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FALCON

*F*orce *A*pplication and *L*aunch from *CON*US Technology Demonstration

PHASE I

SOLICITATION 03-XX

Defense Advanced Research Projects Agency
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1.0 INTRODUCTION

The Defense Advanced Research Projects Agency (DARPA), and the Department of the Air Force are pleased to offer the opportunity to respond to the FALCON program solicitation. As the Offeror explores this solicitation, we believe the Offeror will appreciate this unique opportunity to work in partnership with the US Government to design, build, and demonstrate a FALCON system that can effectively and affordably conduct responsive and flexible global strike missions.

1.1 Vision

DARPA and the Air Force share a vision of a new transformational capability that would provide a means of delivering a substantial payload from the continental United States (CONUS) to anywhere on Earth in less than two hours. This capability would free the U.S. military from reliance on forward basing to enable it to react promptly and decisively to destabilizing or threatening actions by hostile countries and terrorist organizations.

The Government's vision of an ultimate prompt global reach capability (circa 2025 and beyond) is engendered in a reusable Hypersonic Cruise Vehicle (HCV). This autonomous aircraft would be capable of taking off from a conventional military runway and striking targets 9,000 nautical miles distant in less than two hours. It could carry a 12,000-pound payload consisting of Common Aero Vehicles (CAVs), cruise missiles, small diameter bombs or other munitions. This HCV will provide the country dominant capability to wage a sustained campaign from CONUS on an array of time-critical targets that are both large in number and diverse in nature while providing aircraft-like operability and mission recall capability. The Government is interested in innovative HCV concepts that utilize novel technologies that mitigate heat load and extend range. Such innovative concepts could enable effective prompt global reach missions and potentially provide a reusable first stage access to space vehicle.

The United States, however, needs a prompt global reach operational capability in the much nearer term (see AF Space Command Operationally Responsive Spacelift and Prompt Global Strike Mission Need Statements). This near-term operational capability is embodied in the Common Aero Vehicle (CAV) munitions delivery system integrated with a low-cost, operationally responsive, rocket booster. Essentially, CAV is an unpowered, maneuverable, hypersonic glide vehicle capable of carrying approximately 1,000 pounds in munitions or other payload. This concept has been studied since the mid-nineties and conceptual designs utilizing existing technologies have been developed that offer substantial capability. CAV designs based on existing technologies are predicted to have a downrange on the order of 3,000 nautical miles. Advanced CAV designs have also been developed that offer substantially greater downrange (approximately 9,000 nautical miles) and improved maneuverability (approximately 3,000 nautical miles cross-range). This enhanced performance CAV, referred to as the

Enhanced CAV, requires significant technology development particularly in the areas of thermal protection and guidance, navigation, and control.

In the far-term, the HCV itself could deliver CAVs to multiple targets. In the near-term, CAV requires a launch vehicle or other means of attaining its pierce point conditions in terms of altitude, attitude and velocity. Expendable rocket boosters offer adequate near-term capability. However, existing booster systems are costly and in limited supply. Conventional weapons need less expensive launchers. As a consequence, the government intends to develop a low-cost, responsive launch vehicle called the Small Launch Vehicle (SLV). This SLV design will be integrated and developed in parallel with the Enhanced CAV design. The SLV will serve a two-fold function in that it will also provide a low-cost, responsive launch capability for placing small satellites into Sun Synchronous Orbit. The desire is to place a payload ranging in weight from 100 kilograms to 1000 kilograms into sun synchronous 450 kilometer orbit at a 79 degree inclination. In addition, the SLV will have a goal for a total recurring cost per launch of no more than ten thousand dollars per kilogram. A cost per sortie of five million dollars or less is desired. Taken together, the two objectives satisfied by the SLV are a significant spiral in the development of an Operationally Responsive Spacelift (ORS) capability currently being pursued by the Air Force.

Substantial commonality exists between the key technologies that will enable the Enhanced CAV in the near-term and the Hypersonic Cruise Vehicle in the far-term. As a consequence, CAV (using available technologies), Enhanced CAV, and HCV are viewed to lie on an common evolutionary design and technology maturation path. Therefore, the FALCON program will be an incremental program in that as key capabilities are matured and demonstrated in flight, opportunities will be generated to spiral them into Systems Development and Demonstration (SDD) programs that will provide successive enhancements to the country's capability to perform prompt global strike missions from CONUS (or equivalent reach from alternative US basing). The Government intends to execute the FALCON program in partnership with private industry collaborating with university and government laboratory researchers.

1.2 Motivation

Recent military engagements in Bosnia, Afghanistan, and Iraq have underscored both the capabilities and limitations of United States air forces in terms of placing ordnance on military targets. While advancements in target identification and precision strike have been abundantly demonstrated, deficiencies in engaging and defeating time-critical and high value, hard and deeply buried targets (HDBT) have also been revealed. Moreover, the current and future international political environment severely constrains this country's ability to conduct long-range strike missions on high-value, time critical targets from outside CONUS. This restriction coupled with the subsonic cruise speed limitations of the current bomber fleet translates to greatly extended mission times. Consequences include failure to successfully engage and destroy a large subset of high value, time-critical targets, severe reduction in the tonnage of ordnance that can be placed on targets

within a given timeframe, and excessive physical and emotional fatigue levied upon bomber crews.

The US Strategic Command has a critical need for responsive, effective, and affordable conventional strike to provide deterrence, power projection and coercion, delivering munitions in minutes to hours globally from CONUS (or equivalent reach from alternative US basing). The intent is to hold adversary vital interests at risk at all times, counter anti-access threats, serve as a halt phase shock force and conduct suppression of enemy air defense and lethal strike missions as part of integrated strategic campaigns in the Twenty-First Century. During the high-threat early phases of an engagement, critical mission objectives include the rollback of enemy Integrated Air Defenses (IADs) and the prosecution of high-value targets. Throughout the remainder of the campaign, a continuous vigilance and immediate lethal strike capability are required to effectively prosecute real-time and time-critical targets and to maintain persistent suppression of enemy IADs. A system capable of responsively and effectively performing these mission objectives would provide a "no win" tactical deterrence against which an enemy's defenses would be ineffective.

1.3 Program Philosophy

The Government acknowledges the differences between past research and development programs, and the FALCON vision. However, the importance of leveraging the lessons learned from past programs should not be minimized. The Government expects the Offeror to utilize to the maximum extent possible the knowledge base gained from past programs. This leveraging of capabilities can be accomplished, in part, through teaming with partners that possess expertise in critical technology areas.

