



NASA TechLeap Orbital Clarity Challenge

Information Session

September 22, 2026

Challenge information

Cameron Fox:

All right, let's go ahead and jump in. Anna, you can go to the next slide. So welcome everyone, and thanks for joining the NASA TechLeap Prize Orbital Clarity Challenge information session. I'm Cameron Fox with Luminary Labs. We support NASA on the TechLeap Prize, and I will be your host for today. So little housekeeping, this session is being recorded and we will post it on the challenge website within a week of today. All of the attendees, y'all will be muted throughout, but please feel free to submit questions at any time using the Q&A function at the bottom of your Zoom screen, and we'll take them during the Q&A session at the end. The note that we might not get through everything as there are a lot of you here, but we'll be sure to update the website's FAQ page with anything we don't get to.

So in terms of our agenda, we'll start with introductions and a program overview from NASA. After that, we'll move into challenge details, talk about the timeline, potential awards, and the challenge phases. After that, we'll go into how a submission will be evaluated, including what we're asking you to measure and the technical guidelines. Lastly, I'll come back with the details on how to enter, just make sure it's clear how to register, what the caveats there, and then we'll leave plenty of time for any questions at the end. So with that, I will turn it over to my colleague Roshanak to introduce the NASA team and set up why this challenge exists.

Roshanak Hakimzadeh:

Good afternoon everyone. I'm Roshanak Hakimzadeh. I'm the program scientist and the lead for the technology program in NASA's Heliophysics Division. The Orbital Clarity Challenge is a collaboration between three organizations at NASA, the Heliophysics Division, which studies the effect of the sun on the heliosphere and its impact on space weather, including how it contributes to the expansion and contraction of the earth's thermosphere and the implications of that on orbital drag, the Flight Opportunities Program, which facilitates the maturation of promising space technologies through flight testing and the Center of Excellence for Collaborative Innovation, which runs the prizes and competitions like this one. I'm joined here by my colleagues from across those teams, particularly my colleagues, Doug Rowland, Katherine Garcia-Sage, Stephen Christe, who will walk you through the



technical guidelines and several subject matter experts who will be working your questions during this session as well as at the end.

Anh Nguyen from Flight Opportunities is also with us and will say a few words now about the program next. Anh, over to you.

Anh Nguyen:

Hi. So here at NASA Flight Opportunities, we aim to accelerate space exploration discovery and the expansion of space commerce through rapid testing with our industry flight providers. We really want to support future missions and reduce risk. So NASA Flight Opportunity utilizes these TechLeap challenges to rapidly identify and develop technologies of significant interest. So this is NASA Flight Opportunity sixth TechLeap Challenge, which is very exciting, and we are really looking forward to supporting our friends at NASA Heliophysics and seeing your payload solutions. Thank you.

Roshanak Hakimzadeh:

The fog of low earth orbit. Most satellites operate within what we call the thermosphere, which is the thin upper layer of the atmosphere where drag is highly variable and is measured too infrequently to gain an accurate picture. The thermosphere's density shifts continuously with solar and geomagnetic activity, and because drag corresponds directly to that density change, it remains the single largest source of uncertainty in predicting a spacecraft's orbit and trajectory. The operational costs are substantial. Operators maneuver to avoid collisions that may never have posed a real threat and carry extra propellant as insurance against orbits decaying faster than expected. Even then, predictions of what and where a satellite will reenter routinely span windows too wide to be actionable. And when a solar storm result in an increase in density of the atmosphere without warning, the same uncertainty can result in satellites orbit variations without warning. The orbital clarity challenge, the rapid growth of commercial satellites usually cast as a problem for low earth orbit is also an opportunity.

Thousands of spacecraft already fly through the very orbits where better data is most needed, and each one is a potential platform for collecting it. What stands in the way is cost. Measurements taken in orbit are sparse, often disagree for one instrument to the next and are expensive to collect. A single sensor can run from a million to \$10 million. At that price, very few operators can justify carrying even one and models remain starved for data to improve predictions. So this challenge calls for low cost methods of measuring thermospheric density, pressure or drag in low earth orbit. We're looking for approaches that are inexpensive and scalable enough to be produced in quantity and flown as hosted payloads across all orbital platforms. Deployed across constellations, sensors like these could take continuous measurements from many points at once and give drag prediction models the global low latency coverage they lack today.

