Q&A Session #1 – Transcript
April 28, 2023

Robin Ford –

Alright, I'm gonna go ahead and get started.

Thank you very much for joining. My name is Robin Ford, and I will be your meeting host for today. This is our first Q&A session for the Human Lander Challenge, or HuLC as we like to call it.

Before we begin, I'd like to let everyone know that we are recording this session. And if you can kindly mute your mic.

Alright, so the agenda for today, we're going to start off with some introductions of the HuLC staff, sponsors and judges. And then we'll also go through some background information on the Challenge, and we'll follow up with some frequently asked questions that we've received so far, and normally throughout all of our challenges. And then we'll give you guys the chance to ask any questions and then we'll go ahead and wrap up for today.

So, let's start with intros. As I said, my name is Robin Ford. I will be [your] main point of contact for the HuLC Challenge. Next, we have Victoria or Tori O'Leary. Stacy Dees and Shelley Spears. We are all with the National Institute of Aerospace. HuLC is sponsored by NASA's Exploration Systems Development Mission Directorate, Human Landing System Program Office and the Challenge itself is managed by NIA.

So, next we have our NASA sponsors, and I'm going to let them go ahead and introduce themselves. So, Jamshid, if you'd like to start.

Jamshid Samara –

My name is Jamshid Samara. I work for NASA Langley Research Center, and I'm in the Vehicle Analysis Branch. And I do primarily systems analysis.

Robin Ford –

Perfect, thank you. Lynn?

Lynn Bowman –

Good afternoon. I'm Lynn Bowman. I'm from NASA Langley, and I've been with NASA over four years working on various structural mechanics and thermal heat transfer issues and problems and technologies.

Robin Ford –

Thank you. So, we do have some of our judges on the call with us today. I'll let them introduce themselves. Wes, if you'd like to start.

Wesley Chambers –

Sure, hi, I'm Wesley Chambers. I work at Marshall Space Flight Center. My home org is the Natural Environments Branch here at Marshall, where city [?], lunar surface environments and help define those. And I'm also Deputy Pi working with Ashley Korzun on the Plume-Surface Interaction project.

Robin Ford –

Perfect, thank you. Samantha?

Samantha Harris –

Hi everybody. I'm Sam Harris. I work at Marshall as well as Wesley, living in Huntsville, Alabama. I am not a PSI expert myself, but I am the project manager of some of the work that NASA is doing in PSI right now. So, Ashley, Wesley and I all worked together on the Plume-Surface Interaction project.

Robin Ford –

Thank you. Ashley?

Ashley Korzun –

Hello everyone, I'm Ashley Korzun. I'm at NASA's Langley Research Center. I'm the principal investigator for Plume-Surface Interaction. A lot of different tech development efforts over the past several years that have gone into trying to understand PSI and what PSI means. I do all things retro propulsion and now landing environments, as well. But I come from an entry descent and landing background, so landers going to Mars and now lander's going to the Moon. So, looking forward to taking your questions.

Robin Ford –

Thanks, Ashley. Manish had a conflict and it looks like he's not with us right now, but we do have Bill Jacobs on the line with us. He is one of the NASA sponsors as well as a judge. Bill would you like to introduce yourself?

Bill Jacobs –

OK, sure. I'm Bill Jacobs. I am the manager for the Mission Systems Management Office. And uh, one of the things that we do, of course, is look at future technologies for the HLS program. And so, I'm excited to see what kind of approaches will be taken during this competition. Thank you.

Robin Ford –

Thank you. Alright, so next, let's get some context about the HuLC Challenge itself. So, Jamshid, I'm gonna let you go ahead and walk us through this.

Jamshid Samara –

Right. So, this competition kind of came out of the HLS program. This is some work Lynn Bowman and I have looked at uh, different technologies and we surveyed our broad set of technologies. We identified 10 categories and one of the technologies that we thought it was very beneficial for HLS Program, was this, uh, lunar Plume-Surface Interaction. And so, then we kind of selected that and we're very lucky that you know HLS program is funding it. So, at this point, uh, we decide to have this competition.