One important deviation from past approaches will be the major emphasis upon incremental flight-testing in the FALCON program. The government will insist that technologies be developed in the context of a "building block" flight test approach and that the FALCON program remain demonstration-focused.

In this solicitation, the Offeror must "think out of the box" and propose unique collaborative design methodologies, analysis tools, processes, capabilities, concepts, innovative teaming arrangements and business practices to reduce the cost of product development. For Phase I, the Offeror is given the opportunity to respond to two separate tasks, Small Launch Vehicle (SLV), and Hypersonic Weapon Systems (HWS.) The Offeror may respond to one or both tasks. The Government will not provide traditional specifications and a statement of work. Instead, the Government will define objectives and provide guidance for preparing a response. The Offeror, during Phase I, will perform the systems analyses, trade studies, conceptual design, and technical risk assessment and formulate a demonstration plan to develop a system concept that provides a best value solution to the program objectives. The Government is seeking a flexible program management structure and acquisition approach that can accommodate changes resulting from emerging analysis results, technology risk mitigation, and further definition of a Global Strike system-of-systems approach. This structure should support execution of

all aspects of the task or tasks proposed and enable seamless transition between phases so that schedule and cost objectives can be met or exceeded.

Near the end of Phase I, the Government intends to release a separate solicitation for Advanced Technologies to address specific technical risk areas associated with the Hypersonic Weapon Systems defined in Phase I. Technologies common to both CAV and HCV Operational Systems are of particular interest. The Advanced Technologies solicitation will seek out new and innovative ideas from all interested sources that may not have found a suitable means to participate in Phase I of this solicitation. This will allow for the development and demonstration of innovative technologies in conjunction with concept development.

The Government seeks to open up the design space and provide a catalyst for exploring "clean sheet of paper" system design philosophies and global strike mission scenarios especially for far-term approaches. Creative integration of the latest advances across a broad suite of component technologies, and innovative Concept of Operations will enable a revolutionary advance in global strike capabilities.

2.0 PROGRAM DESCRIPTION

2.1 Program Goal and System Operational Capabilities

The goal of the joint DARPA/Air Force FALCON program is to develop and validate, in-flight, technologies that will enable both near-term and far-term capability to execute time-critical, prompt global reach missions. The fundamental underpinnings of the technical approach to be taken in the FALCON program is the recognition that a common set of technologies can be matured in an evolutionary manner that will provide a near-term (~2010) operational capability for prompt global strike from CONUS (or equivalent reach from alternative US basing) while also enabling future development of a reusable HCV for the far-term (~2025). This common set of key technologies includes: efficient aerodynamic shaping for high lift to drag, lightweight and durable high temperature materials, thermal management techniques including active cooling and trajectory shaping (such as periodic flight), target update and autonomous flight control. These technologies will be matured to flight readiness, integrated into a system design and demonstrated in a series of flight-tests.

2.1.1 CAV/SLV System Operational Capabilities

The Government desires to accomplish near-term conventional global strike capability via development of a rocket boosted munitions delivery system that delivers its payload to the target by executing unpowered glide maneuvers at hypersonic speed. This concept, referred to as the Common Aero Vehicle or CAV, requires development of a low-cost, responsive launch system called the Small Launch Vehicle or SLV that is capable of boosting a CAV to its requisite pierce point conditions (e.g. geo-location, altitude, velocity, and attitude). The FALCON program will pursue the development, integration, and demonstration of the critical and enabling technologies and system attributes leading to an operational CAV/SLV system. Operational objectives derived from related Joint Requirements Oversight Council (JROC) validated Mission Need Statements for a future CAV/ORS system can be found in Appendix I.

The following CAV/SLV system objectives are derived from the future CAV/ORS system operational objectives and are established to aid in driving the technology development and demonstration activity for the CAV/SLV Operational System.

- Defeat hard and deeply buried targets
  - Approximately 1,000 pound fuzed penetrator payload (CAV munition)
  - Impact speeds of approximately 4,000 feet per second
- Strike throughout the depth of an adversary's territory
  - Global range
- Mobile/relocatable targets
  - 3000 nautical mile cross-range
  - Linkage to complete, timely Intelligence, Surveillance, and Reconnaissance (ISR)
- Time sensitive targets

- Less than one hour from launch to target
- Launch on-demand consistent with mission requirements

• Accurate weapons delivery
- Three meter Circular Error Probable (CEP)

• High-speed munitions/payload release (Small Smart Bomb, Wide Area Autonomous Search Munitions, etc.)
• Flexible SLV
- Approximately 2,000 pound CAV (1,000 pound payload) at global ranges

• Responsive and economical SLV

2.1.2 HCV System Operational Capabilities

Far-term conventional prompt global strike capability is envisioned as a CONUS-based, reusable, hypersonic cruise aircraft. Reusability and aircraft-like operations are critical to far-term affordable and flexible prompt global strike capability. In order to achieve this capability, the FALCON program will pursue the design, development, integration, and demonstration of critical and enabling technologies and system attributes pertaining to a reusable, operational HCV.

The following system operational performance objectives are established to aid in driving the technology development and demonstration activity for the HCV Operational System.

• 9,000 nautical mile strike capability
• 12,000 pound payload capacity
• Flight time of two hours or less (take-off to target strike)
• Launch on-demand consistent with mission requirements
• Reusability consistent with airplane-like operation
• Logistically suitable for CONUS-based military operations
• High speed munitions release

2.1.3 Small Satellite Launch Vehicle System Operational Capabilities

A second, but equally important, capability of the SLV is to place small satellites into Sun Synchronous Orbit. For this application, the SLV must be at least an order of magnitude more responsive than existing satellite launch systems and must have a low launch cost. The FALCON program will pursue development of an innovative SLV concept possessing these attributes and demonstration of the integrated set of key enabling technologies in a sub-orbital flight demonstration. The program will also seek to develop a unique CONOPS that will support and enable both the responsiveness and low-cost system objectives.

The following system operational performance objectives are established to aid in driving the technology and development activity for the SLV in concert with those specific to the CAV/SLV prompt global strike operational objectives identified in Section 2.1.1:

• Place a payload weight range of 100 kilograms to 1000 kilograms into a sun synchronous orbit, 450 kilometers, 79 degree inclination
• Launch after authorization from an alert status within 24 hours
• Average launch cost per kilogram of less than ten thousand dollars; cost per sortie of five million dollars or less is desired (CY 2003 dollars).

