Source Selection Statement

NextSTEP-2 Appendix H: Human Landing System Broad Agency Announcement NNH19ZCQ001K_APPENDIX-H-HLS

National Aeronautics and Space Administration

April 28, 2020

Introduction

In my role as the Source Selection Authority (SSA) for the National Aeronautics and Space Administration (NASA or Agency) Human Landing System (HLS) procurement, for the reasons set forth below, I select the following firms for HLS contract awards: Blue Origin Federation, LLC, Dynetics, Inc., and Space Exploration Technologies Corp. This selection statement documents my independent analysis and judgment as the SSA, and constitutes my final determination on this matter.

Procurement Description

The purpose of this procurement is to facilitate the rapid development and demonstration of an HLS that will deliver the first woman, and next man, to the Moon no later than 2024. In addition, commercial and international partners will be able to leverage the new capabilities developed through this initiative for the execution of other missions over the coming decades, including the potential to leverage them in regularly recurring hardware and services procurements. NASA recognizes the need to foster the commercial development of expertise and technologies required for reusable, sustainable, and human-rated landing systems, and that these technologies are likely to have significant commercial applications beyond NASA.

To that end, NASA is employing a public-private partnership model for this procurement, using fixed-price research and development contracts; industry, with NASA's support and expertise, will lead the development and demonstration activities. Investments such as these by the private sector are expected to grow as additional market opportunities are identified, and activities expand from science and exploration to include resource utilization and other commercial activities for the benefit of both the public and private sectors. The HLS procurement is thus a critical component of fulfilling the goals articulated in Space Policy Directive-1, and NASA's plans to once again establish U.S. preeminence on and around the Moon and accelerate the advancement of technologies that have broad and valuable utility beyond the HLS Program.

Procedural History

NASA released the HLS solicitation (as amended) on October 25, 2019. Five offerors, listed below in alphabetical order, submitted timely proposals by the due date of November 5, 2019.

- Blue Origin Federation, LLC (Blue Origin)
- The Boeing Corporation (Boeing)
- Dynetics, Inc. (Dynetics)
- Space Exploration Technologies Corp. (SpaceX)
- Vivace Corp. (Vivace)

Based upon the proposals submitted and the evaluation thereof, three of these offerors—Blue Origin, Dynetics, and SpaceX—currently remain eligible for selection and award.[1]

[1] Consistent with the evaluation methodology provided within the HLS solicitation, I removed Boeing and Vivace from further consideration for award earlier in the source selection process.

After receipt of proposals, the Source Evaluation Panel (SEP) appointed to evaluate HLS proposals, comprised of three sub-panels (one each for Technical, Price, and Management), began its evaluation.

On February 7, 2020, following my determination that it would be in the Agency's best interests to do so, the Contracting Officer opened discussions with the offerors that remained in the competition at that time. In response, these offerors submitted timely revised proposals by the due date of February 23.

Following the submission of revised HLS proposals, I asked the SEP Chairperson to present a checkpoint briefing to me providing the SEP's assessment of the selectability of these revised proposals (i.e., whether the proposals contained any deficiencies or other issues that rendered them ineligible for contract award). On February 26, the SEP Chairperson provided this briefing. Therein, he presented the SEP's preliminary assessment that although the three offerors' respective revised proposals had unique technical merit and were selectable, NASA's budget profile for the HLS base period of performance did not support the award of a contract to all of these offerors at the firm fixed prices they had proposed. Specifically, the SEP noted that there was a significant shortfall between NASA's Fiscal Year 2020 (FY20) HLS budget and the combined total of the three offerors' proposed FY20 payments.

The HLS acquisition strategy contemplates having up to four prime contractors during the base period, with future down-selections from among these contractors occurring at the time of option awards. This strategy is intended to create the most competitive environment practicable, maximizing the likelihood of successful development that will culminate in crewed demonstration missions. Thus, in light of the checkpoint evaluation results, and in an effort to effectuate the HLS acquisition strategy, the SEP Chairperson recommended that I make initial, conditional (i.e., non-final) selections for potential contract award of the three selectable offerors in order to authorize limited, post-selection negotiations. As recommended, these negotiations were to be narrowly tailored to allow the offerors an opportunity to reduce their prices and negotiate other minor, outstanding contract terms and conditions. On April 15, I concurred with this recommendation, and determined that it would be in the Agency's best interests to make initial, conditional selections of Blue Origin, Dynetics, and SpaceX to enable the Contracting Officer to engage in post-selection negotiations with these offerors.

On April 15, the Contracting Officer opened post-selection negotiations. In response, NASA received timely second revised proposals from all three firms by the due date of April 19. Thereafter, on April 24, the SEP, led by the SEP Chairperson and the sub-panel leads, presented its full and final consensus evaluation results for each of the three remaining offerors to me and other senior NASA officials (SEP Briefing). This briefing provided an opportunity for the SEP to fully explain its final assessment of each of the proposals, and for me and other senior NASA leaders to ask questions and receive answers directly from the Agency experts that comprised the SEP.

