SBIR Program Questions

1. **Cost template question: Is that different than the Cost volume entered directly in DSIP?**
   Yes, it is. The cost volume that DSIP uses is a very basic (four or five lines, one tab, milestones, and how much we're spending for each). SOCOM's is more detailed in saying: Who's working on it? Labor category? How many hours? Who's your primary investigator? How much is working on it? And then that goes into any needed material, any needed labor travel, subcontractors, consultants, and please, when you do, those (subcontractors and consultants) needs to be within the boundaries. So, for SBIR Phase I, there's a 2/3 rule, and for Phase II, it's 50% rule that you have to do as the small business firm. I see consistencies with other agencies - some do use the DSIP one, some use their own, and I've seen both being used. Go to SOCOM.mil, the link that is in Direct to Phase II and see if the cost volume is there. If you don't see it in the Phase I or Phase II in DSIP, I think you might have to initiate the proposal for you to see those documents.

2. **So we fill in DSIP cost proposal, and add SOCOM cost proposal as an additional attachment?**
   No, you only need to do one cost proposal. I don't know about the DSIP. If DSIP requires you to do something, then you have to do it.
   Go to SOCOM.mil, then doing business, and then SBIR on the far right, the cost volume at the bottom. The best way to do this is to right click and download instead of opening it. If it has total cost, proposal, subcontractor, consultant, then that's the right one., Much of the form auto calculates, so make sure the formula is done right.

3. **Regarding review: how much weight does company commercialization report receive? Does significant dual-use potential strength a proposal?**
   I cannot give you a weight, as in a number or color. We do evaluate it holistically and look at it. Technical is very, very important. Your company commercialization report is very important, because it tells us if you're going to develop something, and then you're not going to be able to proceed with it or not. Dual use is very important, as it tells us if you can commercialize it as well. Again, this is America's seed funds, we want to make sure that you're growing in the US Market.

4. **What is the timeline between Phase I research and getting product/technology into the hands of the warfighter?**
   This really depends on the topic itself. Some may need more development and more time, others may need less. On average, I think we've seen a Phase I to Phase III in about three years or so. We have gotten it down at as low as seventeen months between from Phase I proposal to a Phase III award, and that's really great. And for their active phase ones, it may be right after the period of performance. The one thing about SOCOM is that when we, when we look for SBIRs and STTRs, it's right out of the technical POCs office. So it's a requirement that we're looking for. And because of that, there's more opportunity for a better chance for transition. That's something to keep in mind when you're working through it. We're trying to cut

down on a time between a Phase I and a Phase II. we are working some different processes right now to see how we can improve on it.

5. **Will SOCOM TPOC help with transition opportunities?**
    Your SOCOM technical POC is a member of the program office, if not the program manager that requires this effort or this technology. They will be the ones walking that path with you. A common conversation in the SBIR/STTR community is, "Here's how it across the Valley of Death, and here is what's needed to get to transition, etc. and here are some opportunities." In SOCOM, we bridged the "valley of death" by connecting Phase I, Phase II, and Phase III very nicely through teaming you up with the program of office, the program of records or program office themselves. So, keep in good contact with them. If you are to be awarded the SBI/STTR and continue to communicate with them, they are the road to transition. If you have a prototype, that is exactly what we're looking for, then it's not going to take much for them to say, "We need this", and they will do whatever it takes to do it. Since this is an SBIR/STTR, you have that opportunity to go into Phase III without any Full and Open competition thereafter, or any additional requirements. It's good as long as we have that authority.

6. **Is there any concern about SBIR program funding being renewed by Congress by 30 September 2022? Is there any backup funding plan?**
    We have confidence that our leadership, are all working hard on this five billion dollar program, to make sure small business is growing in the U.S. They're doing their part and we have confidence that we are going to get some kind of authority at some point. In the meantime we're preparing ourselves continue on the work during the potential lapse in authority. Those three topics are going to end closer to the end of the fiscal year. So, if we don't have an authority, we will continue to do our evaluation, and whenever we have an authority we will work on the awards. They're doing their part and we have confidence that we are going to get some kind of authority at some point.

7. **Once Phase I is awarded when will the company be notified? Is there a certain date? Same question for Phase II?**
    If we have an authority, we usually try to get things done within about 30-45 days. There are a lot of dependencies for this, for example, technical evaluators, how many proposals we receive, the contract shops, workload., Phase II may take a little bit longer, because we have to read through feasibility studies that when we do our technical evaluation. Having no SBIR/STTR authority may impact the outcome. If we don't have an authority, things might be a little bit different until we have an authority.

8. **Once awarded, will there by a "help line" to assist?**
    Yes, you have several communications with the SOCOM Team Your technical POC is your person, and that person you should be communicating with at least once a month. You'll also have access to the KO, and the SOCOM SBIR/STTR team.

9. **Will Phase I be FFP?**
    I believe so.

SOFWERX

SOCOM224-007 – Topological Anomaly Detection

1. **Will the government provide any datasets for evaluation?**
   Yes and no. To begin with, we're looking for open-source data information, that should be something that is available. We can point you in the right direction, potentially, for that. But when it comes time to do a prototype effect, yes, we will be able to provide some data sets for evaluation.

2. **What constitutes an anomaly? I.e. transactions between known persons of interest, transaction amounts and recurrence, etc.**
   Yes, potentially all of that. We're looking for persons and/or institutions, anything that would be an oddity in our world. So, money movements between certain personas, also money movements or some type of data transaction between certain countries of interest. It's one of those things that needs to be able to tip and cue us to dig further into something that may not be a normal financial transaction.

3. **Are you looking to detect anomalous topologies (static subgraphs), or are you looking to detect anomalous activities (time-evolution of sub-networks)?**
   We're looking for near real-time, but also over time. We want to see trends and patterns, so we're looking for both.

4. **Will data for what constitutes normal transactions be provided?**
   Yes.

5. **Are real-world open-source and/or synthetic data sufficient for feasibility study evaluation?**
   Of course, yes. We are looking for you at this point to be able to do it with open-source information. Obviously, as this is an unclassified effort at this point, later potentially to be classified with data subsets that we provide. But for now, yes, open source is what we are looking for.

6. **Will human users be actively involved in anomaly detection processes, or will they be only consumers of completely anonymous or autonomous anomaly detection outputs?**
   They will be involved. I don't think any of us are ever at the point where humans are not going to be involved with intel. We're looking to automate that process as much as possible, and potentially cue us as to where to delve deeper.

7. **How does SOCOM plan to deal with US personal information (USPI) that inadvertently may be collected by their SBIR performers or be contained in financial data?**
   We have a standard for that. We are able to identify and scrub that information, so that shouldn't be a concern for us.

8. **Regarding data to be processed: if time series, are these multiple independent scalar time series or multi-dimensional time series?**
   We're definitely looking for both.

9. **Regarding data to be processed: will ground truth for an anomaly be provided to aid in learning?**

DEFENSEWERX

Will we provide an example of an anomaly? Yes. Once these things have been down-selected, as we go further in the process, I think we can provide an example of what we're talking about.

10. **What is a relevant (high-level) operational scenario (e.g. foreign internal defense, near-peer competition, counterterrorism, etc.)?**

    This is just a broad, generic, tactical units mission plan, with higher fidelity of players involved when entering foreign AORs. Commanders met various foreign military partners from aligned connections and associations, and in procurement look at vendors of interest to potential foreign and risky investments or involvement to include potential risk supply chains. That's just some examples what our users would look for to use your software.