It has two faults, first of all, and I would kind of get the students involved with all the NASA work, but also start looking at some kind of, you know, seeking new innovation and new technology. And part of this new technology is more to improve, or actually enable, some new capability for us. And this innovation could be a method, it could be a device, it could be a new idea, or a destructive idea. We may be looking at some radical ideas that we are looking at incremental innovation. So, we are not limiting it to that sense. So, and the idea is not only [for it] to be novel, but we have to be useful. So, we're looking for feasible ideas that are not only possible, but practical. And so, it could be a neutral, a new twist to an old idea. It could be borrowing from another discipline. It could be combining a bunch of older ideas into the new one.

So, in terms of broad perspective of innovation, we have kept that as broad as possible. But at the end of the day, that new idea, or new concept, has to help HLS improve, or as I said, kind of introduce a new capability for us.

And for the students, I strongly encourage you to have a brainstorming session with this. And by doing that you can go through systematically through this approach. And there's actually a nice article on *Harvard Business Review* about how to do brainstorming, how to do a brainstorming better. So, this is very nice article. If you haven't done it before, I strongly encourage you to kind of do that before you start your brainstorming session.

Robin, and the rest of crew at NIA have done a great job and there is a proposal guideline, a PDF guideline, that details a lot of information and also on NIA website. There are a lot of good resources on the NIA website, starting from reports; to flight; to orbital mechanics code; to costing tools that you can use. So, there's a lot of stuff on the website. I encourage you to go through [it] as well. Take advantage of all those available tools on the NIA website.

So, that's it, that's my part. Thank you.

Robin Ford –

Thanks, Jamshid. Ashley, would you like to walk us through the actual theme for this year?

Ashley Korzun –

Yeah, I'd be happy to do so. And you know, if everyone can see the screen that with the slide that Robin's put up for us too, this is this is a great guide.

So, our theme for this year is what we call Plume-Surface Interaction or PSI. And I think you probably heard a few of us mention that buzz phrase in our introductions. Jamshid did a great job of putting this in context. As NASA, and a lot of other folks are looking to return to the Moon, we're taking landers of all sizes and all complexity and things like that. But if you've seen the pictures and things when we talk about human exploration at the Moon, we are really moving beyond Apollo.

How do you land on the Moon? You have to do this using rocket propulsion to slow yourself down to a controlled, a directed, you know, so you're in the right place, soft, safe touchdown on the surface of the Moon. As you take those engines close to the surface, you do a lot. Those engines, and what comes out of them, exhaust products are very much interacting with the lunar regolith or, you know, the lunar surface, which is a granular media, underneath the vehicle.

So, what we're looking for with this year's theme, is we really need to figure out how we can do this and seeking ideas that minimize these Plume-Surface Interaction effects, or mitigate against the risks that these effects pose to the vehicles themselves.

Things like reduction or mitigation of erosion, or cratering, if craters are produced underneath the vehicle, as well as ejecta. You know, where does all of that material that you've liberated underneath the vehicle go? Does it go out? Does it go up? You know those types of questions and understanding how do you protect your systems against that. First, how do you understand it? And second, how do you protect against it?

Similarly, things like, how do you obtain knowledge in an environment like this? Things like sensors, instrumentation, measurement methods, all of those pieces fitting together. How do you understand this problem?

In that case, same with, you know, dust is not necessarily in scope I would say here, but of course dust is a part of this problem, and a lot of your dust environments that you induce during landing, they start with these Plume-Surface Interactions. Absolutely, astronauts walking around on the surface and conducting science, we'll also have issues associated with dust, but there's a lot of that is coming from this very initial landing environment.

You know, so that's kind of a generalized scope of what we're looking for and why we're interested in Plume-Surface Interaction. So, hopefully that answers the mail on that one for you, Robin.

Robin Ford –

Thank you. Appreciate that. And so now, we'd like to discuss what the expectations are for both the proposal and the video.
When you submit, [not only is] there a five-to-seven-page proposal that you would submit, but there is also a 2-minute video. So, within that proposal you really need to clearly articulate the innovation and the design that's being proposed. Remember that you are selling your proposed concept to the judges. Make sure that you include enough details so that the concept has merit.

