

Selection Statement
For
Collaborations for Commercial Space Capabilities 2
(Announcement Number NASA-CCSC-02)

On April 28, 2023, I along with other senior officials of the National Aeronautics and Space Administration (NASA), met with the Participant Evaluation Panel (PEP) appointed to evaluate proposals submitted in response to the Collaborations for Commercial Space Capabilities 2 (CCSC 2) Announcement (Announcement Number NASA-CCSC-02).

I. Background and Evaluation Process

NASA recognizes that a robust and competitive low-Earth orbit (LEO) economy is vital to continued progress in space. To successfully meet NASA's goals including Strategic Objective 2.2 of NASA's 2022 Strategic Plan, "Develop a human spaceflight economy enabled by a commercial market," NASA has established the Commercial Crew Program (CCP) and the Commercial LEO Development Program (CLDP), both of which have roles in developing a sustainable LEO economy and are executed within NASA's Space Operations Mission Directorate.

CCP facilitates development of a U.S. commercial crew space transportation capability with the goal of achieving safe, reliable, and cost-effective access to and from LEO and the ISS. By supporting the development of U.S. human spaceflight capabilities, CCP is also contributing to the foundation of a more affordable and sustainable future for human spaceflight in LEO and beyond.

CLDP is building and executing a targeted strategy for an "economy of space commerce" in LEO that is sustainable, cost-effective, and safe. The current strategy builds on and applies the lessons learned from over a decade of work and experiences with commercial companies. This includes the first Collaborations for Commercial Space Capabilities (CCSC) Initiative which began in 2014 by awarding Unfunded Space Act Agreements (SAAs) to advance commercial space-related efforts by facilitating access to NASA's vast space flight resources.

This Announcement solicited proposals for a second effort in the CCSC Initiative – CCSC2 – which will be managed by CLDP in coordination with CCP where human space transportation is involved. The objective of the CCSC2 Initiative is to advance private sector development of integrated LEO space capabilities so that the emerging products or services are commercially available to government and non-government customers within approximately the next five to seven years.

The Announcement was released on November 2, 2022. It required proposals be divided into four sections with three appendices, all due on December 9, 2022. Section I was an Executive Summary, Section II was Relevance to NASA, Section III was the Business Approach, and Section IV was the Technical Approach. Appendix 1 contained a proposed Space Act Agreement, Appendix 2 was to identify Government resources requested, and Appendix 3 was to provide Supplemental Business Data. Modification 1 was issued on November 9, 2022 to post the Pre-Proposal Conference charts from November 7, 2022 and the Source Selection Statement from CCSC1. Modification 2 was issued on November 16, 2022 to post answers to questions submitted in response to the Announcement. Modification 3 was issued on December 6, 2022 to correct the CCSC2 email address. Proposals were received from the following companies (Participants):

- Blue Origin
- Ernst & Young

- Gravitics, Inc.
- Northrop Grumman Systems Corporation
- Ohio Aerospace Institute
- Space Development Corporation d/b/a Orbital Assembly
- Sierra Space Corporation
- Space Exploration Technologies Corp. (SpaceX)
- Space Villages, Inc.
- Special Aerospace Services, LLC
- ThinkOrbital, Inc.
- Vast, LLC

In accordance with the Announcement and Evaluation Plan, the evaluation and selection were conducted using a five-step process as discussed below:

- Step 1 – Acceptability Screening
- Step 2 – Initial Evaluation
- Step 3 – Due Diligence
- Step 4 – Portfolio Selection
- Step 5 – Finalize Space Act Agreements

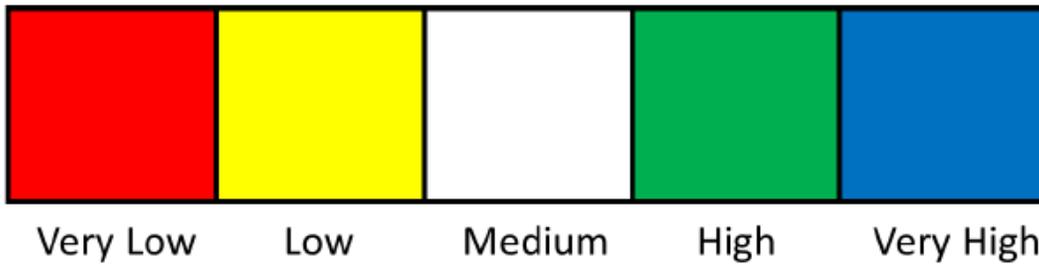
Acceptability Screening: Upon proposal receipt, the Agreements Officer reviewed all proposals to determine whether each proposal was consistent with the Announcement’s proposal instructions. Additionally, the voting members of the PEP read the executive summary of each proposal to determine whether the proposal was acceptable for evaluation. The PEP would not continue evaluation of any proposal when it determined from the Executive Summary that the proposal was unacceptable because (1) it does not represent a reasonable initial effort to address the objective of the CCSC2 Initiative; or (2) clearly demonstrates that the Participant does not understand the objective.

All proposals received were determined to pass this Acceptability Screening.

Initial Evaluation: The PEP then conducted an initial evaluation of the full proposals that passed the acceptability screening to assess how well each proposal met the following criteria:

- Relevance of the proposed capability to the purpose of this Announcement as described in section 1.2.
- Feasibility of the business approach to achieving commercial availability of the proposed capability.
- Feasibility of the technical approach to achieving commercial availability of the proposed capability.
- Feasibility for NASA to provide the requested resources.