More accurate models translate directly into safer operations and a more reliable orbit trajectory. The challenge runs in three phases, advancing up to four winners' concepts to flight ready solution within 12



months, and NASA intends to offer each winning team a test flight at no cost. Cameron's going to take you through the timeline and the awards and the three phases for this competition. Cameron, back to you.

Cameron Fox:

Thanks, Roshanak. Yeah, so as Roshanak said, excuse me, I'll walk through how the challenge is structured. So timeline, awards, and what happens in each phase. Starting with the timeline, so the challenge launched on August 19th, and we're here today for the info session. Phase 1 submissions close on November 11th, and Phase 2 will run through early 2027 to spring of '27. Phase 3 will run from spring of 2027 to the summer, and I'll break each phase down in a moment. Next slide. So in terms of awards, up to four winners will each receive up to \$500,000 each to develop flight-ready solutions, and that's paid out by phase. So \$200,000 per team for Phase 1, \$200,000 per team for Phase 2, and \$100,000 per team for Phase 3. In addition, NASA intends to provide an opportunity for the winning teams to demonstrate their solutions in orbit at no cost.

One thing to note here, since this is a price competition and not a grant, funds are distributed directly to the winners and may be used however the winners see fit.

So going into Phase 1, the application period, this is a 12-week window during which eligible individuals, organizations, and teams are invited to complete submissions for low cost scalable sensing technologies that enable proliferated measurements of density, pressure, or drag in low earth orbit. As I said, we opened on August 19th. Registration closes a bit before submissions, so that's something to be aware of. You'll need to register on the platform by October 28th at 5:00 PM, and then submissions actually close November 11th at 5:00 PM Eastern. They are two separate steps, so make sure that you register first. After the submission period closes, a panel of judges will score each eligible submission across four criteria. We'll walk through those in detail in a second. And up to four winners will each receive \$200,000 and advance to Phase 2. We'll be announcing those winners in December of this year.

So during Phase 2, the winners of Phase 1 will have four months to finalize their design and build an engineering model of their sensing technology, demonstrating in ground testing that it can make the required measurement with support from NASA subject matter experts. This will start early next year. In spring of next year, field judges will conduct site visits to each team to evaluate progress against the Phase 2 scoring criteria. The Phase 2 teams will have an opportunity to each receive \$200,000 and continue to Phase 3. We'll announce those Phase 2 winners in spring of next year.

Lastly, Phase 3. So Phase 2 winners will have a final four months to complete their solutions, demonstrate operation in a relevant space environment, and prepare a test matrix and operational validation plan ahead of the test flight. Like in Phase 2, get support from NASA subject matter experts. This will begin in spring of next year. Next summer, field judges will do site visits just like in Phase 2 to evaluate progress against the Phase 3 scoring criteria, and each of the Phase 3 teams has the opportunity to receive an additional \$100,000. And as we said, NASA intends to offer each of those



winners a flight test at no cost. We'll announce the final winners in summer of next year. So with that, I'm going to hand it over to Doug Rowland and he'll walk through what we're asking you to measure and some of the technical guidelines. Over to you, Doug.

Doug Rowland:

Thanks, Cameron. I'm Doug Rowland and I'm an upper atmospheric researcher at NASA. The core goal is low cost measurement of thermospheric density in low earth orbit at a cost and form factor that allow measurements to proliferate across commercial satellite platforms. Mass density is the lead measurement. Thermospheric pressure and drag acceleration are in scope as a means of determining density, including approaches that use the host spacecraft itself as a sensor of drag acceleration. Measurements of composition, major species number density, are valued but not required. If you can measure composition alongside density, that is the most valuable input to density models and the evaluation criteria reflect that.

Solutions should target one or both of two altitude regimes, very low earth orbit, below 300 kilometers and low earth orbit between 300 and 800 kilometers. Every applicant identifies the regime and the altitude range within that regime where their solution meets its stated performance. Be specific about this. The relevance criteria looks at the altitude range you cover as well as what you measure. Next slide please. These are some examples, three illustrative pathways that can be eligible solutions for this challenge. Hosted in situ sensors are instruments that directly sample the local environment from the host spacecraft. For example, measuring neutral density, composition or pressure along the host satellite's orbit.