Jamshid, do you want to talk about the budget assessment as well as the balance between innovation and feasibility?

Jamshid Samara –

I think as I said, I think one of the key features of the proposal will be how feasible this solution is, and part of that feasibility is in terms of cost.

If something's gonna cost us, you know, $2 million to build, that’s one thing. But if it's gonna take $5 billion to build, it kind of becomes impossible, or it becomes harder to do it.

So, one of the things we are providing on the resource website at NIA is the costing tool. This is a costing tool that NASA uses. The approaches we are using, you're not constrained to use these tools. However, if you're using another tool, we gotta show that this concept not only is possible, but more important, it's feasible, we can actually build it within the cost and the schedule that we have for the Artemis program.

Robin Ford –

Perfect. Thank you.

And then one big thing that we'd like to remind teams as they go forward, the faculty advisors do have to sign off on the proposal for submission for it to be valid. We will not accept it without a faculty advisor signature.

And then for the two-minute video, the intent really is that that video augment your proposal, in case there's higher level things that you really can't explain into words and such, and you need to pictorialize it. That's a great way to help augment your proposal.

Stacey Dees –

And Robin, if you don't mind, I'm going to jump in here really quickly on the video. One of the things that we have seen that's kind of a neat collaboration in previous challenges is when a team of engineering students reaches out to maybe their communications department or something similar at the university and they work hand in hand together to develop this video.

And so, in that sense, you get to bring in a totally different type of discipline, a totally different type of person that would be on your normal kind of technical research aspects of the team. And they get to participate in this cool NASA project as well. And so, you can take their skill set. And sometimes they can use it as a project for school or for an extra credit or something like that to help support you.

So definitely make use of the resources at your school to help with the video. We know that's not a skill that's in everybody's wheelhouse, so definitely just try to find what avenues are available to you, what resources are available to you at your university? And find some fun partnerships to help you. With some of this stuff.

Robin Ford –

Very true. Thanks, Stacy. It's a perfect lead into what Jamshid and Stacy were referring to on the HuLC website. We have a page dedicated strictly to resources. So, as you click through each of those icons, it will bring up a plethora of resources available to you.

And here underneath where the yellow arrow is pointing, there is a costing button down at the bottom, and that's where you will find those NASA costing tools available to you. They are free of charge. You just need to sign up and provide some basic information, but it is free.

Alright, so let's talk about some of the programmatic things with the challenge.

For eligibility, all of the details are listed on page 6 of the Challenge Guidelines. I'm not gonna read them verbatim, but at a minimum [each] team has to have a faculty advisor at an accredited US-based academic institution along with two students from that institution.

So, as you're building your team, think about the diversity of skills and expertise in team members. We do highly encourage multidisciplinary teams because they often submit very well-rounded concepts.

For the deadlines, our next deadline is October 22. That's when your Notice of Intent is due. We will have a second follow-up Q&A session that's gonna be on November 8. You can submit advance questions to that on October 31. Your actual proposal and video submission deadline is March 4, [2024].

So, as you prepare your proposal, I'm not going to read these all verbatim, you can definitely go through them. You really want to make sure that you adhere to the competition Guidelines because they are the foundation upon which your submission is going to be judged.

Make sure that you're proofreading. Make sure that you've followed all of the points within the Guidelines.

Make sure that you start early and plan ahead so that you have enough time to get all of those milestones achieved, because all of the deadlines are firm. There are no extensions that will be granted.

All right let's get to some of the frequently asked questions that we receive. We do have a page on the website that will have a list of them. As we receive more via e-mail or even through these Q&A sessions, we will post them on the website so that they are available to all of the teams, not just the team that asked.

[Here's] just a couple to point out to you that comes up quite frequently. Are international students allowed to participate? [The answer] is kind of twofold. So, eligibility is limited to US-based universities. Foreign universities are not eligible to participate in the competition.

However, if you are a foreign national that attends a US-based university, you are able to fully participate within the challenge. But there are a couple exceptions, so please make sure that you're reading the Challenge Guidelines. Those exceptions are listed on page 7 [of the Guidelines].