Proposal Evaluation Methodology Overview

NASA conducted this procurement as a firm fixed price Broad Agency Announcement (BAA) in accordance with Federal Acquisition Regulation (FAR) 6.102(d)(2) and 35.016. BAAs are not negotiated procurements conducted on the basis of competitive proposals. As such, NASA did not conduct a comparative analysis

and trade-off amongst proposals. Rather, each proposal was evaluated on its own individual merits. However, in accordance with section 5.3.1.3 of the BAA, although proposals may not be directly compared to one another, or any trade-off determinations made between or among proposals, if multiple proposals have been otherwise evaluated relatively similarly, I am permitted to consider programmatic relevance/balance and/or the availability of funds to make award decisions. Programmatic relevance is determined by the contribution of the proposed work to the Agency's scientific, technical, and human exploration programmatic objectives.

Consistent with FAR 35.016(e), the primary basis for selecting one or more proposals for award is technical, importance to Agency programs, and funds availability, as delineated through the BAA's evaluation factors and areas of focus. The BAA establishes three factors for evaluation: Technical (Factor 1), Price (Factor 2), and Management (Factor 3). These factors are in descending order of importance to NASA: Factor 1 is more important than Factor 2, and Factor 2 is more important than Factor 3. Factors 1 and 3, when combined, are significantly more important than Factor 2.

Within Factors 1 and 3, the BAA establishes specific areas of focus for evaluation. Findings (e.g., strengths, weaknesses) created for the areas of focus were considered in totality by the SEP to arrive at a single adjectival rating for each factor. Areas of focus did not receive their own adjectival ratings. In determining adjectival ratings for Factors 1 and 3, all areas of focus were considered as approximately of equal importance within their respective factor. Table 1 contains the evaluation factors and areas of focus.

Evaluation Factor	Area of Focus
Factor 1: Technical Approach	Technical Design Concept
	Development, Schedule, and Risk
	Verification, Validation, and Certification
	Insight
	Launch and Mission Operations
	Sustainability
	Early System Demonstrations
Factor 2: Total Evaluated Price	No focus areas
Factor 3: Management Approach	Organization and Management
	Schedule Management
	Risk Reduction
	Commercial Approach
	Past Performance
	Small Business Subcontracting Plan
	Data Rights

Table 1: Evaluation Factors and Areas of Focus

Source Selection Analysis

After receiving the SEP Briefing, it is my assessment that the SEP conducted their evaluation, and created their resultant findings, adjectival ratings, and award recommendations in accordance with the procedures and evaluation criteria set forth in the HLS solicitation and its accompanying evaluation plan. I have independently reviewed this evaluation and conclude that each finding, rating, and recommendation has a rational basis, is well documented, and provides sufficient information regarding the qualitative merits and drawbacks of each offeror's proposal to support my selection determinations herein. As such, I fully concur with, and adopt, the SEP's evaluation as documented in the SEP Briefing as the basis for my selections.

Consistent with the criteria set forth in the solicitation, including the respective weight accorded to each of the evaluation factors and areas of focus, my source selection determination is based upon an assessment of each offeror's proposal and the totality of its accompanying evaluation results. Below are my analyses for each offeror and the basis for their selection to receive a contract award.

Blue Origin

A summary of the SEP's evaluation for Blue Origin is as follows:

Blue Origin	Technical Rating	Management Rating
	Acceptable	Very Good

Below is a discussion of the findings from the SEP Briefing that I find to be particularly notable in making my selection decision. This selection statement does not identify or describe other SEP findings for Blue Origin with which I concur but that did not represent significant considerations in my analysis.

Notable Technical Findings

Within Technical Area of Focus 1, Technical Design Concept, the SEP evaluated Blue Origin's proposal as having two strengths that I find to be particularly notable. First, Blue Origin proposed a highly effective, human-centric approach for its rendezvous, proximity operations, docking and undocking system. Blue origin's unique design of this system will reduce crew workload during these critical operations and improve safety by allowing the crew to monitor overall vehicle performance. Second, the HLS design proposed by Blue Origin meets or exceeds all of the solicitation's threshold values provided for the 2024 initial performance requirements, and for each 2024 requirement that contains a goal value, Blue Origin's design meets the goal in all cases. Specifically, Blue Origin's HLS exceeds NASA's threshold requirements in the areas of initial habitation capability and landing accuracy, and meets NASA's goal requirements in the key areas of mass delivery from lunar orbit, extravehicular activity (EVA) excursions per sortie, scientific payload return to lunar orbit, and automated rendezvous, proximity operations, docking and undocking. These expanded capabilities offer benefits to NASA both for the initial 2024 mission and for the missions that follow, and further, they do so in a manner that is feasible and does not compromise other elements of Blue Origin's technical approach.