    All of those things that are listed are in the wheelhouse of what SOF is required to do, especially counter-terrorism, counter-VEO, near-peer competition, internal defense, but the example we gave is probably more aligned with what we're looking for from the package.

    If you come to this from a perspective of intel packaging, we are looking specifically for being able to find the transaction anomalies that we are looking for as a packaging piece of our overall all-source information. We're looking to be able to provide based on a persona, whether that's an individual or an institution, odd things that might constitute further investigation or things that would cause us to want to potentially not be engaged with that person or a packaging in that we need to potentially look further into them by some means.

11. **Is there a specific financial data context? Start-up funding patterns from venture capital? Crypto market changes, influence?**

    Yes. We are looking at any and all currency, including crypto. Any kind of financial transactions. Not necessarily venture capital, but potentially, yes. We're going to be quite honest here and say there are certain areas of operation in the world that we are looking further into.

12. **What are your expectations about the sizes of the networks (number of personal and transaction entities)?**

    They could be pretty vast, or it could be a single entity. It all depends. As you start to look at that, you end up with kind of a spiderweb, if you will. The transaction started at one place and ended at another, but then eventually, maybe it's hot, or it's moved from entity to entity. It's scalable, because I might just be interested in one persona at a time, but eventually I'm going to be interested in the trail.

13. **Should performers assume that the vocabulary of transaction types (e.g., different resources being exchanged) exists, or should one be developed?**

    We have a schema in our financial intelligence realm, so there should be some vocabulary that is standardized that we would be able to share.

14. **What information/observables about "personals" can be assumed by performers?**

    See Question 7.

15. **For feasibility study and system design considerations what is the targeted volume and velocity of data for Phase-II/III?**
We'd have to get back with you on that one, because I can't necessarily say how much that would be. You're looking at great volumes of data in the long run for the end result of this. As far as testing and phase two, trying out a prototype, we would provide a certain set of data at some point. In the scheme of things, our end result is to be able to use this for very large amounts of data.

16. **Topological Anomaly Detection is a relatively newcomer that draws from Topological Data Analysis. Are graph analytics in general okay? Graph Neural network, etc.**
Yes, we are looking for graph analytics. The more visualization the better.

17. **How quickly does this technology need to work? Real-time? Near-real-time? Non-real-time? How often will data be ingested?**
All of the above. Real-time or near-real-time is what we're going for in the long run. If we can get ahead of the curve of something, it's to our betterment. But if there are things that over time create a pattern of analysis that we need to look into., that may not be exactly real time, but over time we start to see something surface. That's just as important.

18. **Is this opportunity open to non-US-based companies? SATIM has an office in US but headquartered in Poland. We do however, have existing NATO Contracts.**
SBIR and STTR are for US small businesses only, and the company members must also be employed within the US only. A person not employed in the US must be a US citizen or permanent resident, and because this is an ITAR topic, there's no employment of any non-US persons (US citizens or US residents). Those are the restrictions for the SIBR specifically with all its boundaries.

19. **For Phase I and Phase II, will we have access to SMEs from SOCOM?**
Yes, our program office is the one who requested this SIBR with the SIBR office, so we will be highly engaged with all the phases.

20. **Does Phase I involve the validation of a topological model by means of comparison with other state-of-the-art algorithms?**
I believe Phase 1 is just "how you would do it." It's a white paper, so we won't be able to validate it. We will have to, based on your submission, figure out if you even have the capability (from our perspective with our specialists). As you move through to the next phase and there's potentially a prototype development, that's when we would look at validating the model.

21. **Regarding data about personas: Will this be only financial/transaction data, or will there be data about people's roles in organization, travels, projects they work on, etc.?**
No, we're looking specifically for financial data. We have the capabilities to look into persons of interest in other realms.

22. **What formats are preferred for transmitting and receiving data?**
A JSON or XML is the most common format of passing data back and forth.

23. **Can you please describe the user interface you are looking for?**
We're trying to build around an open API that's compatible. We'll help you with the standards on that, but the attempt is don't build something proprietary that is unique to your company. You have to be able to share with others as well as with us. The whole idea is that you want to collaborate. Don't think of it as your system; it's a part of a bigger set of systems, a modular open-system approach.
If you are asking about the specific user interface piece, we are looking for visualization. The AIML will be potentially running in the background against the data, but we're looking for you to somehow visualize it so that it's easy for our analysts to detect or to queue toward things that are out of the norm and start to look further into it.
Somebody's going to want a way to be able to search. But I want to have a way to visualize, to be able to put that data that you search for on it in some sort of a graph and show that network, and then to share that out and export it into some sort of a format or another system, or a format to be able to visualize.
We need to be able to visualize it, but also to take that information once it's visualized, and we've honed in on something and be able to share it potentially with some other system for further analysis, or to create our full package. As long as we have some open architecture, and we're able to move data from one thing to another in our location, that's what we are looking for. But that is potentially phase two. One is just a white paper.

24. **Is a demonstration of capabilities via AI algorithm + visualization in scope for Ph1, or does that constitute a prototype which should be developed only in Ph2?**
You are correct. It should be in phase two. We're asking questions beyond phase one right now, which is fine, but phase two is more in the prototype development realm.

25. **Can you describe the difference between your objective and what Palintir offers?**
I'm not going to comment on someone else's program that's already out there and available, because that is not being developed for military in this particular SIBR. But I will say that I don't know for sure what all they offer in this realm. That is definitely something that you could contact Palintir and see if there's some differences or things that you could go after in a gap. I will tell you that in the intel world, we do not use Palintir here. That is, specifically in the Ops realm at the moment.

26. **I thought Phase I output is TRL 3? is this actually developing some algorithms?**
The phase one is a feasibility study and a final report that would come after six months, not the actual development of the code or the algorithms. The phase two is the development.

27. **Should Phase-I be primarily a literature review w/o demonstration of experiments or code development?**
Phase one results in a final report. We have a CDRL that is attached to our topic, and if not it will be on the website. The feasibility study does not include any code. It

doesn't demonstrate or do any kind of a code development. The demonstration, the prototype itself, work happens in the phase two. Phase one is six months, 1,500. That's why we're working through to see how many, and then there will be multiple awardees as well. Generally speaking, it'll be more than one.

The phase two would be the one, maybe more, and they'll be focused more on developing the system and seeing what it is, and taking it from a TRL 3, 4....all the way up to potentially 6 or 7. This is not really something that's set in stone within a policy directive, but something to put a marker on a map, if you will. Pay attention to the CDRL- I'll put the link in the chat.

28. **Can you share with us the open source datasets you have mentioned?**

Not for phase one. For the phase two, when there's a down-select and someone's proposal gets to phase two, we will then share the data sets for the prototype piece. This is just a feasibility study on whether or not you can do it and how you are going to do it.

29. **How are you going to differentiate the proposals for Ph I? If it's just a report as output, won't all companies propose to investigate temporal graphs?**

No, because it's not just "can you do this?" It's how you're going to do it and how would you do it? From a technical perspective, I want to see how your company is going to go about creating it and what resources you have available to do that. It's not just an "I'd like to be able to do this, and I'm going to make this graph." That doesn't really answer the question. How are you different from everyone else, or any kind of existing things that might be out there?