Each proposal was evaluated on a standalone basis without comparison to other proposals. Evaluators identified the distinguishing factors associated with each proposal as it relates to the likelihood of success and the ability of each proposal to meet the stated objective of the CCSC2 Initiative. The distinguishing factors were described in terms of significant strengths, strengths, weaknesses, and significant weaknesses of the proposal. The team leads each convened a meeting of their evaluation team to review and consolidate all findings in their respective areas and prepared an evaluation summary of their section, supported by specific examples drawn from the strengths and weaknesses identified by the evaluation team. Each team lead then identified a recommended color rating for their section using the illustration below.



Relevance to NASA color ratings were assigned as follows:

Very High: The proposed capability has very high alignment with section 1.2 of the Announcement. No significant weaknesses exist.

High: The proposed capability has high alignment with section 1.2 of the Announcement. One or more significant strengths have been found, and strengths outbalance any weaknesses that exist.

Medium: The proposed capability has medium alignment with section 1.2 of the Announcement. There may be strengths or weaknesses, or both. As a whole, weaknesses not offset by strengths do not significantly detract from the offeror's response.

Low: The proposed capability has low alignment with section 1.2 of the Announcement. One or more significant weaknesses have been found, and weaknesses outbalance any strengths that exist.

Very Low: The proposed capability has very low alignment with section 1.2 of the Announcement. One or more significant weaknesses exist that demonstrate a lack of overall competence or would require a major proposal revision to correct.

Business Approach and Technical Approach color ratings were assigned as follows:

Very High: A comprehensive and thorough approach of exceptional merit with one or more significant strengths. No significant weaknesses exist.

High: An approach which demonstrates overall competence. One or more significant strengths have been found, and strengths outbalance any weaknesses that exist.

Medium: An approach which is reasonably sound. There may be strengths or weaknesses, or both. As a whole, weaknesses not offset by strengths do not significantly detract from the offeror's response.

Low: An approach which has one or more weaknesses. Weaknesses outbalance any strengths.

Very Low: An approach that has one or more significant weaknesses that demonstrate a lack of overall competence or would require a major proposal revision to correct.

Proposed Government Resources color ratings were assigned as follows:

Very High: It is highly feasible for NASA to provide the requested resources. No significant weaknesses exist.

High: It is generally feasible for NASA to provide the requested resources. One or more significant strengths have been found, and strengths outbalance any weaknesses that exist.

Medium: It is moderately feasible for NASA to provide the request resources as. There may be strengths or weaknesses, or both. As a whole, weaknesses not offset by strengths do not significantly detract from the offeror's response.

Low: It is generally infeasible for NASA to provide the requested resources. One or more significant weaknesses have been founded, and weaknesses outbalance any strengths that exist.

Very Low: It is highly infeasible for NASA to provide the requested resources. One or more significant weaknesses that demonstrate a lack of overall competence or would require a major proposal revision to correct.

The team leads then presented the consolidated team findings, proposed evaluation summaries, and color rating recommendations for their respective area to the PEP. The PEP reviewed the results of the evaluations and reached consensus on the consolidated findings, evaluation summaries and color rating.

After all standalone evaluation were complete, the PEP prepared a presentation to me summarizing the results of the initial evaluation. We then discussed which proposals were most favorably evaluated as candidates for further due diligence discussions for my decision, with consideration given to the range of capabilities proposed. All other proposals not selected for further due diligence received no further evaluation at this point, but were carried forward to be included in the final portfolio selection step.

Due Diligence: NASA conducted teleconference due diligence meetings with participants whose proposals were selected in the previous step. Each participant was provided with a list of its initial findings and questions resulting from the initial evaluation. They were also given the opportunity to present an overall business approach, technical approach, and responses to the findings and questions provided by NASA, as well as resolve issues associated with the proposed Space Act Agreements. After completion of the due diligence meetings, the PEP reconvened to modify or amend the evaluation results and color ratings based on the modified or amended evaluation summaries.

Portfolio Selection: The PEP presented to me and my advisors a summary of the proposal evaluations including the consensus findings, color ratings, estimated cost of Government resources requested, and any proposed changes to the standard terms of the Space Act Agreements. This included the PEP's analysis of the range of capabilities covered and recommendation for selecting one or more proposals for award.

II. Initial Evaluation

Twelve proposals passed the Acceptability Screening and were evaluated by the full PEP. The Relevance to NASA, Business Approach, and Technical Approach sections were evaluated, as well as the Proposed Government Resources appendix, separately with a color rating given for each, based on the consolidated findings prepared using the distinguishing factors (significant strengths, strengths, weaknesses, and significant weaknesses) in the proposal.

Blue Origin

For the Relevance to NASA evaluation, Blue Origin's proposed capability has very high relevance to the purpose of the Announcement as described in section 1.2 as it provides an integrated LEO capability that significantly contributes to the sustainment of a LEO ecosystem beyond the retirement of the ISS and will be available in the next 5 to 7 years to Government and non-Government customers. There were no weaknesses found.

For the Business Approach evaluation, although the proposed new capabilities would add greatly to the LEO ecosystem, Blue Origin failed to provide much of the required content for the business plan. It described only portions of the capability development plan, gave little marketing information, included no cost data, and did not state the source of funds for several capabilities. This lowered the Government's confidence in the feasibility of the participant's business approach to achieving commercial availability of the proposed capabilities.

For the Technical Approach evaluation, Blue Origin's capability concept received a significant strength for reusability of its commercial space transportation system (CTS) elements. It also has a strength for the key features of its interrelated LEO space transportation capability that utilizes its reusable Space Vehicle (SV), New Glenn launch vehicle, and other supporting elements. The development plan for the reusable CTS has significant strengths for its low external dependence, approach to mature its technologies, and demonstrated technical competency. However, the proposal had significant weaknesses due to insufficient information for its CTS capability concept and for how the proposed development activities support developing and fielding its CTS capability. Its approach to S&MA has a weakness due to insufficient information for S&MA elements specified in the Announcement. Blue Origin's technical risk approach received a strength for identifying its most significant risks, and providing reasonable mitigations, associated with conducting the proposed testing activities; however, it received a significant weakness for failure to identify technical risks associated with its CTS elements. Overall, Blue Origin's technical approach is reasonably sound and the weaknesses do not significantly detract from the proposal, which gave the Government moderate confidence in the feasibility of its technical approach.