Within Technical Area of Focus 2, Development, Schedule, and Risk, the SEP evaluated Blue Origin's proposal as having one significant strength regarding Blue Origin's teaming arrangement that I find to be particularly notable. Specifically, Blue Origin has proposed two primary partners (Lockheed Martin and Northrop Grumman) that have extensive, demonstrated experience in spaceflight system design, development, and test and operations, and that will each be responsible, along with Blue Origin, for the parallel development of an element in the proposed Integrated Lander Vehicle. In addition, Blue Origin proposes to have Draper Laboratory provide crosscutting support in guidance, navigation, and control (GN&C). This teaming approach, which strategically draws upon the unique capabilities of each team member, as well as relies upon heritage hardware and systems, provides confidence that the team can complete the design, development, test, and evaluation of an HLS that meets NASA's requirements for the 2024 demonstration mission.

However, within Technical Area of Focus 2, the SEP also evaluated Blue Origin's proposal as having one significant weakness that I find to be noteworthy; specifically, Blue Origin's power and propulsion system has numerous attributes that introduce appreciable risk into its proposal. This system is comprised of multiple relatively low technology readiness level (TRL) systems that will be challenging to manufacture, integrate, and test. This proposed propulsion and power system architecture introduces significant risk to the program. Technically, the design appears to be sound, but this design can only come to fruition as a result of a very significant amount of development work that must proceed precisely according to Blue Origin's plan, including occurring on what appears to be an aggressive timeline. Blue Origin's Descent Element (DE) propulsion system includes novel approaches for achieving overall performance gains, but this comes at the expense of higher complexity with minimal historical experience and no flight history. The low TRL and complexity of its power system components and subsystems also decreases the potential for successful contract execution. Yet, while I agree with the SEP's evaluation on this aspect of Blue Origin's proposal, including the fact that it introduces significant risk, I note that Blue Origin overall has proposed a well thought-out design for its propulsion system. They have also conducted significant system modeling that increases the credibility of this approach. Thus, while this is overall a significant weakness of Blue Origin's proposal, Blue Origin's proposal in this area contains mitigating aspects, and this significant weakness otherwise does not outweigh the many notable positive technical attributes within Blue Origin's proposal.

Within Technical Area of Focus 5, Launch and Mission Operations, the SEP evaluated Blue Origin's proposal as having one significant strength regarding Blue Origin's approach to the training and certification of launch and mission operations personnel that I find to be particularly notable. Specifically, Blue Origin proposed a comprehensive, detailed plan for training and certification of launch and mission operations personnel that significantly exceeds NASA's requirements. Blue Origin's proposed approach of evolving from the use of low, to medium, and then high-fidelity simulators should provide a highly effective approach to training ground and flight crews for the first mission. Additionally, Blue Origin's exceptionally thorough Operations Integration Plan contains numerous instances of early collaborative and integrated full-team training that will provide highly effective paths to certification of critical personnel. Overall, this thoughtful and extensive proposed approach to its HLS training program will appreciably decrease mission risk.

Within Technical Area of Focus 7, Approach to Early System Demonstration, the SEP evaluated Blue Origin's proposal as having one significant strength, an early flight demonstration of its DE in 2023, that I find to be particularly notable. Blue Origin proposes this early flight demonstration at the same landing site selected for the 2024 crewed demonstration mission, and will test critical technologies and systems such as propulsion; entry descent and landing sensors, algorithms, and concept-of-operations; advanced avionics and automation; passive and active thermal control; and mission operations processes and procedures. By demonstrating these and other key attributes of its DE prior to the crewed demonstration, this testing strategy will significantly reduce schedule and technical risk.

Price Assessment

Using the methodology provided within the solicitation and the techniques specified at FAR 15.404-1(b)(2)(i), 15.404-1(b)(2)(v), and 15.404-1(b)(2)(iii), the SEP calculated a Total Evaluated Price for Blue Origin and evaluated that it is reasonable and balanced. I concur with these conclusions. In addition, I find it notable that through price negotiations, and in accordance with NASA's stated negotiation position, Blue Origin's final proposal contained a price reduction in excess of $300M for the base period of performance without any corresponding change to its technical or management approach.

Notable Management Findings

Within the Management factor, the SEP evaluated two significant strengths within Blue Origin's proposal that I find to be noteworthy. First, the SEP evaluated a significant strength that I find to be notable within the Management Area of Focus 4, Commercial Approach. Here, Blue Origin proposes a strong commercial approach that "aims to use HLS capabilities and technologies to accelerate the development of a cislunar economy by making cargo and crew missions more affordable, available, and efficient." Blue Origin's target eventual customer base includes U.S. Government customers, collaborating international space agencies, and industrial customers from around the world. Blue Origin has also already started engaging with lunar cargo customers, and the integrated lander team partners propose to leverage their respective HLS investments to offer a variety of other services to the commercial marketplace. This aspect of Blue Origin's proposal thoroughly describes how Blue Origin will leverage its HLS efforts to enable future commercial uses of HLS capabilities and technologies while maintaining compatibility with NASA's objectives and facilitating sustainable and cost-effective recurring lunar transportation services for NASA and other stakeholders.

