Questions and Answers from SMEX Preproposal Conference
February 21, 2003

The conference was held at 8:30 a.m. in Salon A of the Greenbelt Marriott, 6400 Ivy Lane, Greenbelt, Maryland, Paul Hertz, Explorer Program Scientist, presiding.

PRESENTER: Agenda Item Affiliation

JIM BYRD Explorer Program (NASA/GSFC)
TONY COMBERIATE Explorer Program (NASA/GSFC)
PAUL HERTZ SMEX AO (NASA/HQ)
CARLOS LICEAGA TMC Evaluation (NASA/LaRC)
RICK CLAFFY SMEX SR & QA (NASA/GSFC)
NORMAN BECK Launch Vehicles (NASA/KSC)
STEVEN (CHRIS) DUNKER ISS Attached Payloads (NASA/GSFC)
PAULA GEISZ Export Control (NASA/HQ)

AUDIENCE MEMBER: Are you going to put these view graphs on the website?

DR. HERTZ: All the presentations from today's conference will be available from the Preproposal Conference link on the SMEX Acquisition Additional information Page referenced in Section 6.1.3 of the AO.

AUDIENCE MEMBER: Typically, we don't include cost reserves for the launch vehicle portion. For Shuttle launch costs, where the costs are not yet defined, would you expect to see reserves included in our budgets?

DR. HERTZ: The rule of thumb cost that is specified in the *ISS Transportation and Services* document includes the cost reserves. It says set aside 20 percent of the cost cap. And that should be big enough to include both the launch cost and the reserves on the launch cost. [Added note: see Questions LV-3 and IS-12 in the SMEX Q+A document.]

AUDIENCE MEMBER: Is there any current speculation or feeling about whether the mass of your payload or the linear dimension in the shuttle bay will effect the costs later?

DR. HERTZ: Oh, absolutely, absolutely. The shuttle cost is going to be dependent on the amount of resources you need on the shuttle and it will certainly depend on some kind of combination of the mass and the volume that you require. And I should point out that the assumption for the rule of thumb is that a SMEX is a secondary payload and that therefore, it doesn't require anything like half of the Shuttle bay. We don't yet have an agency pricing policy, so I can't tell you that a mission which requires a huge fraction of the Shuttle's capabilities isn't going to fit in the SMEX cost cap, but the assumption is that a SMEX is small compared to what the shuttle is capable of carrying to the Station. [Added note: see Question IS-11 in the SMEX Q+A document.]

AUDIENCE MEMBER: You said that we would have to work out the cost in Phase A. I thought that NASA was actually going to tell us the cost.

DR. HERTZ: What I said was that NASA will have its Shuttle use pricing policy available during Phase A and that, working with NASA, you will have to determine what your launch costs

are and those costs will be part of your Phase A study and part of the budget that you submit at the end of Phase A.

AUDIENCE MEMBER: You said that the science will only be re-reviewed at the end of Phase A if the science objectives are changed. Does that mean add science, too, or just take things away?

DR. HERTZ: "Change your science objectives" means to take things away. When we pick you at the end of the first stage, we're going to be selecting your science objectives. As long as you don't remove any of those, then the science value, the compelling nature of your science that is the reason you got selected in the first place, will still be valid.

AUDIENCE MEMBER: You said that the only NASA centers allowed to provide project management/end-to-end systems engineering are GSFC and JPL for free-flyer investigations, and GSFC, JPL, or JSC for ISS-attached investigations. Is that slash there an "and" or an "or"?

DR. HERTZ: Typically, those services are provided by the same organization. Typically, system engineering is a part of the Project Office? Most proposals come in with both those functions in the same location, so I don't have an answer. If you want to propose that system engineering be performed somewhere other than the project office, write to me, and I will talk to the people who are in charge of this rule and find out what the answer is. If it really matters, and I need to figure out an answer, then write me a question.

BILL CUTLIP: Paul, if I can speak for Goddard, if we're managing it, we're not going to let somebody else do that end-to-end systems engineering. I mean, we're going to do that at Goddard also.

DR. HERTZ: So like I said, I can't recall seeing a proposal where those two functions weren't in the same organization, but if you really want to propose that and you need an answer to the question, then you can ask me and I'll get you an answer.