For the Proposed Government Resources evaluation, Blue Origin's proposal identified the Government data and equipment resources it would possibly request, and these were all of types identified in the Announcement. However, the proposal requests use of some NASA data and testing that NASA may not be able to provide due to NASA mission launch dates, and/or availability/capability of equipment/facilities. Therefore, it is moderately feasible for NASA to provide the requested resources.

Ernst & Young (EY)

For the Relevance to NASA evaluation, EY's proposed approach, which will contribute to a LEO economy and will extend beyond ISS retirement, provides some alignment with the goals of the Announcement. However, it does not provide for the development of an integrated LEO capability, as it is focused on management activities only. As a whole, the proposed capability has medium relevance to the purpose of the Announcement as described in section 1.2.

For the Business Approach evaluation, the proposal significantly lacked clarity on what EY would do and for whom. If it is to be a catalyst for commercial LEO companies, it presents no assessment of the market for that service or evidence that current LEO ecosystem companies desire it. It also failed to explain how it would fund the agreement after the first year. This significantly lowered the Government's confidence in the feasibility of EY's business approach to achieving commercial availability of the proposed capabilities.

For the Technical Approach evaluation, EY proposed no physical, in-space system and presents a weak technical approach to achieving the proposed capability. The proposal has significant weaknesses in its capability concept and development plan regarding its approach to acquiring and sharing government and industry information and knowledge. It also has a significant weakness due to an insufficient technical assessment of risk. This significantly lowered the Government's confidence in the feasibility of its technical approach.

For the Proposed Government Resources evaluation, EY's proposal has a significant weakness as it requests data from NASA that is not available for NASA to share for legal reasons. Therefore, it is generally infeasible for NASA to provide the requested resources.

Gravitics, Inc. (Gravitics)

For the Relevance to NASA evaluation, while the proposed capability does not support a continuous human presence in LEO, it does have high relevance to the purpose of the Announcement as described in section 1.2 as it provides an integrated LEO capability that significantly contributes to the sustainment of a LEO ecosystem beyond the retirement of the ISS and will be available in the next 5-7 years.

For the Business Approach evaluation, Gravitics' proposal presents insufficient evidence for a market for the proposed modules and there is no one on the management team with marketing experience. The management team does have strong technical experience. The proposal did not provide sufficient information on its development plan for the Government to evaluate and was unclear on total cost. This lowered the Government's confidence in the feasibility of the participant's business approach to achieving commercial availability of the proposed capability.

For the Technical Approach evaluation, the proposal received a significant weakness on its capability concept due to insufficient information of subsystem elements for its demonstration of the StarMax capability. Its development plan had significant weaknesses due to an insufficient technical approach for developing, producing, and fielding its capability and due to insufficient detail on development of its ECLSS system. While it had strengths for portions of its capability concept, incremental development approach, and S&MA approach, the weaknesses outbalance the strengths. This lowered the Government's confidence in the feasibility of Gravitics' technical approach.

For the Proposed Government Resources evaluation, the Gravitics proposal identified the Government data and equipment resources it would possibly request, and these were all of types identified in the Announcement. However, the proposal requested use of some NASA data and interoperability testing that NASA may not be able to provide due to NASA mission launch dates, availability and/or contract limitations, and/or availability of equipment/facilities. Therefore, it is moderately feasible for NASA to provide the requested resources.

Northrop Grumman Systems Corporation (NGSC)

For the Relevance to NASA evaluation, NGSC's proposed capability has very high relevance to the purpose of the Announcement as described in section 1.2 as it provides an integrated LEO capability that significantly contributes to the sustainment of a LEO ecosystem beyond the retirement of the ISS and will be available in the next 5-7 years to Government and non-Government customers. There were no weaknesses found.

For the Business Approach evaluation, NGSC's proposed human-tended free-flyer would complement the NGSC's permanently crewed free flyer in serving the microgravity market. The company has a solid management team with relevant experience. Financing however is a major concern as the proposal only commits to the first year's activities and has no clear financing strategy beyond that. Overall, the approach is reasonably sound with strengths balancing weaknesses, which gave the Government medium confidence in the feasibility of its business approach.

For the Technical Approach evaluation, NGSC presented a comprehensive and thorough approach to achieving the proposed LEO Persistent Platform concept intended to be a primarily uncrewed companion station to its CDFP crewed station. It has significant strengths in its capability concept and development plan that include compatibility with CDFP, allowing payload changeout, and being upgradable. Additionally, it received strengths for its technical risk management, S&MA approach, and demonstrated competency in developing, producing, and fielding spaceflight systems including interfacing with a crewed space station (ISS). It plans to leverage existing hardware, manufacturing, and operational capabilities for its proposed effort. There were no significant weaknesses. This gave the Government very high confidence in the feasibility of its technical approach.

For the Proposed Government Resources evaluation, NGSC's proposal identified the Government data and equipment resources it would possibly request, and these were all of types identified in the Announcement. However, the proposal requests use of some NASA data that NASA may not be able to provide due to availability and/or contract limitations. Therefore, it is moderately feasible for NASA to provide the requested resources.

Ohio Aerospace Institute (OAI)

For the Relevance to NASA evaluation, OAI proposed an integrated capability, which will extend beyond the timeframe of ISS retirement and will provide services for more than just the government in 5-7 years. However, the proposed effort was relatively limited in scope. As a whole, the proposed capability has medium relevance to the purpose of the Announcement as described in section 1.2.