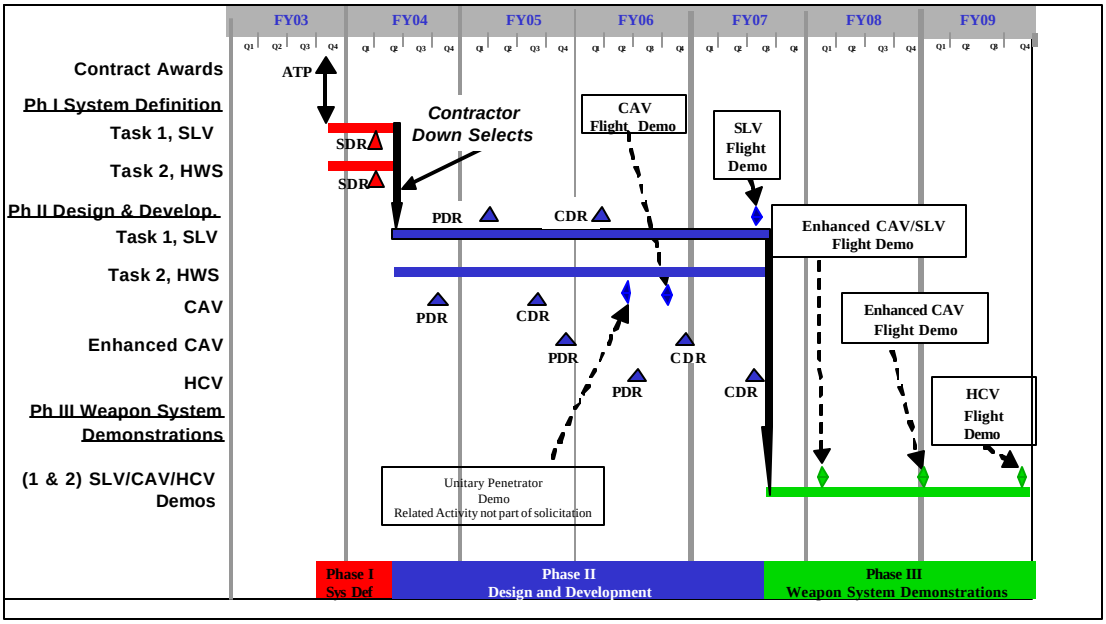

Figure 2.1 Notional Program Plan

2.2 Program Plan

A government baseline program plan and schedule for the FALCON program is illustrated in Figure 2.1. This is only a baseline plan and better ideas are solicited based on specific contractor technology development plans.

• Phase I – System Definition
• Phase II – Design and Development
• Phase III – Weapon System Demonstrations

One goal of this program strategy is to provide information at key program milestones to enable decision-makers to determine whether it is technically and fiscally prudent to continue the program as well as to down-select among performers consistent with funding available in each phase.

Each of the three phases is notionally described below:

Phase I, System Definition, will consist of two tasks that will be conducted in parallel over a six-month period of performance. Multiple agreement/contract awards are planned for each task.

The **Task 1, SLV**, objective is to provide the means for the Government to intelligently select the best value SLV design(s) suitable for launching either a global range Enhanced CAV with an approximate 1,000 pound munitions payload or a small satellite to a specified Sun Synchronous Orbit. The Government desires low-cost, responsive booster designs. Deliverables will include conceptual booster designs, performance predictions, and CONOPS and ROM costs for development and operation.

The **Task 2, HWS**, objective is to develop the conceptual designs for the CAV, Enhanced CAV, and HCV which optimize the Air Force warfighting requirements and operational capabilities; performance requirements; munitions weight, volume and high speed dispense requirements; and launch alternatives. Deliverable will include an integrated demonstration plan including ROM costs to execute, critical technology identification and maturation plan, and conceptual demonstrator designs for the hypersonic weapon systems.

The Government's decision to progress from Phase I to Phase II will, in part, be based on the delivered Phase I products which best address the below combination of information or events to meet the stated objectives:

1. Conceptual design and CONOPS for a low-cost, reliable SLV to deliver an operational, global range Enhanced CAV while reducing current launch preparation times to less than 24 hours.
2. Conceptual design and CONOPS for a low-cost, reliable SLV capable of placing a payload weight range of 100 kilograms to 1000 kilograms into a sun synchronous 450 kilometer orbit at a 79 degree inclination for a total recurring launch cost per kilogram of less than ten thousand dollars.
3. CAV designs, technologies suite and capability demonstration plan to validate a 3,000 nautical mile, approximately 800-second mission and a 9,000 nautical mile, approximately 3000-second mission (global range).
4. A "closed" concept design and CONOPS for the HCV that achieves 9,000 nautical mile strike distance, 12,000 pound payload, and flight time of two hours consistent with scramjet performance and TPS projected by 2012.
5. Completion of HCV trajectory optimization trades that compare the instantaneous and integrated aerothermal loads for constant altitude and periodic trajectory flight paths.
6. Identification of a common technologies suite for CAV and HCV as well as an HCV-specific technologies suite and demonstration plan for a HCV-specific demonstrator

Phase II, Design and Development, will continue the two tasks from Phase I and have a period of performance of 36 months.

The **Task 1, SLV**, objective is to demonstrate and flight-test all significant characteristics of the operational launch vehicle. One or more SLV agreements/contracts will be extended into Phase II as the result of a competitive down-select among Phase I

participants. Phase II will develop an SLV design in parallel with CAV development. Coordination and information exchange between SLV and HWS contractors will take place during Phase II to integrate the physical and functional characteristics of the SLV and Enhanced CAV. Deliverables will include refinement of CONOPS for each SLV approach, a detailed flight demonstration plan of each booster system, and flight-test of a single low-cost booster design.