30. **Confusion around Ph1 is because we are unclear about how we should demonstrate capabilities or viability w/o any development of algorithms or software in Ph1.**

You are not demonstrating capability or viability in phase one. That is phase two. Phase one is a feasibility study, basically a white paper of sorts that says how you would do it.

31. **Oh, so proposal should address both Ph1 and Ph2 even though we will only be awarded a Ph1 contract to begin?**

Phase two is an actual prototype based off of the feasibility study. So you can address that, but you need to address how you would go about doing it, and what kind of resources you have available. Do you have specific engineers or people who have experience with creating algorithms? Those are things, like the resume submission as a part of your packets, that show, do you have that expertise? I don't think you need to develop anything at this point. That would be on you as a company what you would like to do. But we're just looking for how you are going to do it.

You've been working on some of these things, you have some of this stuff in mind, but it's obviously a lower tier out in our mind and through our research. So you want to show and some of you have already been excelling in this and say, "Oh, we're already 50% through." You can propose some of the stuff and show, "Hey, here's what we've been working on. Here's some of the things that we came up

with." Not necessarily algorithms, but more of the solution of what you came up with so far. But if you are in the beginning, which most of the proposals usually come in as, then you would say how you are going about and developing it with your expertise. "Here's what it may look like. Here's some kind of a flow chart." etc.

32. **Some topics actually forbid prototype development. Is that the case here? Or can we implement something and test on data and report on that for Phase I?**
No, we're looking for exactly what we just laid out. If you already have a prototype, maybe you're just ahead of the game. I would ask that you just explain what you have already developed in this paper, and how you would implement it with that data. As far as the prototype piece, you're welcome to show screenshots and pictures. Those are things that I am very much interested in looking at. Do you already have a product? Great. If so, show us what it is on paper.

33. **Should the final application also have the capability to "automatically" detect anomalies every time a new transaction is added to a database?**
Yes, that would be the ultimate goal, for us to take as much manpower in the middle out as possible, so that those folks can then turn around and actually do their job, which is the analysis piece of it, and being able to provide that as part of a bigger package. So yes, automatic detection is what we're eventually going for.
You will also hear the word "duplication." Can you also search to make sure we're not going to duplicate or authenticate the source? Because you'll find that you might get two or three things, probably the same person, but identified as new transactions. That's a big one, especially in large databases: de-duplication.

34. **How long are resumes allowed to be in supporting documents?**
If it's separate from your technical volume, you can do a couple of pages. I wouldn't recommend submitting a 15-page resume, which I've seen in the past, not for SBIR, but you know, keep it as if you're submitting your resume to a position-type deal.

35. **Does financial input data require language triage? Mention detection, paraphrasing, joining similar records using NLP. Is input data triaged?**
I think really what we're asking is, we're doing it the English language, and say we want to translate to Chinese, yes, you're going to have people that would like to be able to take something written in another language. You know, probably be able to translate it. But I don't think necessarily for this phase. That can be a whole other process. So it's probably a like, but not necessarily a hard requirement for phase I or II.
That's all phase two stuff. I mean, you could mention it in phase one how you would do it. But phase two is where it would be put into practice. And as far as "is input data triaged," I would expect it to be triaged, maybe using the algorithm that you develop or some process to be able to bin it however it needs to be, or to dupe it, or to prioritize it the right way is the way I would say for the input.
And one other thing to add - think about SOCOM's mission, global missions, they go all over the world. So when you say "What do I need NLP for?" it just depends on which TSOC, which part of the world they're on. So that's why we say it's got to be scalable and flexible, because if I'm in a particular part of the world, that's the

language I'm interested in, where another TSOC wouldn't care. So you know, that's why we have to be able to scale that.

36. **Are letters of support not required for D2P2 as well?**

When you say D2P2, you definitely had some experience with the Air Force, because Air Force is very creative, and I really love that about them. But, no, we don't require a letter of support, and I mentioned AFWERX because again, they have almost a billion dollars annual budget. Where mine is like not even a fraction of a percentage or something small. But they do that because they want to make sure that whatever you're submitting is actually usable by other Air Force teams or Air Force program offices, users, et cetera. But in our case, the technical POCs on the line are the ones that are going to be evaluating the submissions and working on it. They're the ones that wrote the topic. So, they don't need any support because, they are your support. So no letters of support required for direct-to-phase twos.

37. **Where do we find the SOCOM cost proposal template?**

https://www.socom.mil/SOF-ATL/Pages/sbir-22-4-PhaseII.aspx
You should be able to download it automatically once you start a proposal.

38. **What is the technical proficiency of the users we'd be delivering capability to? Do you imagine the UI having more algorithm insights or just present the answer**

As far as technical proficiency, these are intel analysts, so they have some proficiency, but they will have to be potentially trained in the in the long run, or whatever is developed right, just like everyone. To make it as much user-friendly as possible, though, like I mentioned, you know, having pictures having easy buttons to be able to get to what they need think about that. Think about, can your third grader use it? That's probably the level of pretty much anybody can use it.
But we do have, just like everywhere, we have folks that are better in technology than others. But these are intel analysts. They're all source analysts. So, they should be somewhat proficient in knowing the things that they're looking for.

As far as Ui having more algorithm insights or just present the answer:
I guess it's probably going to depend on different scenarios as to whether you would want the answer or insight, so like there's probably some things that are going to be more apparent than others. That would just say, Hey, here is someone who meets the threshold of being a person of interest, or here is an organization that has some questionable transactions. Do you want to dig into that further. So I mean, I think, that there's probably a use case for both of those. So personally, I wouldn't necessarily limit to focusing on one.

39. **Is entity resolution important? E.g., disambiguating simple data entry mistakes and/or detecting intentional deception via shell companies, etc.**

Yes, it is very important. Because we're trying to get to the truth. So, if there's ambiguous data, if there are, like we mentioned, duplicate of data, folks that we think or entities that we think are intentionally deceiving, I mean let's be honest, that's going to happen, specially in certain areas of the world. Yes, so we're looking at that as being, hey - Maybe that's a trigger of something we need to look further into. If there's something that seems a little out of the norm or something that you can't find records on from a company perspective. Those are things that we want to dig further into, so yes.

40. **Is it expected to be web-based interface?**

Yes, we do have the potential to be able to have to use this in a disconnected environment. So yes, we need to be able to have a web-based interface. We also potentially would be able to put it on a cloud somewhere for any and all users or onto another network, and so we would need to have a web-based interface for all of our disconnected, and not just disconnected, but I mean disconnected as far as folks in all areas of the world trying to get into this product. I don't necessarily want to load it on everyone's machine. I want it to be something that we can get to through a web interface and not necessarily on just unclassified, on other networks as well.

41. **What are SOCOM's plans for this topic if the SBIR program is not renewed for FY23?**

The authority for SBIR is it might be expiring by the end of this fiscal year. Our lawmakers and leaders are working through getting this reauthorized. We are confident that there will be a reauthorization. So, in the meantime, the current topic, SBIR 22.4 is going to close by the end of this fiscal year, so close to the end of September. After that we are going to continue on with our selection and evaluation and keep things going. Our plan is to be ready for whenever the authorization comes in, if it's not already, but then go ahead and award the SBIR and STTRs. We don't foresee that the program, after four years of successes, and all the building blocks that have been put into it over the past four years to just disappear. I mean I don't know what the chances of that is. I can tell you that the Department of Defense and other government agencies are taking some major steps into making sure that there's an authority that's going to come in place eventually, so I wouldn't say, Hey, what's going to happen if it doesn't get renewed.