Second, the SEP evaluated a significant strength within the Management Area of Focus 5, Past Performance, that I find to be meaningful. Specifically, the SEP assessed that Blue Origin's proposal reflects a team with a successful record of relevant past performance across numerous efforts that have direct implications for their performance of this effort, and greatly increases NASA's confidence in their ability to successfully conduct the HLS demonstration mission. These team members are leveraging the successful development of previous spaceflight systems in developing the HLS systems. This relevant, positive past performance across numerous efforts greatly enhances Blue Origin's potential for successful contract performance.

Evaluation Summary

Based on the totality of Blue Origin's evaluation results, particularly the foregoing notable findings, its Acceptable Technical rating, its Very Good Management rating, and its reasonable and balanced Total Evaluated Price, I find that Blue Origin has submitted a meritorious HLS proposal that warrants serious consideration for the award of an HLS contract.

Dynetics

A summary of the SEP's evaluation for Dynetics is as follows:

	Technical Rating	Management Rating
Dynetics	Very Good	Very Good

Below is a discussion of the findings from the SEP Briefing that I find to be particularly notable in making my selection decision. This selection statement does not identify or describe other SEP findings for Dynetics with which I concur but that did not represent significant considerations in my analysis.

Notable Technical Findings

Within Technical Area of Focus 1, Technical Design Concept, the SEP evaluated Dynetics' proposal as having two significant strengths and one related strength that I find to be particularly notable. First, Dynetics' proposal earned a significant strength because, in response to the solicitation's initial functional and performance requirements, Dynetics meets or exceeds all of NASA's threshold values, and for each 2024 requirement that contains a goal value (six in total), Dynetics proposed to meet or exceed that goal. Specifically, Dynetics meets the goal values for three of the requirements (scientific payload return to lunar orbit, HLS automated RPODU—Initial, and Landing Site Vertical Orientation), and exceeds the goal values for delivered payload mass, NRHO quiescent operations duration, and the number of EVAs supported. As a result of these features, Dynetics' proposed HLS system demonstrates sophisticated exploration capabilities, increases mission return, provides additional mission flexibility, and increases mission effectiveness.

Dynetics' second notable finding within the first Technical Area of Focus is a significant strength for its low-slung Crew Module architecture, and its related strength for an overall crew-centric design. Here, Dynetics designed its Crew Module in a way that greatly facilitates ease of access for crew to the lunar surface with a relatively small distance between the crew EVA hatch and the lunar surface. This design reduces the risk of crew injury due to falls, and simplifies the offloading and loading of equipment required for EVA missions. As a related strength that I find to be similarly noteworthy, Dynetics' HLS design overall is crew-centric, and likely to have a positive impact on successful contract performance as a result. For example, Dynetics has proposed optimal locations for its flight controls and windows to enable effective crew visibility during landing on the lunar surface and during proximity, docking and undocking operations. Other notable features include a predictable translation path and a dust barrier. By focusing on human systems integration, these design features will enable the crew to efficiently control safety hazards while operating the vehicle and gathering science from the lunar surface.

Within Technical Area of Focus 2, Development, Schedule, and Risk, the SEP evaluated Dynetics' proposal as having one strength regarding Dynetics' approach to its Descent/Ascent Element development. Here, Dynetics has proposed a highly innovative integrated horizontal drop tank Descent/Ascent Element architecture requiring only two primary development efforts: one for complex crewed spacecraft, and one for a moderately complex fuel element. By offering a unique alternative to the traditional three-element design for an HLS, Dynetics' two-element design minimizes mission risk and is directly responsive to the solicitation's call for "innovative solutions from the contractor(s)." This architecture reduces the number of highly complex element developments to one, and thus inherently minimizes the number of required interfaces and verification steps. Overall, this design choice by Dynetics will meaningfully reduce the amount of time needed for design, development, test, and evaluation of its HLS.