AUDIENCE MEMBER: What's the process for compliance check? How do you do those?

DR. HERTZ: There is a brand new feature of this AO. There is actually a proposer's checklist in one of the appendices in the back of the AO that is an example of some of the kinds of things that we check in the compliance check. We have a list of requirements that are extracted from the AO that every proposal must meet, and we do a check of your proposal against that list. There are lots of requirements in the AO, some of which can't be checked with a quick read, but the ones that can be verified quickly are included in the initial compliance check. I will point out that we at NASA have sent proposals back for being non-compliant and we have not reviewed them. I sent back one in the last MIDEX and one in Discovery. In Mars Scout we sent back two. So, proposals can come in that are non-compliant, and we won't review them if they're non-compliant. And I know none of you are planning on submitting a non-compliant proposal.

AUDIENCE MEMBER: Can you explain in some more detail what this scientific implementation merit is?

DR. HERTZ: It's the same thing that used to be called technical merit. It's just that technical merit wasn't very descriptive and I think scientific implementation merit is more descriptive. The first criterion, scientific merit, is whether the science you're proposing is interesting, is it worth doing? The second one is, scientific implementation merit, is whether you proposed a method of doing it that will deliver the science? So scientific merit is, is it great to study

blue stars. Scientific implementation merit is, did you propose a detector that can do it, that can detect blue stars?

AUDIENCE MEMBER: Do you have an example of a traceability matrix that you in the Program Office consider sort of appropriate level of detail that's not on the additional information site?

DR. HERTZ: No. We've seen some very good ones but they belong to the PI's that proposed them.

AUDIENCE MEMBER: The list of attributes that you had there and the risk low, medium, high, I envision that you put some matrix together. Is it that quantitative or is it qualitative? In other words, are there different weights for those attributes?

DR. LICEAGA: There are no assigned weights. In Step 1 we would look at all the major findings, whether they're strengths or weaknesses, and those are the main things that guide us into our risk assessment; but it's not to the level that you're implying where we have fixed weights and a matrix.

AUDIENCE MEMBER: You mentioned two different cost models to validate your cost estimates. Could you tell us which ones you use?

DR. LICEAGA: No, we use different companies to support us. We try to get two independent companies to improve our process.

AUDIENCE MEMBER: I'm just a little bit confused on the demarcation line between this proposal and the concept study report. You mentioned that when we do a site visit, and that's obviously Phase A, that we would be looking for these things. So when I see your presentation, particularly in the cost area, the justification for cost, is there really enough material in a Step 1 proposal to explain all that?

DR. LICEAGA: This is really just covering this stage but I guess what I was referring to is that these are questions that we're going to ask ourselves and try to get the answer from your proposal during Step 1. Obviously, during this Step 1, we cannot go back to you and ask you questions. So your proposal has to speak for you. During Step 2, if you get that far, we're going to be provided with more detail. We're still going to be asking the same questions, but we're going to expect better answers and we'll have a chance to ask those questions face to face.

AUDIENCE MEMBER: So, it's my understanding then that you're holding back the money for mission assurance oversight. Should we cost this in the proposals and how much would you cost?

MR. CLAFFY: I can't give you a specific number. I'll give you an example of a SMEX level, IEEE electrical, electrical/mechanical, electronic parts support specialist. Now you, the PI team, would be doing all the parts engineering. You would be doing all the part selection, working with your designers of each and every box in the spacecraft and the instrument, and you will be developing your preliminary parts lists for an upcoming confirmation review, let's say, for instance.

Guidance and help in doing that, and oversight of the process and assurance to the project manager assigned in the Explorer Program Office that that process is healthy, that's the function we would serve and we provide you whatever technical expertise you desire. Generally, that oversight

and assistance function is about three-tenths of a full time equivalent of a professional parts engineer. That's only scratching the surface of the parts engineering effort.

AUDIENCE MEMBER: Well, if a project proposes another way to get all those things done to the satisfaction of the project manager that works for the PI, then one could regard the Goddard oversight tax, if you want to call it that, as sort of something above and beyond what the project needs to do its own job. So how is the project supposed to account for that reduction of their cost cap?