The **Task 2, HWS,** objective is to flight-test a CAV and develop critical designs for Enhanced CAV and HCV demonstration systems incorporating flight-ready hypersonic technologies. Up to two HWS agreements/contracts will be extended to Phase II as the result of a competitive downselect among Phase I participants. Phase II will execute an integrated plan to evolve both CAV and HCV designs and mature associated critical technologies. This task will mature key enabling technologies applicable to both the Enhanced CAV and the reusable HCV design. Extensive analytical and experimental effort will be conducted to bring a suite of these technologies to flight-readiness (TRL = 6). The HCV design will be evolved further and performance predictions made based on the revised design. The CAV, Enhanced CAV, and HCV demonstrator preliminary and critical designs will be developed and risk mitigation plans enforced for all flight experiments planned. A flight demonstration of a CAV using "800-second" TPS technology currently available is envisioned from Vandenberg AFB or Kodiak Launch Range to Kwajalein Atoll. Advanced GN&C, range safety, in-flight target updating, periodic trajectories, terminal guidance, and functionality against HDBT will be demonstrated. Coordination and information exchange between SLV and HWS contractors will take place during Phase II to integrate the physical and functional characteristics of the SLV and Enhanced CAV in preparation for an integrated SLV/Enhanced CAV flight test in Phase III.

The government's decision to progress from Phase II to Phase III will, in part, be based on the delivered Phase II products which best address the below combination of information or events to meet the stated objectives:

1. Successful flight demonstration of an affordable, responsive booster SLV.
2. Successful 3,000 nautical mile, 800-second flight-test of the CAV demonstration system with a simulated unitary penetrator payload.
3. An Enhanced CAV critical design that will demonstrate a 9,000 nautical mile, 3000 second mission capability.
4. A HCV demonstrator critical design that incorporates at least three hypersonic technologies identified in Phase I; these three technologies will be developed to at least TRL = 6.

Phase III, Weapon System Demonstrations, will consist of a single task identified as Weapon System Demonstrations. The objective is to flight-test an integrated SLV/Enhanced CAV system, and flight-test Enhanced CAV and HCV demonstrators to validate system and technology performance. Phase III will be performed over a 30-month period during which the Enhanced CAV will be flown integrated with the SLV. The CAV payload flown in the integrated CAV/SLV flight demonstration may be scaled

relative to an operational CAV commensurate with the capabilities of the SLV flight demonstration system. The balance of the Phase III effort will focus on demonstration of reusable technologies that are considered key to enabling future development of a hypersonic cruise vehicle. Many of these same reusable technologies are expected to benefit Enhanced CAV designs as well. Key technologies will be integrated into an HCV demonstrator and flight-tested using a similar test approach taken in demonstrating the CAV. Powered as well as unpowered versions of the HCV demonstrator may be tested to permit technology validation for longer duration flights and assessment of the implications of integrating propulsion systems with the vehicle design.

2.3 Management Approach

DARPA is responsible for overall program management of the FALCON program, including technical direction, acquisition, and security. DARPA will provide the Program Manager (PM) and the Air Force will provide the Deputy Program Manager (DPM). DARPA and the Air Force will use a diverse government team to evaluate proposals and conduct milestone reviews.

Program participants are expected to implement a streamlined approach to program management that includes team member cooperation, small staffs, abbreviated oversight, face-to-face communications, real-time decision-making and problem solving, and short, direct lines of authority. Program participants should be prepared for the formal exchange of technical information with other participants, subject to signed non-disclosure agreements.

2.4 Potential Award Instruments

The joint DARPA/Air Force FALCON program is solicited using a modified proposal request. The Government may award either a FAR based contract or an Other Transaction Authority (OTA) Agreement from this solicitation. As a result, offerors are asked to submit proposal responses that accommodate either option. Specific guidance for completing FAR and OTA based proposals appears in Section 4 of this solicitation.

2.4.1 Evaluation Approach

The Government will evaluate all offerors' FAR based proposals in accordance with FAR Part 15, other applicable published procedures and the source selection plan. Interim negotiations may be conducted during the evaluation process. However, FAR based proposals which the Government determines represent "Best Value", all factors considered, will be selected for negotiations leading to award. For those offerors selected for negotiations leading to award, the Government will evaluate their Other Transaction proposal material and negotiate an overall best approach, both contract instrument types considered.

Historically, DARPA has solicited use of Other Transaction Authority exclusively for programs such as this where performance is conducted over multiple phases and it is

likely that revolutionary technology accomplishment will benefit both government and industry. There are significant advantages for a contractor and/or the Government to want to enter into an OTA agreement if the conditions for an OTA can be met. OTAs are discussed in more detail in Section 4.0. One of the conditions for an OTA is cost share of at least 1/3 of the value of the agreement. The intent of this evaluation approach is to prevent contractors with greater financial flexibility from reducing the proposed cost to the Government by providing a large cost share or extra effort beyond that of a contractor with less financial capability. In this approach all proposals are evaluated based upon their technical merits and ability to competitively price their proposed technical scope. This approach also affords the offerors and the Government the opportunity to assess, propose and implement the most beneficial approach to program accomplishment. This approach may also be used in later phases.

2.5 Funding

Total funding for Phase I (Tasks 1, and 2) of this solicitation is $7.0M. The government anticipates awarding multiple Phase I agreements/contracts for each task described within this solicitation. It is anticipated that four to five SLV agreements or contracts will be awarded with a government contribution of $0.3M to $0.6M per award, and three to four HWS agreements or contracts will be awarded with a government contribution of $1.2M to $1.5M per award. The Offeror is encouraged to propose innovative, value added use of the acquisition mechanism. We expect the Offeror to provide a realistic proposal for best achieving the program objectives within the outlined budget and schedule.

3.0 PHASE I STATEMENT OF OBJECTIVES

This section describes the objectives to be addressed in Phase I of the FALCON program. The primary objectives of Phase I are to conduct system trades and generate a preferred system definition for the SLV and HWS conceptual designs, produce Technology Maturation Plans for each, formulate flight demonstration plans, and generate Phase II technical and cost proposals for each task. A chart describing the breakdown of activities is shown in Figure 3.1. Phase I is divided into two major tasks. Task 1 is Small Launch Vehicle (SLV), and Task 2 is Hypersonic Weapon Systems (HWS).