Excuse me. They're also drag acceleration approaches. These are precision measurements of drag acceleration either through a hosted instrument or by using the host spacecraft itself as the sensor for which thermospheric density can be determined, and they're hosted remote sensing instruments, instruments that observe the thermosphere remotely from the host spacecraft, measuring major species density and/or temperature profiles across a range of altitudes, latitudes, and local times. This list is illustrative and not exhaustive. We encourage approaches not listed here provided they produce the target measurements and meet the requirements in the technical guidelines. One hard rule is that standalone free flying satellites, including standalone calibration satellites are not eligible. Every solution must fly as a hosted payload on a commercial spacecraft. Next slide please.

This is a table that shows you the target performance benchmarks, but the single most useful thing to know about this table is these are target floors, not fixed requirements. They describe the level of performance NASA believes would make a solution useful for thermospheric density specification and modeling. You may propose a different target with justification, a solution that trades some measurement performance for substantial gain in cost or scalability can still be highly competitive.

For in situ measurements in either VLEO or LEO regime, mass density would be 20% accuracy target, 10% precision target, and 30 second resolution or faster. Neutral gas pressure will be 20% target for



accuracy, 5% for precision and 30 seconds of temporal resolution, and drag acceleration targets would be 5% for accuracy, 1% precision and 10 second resolution. For the remote sensing targets in VILIO between 90 to 300 kilometers, we're looking for major species neutral density and/or temperature profiles at 10% accuracy and precision with five degree horizontal and 10 kilometer altitude resolution.

Remote sensing teams should propose to measure major species density and/or the temperature profile depending on altitude. Depending on altitude, the major species may be nitric oxide, molecular oxygen, nitrogen or oxygen over as wide a range in altitude, latitude and local time as possible and explain the rationale for the region they chose. Whatever you measure, state your prospective performance against the relevant target with quantitative figures of merit and expected uncertainty supported by test data, prior data or analysis. The performance criterion scores exactly this. The technical guideline page links the NRLMSIS empirical atmosphere model as a reference for expected conditions across VLEO and LEO, and also a review article on density measurement approaches. Next slide please.

For resource needs and accommodation, keep in mind this is a low size weight and power challenge. Solutions should be designed for ready accommodation on planned and existing commercial satellites without significant modification to the host beyond mounting thermal and electrical interfaces. A specific host spacecraft has not yet been selected, so no fixed mass volume or power envelope is published. State the assumptions you are making about the host and the range of conditions your solution could accommodate, mass, volume, power draw, data rate and format, pointing, radiation tolerance, thermal and vibration tolerances, EMI, EMC, and any safety or handling limitations. Designs that remain robust across a range of host conditions will be better positioned for flight. Designed toward interfaces typical of commercial small satellite hosted payloads and state your interface assumptions, supply voltage, data interface mounting, interface specifications will be published as flight arrangements mature and teams advancing to Phase 2 will finalize their designs against them.

Account for the contamination environment of a commercial host. If your instrument has exposed detectors, high voltage elements or sensitivity to volatile contamination, explain how it will tolerate that environment or what workaround you will use, covers or caps deployed after initial outcasing period, for example. Describe the data your solution produces and estimate its daily data volume and peak data rate. Downlink is provided through the host spacecraft. You're not expected to carry your own communication systems. Next slide.

For the additional requirements on our technical guidelines, we have several. One is that the solution is producible at scale. We want to be buildable and deliverable in quantities of at least 100 units at a per unit cost far below the current state of the art where comparable measurements cost roughly \$1 to \$10 million per copy. Per unit cost excludes non-recurring engineering, launch, deployment, and operations. We want the solution to be durable, designed to withstand launch loads and to operate for at least one year in the LEO or VLEO thermal and radiation environment. No title ionizing dose figure is available yet. State your own radiation assumptions. The requirement for no debris hazard is very important. Any deployable elements must be retained and approaches that intentionally release objects must describe



how they meet orbital debris mitigation requirements. Another requirement is that there's no interference with the host spacecraft systems or other payloads.