MR. CLAFFY: We go back to the Insight Agreement that I described at the top of the first slide and in that agreement, we baseline what is that amount and that is held back in the Explorer Program Office.

AUDIENCE MEMBER: (Inaudible)

MR. CLAFFY: No, but I think if you take that three-tenths of a person in the strict oversight role, doing little more than evaluating your processes and warm feeling for the project, if you take that three-tenths of a full time equivalent and more or less run that across the various disciplines that we'll be talking about, you get a reasonable estimate of what the baseline minimum effort is going to be.

AUDIENCE MEMBER: (Inaudible)

MR. CLAFFY: Yes, yeah, they're different people, different expertises.

AUDIENCE MEMBER: Rick, I think what needs to be distinguished is a PI team's internal QA to do their job and how that's funded versus how the Explorer Program QA and your function is funded outside of the cost. I think there's a difference there and I think it's getting mixed up.

MR. CLAFFY: Yes, thank you, Dan. I've been clumsily trying to make that point. Yes, that is true, that once that Insight Agreement is worked out, that -- those dollars are held in the Project Office. They are not counted against the PI's cap. They're a separate amount. The PI is responsible out of those remaining dollars to execute their own SR and QA program.

MR. COMBERIATE: Rick's time and the Explorer Program Office's time to oversee and to offer help is not part of your cost cap.

AUDIENCE MEMBER: (Inaudible)

MR. COMBERIATE: No, the Program Office would probably supply a half-time business manager, a half-time scheduler, Rick's time, but that's oversight kind of functions. That's not the day-to-day management of your project. Now, I think what Rick's talking about is there are QA functions that Goddard can help with and if you use those functions at Goddard, you do have to pay for them, okay, but not necessarily Rick's time or a portion of his time.

AUDIENCE MEMBER: You talk about reliability. Is there a requirement that is imposed by the mission assurance function on mission reliability that causes this to be better than just kind of hand wringing?

MR. CLAFFY: In terms of a specific requirement that says, "Thou shalt deliver a mission be it single-string or otherwise that has a 99.5 percent reliability with a confidence interval of a tenth of a percent for six years." Absolutely not, we never do that. There is a section in this document that addresses reliability and it basically says you need to do the right test program, you need to think about your architecture. You need to think about and identify the weak points in the architecture and you need thorough tests, through analysis or through selective redundancy, functional overlap, by whatever means, to address that within the tool kit of probabilistic risk assessment, which includes failure modes, effects analysis, fault tree analysis, any number of event sequence diagrams. There's a whole tool kit of those things that are useful to get you an analytical

kind of a pseudo-numerical benchmark for your mission reliability, and we can help with that, we can give you benchmarks from other missions. We have a good trend on what these numbers look like on previous SMEX missions right up to the current but you're given flexibility in how you do that.

AUDIENCE MEMBER: I didn't see anything there about peer reviews. Is that still a requirement or is that something that is encouraged? What is the peer review and could you define what a peer review is?

MR. CLAFFY: Peer review is clearly a requirement. It's spelled out very clearly in the document I talked about in my pitch (*SMEX Safety, Reliability, and Quality Assurance Requirements* document in the Explorer Program Library). A peer review is an informal, shirt sleeves rolled up, technical experts on the team sitting down with independent experts of equivalent working experience, sharing the drawings across the tabletop, talking about the technical issues, the problems, possible solutions, documenting what the group decides, setting about to carry out the resolution or if the team cannot find a resolution to the issue, it's carried up to the system level review and a higher level review team will help resolve the issue. So a peer review is a frequent early tabletop discussion but it needs to have some formality, it needs to have someone running the meeting and someone keeping the minutes and someone tracking the request for action that the group generates for itself.

AUDIENCE MEMBER: You haven't gotten to the guts of ITAR.

MS. GEISZ: (Slide 9) The reasons the United States controls exports are: national security, foreign policy, and proliferation (missile, nuclear, and chem-bio).

(Slide 12) And a good reason for you to be concerned with the export control laws and regulations is that there are very stiff penalties for violation. It's pretty much a voluntary compliance system, and the laws are hard to enforce, so when they do find a violation they tend to throw the book at them. Recent violations have resulted in fines against Boeing and Loral. Boeing was fined $10 million. Sometimes people ask if anyone from the government has ever been prosecuted. John Hall tells me that when he was at Commerce, a Commerce person was prosecuted.