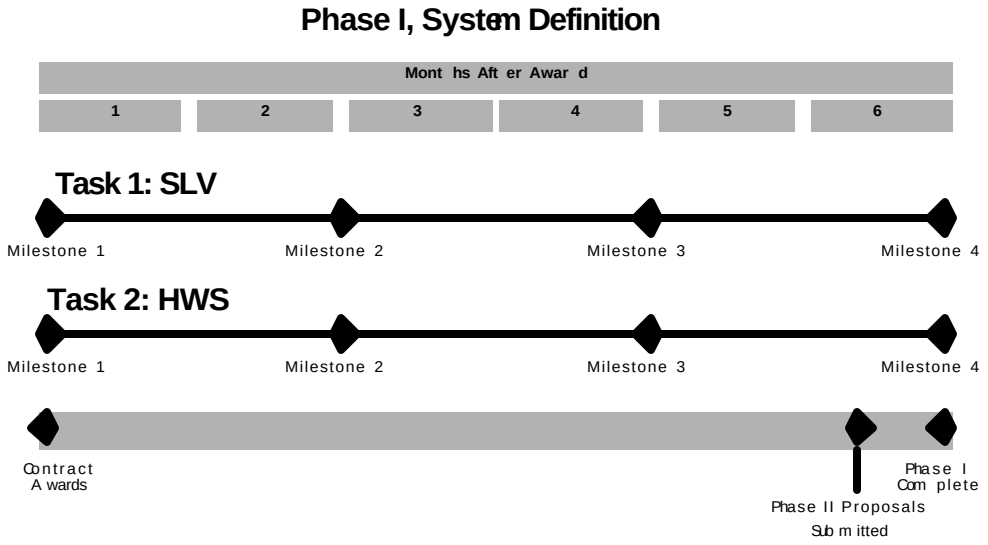

Figure 3.1 Phase I FALCON Activities

3.1 Task 1, Small Launch Vehicle (SLV), Objectives

This task accomplishes major objectives for the system definition of the SLV Operational System (SLV-OS) and the SLV Demonstration System (SLV-DS):

- An SLV-OS launch vehicle will be capable of launching a single CAV on-demand and placing it at its requisite insertion condition (geo-location, altitude, velocity and attitude). Initial SLV launch requirements for the CAV mission family will be formally defined by the Government by the Authorization to Proceed (ATP) for this Phase I task based upon past CAV studies and the Common Aero Vehicle/Small Launch Vehicle Demonstration Study recently conducted under sponsorship by DARPA. For the purposes of this task, these launch requirements will be finalized by the Government by the end of month two following the ATP.
- The SLV-DS will be developed in subsequent phases of this program and used to perform a flight-demonstration of an integrated CAV/SLV system. The SLV-DS

should incorporate key technologies of the SLV-OS and have a clear legacy to the SLV-OS. In addition, the basic SLV-DS should provide requisite capability to place a small satellite into sun synchronous, 450 kilometer orbit at 79 degree inclination. The threshold weight is a 100 kilogram payload and objective weight is a 1000 kilogram payload. The total recurring cost objective for this Small Satellite Launch Vehicle Operational System should not exceed ten thousand dollars per kilogram (CY 2003 dollars). A cost per launch sortie of five million dollars or less is desired (CY 2003 dollars). This cost objective does not include payload and payload preparation costs.

Ideally, the Government desires that a single SLV-OS design will be defined that addresses both the CAV/SLV and small satellite launch vehicle system operational capabilities defined in Sections 2.1.1 and 2.1.3. However, it is recognized that some differences in vehicle design and/or associated CONOPS specific to each payload type may be necessary and/or advantageous to enable performance and launch cost objectives to be met. In that event, the Contractor is encouraged to strive to achieve the maximum degree of commonality practical between the CAV-specific and small satellite-specific launch vehicle operational system designs, document differences between OS designs, and provide a supporting rationale. The Contractor should implement a complete systems engineering process to achieve the objectives of this task. The task should include, but is not limited to, the products in the following sections.

3.1.1 SLV-OS Products

1) Conceptual Design: Each Task 1 Contractor should develop a single SLV-OS conceptual design that meets CAV launch requirements. A physical and functional description of all subsystems and major components including over-all dimensions and estimated weight for each should be developed. Operating pressures and temperatures, materials of construction, and key dimensions including wall thickness for critical structural components should be defined. Propellant constituents including theoretical performance and estimated total weight for these and other consumables should be provided. The Contractor should predict delivered performance in terms of thrust, specific impulse versus time and total delivered impulse and provide a basis for these estimates in terms of assumed efficiencies, propellant usage, historical data, etc. Aspects of the Contractor's concept that have significant bearing on system safety and/or environmental impact during manufacture, transportation, storage or operation should be delineated and discussed. The Contractor should describe any unique design features, manufacturing or processing techniques that potentially differentiate its concept from others in terms of enhanced performance, reduced cost, operational flexibility, or responsiveness. Experimental demonstrations of any of these features even in subscale or simplified form are strongly encouraged in this task.

2) Performance Predictions: Analytical prediction of SLV-OS performance from launch to CAV separation should be generated for a set of CAV missions that

demonstrate the capability and flexibility of the performer's concept. Final physical and aerodynamic properties for a generic CAV will be provided to Task 1 performers by the Government by the end of the second month of Phase I to support this effort. The Contractor should describe the analytical tools and all assumptions used in these calculations.

3) CONOPS: Each Contractor should develop a Concept of Operations (CONOPS) for its conceptual SLV-OS design. The CONOPS should address launch facility requirements/operations and describe the means of transporting the SLV-OS to, and within, the launch facility. SLV-OS assembly and payload integration should be delineated. Preparation for launch and associated timelines should be described in context with the responsive and flexible launch requirements of the CAV mission set. All assumptions including availability of suitable launch infrastructure should be defined. Flight management including contingencies for flight termination and mission abort should be described. Innovative approaches that provide enhanced responsiveness or reduced launch costs should be described and substantiated.

4) ROM Cost: A rough-order-of-magnitude (ROM) recurring launch cost should be generated for the SLV-OS. This cost should include cost of fabrication of the launch vehicle, transportation to the launch facility and storage at the facility, vehicle assembly and payload integration, mission planning, preparation on the launch pad, cost of propellant and other consumables not an integral part of vehicle manufacture costs, and inherent cost of launch facility infrastructure. All assumptions and basis for estimate should be specified.

3.1.2 Small Satellite Launch Vehicle Operational System Products

1) Conceptual Design: Each Task 1 Contractor should develop a single operational system conceptual design that will meet the operational performance objectives for a responsive, low-cost small satellite launch vehicle as defined in Section 2.1.3. This conceptual design should be derived from and possess a high degree of commonality with the SLV-OS addressed in Section 3.1.1. A physical and functional description of all subsystems and major components including over-all dimensions and estimated weight for each should be developed. Operating pressures and temperatures, materials of construction, and key dimensions including wall thickness for critical structural components should be defined. Propellant constituents including theoretical performance and estimated total weight for these and other consumables should be provided. The Contractor should predict delivered performance in terms of thrust, specific impulse versus time and total delivered impulse and provide a basis for these estimates in terms of assumed efficiencies, propellant usage, historical data, etc. Aspects of the Contractor's concept that have significant bearing on system safety and/or environmental impact during manufacture, transportation, storage or operation should be delineated and discussed. The Contractor should describe any unique design features, manufacturing or processing techniques that potentially

differentiate its concept from others in terms of enhanced performance, reduced cost, operational flexibility, or responsiveness. The Contractor should specifically identify and discuss areas of commonality and differences between its Small Satellite Launch Vehicle Operational System conceptual design and its SLV-OS conceptual design.