However, within Technical Area of Focus 2, the SEP also evaluated Dynetics' proposal as having one significant weakness that I find to be noteworthy, which is that Dynetics' power and propulsion system introduces appreciable risk of unsuccessful contract performance from both a technical and development schedule standpoint. This system is complex and relies upon technologies that are at relatively low maturity levels or that have yet to be developed for Dynetics' proposed application, but would need to be developed at an unprecedented pace. Many of its individual subsystems will have to be developed at a speed that does not align with historical experience for the development of analogous systems that perform similar functions. Yet, while I agree with the SEP's evaluation on this aspect of Dynetics' proposal, including the fact that it introduces significant risk, I note that the SEP also evaluated a related countervailing strength within Dynetics' proposal, which is that Dynetics' proposed propulsion system technical design concept thoroughly addresses NASA's stated requirements for propellant considerations, including storability, safety, maintainability, and future adaptation to an in-space refueling capability. This is a key capability required for its propulsion system. The proposed innovative propellant storage solution, if successfully developed and implemented, will result in a more mass-efficient system, which will in turn increase overall performance margin for Dynetics' HLS capability. Thus, while I agree that Dynetics' power and propulsion system overall presents substantial technical and schedule risk, it is also the case that its approach is exactly the kind of innovative solution that NASA sought through the HLS solicitation, and thus presents a measure of counterbalance against the risks inherent to Dynetics' propulsion system overall.

Within Technical Area of Focus 4, Insight, I find the SEP's evaluated strength for Dynetics' proposed approach to insight to be noteworthy. Dynetics proposed a robust, comprehensive plan for NASA insight that emphasizes transparency into all aspects of their development effort throughout the lifecycle of the HLS program. This approach exceeds the solicitation's requirements by enabling NASA participation at every step and level of the overall effort. For example, Dynetics proposes to allow NASA to have full access to its SharePoint systems, and will invite NASA to participate in all integrated product teams, Technical Interchange Meetings, and bi-monthly Program Management Reviews. These measures will facilitate open communication of status updates and will enable early identification of problems as they arise. Thus, Dynetics' approach to facilitating NASA insight will be advantageous to NASA during contract performance.

Within Technical Area of Focus 6, Sustainability, the SEP evaluated a significant strength that I find to be notable. Here, Dynetics has taken a "design for long term sustainability" approach to their HLS concept that will contribute significantly to long-term affordability. Sustainable capabilities are maximized in

Dynetics' baseline system, which will significantly ease the transition from initial phase operations to sustainable phase operations; the minimal redesign, requalification, and testing inherent to this approach will enable a faster and less expensive evolution to sustainability. This system design meets or drastically exceeds all the sustainable requirements of the HLS Program as established in the solicitation. For example, reusability and expanded propellant capacity are enabled by relatively inexpensive components with little or no design modifications. As another example, Dynetics has designed a flexible landing platform that is easily adapted into a large cargo delivery system, which presents a means to deliver both crew and cargo without having to procure a second cargo-specific landing system. These and other thoughtful sustainable design features offer excellent value to NASA for missions beyond 2024 while simultaneously meeting the solicitation's condition of not adding additional risk or other detriments to the 2024 mission.

Price Assessment

Using the methodology provided within the solicitation and the techniques specified at FAR 15.404-1(b)(2)(i), 15.404-1(b)(2)(v), and 15.404-1(b)(2)(iii), the SEP calculated a Total Evaluated Price for Dynetics and evaluated that it is reasonable and balanced. I concur with these conclusions.

Notable Management Findings

Within the Management adjectival factor, the SEP evaluated two significant strengths and one strength within Dynetics' proposal that I find to be noteworthy. First, within the Management Area of Focus 4, Commercial Approach, the SEP evaluated a strength within Dynetics' proposal as a result of its commercial approach that includes substantial engagement with potential international and commercial partners. Dynetics has begun discussions regarding its ability to transport payloads to the lunar surface utilizing the capabilities of its HLS system, including discussions with international partners. Overall, payload transportation is a particularly thoughtful aspect of Dynetics' proposal, in that Dynetics has teamed with two NASA Commercial Launch Payload Services contractors, in part, to ensure that the small commercial payload market is not adversely affected through HLS and similar efforts that present large payload capacities. Dynetics' proposal recognizes that an overall strategy involving a full spectrum of payload delivery options and markets will help ensure "sustainable and cost-effective recurring lunar transportation services." Dynetics' proposal also discusses how its plan for increased lunar access enables development of techniques for propellant utilization from the lunar surface, which will in turn lead to substantially reduced transportation costs, enabling a more robust set of commercial activities around and on the Moon. Dynetics' approach in extending the capabilities of future missions and in commercializing capabilities and technologies developed under this effort will be advantageous for NASA both during and after contract performance.

Second, the SEP evaluated a significant strength within Management Area of Focus 6, Small Business Subcontracting Plan, that I find to be notable. Dynetics' approach to utilizing small businesses, as documented in their Small Business Subcontracting Plan, appreciably exceeds the solicitation requirements in a way that will be advantageous to the Government during contract performance and beyond. Dynetics' proposed subcontracting percentages exceed the solicitation's stated goals in all but one category (HBCU/MSI), for which Dynetics nonetheless proposes to meet the stated goal. In addition, Dynetics proposes a time-phased approach for meeting goals over the life of the contract, ensuring

utilization of small business concerns throughout all phases of performance. In support of these proposal attributes, Dynetics provides strong and logical rationale substantiating their proposed goals and time-phased approach. The proposal thus clearly describes a very strong managerial commitment to utilizing small businesses, and most notably, in high technology areas. This commitment to using small business concerns will meaningfully contribute to the continued development of the small business technology base, and has the potential to reduce risk due to increased access to diverse technical solutions and capabilities within the small business community. Dynetics' successful implementation and adherence to its small business subcontracting plan will be advantageous to NASA during contract performance and thereafter.