42. **when should we assume start date should be? this is a factor for the cost proposal.**

Our process, on average, from proposal to an award, is about 102-105 days. So that would be our estimate. This is all dependent on the authorization that I just discussed. So kind of keep that in mind. If there are any delays, just keep watch on what Congress is doing and what's going to happen.

43. **What are the authentication and authorization requirements for the system?**

It gives you authority to connect to a network, because once we put you on a network, if you ask about how to do all that that's on the DoD network. We have an identity management and all that. But here's the biggest thing I always tell these

companies: DoD is very difficult to work with when you develop something. So, what we call the ATO, the RMF process, we will work with you, that probably would start more in your face, too, once we know what it is because getting accredited, and especially in SOCOM, we call it the SIE network, the SOF Information Environment. That is truly the key, and we have to do it for un-class network or secret or top secret network. But that's what will really help you. We find that there's a lot of companies that develop great software, but they haven't gone through it, and it is a very timely process. So that's one thing I always tell people. If you're gonna do that now, Government sponsors can help you, but a lot of this, your companies probably needs to hire people that understand how you do your accreditation process, because that is a big challenge for a lot of companies.

ATOs are a big deal. If they are looking at ATOs, that means they're looking at fielding this. Usually prototyping, and if they're not sure what's going to happen, then you won't be talking ATOs. But this is a big deal for your transition to a Phase III or you know the fielding of the system.

44. **Is ML explainability a strong requirement for all source analysts? Should the method provide insight (source or input ref) into how a pattern was discovered?**

So, from an auditing perspective, you would want to be able to go back in and figure out how that occurred. Right? I think anybody would. We don't just take the answer at face value. So, I think from that perspective, yeah, I mean, you may queue on something, but if the analyst is interested in the auditability of it, and wants to be able to go back and say, you know, here is what caused this to be something of interest. Yes, we would need that somewhere in the software for us to be able to look at.

When you're talking AI/ML, you're going to hear some of our analysts ask, So we use the AI/ML to create your search. Some of your searches can learn, and some can't. So just take a look at it, I'm not saying we're sure that you need both, but some customers ask, Can I create an AI or an ML algorithm that when I teach it to search, it gets smart over time, but some are just dummy search, where it learns how to identify cameras, but if there's like a different variant, you have to teach it. So just tell you that as well. There's a lot of what you do in searching, especially AI/ML, it's really about how you can teach the algorithm, how can a customer put it in so he can create a customized search using your stuff, but having it learn, or just having it do searches are two different things. Again, we can work more with you. But just wanted to point that out that you know we do definitely look at AI as a tool that enhances the user experience and makes its workflow a lot shorter, that's the whole point of that

45. **long-term, should we assume that some of the data in the network will be classified, and have the need for multiple levels of security for visualization**

Yes, of course. Yeah. We work in all levels of classification. In fact, our analysts, obviously mostly work on high levels of classification. So yes, in all honesty we are looking to be able to replicate this on multiple networks. We'd like to be able to do

some cross domain in the future between what you find in open source, and then being able to cross domain that with higher-level security data.

And in addition to that, being able to classify individual pieces of that data. So that way you can have tear line for releasability or to be able to bring that data back down after you've compared it to something and say, Okay? Well, this data is unclassified, I've pulled from unclassified, but I was able to confirm it on a T.S. source. Just because I brought it out there doesn't mean that it is T.S.: I can still pull that data down. So remember your individual attributes for certain fields of the data you want to make sure that they are able to be labeled and classified appropriately.

46. **in Ph II, will company need to have personnel with appropriate security clearances? and will SOCOM sponsor?**
Yes and yes. From a program office perspective, I don't know exactly what the SBIR does, but from my perspective I would most definitely look at, you know, being a sponsor for that, because the data itself that we may provide may be classified, so we would need to be able to do that as well,

47. **Can you please provide an example of an anomaly that would be of interest?**
For Phase II, we will work with the vendors to define based on data.

48. **Phase II will involve the development of a tool for users i expect. Will we have access to target users to evaluate usability?**
For Phase II, there will be user involvement to evaluate the prototype developed.

SOCOM224-D006 Canine In-Ear Hearing Protection Q&A

1. **Please discuss how SOCOM handles SBIR's and IP (patents).**
   According to SBIRs, or, policy directive, the company owns your intellectual properties that protect your data, your data is protected. From the proposal perspective, all the stuff is protected. There are NDAs for any evaluator, and all the data is stored, or is only within our SOF data center, our servers. It doesn't go outside of that. Also, the DSIP tool is CUI certified so that's residing in a Government system, so it's going to be protected within a data perspective. It's going to be protected in our servers which is government systems and evaluators will also be that way. From the development perspective and the contractual perspective, those are protected on the SBIR/STTR policy directives, ands that's also going to be in the OTA of the transaction that'll be used to award this contract, and it's FAR based so all that information too. OTAs, all that information will be in there. Those are the protection measures that we have.

2. **What type of radio (if used) does Canine wear for receiving commands?**
   As far as current radios, for the purposes of this that's really agnostic. Remember that the canine doesn't have to have a microphone, it's not like its two-way communication. currently, just need to be able to plug into something that will provide that input.

3. **How long is the Canine expected to wear in-ear device typically from insertion to removal maximum?**
   Normally a canine should wear that for twelve to thirty-six hours. I think it's a safe assumption. We'd say 12-24 hours for typical operational time, could be much less, but on the long side, 12-24 hours.

4. **Level of attenuation needed below 1000 Hz?**
   About 23 decibels; 23 is much better than our solution we have now. We are doing a little bit of market research looking into the civilian sector for humans, you know, some in-ear hearing protection can down close to 30 decibels. But we would say 23 would be the threshold, and then beyond, if possible.

5. **Will we test this on MPC dogs in the field?**
   We want a number of devices that will be evaluated by us. The manufacturer, the performer will not have input to the testing. They just need to provide the devices, and then we will evaluate them and return them and base our decision based on that. We all do our own internal testing that we decide on, baseline, pre and post, using whatever deliverable you guys give us, and then give feedback based on that.
   During development, end users will receive prototypes and evaluate fit and form factor on MPCs in a field environment as stated above. Vendor is responsible for providing at a minimum baseline data on attenuation and performance of the hearing protection device to demonstrate that it meets the objectives stated in the requirements.

6. **Will we need baseline hearing testing (BAER) with follow up testing after the dogs have noise exposure?**

Currently we don't think there's any plan to do baseline, hearing testing. What we plan to do is ensure that the devices bench testing will perform as advertised. For instance, they will attenuate the noise, and within those ranges without affecting noise within the other ranges that we don't want affected, and then, as far as the canine interface, we'll test form and fit, and the canine's ability to tolerate them. That should be the extent of the testing, at least in this phase. From our perspective it would be, as far as base line testing and then exposing our canine to certain sounds, that's going to be something we do in-house once we have something to test. But we don't believe that's a function of the actual requirement in the SBIR.