2) Performance Predictions: Analytical performance prediction for the Small Satellite Launch Vehicle Operational System design should be generated for multiple orbital attitudes and inclinations of potential interest as a function of payload weight. The Contractor should describe the analytical tools and all assumptions used in these calculations.

3) CONOPS: Each Contractor should develop a Concept of Operations (CONOPS) for its conceptual small satellite launch vehicle design. The CONOPS should address launch facility requirements/operations and describe the means of transporting the launch vehicle to, and within, the launch facility. Launch vehicle assembly and payload integration should be delineated. Preparation for launch and associated timelines should be described in context with the responsive and flexible launch requirements of a typical small satellite launch mission. All assumptions including availability of suitable launch infrastructure should be defined. Flight management including contingencies for flight termination and mission abort should be described. Innovative approaches that provide enhanced responsiveness or reduced launch costs should be described and substantiated.

4) ROM Cost: A ROM recurring launch cost should be generated for the Small Satellite Launch Vehicle Operational System. This cost should include cost of fabrication of the launch vehicle, transportation to the launch facility and storage at the facility, vehicle assembly and payload integration, mission planning, preparation on the launch pad, cost of propellant and other consumables not an integral part of vehicle manufacture costs, and inherent cost of launch facility infrastructure. The contractor should assume 20 launches per year for 10 years and a 2003 calendar year constant dollar value for purposes of generating these cost estimates. All other assumptions and basis for estimate should be specified. The Contractor should provide a basis for its ROM cost estimate and show a linkage between this ROM cost and its ROM cost estimate for its SLV-OS design.

3.1.3 SLV-DS Products

1) Conceptual Design: Each Task 1 Contractor should develop a single SLV-DS conceptual design that enables demonstration of launch capabilities outlined in Section 2.1.1 and 2.1.3. The Government desires demonstration of this SLV-DS design during Phase II in one or more sub-orbital flight-tests. As previously discussed, the SLV-DS would subsequently be integrated with an Enhanced CAV-DS payload and flight-tested as part of Phase III. The Enhanced CAV-DS payload used in this integrated flight demonstration would likely be subscale relative to the 2000 pound (approximate), full scale Enhanced CAV design.

Payload requirements for this integrated CAV/SLV flight demonstration will be defined during Phase I by the Government in consultation with both Task 1 – SLV and Task 2 – HWS Performers. However, the SLV-DS should possess at least a threshold performance capability consistent with placing a small satellite into a sun synchronous, 450 kilometer orbit at a 79 degree inclination. Significant differences between the SLV Operational and Demonstration System designs should be identified and a rationale provided for why these differences exist.

2) Performance Predictions: Analytical performance predictions should be generated to predict flight trajectory characteristics for the initial SLV-DS flight demonstration in Phase II as well as the integrated Enhanced CAV/SLV flight demonstration in Phase III. In addition, predictions should be made that demonstrate the capability of the Contractor's SLV-DS concept to place a small satellite into Sun Synchronous Orbit. At a minimum, a due east launch from Cape Canaveral Air Force Station and a Polar launch from Vandenberg Air Force Base should be analyzed. Payload weight including shroud as a function of orbital altitude and inclination should be the primary figure of merit. Differences in predicted performance capability between the SLV-OS and SLV-DS should be quantified and discussed.

3) Development and Demonstration Plan: A development and demonstration plan should be generated to meet the objectives of this program. Any deviations from the SLV-OS basic design that have been assumed in defining the SLV-DS (including scale) whether required to conduct the integrated CAV/SLV flight demonstration in Phase III or simply to enhance performance or reduce cost should be defined and discussed. The Offeror should ensure that the SLV-DS it proposes to develop in Phase II will satisfy all requirements to launch the CAV-DS and meet, as a minimum, the threshold objective for small satellite launch.

3.1.4 Phase II Proposal

The Contractor should generate and submit a Phase II proposal consisting of technical and cost volumes if it wishes to be considered for participation in the remainder of the program. This proposal will be a Phase I product as part of Milestone 4 and will need to be submitted on or about the end of the fifth month of Phase I. The exact due date will be established, proposal scope and format defined, evaluation criteria delineated and additional directions provided by the Government at least thirty days in advance of the proposal due date. The Task 1 Phase II proposal together with the quality of the products generated by the performer in Phase I as described in Sections 3.1.1, 3.1.2 and 3.1.3 and the overall potential of the Contractor's concept to meet or exceed the stated system objectives will comprise the basis for awarding a Phase II agreement/contract to demonstrate the SLV concept in flight-testing.

3.1.5 Milestones and Accomplishment Criteria

As part of the negotiated agreement/contract, payment will occur at four payable milestones. Figure 3.1 illustrates Phase I milestones in relation to the task. The Contractor must satisfy minimum accomplishment criteria to receive the milestone payment. The payable milestones for the Phase I work occur at kickoff, two months, four months, and six months after award, respectively. A milestone review should be held in conjunction with completion of effort associated with each milestone.

Milestone 1 Minimum Accomplishment Criterion
The accomplishment criterion for the first payable milestone is conduct of the kickoff meeting. The kickoff meeting should include, but not be limited to an SLV Phase I Systems Definition program plan; introduction of all key personnel and responsibilities; design process; and an update of SLV system concepts to date.