AUDIENCE MEMBER: I'd been under the impression that anything that went into space was covered by ITAR, not just the spacecraft itself but also any instrument, any sub-system, and that sounds more restrictive than you just said. Except for the space station.

MS. GEISZ: We classify the payloads that are going on the space station individually, based on their function, just because they're designed to fit on the space station in space, doesn't mean they are 9A004 or ITAR. For example, the growth chambers are under the Commerce Control List (CCL). Everything that goes into space is not covered by the ITAR. A triple E part classified under 3A002 on CCL is not covered by the ITAR, yet it could go into space. When that part becomes part of a spacecraft or satellite it is under the ITAR. All spacecraft and satellites (with the exception of ISS) are covered by the ITAR.

AUDIENCE MEMBER: Can you differentiate between spacecraft and instruments, and I think in your vernacular, the spacecraft is everything that flies, whether it's is an instrument, a support bus or otherwise, the whole thing is what you're calling the spacecraft; is that correct?

MS. GEISZ: (Slides 17, 18) Generally, yes. Not when you talk about the space station. Now, if you have a component that's going to someday be integrated in the spacecraft, this component could come under Commerce's jurisdiction. When you export it separately (it is not embedded in the spacecraft), it may have a different classification. If you're just sending some IEEE parts that are under the Commerce Control List to your foreign partner to embed in something that is ITAR controlled, when you send it out of the country, it would be under a Commerce license, and then it will be embedded and then the spacecraft or satellite is ITAR.

(Slides 19 & 20) There's a whole list of exemptions to license requirements in the ITAR. Several are for the U.S. Government only. One or two require government direction for you to be allowed to use them, and the rest are out there for you to use. This is just a list. There wasn't time to go through each exemption. An exemption can never be used when dealing with a Proscribed Country. When NASA has an international agreement with a foreign partner, and we have a contract with a contractor or somebody, we can give them, through the contracting officer, a letter directing them to use this exemption to transfer certain technical data to their foreign party without them needing a license.

(Slide 19, §125.5c) If we want JPL to allow a plant visit by a foreign entity, we'll issue them a letter directing them to do this. Whenever you use these exemptions, you need to read them fully in the ITAR to make sure you understand. Sometimes there's reporting requirements.

AUDIENCE MEMBER: As I've looked through various pieces of the ITAR, how is software considered? It's not a hardware part. Is it a sub-system or a component of?

MS. GEISZ: It's technology.

AUDIENCE MEMBER: It's considered as technology?

MS. GEISZ: Technical data, it's defined in the ITAR at §120.10. It's considered technical data, if it's ITAR software.

AUDIENCE MEMBER: Excuse me, pertinent to this group is the 125.4(b)(10), on the university employees, can you just elaborate on that a little bit. I think that would be helpful, what data is disclosed, from whom to whom under what? (Slide 19)

MS. GEISZ: Consider a foreign employee or a foreign person but they're employed by the university in certain status. Then some technical data is allowed to be released to them but there are caveats. But all of these exemptions have thresholds that you need to meet and sometimes it's hard to meet everything and then still be able to use it, but that one has to do with whether they're an employee of the university, have they signed a non-disclosure agreement. It generally doesn't include students. §124.4(b)(10) allows disclosures of unclassified technical data in the U.S. by U.S. institutions of higher learning to foreign persons who are their bona fide and full time regular employees. Exemption is available only if: (i) The employee’s permanent abode throughout the period of employment is in the United States; (ii) the employee is not a national of a country to which exports are prohibited pursuant to §126.1 (proscribed country); and (iii) the institution informs the individual in writing that the technical data may not be transferred to other foreign persons without prior written approval of the Office of Defense Trade Controls.

A green card holder, as you know, is considered a U.S. person relative to the export control laws and regulations. They're not considered a U.S. person relative to the security rules and things we have concerning access to our facilities.