For the Business Approach evaluation, OAI proposed spaceflight training capabilities but did not present evidence that there is a commercial market for these capabilities. The proposal provided few details on the financing plan, the development plan, and its relationship with its key partner. Overall, the approach had significant weaknesses and no strengths. This significantly lowered the Government's confidence in the feasibility of the participant's business approach to achieving commercial availability of the proposed capability.

For the Technical Approach evaluation, OAI's approach to achieving the proposed commercial astronaut training facility was not thoroughly explained. The proposal received significant weaknesses in its development plan, safety and mission assurance, and technical risk. Sufficient detail was not provided about the plan to develop, produce, and field the proposed capability and its elements, including the schedule and technical detail for managing its major construction projects, facility operations, and aircraft to support zero-g parabola flights. While the overall capability concept is adequately described, the weaknesses of this proposal outbalance any strengths. This lowered the Government's confidence in the feasibility of its technical approach.

For the Proposed Government Resources evaluation, OAI's proposal identified the Government data and equipment resources it would possibly request, and these were all of types identified in the Announcement. However, the proposal requested use of NASA equipment for use in participant's training activities and facilities, which are not available for non-NASA purposes due to availability, ownership and/or contract limitations. Therefore, it is generally infeasible for NASA to provide the requested resources.

Space Development Corporation d/b/a Orbital Assembly (Orbital Assembly)

For the Relevance to NASA evaluation, Orbital Assembly's proposed capability has high relevance to the purpose of the Announcement as described in section 1.2 as it provides an integrated LEO capability that significantly contributes to the sustainment of a LEO ecosystem beyond the retirement of the ISS and will be available in the next 5-7 years to Government and non-Government customers. While the proposed capability does not support a continuous human presence in LEO within the timeframe of this Agreement, this weakness does not outbalance the high relevance of this proposal to the purpose of the Announcement.

For the Business Approach evaluation, Orbital Assembly proposed an automated, modular free flier as the first step toward greater capabilities, which is a logical development path. However, the management team did not appear to have strong relevant experience in developing, operating, and marketing such space capabilities; the proposal provided few details on the plan to develop, produce, and field these capabilities; and the proposal did not provide sufficient rationale for the financing and revenue projections. This significantly lowered the Government's confidence in the feasibility of the participant's business approach to achieving commercial availability of the proposed capabilities.

For the Technical Approach evaluation, Orbital Assembly's proposal has a significant strength for thoroughly describing its multi-use LEO destination capability concept. It also has a strength for technical advantages of its small cargo transport capability. Its development plan has strengths for its technical approach and the proposed partners having some demonstrated competency in spaceflight development. It has weaknesses for the feasibility of its schedule and insufficient information for its technology development for the capability. It has a significant weakness for insufficient information to address the complexity associated with its robotic systems. It has a strength for its approach to S&MA and a weakness for identification of technical risks. The weaknesses of this proposal were offset by its strengths. Overall, Orbital Assembly's technical approach is reasonably sound, which gave the Government moderate confidence in the feasibility of its technical approach.

For the Proposed Government Resources evaluation, Orbital Assembly's proposal identified the Government resources it would possibly request, and these were all of types identified in the Announcement. There were no strengths nor weaknesses identified. Therefore, it is moderately feasible for NASA to provide the requested resources.

Sierra Space Corporation (Sierra Space)

For the Relevance to NASA evaluation, Sierra Space's proposed capability has very high relevance to the purpose of the Announcement as described in section 1.2 as it provides an integrated system of LEO capabilities that significantly contributes to the sustainment of a LEO ecosystem beyond the retirement of the ISS and will be available in the next 5-7 years to Government and non-Government customers. There were no weaknesses found.

For the Business Approach evaluation, Sierra Space's proposed business plan demonstrated overall competence for a wide range of capabilities to help build a sustainable LEO ecosystem. The proposal has significant strengths in its business strategy, management team, financial position, and market knowledge. However, the proposal lacked sufficient information to assess the business aspects of its development plan. Overall, the Government has high confidence in the feasibility of the participant's business approach to achieving commercial availability of the proposed capabilities.

For the Technical Approach evaluation, Sierra Space's proposed technical approach demonstrated overall competence to achieving the proposed capability. Its capability concept received a significant strength for its integrated LEO transportation, destination, and infrastructure capabilities that utilize DC-200,

Pathfinder, and other elements. It also has strengths for its approach to enabling other LEO applications and spacecraft reusability. The proposal lacked information on its concept of operations. Its development plan has significant strengths for being well defined, inclusive of risk reduction activities, its technical approach to reduce complexity and uncertainty, and its relevant demonstrated technical competency. It has significant weaknesses for not adequately describing its ECLSS development and end-to-end human-rating approach. Overall, the strengths of this proposal outbalance any weaknesses. This increased the Government's confidence in the feasibility of its technical approach.

For the Proposed Government Resources evaluation, Sierra Space's proposal identified the Government resources it would possibly request, and these were all of types identified in the Announcement. There were no strengths nor weaknesses identified. Therefore, it is moderately feasible for NASA to provide the requested resources.

Space Exploration Technologies Corp. (SpaceX)

For the Relevance to NASA evaluation, SpaceX's proposed capability has very high relevance to the purpose of the Announcement as described in section 1.2 as it provides LEO capabilities that significantly contributes to the sustainment of a LEO ecosystem beyond the retirement of the ISS to Government and non-Government customers. While the proposed approach does not contain a schedule that indicates the capabilities will be available in 5-7 years, this weakness did not detract from the very high relevance of this proposal to the purpose of the Announcement.