Finally, the SEP evaluated a second significant strength within the Management factor that I find to be of note; specifically, within the Management Area of Focus 7, Data Rights, Dynetics' proposal demonstrates a comprehensive approach to data rights that in many cases, exceeds the Government's requirements in a way that will be advantageous to NASA on this contract and other human exploration programs in the future. As an initial observation, Dynetics' Assertion Notice is notably thorough. They have provided dozens of detailed assertions made at the lowest practicable and segregable level as required by the solicitation. This clarity allows both parties to understand their respective intellectual property rights at time of contract award, preventing time-consuming and often costly intellectual property negotiations and disputes that often occur during contract performance. In addition, Dynetics has worked with twelve of its major subcontractors and teammates to ascertain their proposed rights in data for their contributions to the HLS effort. As was true of the thoughtfulness of the prime contractor's assertions, this level of coordination and detail pre-award will enable the parties to have fewer data rights issues post-award. In addition to being exceptionally thorough and otherwise fully compliant with the solicitation's Assertion Notice requirements, Dynetics' approach to data rights is exceptional in that it proposes to provide a Government Purpose Rights (GPR) license for data and software that is critical to NASA in a manner that exceeds the license rights required by the solicitation. Obtaining a GPR license in data that could be leveraged in future human exploration-related NASA procurements is of particular importance to NASA for this procurement, and Dynetics' has proposed to develop much of this data at private expense but nonetheless deliver it to NASA with a GPR license. This data includes GN&C algorithms and software; lunar lander simulation and simulation framework data; and navigation sensor models. Dynetics' data rights proposal thus appreciably exceeds specified requirements in a way that will be advantageous to NASA during contract performance and thereafter.

Evaluation Summary

Based on the totality of Dynetics' evaluation results, particularly the foregoing notable findings, its Very Good Technical rating, its Very Good Management rating, and its reasonable and balanced Total Evaluated Price, I find that Dynetics has submitted a meritorious HLS proposal that warrants serious consideration for the award of an HLS contract.

SpaceX

A summary of the SEP's evaluation for SpaceX is as follows:

SpaceX	Technical Rating	Management Rating
	Acceptable	Acceptable

Below is a discussion of the findings from the SEP Briefing that I find to be particularly notable in making my selection decision. This selection statement does not identify or describe other SEP findings for SpaceX with which I concur but that did not represent significant considerations in my analysis.

Notable Technical Findings

Within Technical Area of Focus 1, Technical Design Concept, the SEP evaluated SpaceX's proposal as having one significant strength and one strength that I find to be particularly notable. First, SpaceX's proposal earned a significant strength because, in response to the solicitation's initial functional and performance requirements, SpaceX meets or exceeds all of NASA's threshold values, and for each 2024 requirement that contains a goal value (six in total), their proposal meets or exceeds that goal. Specifically, SpaceX's proposal meets the 2024 demonstration mission goal values for HLS automated rendezvous, proximity operations, docking and undocking, and landing site vertical orientation. Further, SpaceX exceeds the 2024 demonstration mission goal values for mass delivery from lunar orbit, quiescent lunar orbit operations, EVA excursions per sortie, and scientific payload return to lunar orbit. These expanded capabilities provide additional mission flexibility and increased mission effectiveness, which offer benefits to NASA both for the initial 2024 mission and for the missions that follow. In addition, SpaceX proposed implementing these expanded capabilities in a manner that is feasible and does not compromise other elements of SpaceX's technical approach. Second, SpaceX's proposed design thoroughly addresses the solicitation's requirements for the vehicle to support EVA operations, as well as for an effective dust mitigation strategy for the habitable volume. More specifically, SpaceX's Starship capability provides two fully redundant airlocks separated from the crew's living quarters by a common anteroom, each being capable of permitting two crewmembers to simultaneously don and doff EVA suits, with the ability to support four suited crewmembers if needed. I find these advantageous design attributes will facilitate and reduce the risk of EVA operations.

Within Technical Area of Focus 2, Development, Schedule, and Risk, the SEP evaluated SpaceX's proposal as having a strength that I find particularly notable. Specifically, SpaceX proposed an effective HLS design maturation methodology, which leverages development from its extensive heritage hardware and software systems used on existing flight programs, including its Cargo and Crew Dragon, as well as Falcon 9. This methodology reduces technical, schedule, and safety risk, as well as bolsters SpaceX's credibility for meeting the solicitation's primary objective of rapid HLS development to support a 2024 demonstration mission.