7. **Is a feasibility study required or is that supposed to be incorporated in Phase II.**

   According to SBIR, SDTR Policy Directive, if we are doing a direct-to-phase two, which we are doing a direct-to-phase two for this instance, a feasibility study is required. The feasibility study is going to be something that you that document, that you will submit as part of your proposal. It is in accordance with the instructions it's in Volume 5 of your proposal. Please make sure you submit it because they'll be part of the evaluation, it'll be evaluated as part a successful proposal. If you don't submit it will be a non-responsive, as in your proposal is not complete. It will also tell us that you've done the feasibility that you can actually do the work that is required. That's the equivalent of the phase one, hence the direct-to-phase two, as in we're skipping phase one to phase two, because feasibility study has been done.

8. **Why is the 2000-4000hz range used for pass through? What is max audio level of pass through required?**

   This is the level that we want the dogs to be able to hear. We also wanted to have active, not noise cancelling, but it wanted to be able to still attenuate high levels of noise at this range, but have the canine be able to hear at this range and at a non-high-level non-damaging audio level decibel wise. To clarify, the low frequencies, are what we found are extremely damaging to the canines hearing. We expose our canines a lot to long, exposed helicopter rides, convoys, stuff like that. That's why that below 1,000, the 2,000-4,000 is basically to give them environmental hearing, much like myself or any other soldier. We wear PELTORs, or whatever brand where it has automatic gain control, so we can still hear through a specific frequency. So we can hear people talking, but the gain automatically cuts to a certain level that we documented, and it cuts out and protects my hearing, so that 2,000-4,000 was basically the left and right limits of what we would like to pass through, so the dog can hear while wearing the hearing protection.

9. **Is automatic noise cancellation to standard compression above a certain dB level? Or Active Noise Cancellation (14:27)**

   The goal is to protect the dogs hearing, and we are going to let the companies decide between what standard of compression and whether it's active noise cancellation. But understand, don't want to attenuate that level from two to one

thousand to four thousand Hertz to allow them to have that environmental awareness at the same time as being protected from noise. In that two to four thousand range that we do want attenuation over a threshold. So in that frequency range, there's an impulse of well over one hundred decibels - hat's when the automatic gain control would come in.

10. **What IPX rating is expected for environmental conditions?**
IP 67 would be adequate if we wanted higher than that, we could do that in a follow-on for unique situations.

11. **Can you provide a list of radios, other communications for compatibility?**
At this time, this project needs to be radio agnostic. In this forum we don't want to give a specific model or anything right now. That would have to be kind of down the road if that works. If you aim for sort of the same compatibility as that universal connector, either stereo or the stereo mic type things that the PELTOR has, not that it needs to be that, but the same compatibility for that stereo connector, that would be sufficient.

12. **Can any of the system components be procured from foreign companies or do 100% of the components need to be US mfg?**
It depends. Hypothetically, let's say you're buying a battery, and that batteries coming from I don't know South Korea or Australia, something that you just kind of a you know It's a part that you're buying from somewhere – that is allowed. If you are developing something, all development must be done in the US. If you're subcontracting to and with another company, that company must also be US. You cannot develop things outside of the US. It runs into a lot of complications and restrictions, especially suburb, etc.

13. **What. Other equipment do the dogs carry**
Without giving up too much of how we dress our dogs down. They all wear tactical vests. So if you're thinking of how to mount something, you can make up the dogs wearing tactical vests, You can go online and look at tier tactical - that is a good example. If you just kind of look at what they sell, that's very standard. They'll give you good left and right limits of what they wear as far as vests go, and then they always have some sort of a collar on, generally multiple, a pinch collar and a normal one.
For folks that don't have experience with the military working dogs, I would do market research for mounting solutions. Just do some research on like what kind of Eye pros are out there. So just beyond wearing a vest, and wearing a collar, there's other options out there for mounting solutions.

14. **What types and sizes of dogs do you use?**
Generally speaking, we have a quite a few of in the Malinois and Sheperd breeds. We also a have a couple special dogs here and there. For sizes, they range from mid-fifties to mid-seventies, with some outliers – like a 49lb or an 82lb. To cover all sizes, assume a weight range from 45-100 lbs.

15. **Does the "Automatic Noise Control" refer to clipping/reducing external noise or destructive interference "ANC" like a Bose headphone**

That would be much like the Pelter systems that don't necessarily filter out certain things. But those things can be set up for ability to talk to people and hear voices. This just needs to protect over a certain threshold, and ensure that there's no distortion if there's a digital processing in there, so that the voice isn't distorted and if there is an amplification of a noise below a certain decibel once again, there's no distortion there. The two types of electronic component is AGC and ANC - Automatic Gain Control which is for that automatic voice control, and that's just allowing pass through to hear environmental sounds, and when there's a specific threshold met, it cuts off everything above that. So then it becomes passive and turns off that pass through. And then the Automatic Noise Cancellation - The reason that we have that in there is because in attempts to do over the ear protection, we found that below a thousand Hertz, ANC is required to protect against the lower frequencies. And then, as I did further research, we found that you get much, much better sound attenuation. This is in humans, at least when you use in ear hearing protection. So the ANC goes with the over the ear, and the in ear has similar attenuation, as I would say, a really good over-the-ear set with automatic with noise, cancellation. So with that being said, I don't think ANC is a requirement as long as we meet attenuation thresholds.

16. **What type of batteries are allowed? Can the device be rechargeable?**
A good route to take is CR123s because we use that in basically everything that we have. But beyond that, I would say preference would be your standard size batteries with CR123s as the preference. And being rechargeable is actually a very big plus. A lot of prototypes do not have rechargeable, it's always a down the road kind of feature, so I would say, rechargeable is definitely a plus.

17. **Regarding multiples sizes, is there a limit to the number of sizes of ear tip/earpiece?**
The optimal is to try to have one-size fits all. So you don't have to have multiple sizes, like some of the human earplugs. The less is better as long as it meets the requirements. We don't want to have an extra extra small, extra small, small, medium, large. If we could neck it down to small, medium. large, and we in house have done some molds of ears, and we started to skip. We started to kind of go down the route of could we make our own custom in-year plugs for the dogs. So we started to get molds of their ear canals, and we scanned them, and we had them 3D printed in rubber and everything, and we kind of found that it's very difficult to do. So the goal with this would be more of universal sizes. We have the ability to provide some STL or CAT files of some ears and we can get more. So maybe start averaging out what you know what those categories can look like. We might find that we need five different sizes. We might only need two, but the fewer the better.

18. **Where can I get the STL files?**
That's not a public one. I'm just going to put that out for all the vendors. I believe that's a post white paper down select, then whoever we're working with, then we can share that information

19. **Is there an expected lifetime for replaceable components, such as ear tips?**
For the ear tips or ear phones, it could almost be a one-time use. This is depending on cost, obviously if it's custom molded to every dog we would want it to last a long time. But if it gets down to a few sizes and the cost is low, it could as simple as you use it for a twenty-four hour time period and that's the extent.

20. **Is wired into in ear ok or wireless preferred?**
We don't have a preference. Typically we try to keep as many wires off the dog. But if there's already going to be some kind of a retention system, I think wiring through that is very acceptable.