For the Business Approach evaluation, SpaceX's proposed approach demonstrates overall competence. The proposed Starship capability in terms of size and reduced cost could have a far-reaching impact on the sustainable development of the LEO economy. In addition to applications beyond LEO, Starship could significantly impact crew & cargo transportation and could itself become a large Commercial LEO Destination. Adding increased confidence is the company's plan to self-fund Starship development from its launch and satellite enterprises. The only weaknesses in the proposal were the lack of a schedule to field its new capabilities and involving NASA in its SAA milestones. Overall, strengths outbalance weaknesses. This gave the Government high confidence in the feasibility of the participant's business approach to achieving commercial availability of the proposed capabilities.

For the Technical Approach evaluation, SpaceX's proposed technical approach demonstrated overall competence to achieving the proposed capability. Its capability concept has significant strengths for its interrelated LEO transportation, habitation, and communication systems utilizing Dragon, Starship, and Starlink and also for technical advantages resulting from the capability's key features and reusable systems. It has a significant weakness due to insufficient information for aspects of its Starship system capability concept. It also has strengths for its technical maturation approach. Its development plan has significant strengths for its use of existing systems, demonstrated technical competence, and low external dependence. It has a weakness due to insufficient information on expansion of its capabilities and a significant weakness for insufficient information on how the proposed activities support developing and fielding this capability within the next 5-7 years. The participant received strengths for its demonstrated approaches to S&MA and technical risk for human spaceflight; however, it received a weakness for insufficient detail regarding the Starship system's technical risks. Overall, the strengths of its proposal outbalance its weaknesses. This gave the Government high confidence in the feasibility of its technical approach.

For the Proposed Government Resources evaluation, SpaceX's proposal identified the Government resources it would possibly request, and these were all of types identified in the Announcement. There

were no strengths nor weaknesses identified. Therefore, it is moderately feasible for NASA to provide the requested resources.

Space Villages, Inc. (Space Villages)

For the Relevance to NASA evaluation, the proposed capability has high relevance to the purpose of the Announcement as described in section 1.2 as it provides an integrated LEO capability that significantly contributes to the sustainment of a LEO ecosystem beyond the retirement of the ISS and will be available in the next 5-7 years to Government and non-Government customers. While the proposed capability does not support a continuous human presence in LEO within the timeframe of this Agreement, this weakness does not outbalance the high relevance of this proposal to the purpose of the Announcement.

For the Business Approach evaluation, Space Villages' business plan is well written and presents a solid strategy to finance development of Orbital Outpost. It also presents a strong management team. The proposal, however, lacks clarity on the company's legal status, its facilities, and the status of its major partners. Overall, the approach is reasonably sound with strengths balancing weaknesses, which gave the Government medium confidence in the feasibility of its business approach.

For the Technical Approach evaluation, Space Villages' proposed approach has a significant weakness in its capability concept due to insufficient information for the overall OO1 Concept of Operations. It also had a significant weakness in its development plan due to insufficient detail for the near term OO1 Demonstration System. There is also significant development risk for developing and fielding of elements of their capability. Space Villages received a related weakness in its development plan due to its lack of information on how it would achieve its very rapid timeline. Space Villages had a significant strength for its technical risk approach. It received strengths for its proposed technical development approach to mature important elements and aspects of its overall OO1 capability concept. The weaknesses of this proposal outbalance any strengths. This lowered the Government's confidence in the feasibility of its technical approach.

For the Proposed Government Resources evaluation, Space Villages' proposal identified the Government resources it would possibly request, and these were all of types identified in the Announcement. There were no strengths or weaknesses identified. Therefore, it is moderately feasible for NASA to provide the requested resources.

Special Aerospace Services, LLC (SAS)

For the Relevance to NASA evaluation, SAS's proposed capability has very high relevance to the purpose of the Announcement as described in section 1.2 as it provides an integrated LEO capability that significantly contributes to the sustainment of a LEO ecosystem beyond the retirement of the ISS and will be available in the next 5-7 years to Government and non-Government customers. There were no weaknesses found.

For the Business Approach evaluation, SAS proposed a new commercial autonomous maneuvering capability but did not adequately describe the market for it. SAS laid out a reasonable plan for financing the capability. Overall, the approach is reasonably sound with strengths balancing weaknesses, which gave the Government medium confidence in the feasibility of its business approach.

For the Technical Approach evaluation, SAS's proposal has a strength for its capability concept of an autonomous maneuvering unit. It has a significant weakness for insufficient detail about key features and

concept of operations. Its development plan has a significant strength for its uncrewed Autonomous Maneuvering Unit (AMU) with an in-space proto-flight demonstration followed by the human rated AMU-HR. It also has strengths for its phased development and for having some demonstrated competency in spaceflight equipment development. It has weaknesses in its technology development and S&MA approaches. Overall, SAS's technical approach is reasonably sound and the weaknesses not offset by strengths do not significantly detract from the proposal, which gave the Government moderate confidence in the feasibility of the technical approach.

For the Proposed Government Resources evaluation, SAS's proposal identified the Government resources it would possibly request, and these were all of types identified in the Announcement. There were no strengths or weaknesses identified. Therefore, it is moderately feasible for NASA to provide the requested resources.

ThinkOrbital, Inc. (ThinkOrbital)

For the Relevance to NASA evaluation, ThinkOrbital's proposed capability provides an integrated LEO capability that contributes to the sustainment of a LEO ecosystem beyond the retirement of the ISS, supports a continuous human presence in LEO, and will be available to Government and non-Government customers. However, it is not clear whether the capability will be available within the next 5-7 years, which is part of the overall CCSC2 objective. As a whole, weaknesses not offset by strengths did not significantly detract from the offeror's response, which gave the Government medium relevance to the purpose of the Announcement as described in section 1.2.

