swarm algorithm development should be performed automatically by the system itself, does that mean once, in the course of the R&D, or repeatedly while deployed, in response to its characterizations of newly encountered adversarial swarms?

If the answer to the previous question is that counter swarm algorithm development should be performed repeatedly by the system itself, does that mean by a "big iron" system on the ground (in territory controlled by blue forces), which would then upload the dynamically developed algorithms to the blue force counter swarm, or by a distributed system running organically in the blue force counter swarm itself?

Is the adversary swarm assumed to be uniform, role-diverse, etc?

It could be a mix.

Please define "swarm" in this context. Is a "swarm" a small group, 2-20 agents or is a swarm >75 agents?

5-25, but with scalable up.

Does the government provide the vehicles for the field exercise or is the propose expected to purchase and maintain the vehicles?

We could provide the vehicles for the field demo.
1/2/2020

Is there a constraint on the number of sensors on the counter drones?
No.

1/2/2020

Are proximity (intercepted) and/or containment (herded) criteria for threat resolution? Meaning, is achieving desired position the objective rather than the means by which adversaries are neutralized?
Both important.

1/2/2020

Referencing objective (3), if the prototype is to 'create a swarm' to counter the adversary, are there any constraints on the counter-to-adversary agent ratio?
Preference would be n to n or m to n.

1/2/2020

"pick up on adversary swarm behavior based on sensor data" Is this a sensor on one of the counter swarm drones or a remote sensor such as satellite/radar?
Could be either or both, depending on your solution, we are open to different approaches.

1/2/2020

Are we assuming swarms of drones or missiles? Or specifically just drones?
We can't answer this question.

12/29/2019

Are there any specific types or configurations of drone swarms that should be emphasized for this study?
No.

12/29/2019

Would it be possible to address the Phase I requirements by modeling drone swarms?
You can model using your platform of choice.