21. **How do you deal with patent infringement?**
We haven't had an infringement in SOCOM SBIR, and if if any of that has to happen. If any of that has to happen they go through SBA, and there's a proper procedure within that mechanism.

22. **So animal testing isn't expected to be a component of this, it will be done by the SOCOM group?**
If you feel that you need to do animal testing to be successful, then you put that in your proposal, and there's a mechanism that has to go through the US Special Operations Command that Veterinary Review office. Your proposal will be reviewed, and they will approve it. It is not mandatory that you do that. It is up to you to decide whether you want to propose that or not, but if you do, it has to go through the Veterinary review office, and if you have any familiarity with animal testing you should understand that that's standard procedure for that, but the devices that will be delivered will be evaluated in animals by USSOCOM and the personnel that deliver them will have minimal input into how that's done. I expect that to be limited to any clarifications of how they're supposed to be used in in the performance that can be expected from them.

23. **Is radio communications encrypted?**
Think of it as Radio Agnostic and think more universal audio pass through, the mechanism of how the audio gets there is on us, so just keep it universal.

24. **RFP states custom-molded design is acceptable but stated preference is for "a few sizes fits most." In proposal, are specific size recommendations required?**
We would like something that's universal. The fewer sizes the better. If you feel during your work that you need to have custom molded for it to perform in the manner that you needed to perform. Or if you need to use trade space to not meet every single requirement that's in the RFP that's up to you to make that decision, and then, provide justification for why you chose to concentrate on one thing and because of the technical challenges that sort of degraded the ah optimal performance, and in another area.

25. **Is there power available on vest for tapping into?**
There's no power that the canines wear now that you can tap into, so you have to have your own power source.

26. **Follow up to in-ear. Does that necessarily mean all in-canal, or can it extend into concha/pinnae seating?**
   It can extend into the end. The pivotal thing that's written right in the proposals that they need to be able to still move their ears in all directions. So we don't want it to interfere with the headset of their ears and the ability to locate where sound is coming from.

27. **Are any resources regarding K9 ear canal geometry that would be available if awarded a contract?**
   We should have some resources after the contract is awarded to do scans, and whatever kind of equipment we can get our hands on to provide that.

28. **What are some of the things to consider with canine ear canals. Such as sensitive regions?**
   We worry about the sensitivity in their skin, so any materials that you're going to use need to be safe that. And then really the safe areas of their ear canal. If you have done a Google search or look at any images, it takes a pretty hard right angle as you get down into the canal. There are some pieces of marks there and those can be a bit sensitive, depending on how much pressure is put on them.

29. **any idea what distance would be from receive radio on k9 to its ears?**
   Either, as you're left and right limit. You're right limit is going to be the radio all the way on the dog's back. It varies depending on the dog – the CT scans that are in a database that we have access to, or I can get back and see if there is a general standard of what the depth is.

30. **how deep is the right-angle bend from the aperture?**
   It varies depending on the dog – the CT scans that are in a database that we have access to, or I can get back and see if there is a general standard of what the depth is.

31. **Are the CT scans from a single breed?**
   There are CT scans on the heads of many, many breeds, but there is a pool of working dogs at a working dog center. We would reach into that archive and look at, so they would primarily be of military working dog breeds which you've already spoken about. German shepherds, Malinois.

32. **How many awards?**
   It depends on the agreement in the program office as in SOCOM SBIR program office and the technical POC team and what they want to see. And then it also depends on the proposals as well. So if we have one or more so if they have the interest in doing more than one because they see that there are a couple of companies who can do this very well then we will be discussing and going forward with whatever they need. At the moment, there is no answer other than: one or more.

33. **Are we plugging into the military communication system in others words we are not developing our own but creating a connection to the military system.**

Think radio agnostic. Yes, it will be a military type radio, but we cannot get into specifics of what specific radio system , so think of it as a universal connect to a militarized radio system.

34. **Is there research into how much the ear canal changes with jaw movement?**
    It's fairly solid cartilage, so there is not a whole lot of change with jaw movement and keep in mind if you look at the anatomy, we're not looking to get all the way down. If you could it's up to you in your proposal, but it would be extremely difficult to considering that you're going to try to fill the entire canal and get all the way down to the tympanic membrane. So, when you're looking at the anatomy, the areas that you're concerned with it is pretty hard, and it does not change significantly with jaw movement.

35. **Do you require testing to be done in dogs before a prototype is submitted (not military dogs)**
    No, we don't require that it be tested in a dog, military or otherwise. But understand that will be evaluated and the primary requirement is that it is going to form fit in canines.

36. **In a 12-24 period is battery replacement allowed?**
    It can go either way. If you want to go the rechargeable route, then it doesn't need to be replaceable. But if you want it to be replaceable, then that will work too. You can use the CR123s, but you can also use the PR2032 – so keep it to a somewhat universal battery size, and as long as it's easy to replace that is acceptable too.

37. **What is currently being used for these dogs?**
    There is nothing in-ear right now. If you look online there are options for over-the-ear that we can, but again, nothing in ear right now.

38. **Do you know the Time Weighted decibel average these dogs are exposed to in the field?**
    We cannot give a specific answer because it varies operation to operation. I would think of long multi-hour convoys/Helo rides, all the way down to extremely high impulse sounds, gunshots, explosions, things like that.

39. **The 2000-4000 pass-through bandwidth is fairly narrow, compared to human products to pass/amplify speech and signals. Can we get of why that spec?**
    So for that specification, that is the environment that we want the canines to be able to hear without distortion. You can allow pass through outside of those frequency ranges, we were requiring two to four thousand because that's where human speech lies.

40. **Does test fitting a something in a dogs ear require Veterinarian Review Office (VRO) approval?**
    All submissions will be reviewed by the USSOCOM Veterinarian Review Office (VRO) to determine if the proposed research requires Institutional Animal Care and Use Committee (IACUC) support in the form of review, approval, and oversight. If funded a memo stating that the submission was reviewed and a determination as to whether the proposed research requires IACUC support will be provided. Any proposed research that is determined to need IACUC support

will need to provided its own IACUC support and is responsible for any cost associated for that support, which will not affect the budget ceiling."

41. **Does the system need to be exclusively in-ear? In other words, can the system have an over-the-ear component that keeps the in-ear component in place?**

    The system can have an over-the-ear component that keeps the in-ear component in place as long as the over-the-ear component does not interfere with normal ear carriage and movement. In other words, the over-the-ear component cannot be an earmuff or something similar, but could be something that fits around the base of the ear etc that would still allow free full ear movement.

SOCOM224-D005 Artificial Intelligence-Driven Voice Control at the Edge

1. **Is there any test data available representative of the acoustic environment (including the background noise – gunshots, artillery, vehicles, etc.)?**

   Currently, there is no test data available for this.

2. **Can we assume that all voice commands will be in English?**

   Yes, that is a safe assumption, but I would also assume that it would be used by English speakers with heavy accents.

3. **Is the solution required to integrate with specific SOCOM equipment only, or can a general API software interface suffice?**

   SOCOM equipment is constantly changing, so there's a preference for a general API that works on anything. A lot of equipment utilizes Pixhawk or MavLink protocols, so integrating with those is preferable, but otherwise general is our preference. General APIs are kind of the way we're leaning, and that really was also a specification in the statement of objective that Pixhawk was our threshold system for integrating with.