However, within Technical Area of Focus 2 the SEP also evaluated SpaceX's proposal as having two significant weaknesses that I find to be noteworthy. First, SpaceX's proposed propulsion system is notably complex and comprised of likewise complex individual subsystems that have yet to be developed, tested, and certified with very little schedule margin to accommodate delays. One notable example of this issue

concerns SpaceX's proposed reaction control system (RCS), which is very complex when compared to flight-proven systems and will require considerable development time. Additionally, there is significant risk associated with successful development of the integrated propulsion system given the proposed approach for integrating and testing the individual elements of the system. While I note that SpaceX has proposed a robust and aggressive plan for early systems demonstrations, which lends credibility to its proposed execution, this plan does not adequately address the risk of potential delay in development, as well as concomitant delay to SpaceX's demonstration mission. Second, SpaceX was evaluated by the SEP as having a significant weakness for its proposed overall architecture and concept of operations. Similar to the risks presented by SpaceX's propulsion system, this aspect of SpaceX's proposal presents other development schedule challenges (principally, those associated with its Starship variants and Super Heavy Booster), and requires numerous, highly complex launch, rendezvous, and fueling operations which all must succeed in quick succession in order to successfully execute on its approach. These development and operational risks, in the aggregate, threaten the schedule viability of a successful 2024 demonstration mission.

Within Technical Area of Focus 6, Sustainability, the SEP evaluated SpaceX's proposal as having one significant strength regarding SpaceX's design for a sustainable capability with augmented attributes that I find to be particularly notable. Particularly, this proposed design to be immediately developed in support of its first demonstration mission meets or exceeds all of NASA's requirements for sustainability with reusable elements and robust capabilities that will help realize the Agency's long-term goals for a sustainable and cost-effective lunar surface transportation system. These capabilities include numerous, extended duration EVAs, increase cargo capacity, the leveraging of refueling, and a design that supports any solar angle or thermal environment encountered on the lunar surface. By immediately incorporating these capabilities into its proposed design, SpaceX's proposal provides substantial mission design flexibility and dramatically reduces the time and cost associated with transitioning into sustainable phase mission operations. These and other thoughtful sustainable design features offer excellent value to NASA for missions beyond 2024 while simultaneously meeting the solicitation's condition of not adding additional risk or other detriments to the 2024 mission.

Within Technical Area of Focus 7, Approach to Early Systems Demonstration, the SEP evaluated SpaceX's proposal as having one significant strength for its robust and aggressive early systems demonstration plan that I find to be particularly notable. SpaceX's approach to rapid HLS development heavily prioritizes early and numerous ground and flight system demonstrations to reduce schedule and technical risk. Because the base Starship design serves both HLS and SpaceX's commercial launch purposes, SpaceX asserts that many of its HLS systems will be demonstrated many times on operational missions prior to the 2024 HLS mission. Examples of such demonstration activities include a low-Earth orbital flight of Starship with a demonstration of SpaceX's Super Heavy launch vehicle, a re-flight of the Starship, a long-duration orbital flight, a beyond-LEO flight, and a lunar landing demonstration mission scheduled for 2022. This comprehensive demonstration plan will meaningfully facilitate the maturation of critical technologies and demonstrably reduces schedule and technical risk, thereby greatly enhancing the potential for successful contract performance.

Price Assessment

Using the methodology provided within the solicitation and the techniques specified at FAR 15.404-1(b)(2)(i), 15.404-1(b)(2)(v), and 15.404-1(b)(2)(iii), the SEP calculated a Total Evaluated Price for SpaceX and evaluated that it is reasonable and balanced. I concur with these conclusions.

Notable Management Findings

Under the Management factor, within Management Area of Focus 4, Commercial Approach, the SEP evaluated SpaceX's proposal as having a significant strength for its approach to commercialization that I find to be notable. In particular, SpaceX's proposed commercialization efforts, including its substantial corporate contribution to fund significant aspects of this development effort, will contribute to fostering a cislunar economy and result in more cost-effective, recurring lunar transportation services for NASA and other customers. SpaceX plans to provide cargo and crewed mission services for a broad spectrum of commercial customers, enabling routine access to numerous locations beyond low-Earth orbit. Finally, SpaceX's proposed future ability to deliver large payloads to the lunar surface will be a key contributor to realizing NASA's goal of a sustained human presence on the lunar surface. This aspect of SpaceX's proposal thoroughly describes how SpaceX will leverage its HLS efforts to enable future commercial uses of HLS capabilities and technologies while maintaining compatibility with NASA's objectives and facilitating sustainable and cost-effective recurring lunar transportation services for NASA and other stakeholders.