AUDIENCE MEMBER: I thought you started out saying public domain information is not controlled. (Slide 24)

MS. GEISZ: Correct, but providing technical assistance using the public domain information on a defense article requires a TAA because just giving someone technical data is one thing, then giving it to them and showing them how to use it, providing training, and how to apply it is considered technical assistance. It's considered a Defense Service. You're going one step beyond. You're helping them understand what you've given them.

AUDIENCE MEMBER: Can you very quickly explain when you cross over into the Defense Service, when you provide one?

MS. GEISZ: If I handed you this and it's technical data about a defense article, but it's in the public domain, that's not a controlled export. But if I handed it to you and helped you understand it, apply it to whatever the situation is, provided training to you, that's considered Defense Service, telling you how to operate something, giving you more than just a manual.

AUDIENCE MEMBER: Do the TAA's also apply to people.

MS. GEISZ: Yes.

AUDIENCE MEMBER: If you have a foreign national working for one of your companies, who has access to anything that's ITAR sensitive, do you have to go get a TAA.

MS. GEISZ: Yes. Sometimes people will get a DSP 5 for foreign employees, usually a TAA, a Technical Assistant Agreement. Say you're hiring a foreign employee to come be a manager in one of your plants, and you have controlled items in your plant, generally that person will sign a non-disclosure. You need a TAA.

AUDIENCE MEMBER: Just because it's on the Internet does not make it public domain; is that correct?

MS. GEISZ: If it's on a public Internet site and doesn't require a password to get in and there's no firewall around it, that's public domain. If anybody can get to it, when you put something on the Internet, on a site that has no controls, that's considered putting it in the public domain.

AUDIENCE MEMBER: So if you put it on the Internet, is it subject to ITAR?

MS. GEISZ: We had a case at one of our centers where a NASA employee got a document from the Air Force and the document was clearly marked "This is ITAR controlled", and the NASA employee put it on the Internet. It's still ITAR. The Air Force stumbled upon it, and it was quickly pulled down and that's a violation.

Now if it's your data, NASA can determine what we want to put in the public domain without going to the State Department. You're getting into First Amendment issues. If it's your data and you're not going to make money on it, you want to put it out there, you can do it. If it's somebody else's data or if it's controlled in another way, you need to be careful.

AUDIENCE MEMBER: Just to be on the university exemptions, many universities have a graduate student from a friendly country and they're working on some clever gadget that's going to go on a SMEX. Can they do that? If they can, what's the situation there? Foreign graduate students?

MS. GEISZ: If everything the graduate student is using is in the public domain, you don't have is an issue. If the university has a grant with NASA and the grant does not have prepublication review rights from NASA, then the university can assert rights over all that technical data and put it in the public domain. When you come to your spacecraft integrator, though, they will have an issue because usually your spacecraft providers assert a right over their data, it is not in the public domain, because they make money off of it.

AUDIENCE MEMBER: What if they have a green card?

MS. GEISZ: Then they're considered U.S. persons and you do not need a license.

AUDIENCE MEMBER: That's the key. You have to get a green card and then you're in the clear.

MS. GEISZ: Maybe just having foreign national University employee sign a non-disclosure agreement would suffice.

AUDIENCE MEMBER: You mentioned what's on the horizon for the certification of Taurus.

MR. BECK: Each NASA payload, each NASA program, has a certain risk category that's assigned to it. According to NASA regulations, NASA will certify that rocket depending on its reliability based on actual mission flights, data analysis, or review and tests of it.

AUDIENCE MEMBER: Does TMC review launch vehicles' lack of certification differently than if you've proposed one that is certified?

DR. LICEAGA: No, in the past, we have not looked at different categories of certification for launch vehicles. We assume it's a GFE and that Kennedy is going to take care of giving you a reliable rocket.

DR. HERTZ: If we offer it in the AO, you can propose to it.

AUDIENCE MEMBER: And it will be evaluated on is an equal footing, even if it's not certified?

DR. HERTZ: Yes.

AUDIENCE MEMBER: Are there any mitigations or concerns about launch vehicles being available through those dates?

MR. BECK: No. We have contracts that are in place that we can use to order those launch vehicles. It's really the order year in all of our contracts that are cost profiled, not the launch year.

AUDIENCE MEMBER: Are launch facilities still included in the launch services cost?