For the Business Approach evaluation, ThinkOrbital proposed an innovative line of evolutionary products that could make an important contribution to the LEO ecosystem. However, it provided insufficient evidence of a committed management team who all appear to have other full-time jobs. ThinkOrbital did not provide all the information required by the Announcement on the business aspects of its development plan, such as labor and facilities and estimated costs. This lowered the Government's confidence in the feasibility of the participant's business approach to achieving commercial availability of the proposed capabilities.

For the Technical Approach evaluation, ThinkOrbital's proposed approach has significant strengths in its capability concept and development plan for its CONTESA technologies that enable assembly of large, welded metal, pressurized elements in-space from a single launch package to form the basis of its ThinkPlatforms. It has significant weaknesses due to insufficient information for its ThinkPlatform variants. Its capability concept also had a strength for its robotic systems and a weakness due to insufficient information on its assembly approach. Its approach to S&MA had a weakness for not addressing specific elements requested in the Announcement. The proposal has a strength for addressing technical risks associated with its CONTESA capability, however, has a significant weakness for not adequately addressing technical risks associated with its ThinkPlatforms. In general, ThinkOrbital's approach to CONTESA was well detailed, but there was a significant lack of detail about its capability design concepts for the ThinkPlatforms. The weaknesses of this proposal outbalance any strengths. This lowered the Government's confidence in the feasibility of its technical approach.

For the Proposed Government Resources evaluation, ThinkOrbital's proposal identified the Government resources it would possibly request, and these were all of types identified in the Announcement. There were no strengths or weaknesses identified. Therefore, it is moderately feasible for NASA to provide the requested resources.

Vast, LLC (Vast)

For the Relevance to NASA evaluation, Vast's proposed capability has high relevance to the purpose of the Announcement as described in section 1.2 as it provides an integrated LEO capability that significantly contributes to the sustainment of a LEO ecosystem beyond the retirement of the ISS and will be available in the next 5-7 years to Government and non-Government customers. While the proposed capability does not support a continuous human presence in LEO within the timeframe of this Agreement, this weakness does not outbalance the high relevance of this proposal to the purpose of the Announcement.

For the Business Approach evaluation, Vast's proposed approach demonstrates overall competence. Vast proposed fielding a crewed LEO destination in five years as a step toward a much more robust one, a logical business strategy. It described strong development and financing plans. Its weakness was not providing insight into the management team or launch providers. Overall, strengths outbalance weaknesses. This gave the Government high confidence in the feasibility of Vast's business approach to achieving commercial availability of the proposed capabilities.

For the Technical Approach evaluation, Vast's proposed approach focused on developing and fielding its initial crewed Demo Module that is planned to be commercially available within the next 5 years. Its capability concept received a significant strength for the key features of the Demo Module including the ability to spin in order to create an artificial gravity. The capability concept received a significant weakness due to insufficient information on the design concepts and concept of operations. The proposal also has a significant weakness due to inadequately describing its plan to develop and field its artificial gravity capability planned to be used on its crewed Demo Module. Also, the proposal does not indicate whether potential impacts to human health and performance have been assessed and addressed. Vast received a weakness for its approach to S&MA; however, it received strengths for identifying its significant technical risks and providing reasonable plans to manage them. The weaknesses of this proposal outbalance any strengths which lowered the Government's confidence in the feasibility of its technical approach.

For the Proposed Government Resources evaluation, Vast's proposal identified the Government data and equipment resources it would possibly request, and these were all of types identified in the Announcement. However, the proposal requests use of some interoperability testing that NASA may not be able to provide due to availability of equipment/facilities. Therefore, it is moderately feasible for NASA to provide the requested resources.

III. Final Evaluation after Due Diligence

In accordance with the Announcement and Evaluation Plan, the most favorably evaluated proposals were selected for due diligence, with consideration given to the range of capabilities proposed. Seven proposals went through due diligence: Blue Origin, LLC; Northrop Grumman Space Systems; Sierra Space Corporation; Space Exploration Technologies, Inc.; Special Aerospace Services, LLC; ThinkOrbital, Inc.; and Vast, LLC.

The PEP modified the consolidated findings, evaluation summaries, and color ratings based on the results of further due diligence. These final evaluation summaries and ratings were presented to me on April 28, 2023 and are summarized below.

Blue Origin

For the Relevance to NASA evaluation, there were no new strengths and no weaknesses identified. The rating was unchanged.

For the Business Approach evaluation, there were no new strengths and all weaknesses were fully addressed, except for the inadequate description of its capability development plan and lack of cost data. The rating changed from a Low to a Medium.

For the Technical Approach evaluation, there were no new strengths and all weaknesses were fully addressed, except for insufficient information in its technical development plan for human rating its CTS. The rating changed from a Medium to a High.

For the Proposed Government Resources evaluation, there were no new strengths identified and the one weakness remains. The rating was unchanged.

Northrop Grumman Systems Corporation (NGSC)

For the Relevance to NASA evaluation, there were no new strengths and no weaknesses were identified. The rating was unchanged.

For the Business Approach evaluation, there were no new strengths and the significant weakness was partially addressed and changed to a weakness for uncertainty in development funding after the first year of effort. The rating changed from a Medium to a High.

For the Technical Approach evaluation, there were no new strengths and all weaknesses were fully addressed. The rating was unchanged.

For the Proposed Government Resources evaluation, there were no new strengths identified and the one weakness remains. The rating was unchanged.

Sierra Space Corporation (Sierra Space)

For the Relevance to NASA evaluation, there were no new strengths and no weaknesses were identified. The rating was unchanged.

For the Business Approach evaluation, there were no new strengths and all weaknesses were fully addressed, except for the lack of sufficient information on how it will simultaneously manage development of multiple space systems. The rating was unchanged.