No EMI or EMC requirements are published yet, so assume reasonable compliance will be expected. State what you assume that entails and explain how your design accommodates it. On the test flight, NASA intends to offer each team that completes Phase 3 a flight test in orbit at no cost and flight costs are excluded from your budget. The vehicle provider and mission have not been selected, so make reasonable assumptions, state them in your submission and show that your design remains robust if they change. That's what we're asking you to measure and the guidelines your solution needs to meet. Roshanak will take it from here on how submissions are evaluated. Roshanak, over to you.

Roshanak Hakimzadeh:

Thank you very much, Doug. So now we want to talk about how your submissions will be evaluated. We'll talk about Phase 1 first and then we'll talk about the two build phases.

So next slide, evaluation process Phase 1. Phase 1 submissions will be evaluated by a panel of judges carefully chosen for their specialized knowledge and expertise. Each judge scores their assigned submissions on a scale of one to five across each of the four criteria and provides qualitative comments. Each valid submission receives five sets of reviews and those scores are statistically normalized to account for differences in approach between the judges. The selection committee then reviews the top scoring submissions and selects up to four winners based on the results of the judging panel as well as the various programmatic considerations that will go on to Phase 2. Next slide.

Phase 1 evaluation criteria. There are four criteria for Phase 1, relevance, performance, cost and scalability and flight readiness.

Relevance is to what extent would the measurements that the solution produces serve to support the thermostat density specifications and modeling given the parameters it measures and the altitude range it covers. The strongest submissions measure density together with composition over a clearly identified extensive altitude regime and make a specific well evidenced case for how the data would improve model accuracy or fill known coverage gaps. Make that case explicitly. Don't assume it's obvious.

Performance. That criterion is basically to what extent does the evidence presented, such as test data, prior development calibration plan, make a credible case that the solution will meet the performance benchmarks for what's measures and the altitudes it targets. Strong submissions are quantitative and characterize their expected uncertainty realistically.

Under cost and scalability, we're looking for to what extent would the solution be low cost to produce and fly at scale relative to current instruments and how credible is the plan to produce it in volume? We look at projected unit cost, production rate, manufacturing approach and ease of accommodation across a broad range of commercial launches. Name a specific manufacturing methodology and a production rate with quantitative backing.



The last criterion, flight readiness. Here we're looking for to what extent is there evidence that the technology can be made flight ready and integrated as hosted payload within the competition timeline supported by a realistic plan, scheduled budget and risk register. Milestone dependencies and resources clearly laid out a budget aligned with scope and key risks with actionable mitigations and margin.

The full five level rubric for each criterion is published on the evaluation criteria page. I highly recommend that you read it before you write your proposal. Next slide please.

Now let's talk about the Phase 2 evaluation process. At the conclusion of Phase 2, field judges will conduct onsite visits to evaluate the progress each team has made. Submissions are now scored out of 100 and a team must receive at least 80 points to receive the additional \$200,000 price purse for this phase. Next slide please.

Phase 2 evaluation criteria, again, there are four criteria in this phase. Each of them will receive 25 points. First criteria is the evidence that a finalized design has been completed and documented, including key design decisions, trade studies and the rationale for the chosen approach.

Then we look for evidence that the design is mechanically, electrically and dimensionally compatible with integration as a hosted payload consistent with the interface specifications in the technical guidelines.

Next, we look for evidence that a credible development and testing plan is in place with clear ties to system requirements and to the schedule the team proposed in its submission and that the team is on track against that schedule.

Lastly, we look for evidence that the team has built an engineering model of sensing technology identified in its submission and demonstrate that it can make the required measurement in ground testing. The engineering model is at the heart of Phase 2. Next slide please.

Then you go to Phase 3, the Phase 3 evaluation process. At the conclusion of Phase 3, field judges conduct onsite visits to evaluate the progress each team has made and its readiness to integrate the solution with the host spacecraft. Again, this is going to be scored out of a hundred with 80 points needed to receive the additional price purse of \$100,000. Next slide please.

There are four evaluation criteria for Phase 3, each receiving 25 points. The criteria are as follows.