MR. BECK: Yes, your spacecraft processing facilities, that is all included in the standard cost of the launch service. Your range cost, your telemetry costs, all of the launch service, all of the launch vehicle costs itself are all included in the launch service and the NASA people who help you through that process and do your verification. You saw a lot of the items that were in the SR&QA, we follow that almost to the letter on the launch vehicle side of the house, so things like verification matrices and verification tasks, we perform those functions for you. That's one of those GFE things that is at no cost to you for what we do.

AUDIENCE MEMBER: Does margin need to be added to the launch vehicle costs?

MR. BECK: No, that is all included in the programmatic costs.

AUDIENCE MEMBER: But it does for shuttle costs, that's what Paul said this morning.

DR. HERTZ: No, that's actually the opposite of what I said this morning. What I said this morning was that the rule of thumb was for the cost including reserves.

AUDIENCE MEMBER: Then I'm confused. Are you saying that for the shuttle service costs, you should carry reserves on that cost?

DR. HERTZ: No. We don't know what the costs are. What we gave you was a rule of thumb and that rule of thumb is for the costs including reserves. You do not have to carry additional reserves on top of that rule of thumb. That includes the shuttle launch services and the standard services. It's not for special services or mission uniques. Any special or mission uniques, you'll need to cost separately and include reserves, since you probably can't cost them exactly.

AUDIENCE MEMBER: You did say you were expected to carry launch delay reserves.

DR. HERTZ: That's correct. But that's not a reserve on the cost of the launch. That's a programmatic risk for your marching army if you can't control your launch date.

AUDIENCE MEMBER: You mentioned bringing it back [from the ISS]. Do the costs that we're going to get for the Shuttle include bringing it back or is it just one flight to install it?

DR. HERTZ: The standard service includes returning the payload.

AUDIENCE MEMBER: There is one caveat, the policy that you refer to that is as yet unwritten, I don't know what they're going to say but for purposes of our proposal we have to assume --

DR. HERTZ: Right, for purposes of this AO you may assume that standard services include the return. If the policy doesn't that will have to be dealt with in Phase A. The standard service is launch, delivery and return. The money you should set aside under the rule of thumb is to cover the launch service and standard services. Standard services include installing it on the space station and taking it off and bringing it back. If you need anything much more complicated than plug and play, then you'll need to discuss it with the ISS research office POC. That would be a special service. If you need the astronauts to do something more complicated than that, you'll have to cost in addition to the standard services.

AUDIENCE MEMBER: The standard service cost for the Missions of Opportunity that cover the EXPRESS is 25 percent of 35 million; is that correct?

DR. HERTZ: You'll have to use the instructions in the document that's provided in the Explorer Program Library to calculate the amount of funding you should set aside for your shuttle launch services and standard services.

AUDIENCE MEMBER: The previous chart before this talked about operating the payload and receiving data through MSFC via a workstation at the PI's site. Is it the PI's workstation or MSFC's workstation?

MR. DUNKER: You have an option of getting a workstation. You can purchase it from MSFC. It's called TREK, T-R-E-K. -- or you can develop it yourself and but I think if you get the TREK you buy it from them and it's yours, I believe. Now they give you I think the software that works with it. [See Question IS-13 in the SMEX Q+A document for a fuller response.]

AUDIENCE MEMBER: Is there any information we can get on the standard station logistical carriers, what they weigh, what they can carry, when they're likely to fly?

MR. DUNKER: I can get some information and we'll have to take that maybe as a question with some place we can tell folks to go to get that. [See Question IS-14 in the SMEX Q+A document.]

AUDIENCE MEMBER: I'm more interested in whether I might have to share the load. I want to maximize my co-manifestability. I want to see what types of carriers I am going to ride with.

MR. DUNKER: He wants to know what he might be sharing with so your co-manifestability is a good match. If you know the size of your carrier or the size of the logistics carrier, you can make that deduction.

AUDIENCE MEMBER: If you're using a mission operations center that is already used for a NASA mission but not necessarily at Goddard, will there be additional costs to meet IT security regulations?

DR. HERTZ: All I can say is that all mission operation centers have to meet IT security requirements. If you can get a mission operations center where they're not going to charge you to meet IT security requirements because they're already doing it, that's great.