For the Technical Approach evaluation, there was one new significant strength for engaging with industry partners for alternative transportation options to service Pathfinder and increase flexibility and availability of access. All weaknesses were fully addressed, except for the one related to the concept of operations for aspects of its DC-200 crew transportation capability. The rating changed from a High to a Very High.

For the Proposed Government Resources evaluation, there were no new strengths or weaknesses identified. The rating was unchanged.

Space Exploration Technologies Corp. (SpaceX)

For the Relevance to NASA evaluation, there were no new strengths and all weaknesses were fully addressed. The rating was unchanged.

For the Business Approach evaluation, there were no new strengths identified and all weaknesses were fully addressed. The rating changed from a High to a Very High.

For the Technical Approach evaluation, there were no new strengths identified and all weaknesses were fully addressed, except for insufficient information in its capability concept and development plan for Starship crew transportation. The rating changed from a High to a Very High.

For the Proposed Government Resources evaluation, there were no new strengths or weaknesses identified. The rating was unchanged.

Special Aerospace Services, LLC (SAS)

For the Relevance to NASA evaluation, there were no new strengths and no weaknesses were identified. The rating was unchanged.

For the Business Approach evaluation, there were no new strengths and all weaknesses were fully addressed, except for insufficient clarification of the market analysis. The rating was unchanged.

For the Technical Approach evaluation, there was one new strength for utilizing robotic technologies in its design approach. The rating changed from a Medium to a Very High.

For the Proposed Government Resources evaluation, there were no new strengths or weaknesses identified. The rating was unchanged.

ThinkOrbital, Inc. (ThinkOrbital)

For the Relevance to NASA evaluation, the identified strength was changed to a significant strength for showing developing of a capability within 5-7 years. All weaknesses were fully addressed. The rating changed from a Medium to a Very High.

For the Business Approach evaluation, there were no new strengths identified and all weaknesses were fully addressed, except for insufficient information on the business aspects of its development plan and lack of specific detail in its financing plan. The rating changed from a Low to a Medium.

For the Technical Approach evaluation, there were no new strengths identified and all weaknesses were fully addressed, except for its very aggressive development schedule and lack of detail about its crewed ThinkPlatform development plan. The rating changed from a Low to a Medium.

For the Proposed Government Resources evaluation, there were no new strengths or weaknesses identified. The rating was unchanged.

Vast, LLC (Vast)

For the Relevance to NASA evaluation, there were no new strengths identified and all weaknesses were fully addressed. The rating changed from a High to a Very High.

For the Business Approach evaluation, a significant strength was changed to a strength for adding development of a sub-scale demo module, but not addressing additional resources needed for this. All weaknesses were fully resolved. There was a new weakness on relevant experience of the management team. The rating was unchanged.

For the Technical Approach evaluation, a strength for the requirements definition of the crewed Demo Module was combined into an existing significant strength. All weaknesses were fully addressed, except for insufficient information on elements of the design concepts and concepts of operations for the initial Sub-Scale Demo Module and Full-Scale Demo Module and insufficient information on its plan to develop and field its artificial gravity capability. The rating changed from a Low to a Medium.

For the Proposed Government Resources evaluation, there were no new strengths or weaknesses identified. The rating was unchanged.

IV. Portfolio Selection Decision

Following the presentation by the PEP, I fully considered the findings presented to me, as well as the information I gained from reading the proposals, and held an executive session with my advisors to discuss the evaluation results. I asked the opinion of the advisors present and asked for their comments, objections, or concerns with the materials presented. Following this discussion, I compared the proposals against one another to select a portfolio of approaches that best meets the objective of the CCSC2 Initiative, as stated in the Announcement. I explain the discriminating factors and the significance of those discriminators in my selection decision, as follows:

The objective of the CCSC2 Initiative is to advance private sector development of integrated LEO space capabilities so that the emerging products or services are commercially available to government and non-government customers within approximately the next five to seven years. As stated in the Announcement, these capabilities must be of a type that extends beyond the retirement of the International Space Station (ISS) and that should support a continuous U.S. human presence in LEO. In accordance with the evaluation plan, I considered which proposals had the most feasible approach to accomplish this objective and could be supported by NASA within available resources.

I paid attention to the overall evaluation summaries and color ratings the PEP gave to each proposal as an indicator of the proposal's feasibility. However, these summaries and ratings were only indicators and did not form the sole basis of my decision. As part of my comparative assessment of the proposals, I considered all data presented from all the proposals; however, I gave certain factors more weight in my deliberations than others. Ultimately, Relevance and Government resources color ratings were not a discriminator in my decision and I focused on the strengths and weaknesses in the Technical and Business Approaches for each participant.

I considered the development of LEO human transportation capabilities to be of high importance in this portfolio. Having sufficient competition and choice in the availability of human transportation options to LEO will be a key driver for developing both the near- and long-term growth of the low earth orbit economy as the number of LEO destinations increases.

I also prioritized the diversity of the portfolio. In order to build and sustain a robust LEO economy, NASA needs to support the development of all types of capabilities, including development of destination

capabilities and those versatile capabilities that have broad applicability across the industry and could be applied across different platforms. Capabilities such as these provide a significant “bang for the buck” when it comes to advancing and sustaining the LEO economy. I wanted to make sure our CCSC2 portfolio reflects the diversity of the capabilities needed for a healthy LEO economy.

Of the twelve proposals submitted, three included a crew and cargo transportation element – Blue Origin, Sierra Space, and SpaceX. In reviewing Blue Origin’s proposal, I concurred with the PEP’s findings. During the selection meeting, I asked the PEP whether Blue Origin understood that our interests focused on the Crew Transportation System capability which includes its Space Vehicle, Common Bus, New Glenn launch vehicle, and associated ground and mission systems. The PEP responded that it communicated this during due diligence and that the SAA included these CTS elements. I find that Blue Origin’s capability as a human space transportation provider is compelling, and the LEO economy at large would benefit from the vehicle once developed.