We look for evidence that the build is complete and on track for on-time delivery to the flight provider and integration into the host spacecraft.

Next, we look for evidence that the solution has been built to the requirements of the host spacecraft interface.



Then we look for evidence that testing and analysis for the anticipated flight conditions have been completed, including a demonstration that the solution operates in a relevant space environment and that the results indicate it's ready for flight.

And lastly, we look for evidence that the potential risks for the flight have been considered and mitigation plans developed and that a test matrix and operational validation plan are in place ahead of the flight test. That's in a nutshell the technical picture. Now back to you, Cameron, for how to enter.

Cameron Fox:

Thanks Roshanak. All right, so now we'll close out before getting to Q&A with just some of the details on how to enter. Next slide. So four steps that y'all should be aware of. First, highly recommend that you review all of the materials on the challenge website, occ.nasatechleap.org, especially the technical guidelines, evaluation criteria and the sample submission form. Second, be sure to register on the submission platform. You can visit orbitalclaritychallenge.awardsplatform.com or just click the register and submit button on the main webpage. There you can create an account and complete registration until 5:00 PM Eastern on October 28th. Third, prepare your submission. So you'll want to complete each step of the submission process and we'll go through that in a second and you can always reach out to hello@nasatechleap.org if you have any questions or issues with the form.

And lastly, submit. Make sure to finalize and submit your application by 5:00 PM Eastern on November 11th. The evaluations will run November through December of this year and we'll announce winners near the end of the year. Next slide.

So just a quick overview of what you'll find in the submission portal for your application. There are six sections. First, introduction, short title and description that introduces your proposed technology. Next about you or your team, so your team's capabilities and size plus eligibility and insurance confirmations. Third, your technology, really the core of the application. What are you measuring? How does it perform and what will it cost to produce at scale? Fourth, we'll ask you to submit a video pitch. So this is a short video describing your technology and why it should be selected fewer than 90 seconds and we don't expect it to be professionally produced. An iPhone is completely fine. Fifth, project schedule and milestone. So we want to understand your plan, the timeline, and what your budget is to build a flight ready solution. And lastly, there's a checklist for final confirmations and agreements before you submit. Next slide.

Now, last thing we wanted to talk about before we get to the Q&A is eligibility. So NASA welcome submissions from individuals, teams, and organizations or entities that have a recognized legal existence and structure under applicable law. They're in good standing in the jurisdiction under which they're organized with a few restrictions. First, individuals need to be US citizens or permanent residents of the United States and 18 or older. Organizations need to be incorporated in and maintain a primary place of business in the US. And lastly, teams need to be composed of otherwise eligible individuals or organizations and led by a US citizen or permanent resident. Teams can include foreign nationals, but



there are a few caveats here. First, it's subject to FAR trade agreements, and the team will still be eligible to receive a prize as long as foreign nationals sign and deliver a foreign participant acknowledgement form, acknowledging they're not eligible to receive a prize from NASA.

There are a few more details. I would really suggest checking the rules, terms and conditions page on the site to make sure it's all clear. And of course, you can reach out to us, hello@nasatechleap.org if you have any questions. Last thing to flag here for federal employees, you may enter with some specific restrictions. You can't be acting within the scope of your position nor use any facilities available to you unless they're available to everyone. The only people that doesn't apply to you are NASA employees or JPL contractors who are not eligible.

All right. So with that, we'll go ahead and pull down the slides for now and start going through some of the questions that we have received.

Q&A

All right, so first one I'm seeing here, are joint ventures, teaming agreements or academic industry partnerships allowed? Yes, absolutely. Applicants can partner with other organizations on their submission, including company or university partnerships, as long as participants meet the eligibility rules and the team is led by an eligible US citizen, permanent resident, or US incorporated organization. Again, see the rules, terms, and conditions on the site for all the details there.

What are the insurance requirements and how can applicants plan ahead? So to participate in the prize, you'll need to demonstrate that you have at least \$250,000 in liability insurance coverage or otherwise demonstrate financial responsibility for that amount. The policy needs to be in effect from the date of your submission through the end of the competition. We'll request proof for that at the time you're selected as a potential winner, and you'll need minimum claims coverage of \$250,000, and it needs to run through at least December 31st, 2028. There is a page you can find on the website with the insurance guidelines.