Can we work with industry, either formally or informally? And yes, we do encourage that, [but] it is acceptable in a small capacity. We want to make sure that this is still a student project and that the teams and the universities are doing the work, not the bigger industry corporations and such.

And then, can we have a faculty or a technical advisor who works for NASA? That is not allowed. Technical advisors who work for NASA, either as civil servants or contractors, are forbidden.

As I said, for a full list of the FAQ's, you can find them on our website.

And so now we're going to go ahead and open up the floor to you guys. If you have any questions, go ahead and use the raise hand feature here in Teams or you can drop a question into the chat. Now's your time to ask some [questions] of the judges and sponsors. Do we have anything yet?

Stacey Dees –

Looks like Felix is asking a question in the chat, so we'll let him type that in. Got a couple coming in. You're also welcome to hit the raise your hand function and turn on your mics and just ask the question out loud when we call on you.

Robin Ford –

Is there a maximum number of participants?

No, there is no maximum number of students, but there is a minimum. You need at least one faculty advisor and two students. But beyond that, there is not a maximum. Now, I would say and Stacy, you can elaborate, if you are one of the finalist teams and it comes time to attending the Forum, we may need to limit the number of team members that can attend, just on a space logistics basis.

Can we have students from more than one university on a team? I believe the answer is yes, but Stacy, do you want to [answer]?

Stacey Dees –

Yes, absolutely. So, in fact, some of our really successful teams and past challenges have been from multiple universities. And so, what we would do in that scenario, is you still need to have one university that serves as kind of the primary or the lead university for that team, and they would need a faculty advisor from that lead institution to serve as kind of our primary POC.

If the team was selected as a finalist, all of the stipend funding would go directly to that particular lead institution. So, you would need to work out internally, between the two universities, how any of that funding would be shared.

Similarly in terms of the prizes, if your team were to be one of our prize recipients and placing in the top three teams, we would also need to send the prize funding directly to that lead institution. So just make sure that the institutions are talking to each other and you're agreeing on how those funds would be shared.

Robin Ford –

Any other questions?

Stacey Dees –

We realize that, you know, this is very early in the process and we have an entire year until proposals are due, but we wanted to just provide kind of an open Q&A forum early on, in case if there were any professors or students who wanted to start working on formulating kind of how they wanted to approach this challenge over the summer.

But we really understand that the bulk of this work is probably going to start taking place in the fall and once you start getting into the research and kind of narrowing down your topic, I'm sure that you will have a ton more technical questions at that point. That's kind of what we were anticipating. And in the meantime, you know, there's a big window between now and our next Q&A session. However, we are here and available at any point in time if you have questions.

And so, I think Robin probably has a slide, if I'm not mistaken, that [is] where she's going to talk about this a little bit. But please don't hesitate to reach out to us at the HuLC@nianet.org email at any point in time.

We want to make sure that you guys are successful, and so getting back with you and working with you and helping to find an appropriate response to all of your questions, is going to be a priority for us.

Robin Ford –

Perfect. Thank you.

And so, yes, one thing that we do ask is that you don't try to contact the judges directly. Uh, we want them to have a fair and impartial relationship with all of the teams. We [also] update the website frequently. So please check back often.

The QR code is there so that you can quickly get to the Challenge Guidelines. And you'll note on the bottom of page 2, if we have to make any changes to the Guidelines at all, we will notate them, along with the date, so that you know that you're getting the most up to date version of the Guidelines.

And if there aren't any other questions. I believe we're adjourned.

Stacey Dees –

Well, thank you to all of the NASA sponsors who took time out of your busy day on a Friday to join us for the call and for all of the hard work that went into putting these Guidelines together. I think we're going to come up with some wonderful concepts for you all, and we definitely appreciate your time. We also appreciate the interest in the Challenge and like I said, we're here for you.

And it looks like Barbara might be typing one last question. So, before we pop off, let's wait just a second. Oh, just a thank you. Oh alright, great. We're excited too.

Robin Ford –

Thank you everyone. So, again a copy of the recording, as well as the transcript will be available on the HuLC website on May 5, next week. All right. Thank you.

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