4. **What is the list of required commands and autonomous behaviors that the system will support?**

   That would be developed throughout the effort, probably at the kickoff meeting, in preliminary design review, etc. In the statement of objectives, we just quoted a quantity of commands from a threshold and objective perspective. Those commands would be developed as a part of the kick off of this effort. We have not developed a library of commands at this point, so that would be a dialogue leading into and as part of the kickoff.

   Part of the point of this effort is that we're not going to have a predetermined list of behaviors, but that our operators will end up knowing the best what behaviors they want through operations and will not always describe the same behaviors with the same words. So, a key tenet of this SIBR is to look at using artificial intelligence or machine learning to interpret disparate commands to mean the same thing. That's a key element of this, is to use machine learning, whether it's training data or just other kinds of algorithms to interpret those commands which will sometimes be different.

5. **What types of sensors will the application be interfacing with?**

We did not specify exactly on the statement objectives. You could imagine there may be cameras or other types of sensors that would be organic to aerial platforms/UAS platforms.

6. **What are the options for device connectivity?**

We're looking at using the organic command and control links, radios, whatever's in UAS right now, and ultimately looking at being extensible to other robots, ground robots, or small boats, or other things like that. But there's no specification other than what's in the statement of objectives. There'll be a need to demonstrate on some UAS throughout the course of this effort.

7. **What is the lowest limitations of the hardware?**

If it was a software only. For development, that may be an option, if you would be using inherent hardware that's already on the UAS or on the controller

8. **How many potential awards on this topic?**

That is dependent on the need. It could be one or more, if we have multiple companies that we see that can provide something very useful for us and for our UAS cases, for the requirements. Then it'll be a discussion between the technical PoC and the SOCOM's SIBR/STTR program manager.

Make sure that you have some kind of a traceability to make sure every one of those is met so you don't become a non-responsive. Please ask questions early on and submit it early. Don't wait until the last minute. You don't know what's going to happen, and if everybody submits last-minute, the system may not take everything at once.

9. **What are some example use cases?**

We are not talking in a classified environment. This is information that will be available to the public. So, we need to keep that in mind as we ask or answer the questions.

10. **All processing of the voices will need to take place on-edge, correct? (As in, no communications with the cloud before issuing output signals).**

That is correct.

11. **Please explain or give examples for "Provide an audio feedback loop to confirm commands and actions."**

It's just confirming what the operator told the system to do before it sends it out to do whatever is going to do.

12. **What format is the audio in? PCM, u-law, etc.? What is the sampling rate?**

I don't think we have a specification for the format. That would be dependent on whatever hardware you chose to implement for the microphones or anything like that. I don't think a lot of the ground control stations come with microphones, so that's probably an additional piece of hardware that you can choose. We're not imposing any standard there.

13. **For showing feasibility, what is the priority/importance of the listed Key System Attributes?**

If you're referring to the system attributes outlined in the statement of objectives for the Phase 2, we don't have a priority on those. They're not rated necessarily as a priority. Probably during a design review, if there is perhaps one threshold or objective that you could obtain one system attribute but that might have an effect on another system attribute, that would be something we would want to address with the Government team, and then we can make an educated decision on that.

14. **What are your expected edge devices? What is the expected operating system?**

You can look across the community and see what kind of tech devices are out there. SOCOM has a program, "field compute device wearable," but they look like a lot of things. I don't think we're imposing whether it's ATAK or WinTAK. You can use whatever. Whatever you as the company is proposing to work on, it's going to have some edge device in the ground controller and some sort of processor on the aircraft. But we're not directing those, other than to say we'd like them to use map-like protocols over the air.

15. **Are the protocol integrations previously mentioned spelled "ATAK" and "Pixhawk"? Any other protocols?**

Yes, it is spelled ATAK, used to be called android tactical assault kit. Pixhawk is a company that sells autopilots. They primarily run an open-source autopilot called PX4. So, sometimes people, including us, mix those two, and use Pixhawk to talk about the autopilot, which is really, maybe more accurately a PX4 software. But, yes, that is the correct spelling of ATAK and Pixhawk, though what we're really talking about is the MavLink protocol directing what commands are there, and the PX4 software directing the vehicle how to fly and maintain stable flight.

16. Pixhawk UAS's and mobile phones/microphones can have widely varied hardware specs. Is there a specific initial threshold system target?

I don't think we are dictating a specific initial threshold, other than the vehicle that you prefer to work with in your proposal. If it's a one of the blue UAS 1.0, maybe it's an S20, it could be any of these things, and we're not going to necessarily dictate that. Just bring us the proposal and think about it. If you're not able to bring that as part of the proposal but you end up getting awarded, we can work through that during the kickoff and execution of the event. That was one of the primary reasons we went towards the Pixhawk autopilot system was because it was so widely available on a variety of platforms. We did not want to box anybody in with the platform.

17. Should we assume Android for the home operating system?

You may assume that. Tell us what your assumption is during the course of the proposal. If there's a reason you want to go with Windows, or something else other than Linux build, then we're not going to preclude than, we'd like to know. We'd like to work on something that's close or relevant to SOCOM hardware.

18. Is it possible to get access to the SOF organic Push to Talk (PTT) radio microphones for which the system should be optimized?

In the statement objectives, we specified that no government property was planned, but there was the option that the developer could request government property. The contractor should identify mitigation strategy if we're not able to provide the equipment requested. So, they can make a request, and we'll see if we can provide it. But the vendor needs to be prepared to provide his own microphone system for the purposes of this development effort.

Purchasing hardware and laboratory equipment or prototype equipment is allowable cost under the SIBR. If you go into the cost volume, the template that we provide has a couple of tabs, one for material, one for equipment. If you're looking for lab equipment or material to build the system, that's all allowed,

19. Please expand on the statement: "Flexible software architecture to allow application to multiple electronic systems with minimal adaptation."

The system should not be specifically designed to a one UAS. For example, it shouldn't be integrated so heavily into one system that I couldn't take it and put it on another different UAS by a different manufacturer, or a different model, etc.

SOCOM is always changing hardware out, and we have a bunch of different robots with a bunch of different life cycles that are all staggered. One's winding down, another

one's spooling up, and we just need to be able to transport this type of capability across multiple systems without extensive rework and investment required.

20. **Is voice recognition required?**

    Yes

21. **Is a clearance level required for PI (principle investigator)?**

    It depends. If we are going to do a DD254, then there might be some classification required, and in that case, we might want to find out more about it. But this is an unclassified work, as long as the company is US-based, all people working on it are US citizens or permanent residents, no foreign personnel, definitely nothing done outside of the US. That's because it's a SIBR tool, it's ITAR. So, all of that is a good start. Now, if after the award, we need to have someone to gain a kind of a clearance for DD254, then that can be supported by the SIBR, by the technical POC, by us, etc.

22. **Do you have a lexicon that is used today across the data set? Will it be available for use in our models?**

    We might uncover something like that during the execution of the effort. It's not available pre-proposal. The diversity of UAS missions and the diversity of UAS operators make it very unlikely that we'll be able to maintain some sort of, pseudo-nine-line type of radio discipline. And so, part of this significant underlying technology here is the ability to use machine learning to interpret different commands like raise elevation, raise altitude, increase altitude, go to X altitude, to be the same thing. So that's an important part of this effort, and even if we provide an initial set of lexicon that will come out during the kick-off or early phases of the effort and is expected to change as the operators who really know best about how to use these things get time on the system.