Milestone 2 Minimum Accomplishment Criteria
The minimum accomplishment criteria for Milestone 2 is completion of the following elements:

(1) SLV-OS Systems Performance Specification (SPS)
(2) Preliminary SLV-OS vehicle sizing
(3) Preliminary SLV-OS performance prediction

Milestone 3 Minimum Accomplishment Criteria
The minimum accomplishment criteria for Milestone 3 is completion of the following elements:

(1) SLV-OS Conceptual Design, CONOPS and Performance Predictions
(2) Small Satellite Launch Vehicle Operational System Conceptual Design, CONOPS and Performance Predictions

Milestone 4 Minimum Accomplishment Criteria
The minimum accomplishment criteria for Milestone 4 is completion of the following elements:

(1) SLV-DS Conceptual Design
(2) ROM launch costs with basis of estimate for SLV-OS
(3) SLV-DS performance predictions for CAV-DS/SLV -DS and small satellite launches
(4) Phase II technical and cost proposals

Additional accomplishment criteria of each milestone addressed above may be proposed in the Offeror's Phase I proposal along with a proposed milestone award value. At the milestone review, emphasis should be placed on quality and credibility of information and discussion of issues, not on generation of required paperwork. Instead of written milestone reports, the Contractor should provide six (6) electronic copies of annotated briefing slides on CD-ROMs at each review. All milestone information should be in Microsoft Office 2000 compatible format. Milestone review (1) is the kickoff meeting that will be held at the performer's site when an agreement/contract has been negotiated,.

Milestone reviews (2), (3), and (4) will occur at a site or sites to be designated by the Government early in Phase I.

3.2 Task 2, Hypersonic Weapon Systems (HWS), Objectives

This task accomplishes major objectives in the system definition of the CAV Operational System (CAV-OS), CAV Demonstration Systems (CAV-DS), HCV Operational System (HCV-OS) and HCV Demonstration System (HCV-DS):

- The CAV-OS will accurately deliver a variety of submunitions and unitary penetrators from global ranges.
- The CAV-DS will be the primary means for conducting Phase II and Phase III flight demonstrations and should have legacy to the CAV-OS. The CAV-DS should consist of two air vehicles (distinguished by their approximate mission flight times of 800 and 3,000 seconds), booster interface, mission control elements, and any unique support equipment.
- The HCV-OS should reflect the Contractor's vision for an operational, reusable, global-reach platform capable of operating from CONUS and delivering a substantial payload. Specific operational performance objectives were defined in Section 2.1.2.
- The HCV-DS is the experimental test vehicle that will be flight-tested in Phase III to assess and validate technologies that are deemed key to enabling the realization of the HCV-OS.

The Contractor should implement a complete systems engineering process to achieve the objectives of this Task. This task should include, but is not limited to, the products in the following sections.

3.2.1 CAV-OS Products

1) Conceptual Design: The Contractor should develop a preferred Enhanced CAV conceptual design (called the CAV-OS) that is capable of delivering a nominal 1,000 pound penetrator munition to a target approximately 9,000 nautical miles from the launch point. The necessary modeling and simulation required to demonstrate concept effectiveness should be conducted. Key attributes of the CAV-OS are global reach, prompt/effective delivery of conventional payloads from and through space, and affordability. This task should take into consideration, mission effectiveness, platform performance, payload fraction and volume, dispense requirements, booster integration and launch alternatives. The CAV-OS should exploit real-time data sources from the theater information network in a dynamic battlefield. Physical and functional interfaces between the CAV-OS and its launch vehicle should be defined.

2) CONOPS: The Contractor should define a CONOPS for the CAV-OS in a system-of-systems architecture. The Contractor should produce a briefing that

defines the functionalities and sequencing (including timeline) for a typical system operation. This briefing, referred to as a Day-In-The-Life (DITL) briefing, should cover all aspects of the system, including basing; infrastructure requirements; command control and communications; integration with responsive booster assets; mission planning and execution; support; integration with other battlefield systems; etc.

3.2.2 CAV-DS Products

1) CAV Conceptual Design: The Contractor should develop a preferred conceptual design for the 3,000 nautical mile, 800 second mission duration (CAV-DS) to be flight tested in the FY 06 timeframe. CAV-DS will represent an interim operational capability with legacy to the CAV-OS for accurate delivery of a 1,000 pound unitary penetrator. CAV-DS should utilize currently available technologies and boosters. Designs should consider, but are not limited to, integration with the high speed penetrator munition, effective and affordable thermal protection, onboard diagnostic systems and modular experimental bays, mission control and planning functions and interfaces to include integration with existing C4ISR systems, and robust command control and communications including in-flight retargeting during all flight phases. The Contractor should define all physical and functional interfaces between the CAV-DS and its launch vehicle for the flight demonstration. These interfaces should be communicated and coordinated with the launch operations organization.

2) Enhanced CAV Conceptual Design: The Contractor should develop a conceptual design for a CAV flight demonstration vehicle that is analogous to the Enhanced CAV operational system discussed in Section 2.1.1. The Enhanced CAV-DS should be designed to achieve a 9,000 nautical mile, 3,000 second flight. The Enhanced CAV-DS should have an extended cross range and glide capability and have legacy to the CAV-OS. Designs should consider, but not be limited to advanced thermal and structural materials, onboard diagnostic systems and modular experimental bays, munitions dispense, mission control functions and interfaces to maintain increased target selectivity, and robust command control and communications during all flight phases. The Contractor should define all physical and functional interfaces between the Enhanced CAV-DS and its launch vehicle for the flight demonstration. These interfaces should be communicated and coordinated with the launch operations organization.

3.2.3 HCV-OS Products

1) Conceptual Design: The Contractor should describe its preferred HCV-OS configuration, attributes, and performance of the vehicle and its subsystems. The HCV-OS is intended to be the Contractor's operational vehicle design approach that offers the potential of accomplishing the goals established by the FALCON program. It is recognized that given the relative immaturity of several key

enabling technologies, the eventual operational aircraft is likely to differ significantly from the HCV-OS designs generated in the FALCON program.

2) Trade Studies: The Contractor should conduct system studies for the global reach HCV-OS to comparatively assess multiple vehicle design concepts consistent with the program performance goals. The Contractor should conduct comprehensive trades and analyses to identify the system performance required to accomplish the program goals described in Section 2.1.2 and to identify the corresponding suite of critical and enabling technologies to achieve those goals. At a minimum, trades should be conducted in terms of mission radius, payload weight, speed, altitude, and cruise efficiency. The Contractor should comparatively assess multiple mission trajectories including constant cruise altitude and periodic flight trajectory types. The relative benefits and/or disadvantages should be quantified and associated technical challenges identified. All trades should consider the unique aspects associated with the HCV-OS. The trades should fully explore innovative approaches to the concept and evaluate operational battlespace management and logistical requirements for employing the HCV-OS.