What level of technology readiness is needed to progress through the phases? So the challenge doesn't specify or require TRL. On the submission form, you'll see that you'll be asked to explain how the tech has been tested in the laboratory or relative flight environment, at least to the component or breadboard level, and to show that a solution could be ready for flight within eight months. The challenge phases and evaluation criteria page has more detail there.

Is the intent to integrate an existing instrument onto a payload or to develop a new form of measurement? So either is acceptable here. Ultimately, the goal is low cost measurement of thermospheric density at a cost and form factor that allow measurements to proliferate across commercial satellite platforms. Technical guidelines list hosted in situ sensors, drag acceleration approaches, and hosted remote sensing instruments as illustrative pathways. But like we said, the list is not exhaustive. An existing instrument adapted to fly as a low SWaP hosted payload and a new



measurement approach are both eligible as long as the solution meets the target benchmarks and the additional requirements.

Must the solution fly as a hosted payload on a satellite or could a companion free flyer be proposed? So every solution must fly as a hosted payload above a commercial spacecraft. Standalone free flying satellites, including standalone calibration satellites are not eligible for this challenge, and a companion free flyer would fall into that category.

Is attitude control or pointing capability required? Yeah. Since solutions fly as hosted payloads, attitude control will be provided by the host spacecraft rather than by the applicant. You should state the pointing requirements your solution needs, if any, as part of the resource needs and accommodation section on the submission form along with mass, volume, power draw, data rate, and environmental tolerances. Because a specific host has not been selected, we'd ask you to just state your assumptions and the range of conditions your solution could accommodate. Designs that remain robust across a range of host conditions will be better positioned for flight.

Does the challenge allow payloads that combine external drag interaction services with internal calibration mechanisms? So the technical guidelines describe three illustrative pathways and state that the list is not exhaustive. Applicants are encouraged to propose solutions not listed provided they produce the target measurements and meet the published requirements. A payload combining external drag interaction surface with an internal calibration mechanism is not excluded as long as it flies as a hosted payload meets the low SWaP durability, debris safety and non-interference requirements and any deployable elements are retained. Applicant should describe the approach and its expected performance against the benchmarks in the solution.

Is this challenge limited to hardware or are software only or data purchase approaches eligible? So since we're seeking solutions that fly as hosted payload and produces target measurements in orbit, software and data processing are expected to be part of the solution. For example, as drag acceleration approaches that derive density from the hosted spacecraft motion, but a submission does need to include hardware that flies.

Will NASA Labs be available for simulation and are there any other teams with whom I can collaborate? NASA is not providing free lab space for this challenge. You're welcome to collaborate with others on your submission, but we do not have a mechanism to help you find teammates. If you're named as a winner, you will have the opportunity to meet with NASA subject matter experts as you continue the development of your sensors and work towards compatibility to the host spacecraft interface specifications.

How do university teams participate? For example, do we work through our sponsored programs office? How does professor form a team consisting of students, postdocs, and possibly alumni? Yeah, university participation will be university specific. We would suggest you confer with your office on the specific policies for applying, but no specifics from our side.



Flight to orbit at no cost — will integration costs be covered and/or reimbursed? NASA intends to provide the opportunity for flight test, aboard a hosted orbital spacecraft at no cost to the Phase 3 winners. So your budget should exclude flight test cost. Prizes up to \$500,000 per winner, and they'll be distributed directly to the winner and can be distributed as you see fit, including for the integration cost.

Are there any anticipated down selects between phases one, two, and three? No. The winners are named at the end of Phase 1 and all of those winners can continue through all of the phases. That's with the caveat that you meet all of the evaluation criteria scoring for phases two and three, but it is certainly possible that we select four winners in Phase 1 and all four of those winners are retained through phases two and phases three.

Is it compulsory to be from the US to participate? To win a prize, individuals need to be US citizens or permanent residents of the US, the 18 or older. Organizations need to be an entity incorporated in and maintaining a primary place of business in the US. Teams can be comprised of otherwise eligible individuals and led by a US citizen or permanent residents. So foreign participation can happen on teams, but with the caveats that I shared earlier, and like I said, certainly refer to the rules, terms, and conditions for those details.