23. **Could you clarify that this is a direct to Phase 2? So, no Phase 1?**

    It is a direct to Phase 2. A feasibility study, which is an equivalent to a Phase One is required, as is mandated by SIBR CT policy directive. So make sure, and it's in volume five, that you submit the feasibility study as part of your proposal.

24. **Can a US permanent resident be a PI or work on this proposal?**

    Yes, a US permanent resident is a US person, assuming that this is going to be a US-based company/small business.

25. **Do we need to include in our cost proposal the costs of 4 UAS platforms and 4 ATAK devices for the 4 ADVICE prototype kits?**

Yes, you do.

26. **Will Phase 2 be classified?**

No. This is a Phase 2, and it's not classified. It's open to the public. It's not classified.

27. **Can you describe the potential/anticipated transition path to Phase 3? Further R&D? Direct commercial? Customer?**

We have procurement money. We would buy licenses or appropriate kit as comes out of the development effort and perform operational tests on that kit with a UAS that we've already fielded. We would make sure that it meets the war fighter requirements, and then we put it in the field. Some things that are helpful is to have it listed as a commercial product. That allows a little bit easier purchasing instead of having some sort of development contract. We would look to buy it that sort of way.

Initially, before we can do any direct-to-Phase 2 to for SOCOM, we do require a transition agreement. If you want to know how serious we are with the transition agreement, go ahead and ask away, because that team on the line right now have had to go through so much to make sure that there's a transition agreement done. They say we have a plan for it, we have funding allotted, we have a program office that's going to be using this, we have users for it, and all of this says, if we have a successful prototype that meets requirements, we going to continue to either fund it, develop it, or procure it, etc. From the Phase 2 SIBR perspective, we're getting this up to a specific point where it's good enough as an innovative technology, something that we're developing new. At some point, when this ends, and we decide this is a good enough TRL, then our technical POCs would take over from there and either continue to develop it, get authority to operate it, procure it, maintain it, etc. All of this is dependent on a successful prototype. We have a program office ready to do all those jobs, and we field commercial UAS and tricked out/special UAS all the time. So, we know what to do there.

28. **Do you mean that only specific users who have trained their voice to the system will have access to controls for voice recognition?**

No, we're looking for a system that recognizes voice commands and is agnostic to the user. We didn't really specify this, but there may be benefit in having some method for ensuring that the person that is providing the voice controls is an authorized user. But the intent was not that the authorization be accomplished by recognizing their specific voice.

29. **What type of actions are required from the voice commands? On/off, status, and/or specific control? (i.e. turn on light, is the light on? Dim light 50%)?**

    Those are all great examples that they put in the question itself. It's all the ways that an operator would want to interact with the robot so that they can keep their eyes on their rifle sites and on the battle unfolding in front of them, and not have to spend as much time babysitting the UAS.

30. **Are there any anticipated roadblocks or issues?**

    That's a very general question. Roadblocks from cost schedule performance, roadblocks from getting this stuff Phase 3, roadblocks from the operator perspective. I think the operator and the technical part has all been discussed in answering a lot of these questions

31. **Is the data to be used for this effort structured or unstructured?**

    It's likely unstructured. We don't have a giant data set that we've been training on, and part of this effort will require collecting and tagging some sort of data set up in order to train that. Proposers should be prepared to continue to collect new data, as most big data projects are always generating additional data, and we expect this to be no different.

32. **Are there target C2 applications required for interface?**

    Whatever's native to your UAS right now, it's pretty hands on to fly most UAS, so I don't think we're wrapping them in some sort of overall command and control scheme. It's very much like what you would buy off the shelf for UAS.

33. **Can you give some examples of commands that you've thought would be immediately useful?**

    "Go to a waypoint," "take off," "land," "patrol," etc. It's kind of typical stuff that you would use in UAS for ISR-type missions.

34. **Don't see reference to Pixhawk or MavLink on topic – maybe in reference materials? Can you ensure we have spelling on this or reference so we can research?**

    These are very standard underlying things that that enable UAS. I recommend you go to the topic description under SOCOM 22.4. At the bottom, it has four references. One

of them is Pixhawk, and then it has multiple scholarly articles available: SkyRaider product information, Black Hornet product information, etc.

35. Could there be multiple people sending voice commands to the same device at the same time? Is there a need for a command queue?

On the first question, there will not be multiple people sending commands to the same device at the same time. In relation to the second question, yes, a command queue will be required because the fundamental commands that go across MavLink and feed the autopilot are just primitives that get stacked on top of each other to create an additional behavior. Even if there's no command queue on the front end, you would have to have one in order to make complex behaviors out of the primitives that get fed into the autopilot.

36. What are the requirements for connectivity? Internet, Bluetooth, etc.

Most UAS are not connected to the larger Internet, so it's really on-edge processing. That said, they've all got radios communicating between the ground control station and the UAS Itself, and sometimes additional connectivity, whether it's through a cable to an ATAK device or a chest-mounted sort of user interface/end user device. So, it's whatever you would need to put all those things together, but we don't necessarily have a specific requirement. You can design to whatever you want.

37. You've described "go to waypoint" – how will the list of waypoints become available? Would that be a pre-mission update?

You'd have to interface with TAK somehow, because that's where the operators are sending most of their waypoints.

38. What are you expecting in terms of background noise?

Motors, gunshots, any loud noises. So, you'd have to have some noise cancelling, probably just to pick up on the voice, whether as frequency or however it's done.

39. Could you explain the device computation capability and memory size for this application, like a smartphone or PC?

It's much more like a smartphone. If you dig into how common ground control stations are implemented, they often have things like smartphone chips. And it's same with the small UAS. Some of them field, you know GPUs like Nvidia, Jetsons, or whatever. There's some of those out there, so leave it to you to look around and decide what you want to work on. But this will not be a PC or a server rack or a cloud. It's edge compute capability, which can be rather limited.

40. Are you looking for mainly direct command or would you be interested in conversational as well?

I'm not sure we're going to be inquiring for the UAS to provide a lot of data other than its current status, things about it. So, it's not like we'd be queuing up, "Hey, Siri! What's the weather?" I don't think we have any specific conversational required.

41. Two more mic questions: what noise reduction or other DS is built into the organic radio mics? And what radio should we acquire and what is the cost?

I'm not sure what all is built into the SOF push-to-talk radio microphone. You can look into that and figure it out by working with some of those type of vendors here. There are numerous.

The radio is usually built in as part of the UAS between the ground control station and the aircraft itself, unless you're talking about a radio to go into something like an end user device like a like a S20.

42. So this topic is more than command and control. It includes speech recognition. Am I right?

Yes. It's not just speech recognition for known commands that are going to be very disciplined. It's going to be different, changing, accented speech. There are going to be different ways to describe similar behaviors or similar speech to describe different behaviors. We're looking at using artificial intelligence to learn what those behaviors are, and should be, and build trust with the operator.

43. Will there be a need for any authentication required at the beginning of a session or throughout the session and speech interaction using voice authentication?

I don't think we've considered authentication just yet, other than knowing that there's a certain proximity required to the microphone.