Within Management Area of Focus 5, Past Performance, the SEP evaluated SpaceX's proposal as having a strength that I find particularly notable. Specifically, SpaceX's past performance on its Commercial Resupply Service contracts evidence a positive performance trend with demonstrated successful experience in the areas of rendezvous and proximity operations, fault management, berthing, and mission operations. This relevant past performance is likely to have a positive impact on SpaceX's successful performance of the HLS effort.

However, notwithstanding SpaceX's record of successful past performance and valuable relevant experience concerning the development of complex spaceflight hardware, the SEP also evaluated SpaceX's proposal as having a significant weakness in the area of Past Performance that I find notable. Specifically, SpaceX's record of performance on two relevant contracts—its Commercial Crew contract for the development of its human-rated Crew Dragon vehicle and its Air Force Orbital/Sub-Orbital Program 3 (OSP-3) contract for the development of the Falcon Heavy launch vehicle—both exhibited considerable schedule delays. These delays decreased the SEP's confidence in SpaceX's ability to successfully execute on its proposed HLS development schedule. While I concur with the SEP's conclusions with respect to this issue, I find that SpaceX's extensive relevant experience, combined with the lessons learned from these efforts, somewhat mitigate the risk associated with the potential for schedule delays.

Evaluation Summary

Based on the totality of SpaceX's evaluation results, particularly the foregoing notable findings, its Acceptable Technical rating, its Acceptable Management rating, and its reasonable and balanced Total Evaluated Price, I find that SpaceX has submitted a meritorious HLS proposal that warrants serious consideration for the award of an HLS contract.

Selection Determination

Blue Origin, Dynetics, and SpaceX have each submitted HLS proposals that are uniquely meritorious and worthy of serious consideration for award of an HLS contract. I do not undertake a direct comparative analysis of or tradeoff amongst these proposals. However, these proposals, evaluated relatively similarly, allow me to consider programmatic relevance, balance, and the availability of funds in making my award decisions. Programmatic relevance encompasses a proposal's potential contribution to the Agency's scientific, technical, and human exploration programmatic objectives. I may therefore assess these attributes within each proposal in relation to the Agency's available funds; in other words, my analysis and selection may reflect the value each proposal presents to the Agency.

On this issue, it is my assessment that each of the three proposals respectively presents an excellent value to the Agency. As described above, each proposal presents unique and significant potential contributions to the Agency's scientific, technical, and human exploration programmatic objectives, including but not limited to those of the HLS Program. Each offeror has proposed an HLS design and approach that, in addition to presenting achievable strategies for conducting 2024 crewed lunar demonstration missions, will also undoubtedly result in a multitude of scientific, technical, and exploration advancements, including significant advancements that are as-yet unforeseen. NASA, its international partners, and the commercial spaceflight industry stand to realize considerable benefits if these three offerors are awarded HLS contracts.

In addition, in considering each proposal's value in relation to the Agency's available funds, I note that the Agency has a sufficient budget to fund base period awards for all three offerors. Blue Origin has the highest Total Evaluated Price among the three offerors, at approximately the 35th percentile in comparison to the Independent Government Cost Estimate. Dynetics' and SpaceX's prices each respectively fall beneath the 10th percentile. These are meaningful price differences. However, my selection must take into account NASA's acquisition strategy of making a sufficient number of HLS base period contract awards such that the Agency is able to realize the benefits of competition when making down-selections for the award of future contract options, including preserving competition when selecting the offeror(s) that will perform 2024 demonstration missions. It is my assessment that award to all three offerors is the most effective means of achieving this acquisition strategy.

In summary, all three offerors proposed audacious and innovative HLS designs and capabilities, each with unique technical merit. Many of the technologies upon which these capabilities rely have yet to be developed, tested, or demonstrated; the challenge that lies ahead is formidable. Yet while I acknowledge the risk that necessarily accompanies such intrepidity, it is undeniable that these three proposals present tremendous value and potential for NASA and other public and private stakeholders, both in respect to achieving a sustained human presence on the lunar surface and also in dramatically reducing future costs, risks, and timelines of deep space exploration missions and commercial activities. Therefore, I am awarding base period HLS contracts to Blue Origin, Dynetics, and SpaceX. Through these three awards, NASA will realize the benefits of competition when making down-selections for the award of HLS contract options. Maintaining this competitive environment through the 2024 demonstrations and beyond will create performance and pricing incentives for the HLS contractors that will maximize the probability of

NASA achieving its primary HLS objective—landing the first woman, and next man, on the lunar surface by 2024.

These HLS contract awards to Blue Origin, Dynetics, and SpaceX are a critical step in our return to the Moon. The Moon is uniquely suited to prepare us, and propel us, to Mars and beyond. The next chapter in human spaceflight exploration is upon us. With these awards, we go to the Moon, and we go to stay.

STEPHEN JURCZYK

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Date: 2020.04.28 15:36:41 -04'00'

Stephen Jurczyk
Human Landing System SSA