To what extent does the project budget need to align with the prize payments? It's really up to each applicant to determine an appropriate budget for the proposed solutions, and prize funds can be used however the winners see fit. You can include any cost categories, including contingencies for risk mitigation that support the development of your technology and solution, and you're welcome to organize that by phases. One thing to flag is that though the total possible prize amount is up to \$500,000 per team, the amount provided in the budget can be more than, less than, or equal to that value. Including the budget and the submission helps determine if the proposed project plan and budget are reasonable.

What does no cost mean for the flight demonstration? Yes, I think related to what I said earlier, NASA intends to provide the opportunity for a flight test aboard hosted orbital spacecraft at no cost to the payload team for the Phase 3 winners, and your budget should exclude flight test cost. Price is up to \$500,000 per winner, and like we said, they'll be distributed directly to you and can be used as you see fit. And that does include integration costs, just not the flight test itself.

For the first phase, do we need to submit the blueprint of the technical system alongside with the mechanical system? So as part of your application, you'll have the opportunity to upload a single PDF that is a representation, a visual representation of your solution. The additional questions you need to answer on the submission form can be viewed on the website. We have a sample form there. We encourage you to review that document to understand what needs to be submitted.

TechLeap has never had a winner team composed of only one individual. Will this hold true for this competition? Not necessarily. We welcome submissions from individuals and they're all evaluated using the same rubric that is published on the website and that we went through earlier, so there is nothing

precluding that from happening. The rules, terms, and conditions state the money will be given to a person. Biggest concern is this mechanism of distribution of funds. While it's understood this is not a grant, the most efficient distribution of funds is directly to the applying organization where the work will be conducted. This helps with insurance or distribution. In short, for this particular question, it would be helpful to know where the funds are distributed directly to nonprofit educational institutions. If I understand the question correctly, to be clear, if an organization submits, the prize will be paid to that organization and we'll be sure to update the site so that that is clear.

Are the forms for foreign students provided from NASA or does the university associated remain responsible for providing them? The foreign participant acknowledgement form is on the competition website in the rules, terms, and conditions.

Are international collaborators allowable as team members acknowledging they will not receive TechLeap prize funds? Yes, with conditions. So definitely refer to the eligibility guidelines in the rules, terms, and conditions. And you can always email us at hello@nasatechleap.org if it's unclear.

Are there any NASA TechLeap programs, partner programs, or future challenges specifically open to international high school students that you would recommend we watch for? Yeah, NASA has a lot of competitions for students. Specifically, I would say look at the NASA get involved page, which is just nasa.gov/get-involved. So great question.

Can we request a specific location for mounting our instrument on the spacecraft? You are required to provide assumptions that you're making about the host and the range of conditions that the solution could accommodate.

Would it be agreeable to give us an idea of the data and power interfaces available to our instrument from the host? Are we talking about one kilobyte per second and 0.1 watts or 10 megabytes per second and 50 watts? As we said, a specific host spacecraft has not been selected, so there are no fixed mass volume power or data rate envelopes available at this time. You should state the assumptions that you are making about the host and range of conditions your solution could accommodate, including your best estimates of mass, volume, power draw, data rate, format, pointing requirements, radiation tolerance, thermal tolerances, vibration and shock tolerances, EMI MCP considerations, and any safety or handling limitations. Designs that remain robust across a range of host conditions will be better positioned for flight.

The Phase 1 evaluation rubric only allows the highest relevance score if composition measurements are included. Would you be open to modifying this rubric so the composition is not required to achieve this relevant score? While it is true that this composition is important for aeronomy science and model construction, it is not a primary input for satellite drag specification. Also, most, if not all, proven assimilation techniques for specifying the drag environment do not assimilate composition. Long question. Thank you. Yeah, the highest relevance score reflects the most valuable measurement types to advance our knowledge of thermospheric density, a combination of the primary input to drag density



together with the composition that produces that density. We don't anticipate changing the rubric. Note that the selecting official is free to select solutions with a range of rubric scores in order to achieve NASA's goals, including a breadth of different types of approaches or regimes of applicability.