While discussing Sierra Space’s proposal during the selection meeting, I noted that there are synergies with Orbital Reef, but enough differences that I see value in providing support to the development of Sierra Space’s Pathfinder station and DC-200 crew transportation system. I noted that NASA and Sierra Space must both ensure that the CCSC2 effort does not overlap with the existing work that Sierra Space is doing pursuant to the Funded Space Act agreement between NASA and Blue Origin on its Commercial Destinations-Free Flyer Phase 1 activity, under which Sierra Space is a strategic partner to Blue Origin. I concur with the PEP’s finding that there is a reasonable likelihood of success for Sierra Space’s proposal with the decreased scope that was refined during due diligence.

In reviewing SpaceX’s proposal of an Integrated LEO Architecture – inclusive of Starship as a transportation and in-space LEO habitation/destination element supported by Super Heavy, Dragon, and Starlink, and constituent capabilities including crew/cargo transportation and operational/ground support – I was particularly impressed with its plans to conduct crewed missions to LEO with an HLS-similar Starship within the next couple years. Given the strong Business and Technical Approaches proposed by SpaceX in its initial proposal and further refined based on due diligence discussions, I agree with the PEP’s findings and ratings on the feasibility of this proposal to be successful.

The proposals that included development of a destination capability included Gravitics, NGSC, Orbital Assembly, Sierra Space, Space Villages, SpaceX, ThinkOrbital, and Vast. Having already considered Sierra Space and SpaceX, I looked at the findings for the remaining destination providers. I found similarities between the technical proposals for Gravitics and Space Villages, with both receiving significant weaknesses for insufficient information about their development approach and capability concepts. Space Villages had a slightly more feasible Business Approach with a solid strategy to finance the development of its Orbital Outpost. Orbital Assembly proposed a stronger Technical Approach than Gravitics and Space Villages; however, ultimately, there were other destination capabilities that had stronger proposals.

NGSC had a very highly rated proposal coming out of the initial evaluation and it was improved after due diligence. Despite that, I had concerns that this proposal might overlap NGSC’s efforts under its Commercial Destinations-Free Flyer Funded SAA. While NASA said in the CCSC2 Announcement that proposed capabilities may align with other U.S. Government efforts, specific activities funded under other U.S. Government contracts or agreement shall not be supported under this CCSC2 SAA. During a discussion with the PEP and my advisors, the PEP explained how this proposal is a complimentary capability to their free flying destination to be tended by CDFE crew and, ultimately, I agree with this assessment.

I concurred with the PEP's findings on the Vast proposal. During the selection meeting, I noted that Vast lacks experience in human space systems. Also, I was unsure about the feasibility of the artificial gravity capability, particularly its' impact on crew health. As part of its due diligence, the PEP discussed the technology with a Guidance, Navigation, & Control expert who stated that the concept was not infeasible. The successful development of an artificial gravity capability on a LEO destination would have significant positive impacts on the sustainment of a healthy LEO economy. The advantages of the proposed destination with artificial gravity, if Vast is successful, outweigh the risks of Vast's lack of experience and the possibility that the artificial gravity may not be achieved. I am still concerned that the first demonstration proposed would be with a crewed vehicle, but I think this is something NASA can monitor through a Space Act agreement.

In reviewing ThinkOrbital's proposed capability and findings, what struck me as particularly significant is its concept of in-space welding to construct its ThinkPlatforms on orbit. This capability, if successful, would represent a huge step forward on a capability that would have broad applications across the whole LEO economy. While I am not convinced that ThinkOrbital is, at this point, a realistic option as a commercial destination provider, I believe it can achieve significant progress in its Construction Technologies for Space Applications (CONTESA) concept with the support NASA can provide through the CCSC2 Space Act agreement. I also noted that ThinkOrbital was the only participant that provided signed term sheets with investors, which gave me further confidence that, although very much a small start-up company, it has the capability to carry out its planned capability development in the next several years.

In looking at the remaining proposals, I briefly considered the Ernst & Young proposal to provide various consulting and design services in commercializing LEO and, while the concept was intriguing, I did not see a place for this in a portfolio as there was no physical, in-space system being developed and it was unclear what the market was for this capability. I also briefly considered the proposal from OAI for an integrated astronaut training capability. While this is a capability that would have broad applicability across the LEO space industry, the very low rating on its Business Approach combined with proposed Government resources requests that were not possible to meet through this CCSC2 activity made this proposal not a good fit for this portfolio.

SAS's proposal to develop its initial uncrewed Autonomous Maneuvering Unit (AMU) with an in-space proto-flight demonstration followed by the human rated AMU-HR was intriguing and I agreed with the PEP's findings concerning the feasibility of these capabilities. I thought its proposal was strengthened when, after due diligence, SAS de-emphasized its human rated AMU-HR and primarily focused on the robotic AMU capability. This robotic EVA technology, if successfully developed, would have broad applicability across the whole LEO economy, reducing the time spent by human crew conducting EVAs which would reduce risk to crews in-orbit and provide a significant cost benefit to all commercial destinations. Further, the proposed Government resources requested in support of development of this robotic capability are not significant in size, so the potential return on investment to NASA by providing support through a CCSC2 SAA is great.

In light of the discriminators that I have described above, I select the following companies for award of unfunded Space Act Agreements under the Collaborations for Commercial Space Capabilities 2 activity pending finalization of the terms of those Agreements:

Blue Origin
Northrop Grumman Systems Corporation
Sierra Space Corporation
Space Exploration Technologies, Inc.
Special Aerospace Services, LLC

ThinkOrbital, Inc.
Vast, LLC

Philip R. McAlister

Philip R. McAlister
Selection Authority

06/09/2023

Date