How do we prove the desired 20% accuracy specified by this challenge? What is the truth value that NASA had in mind? Yeah, so you should state your expected performance against the relevant target with quantitative figures of merit and expected uncertainty supported by test data, prior data or analysis. Specifically, applicants are expected to propose their verification and validation approach as part of their proposal to meet the challenge accuracy requirements. Later phase proposals require the evidence be provided that the sensor provides the requirement measurements with the required accuracy.

The challenge asks for 100 or more instruments. What is the cadence, eight a month or 100 at the end of one year? Good question. The challenge does not require the delivery of multiple instruments and only one flight opportunity per team is currently available, the more might become available. Information on cost and scalability should be provided to describe how multiple copies can be provided and at what cadence in the future, but not during the challenge.

Please define your affordability targets. What is the desired price point per unit? Yeah, I would suggest looking at the technical guidelines. Specifically there, we provide the guidance that it is buildable and deliverable in quantities of at least a hundred units at a per unit cost far below the current state of the art, and that's roughly one to \$10 million per copy. So we'd ask you to state per unit cost excluding non-recurring engineering, launch, deployment, and operations. In general, are FFRDCs eligible? Yeah, employees of FFRDCs can participate as long as they are not acting within the scope of their position and don't rely on any facilities, access, personnel, knowledge, or other resources that are available to them as a result of their employment, unless there are resources that can be made available to all other applicants on an equal basis.

If our team is a partnership between two entities, do we need a letter of support? No, letters of support are not required.

Is it possible to speak with experienced principal investigators and past TechLeap winners about our submission? Yeah, you can find technologies previously selected for flight testing through NASA's flight opportunity program. Many PIs and teams are willing to speak about their experience with potential applicants, and you can also find more information and see recorded webinar sessions with the PIs on the Flight Opportunities Community of Practice webpage.

Maybe time for just a couple more here.

Can applicable related work that was/is performed under other NASA contracts that contribute to this challenge solution be eligible? Yes, so long as the solution described in your submission is substantively different from the solution developed using government funds and that you're not using government



funding for the development of this application. And like with everything, feel free to email us if you have more specific questions.

Are we allowed to complete more than one submission? So each eligible lead applicant can only complete one submission. A lead applicant can serve as a partner on a submission led by another eligible lead, provided that each submission proposes a separate and distinct solution. Regional or location specific branches of larger organizations as well as departments, schools, or nonprofits within or based at a university can each register and complete separately as the lead applicant on one submission, provided that each of the proposed solutions is separate and distinct. If an organization is the lead applicant, there should be minimal overlap in team members.

I think one or two more and then we'll close out.

Is it okay for applicants to receive private investment or other funding to accelerate time to market? Absolutely. You're welcome to secure additional funding and resources to develop your solution. If you have other investors or funders secured, please list sources of funding under the budget narrative section of the submission form.

What happens to my intellectual property? So while what you submit for the technology title and description may be published on the website or other NASA websites, the ownership and use of IP from the challenge will remain yours. NASA may choose to negotiate for a license to use the solutions developed as a result of the challenge, but yeah, it is your IP.

Can the submission contain proprietary information or should it be completely non-proprietary? The submission will be shared with the NASA TechLeap Prize team, the evaluation panel judges, and the selection committee. While they will treat all submissions with discretion, you may choose to exclude any confidential and/or sensitive information. And like I said above, the technology title and description might be published on the website, so consider that when you're writing your response.

All right, everyone. I know that we didn't get to all of your questions and it's really exciting to have a group that has so many. These are really great, but I think we're going to go ahead and close.

So yeah, thank you all for attending. Just in terms of next steps, like we said, more than anything, we'd encourage you to visit the website to learn more about everything we talked about and reach out to us at hello@nastechleap.org. If you have any specific questions, make sure you don't miss the registration deadline of October 28th nor the submission deadline of November 11th. And like I said, we didn't get to all of the questions, but we will be compiling all of them and publish the answers on our FAQ page, as well as a recording of this session and the slide deck, and you should see that on the website within about a week. So thank you all very much for your time and best of luck. Bye.