3) CONOPS: Definition of HCV-OS CONOPS should be conducted in an iterative fashion with the system trades to define a preferred solution. To help further describe the operational system concept, the performer should produce a briefing that defines the functionalities and sequencing including timeline for a typical system operation. This briefing, referred to as a Day-in-the-Life (D-I-T-L) briefing, should cover all aspects of the system, including basing, command and control, mission execution, support, integration with other battlefield assets, etc.

3.2.4 HCV-DS Products

1) Conceptual Design: The Contractor should develop a preferred conceptual design of a HCV-DS that incorporates technologies and design elements that are traceable to the HCV-OS conceptual design. The HCV-DS should be a subscale technology demonstrator for the HCV-OS design and may be powered to extend flight duration and/or explore implications of integrating propulsion with airframe. It is intended that the HCV-DS utilize launch platforms, facilities and logistics used to perform CAV demonstration flights.

3.2.5 Technology Maturation Plan

The Contractor should identify all key enabling technologies required by the HCV-OS and CAV-OS to achieve their operational objectives. Technologies of interest include, but are not limited to innovative propulsion concepts; advanced high-temperature materials for leading edges and acreage TPS; unique thermal management approaches including active cooling; trajectory tailoring to minimize heat loads and/or increase operational range in the hypersonic flight regime; cryogenic fuel conformal tank technology; efficient light-weight materials and design approaches; high-speed munitions

dispense approaches; command, control, and communication interfaces; aerodynamic boundary layer control; and high lift-to-drag vehicle shaping. The Contractor should adopt NASA's Technology Readiness Level (TRL) methodology as the standard to rate the various technologies in terms of a set of objective criteria. The assessment should consider the technology effectiveness, realizability in a real system, and maturity, as well as any additional factors considered relevant. Having determined the current TRL of each key technology, the performer should develop roadmaps to maturing all key technologies for each system to a TRL of six, implying flight-readiness. These roadmaps should include all requisite experimental and/or analytical work required, including inexpensive small-scale, flight experiments such as AFSPC ICBM "Glory Trips" or similar alternatives. A top-level schedule and associated ROM cost to mature to TRL= 6 should be generated for each key technology. This information should be documented in a single Technology Maturation Plan for both CAV-OS and HCV-OS and submitted to the government as a Phase I product.

3.2.6 Flight Demonstration Plan

The Contractor should develop a Demonstration Plan for the CAV-DS, Enhanced CAV-DSand HCV-DS. This plan should include flight demonstration of the CAV-DS in Phase II, and flight demonstrations of the Enhanced CAV-DS, integrated Enhanced CAV-DS/SLV, and HCV-DS flight demonstrations in Phase III. The Contractor should also initiate key flight test documentation for use in Phase II of the program. Documentation should consider a definitized overall approach that ensures validation of all system components and operational capability in a thermally stressing flight environment. This includes, but is not limited to demonstration of precision targeting at hypersonic speeds, quantification of aerodynamic performance and vehicle dynamics, validation of attachment concepts, validation of GN&C flight at equilibrium conditions, validation of all electronics (including GPS and all apertures), and validation of control logic needed for operational flight. Test documentation should include flight test trajectories, preferred location(s) for system flight tests, procedures and timeline for obtaining flight clearance, and a detailed schedule showing key milestones leading to flight tests.

3.2.7 Phase II Proposal

The Contractor should generate and submit a Phase II proposal consisting of technical and cost volumes if it wishes to be considered for participation in the remainder of the program. This proposal will be a Phase I payable milestone product and will need to be submitted on or about the end of the fifth month of Phase I. The exact due date will be established, proposal scope and format defined, evaluation criteria delineated and additional directions provided at least thirty days in advance of the proposal due date. The HWS Phase II proposal together with the quality of the products generated by the performer in Phase I as described in Sections 3.2.1 through 3.2.6 and the overall potential of the Contractor's concept to meet or exceed the stated system objectives will comprise the basis for awarding a Phase II agreement/contract to demonstrate the SLV concept in flight-testing.

3.2.8 Milestones and Accomplishment Criteria

As part of the negotiated agreement/contract, payment will occur at four payable milestones. Figure 3.1 illustrates Phase I milestones in relation to the task. The Contractor must satisfy minimum accomplishment criteria to receive the milestone payment. The payable milestones for the Phase I work occur at kickoff and at two months, four months, and six months after award, respectively. A milestone review should be held in conjunction with completion of effort associated with each milestone.

Milestone 1 Minimum Accomplishment Criterion
The accomplishment criterion for the first payable milestone is conduct of the kickoff meeting. The kickoff meeting should include, but not be limited to an HWS systems definition (Phase-1) plan; introduction of all key personnel and responsibilities; design process; and an update of CAV and HCV system concepts to date.

Milestone 2 Minimum Accomplishment Criteria
The minimum accomplishment criteria for Milestone 2 is completion of the following elements:

(1) CAV-OS conceptual design update
(2) Initial CAV-OS CONOPS
(3) Feasibility assessment of HCV-OS mission objectives
(4) Preliminary definition of multiple potential HCV-OS concepts
(5) Initial HCV-OS CONOPS
(6) Preliminary assessment of key enabling technologies

Milestone 3 Minimum Accomplishment Criteria
The minimum accomplishment criteria for Milestone 3 is completion of the following elements:

(1) Preferred CAV-OS conceptual design and rationale
(2) CAV-OS key enabling technology TRLs
(3) CAV-DS conceptual design
(4) Enhanced CAV-DS conceptual design
(5) Preliminary assessment of multiple HCV-OS concepts
(6) Preliminary HCV-OS flight trajectory analysis
(7) Preliminary HCV-OS key enabling technologies and TRLs

Milestone 4 Minimum Accomplishment Criteria
The minimum accomplishment criteria for Milestone 4 is completion of the following elements:

(1) CAV-OS DITL Brief
(2) Preferred HCV-OS design concept and CONOPS selected
(3) Final HCV-OS flight trajectory analysis

(4) HCV-OS DITL Brief
(5) Integrated CAV-OS/HCV-OS Technology Maturation Plan
(6) Demonstration/Flight Test Plan and ROM Costs
(7) HCV-DS conceptual design

Additional proposed accomplishment criteria of each milestone addressed above may be proposed in the Offeror's proposal along with appropriate milestone award amount. At the milestone review, emphasis should be placed on quality and credibility of information and discussion of issues, not on generation of required paperwork. Instead of written milestone reports, the Contractor should provide six (6) electronic copies of annotated briefing slides on CD-ROMs at each review. All milestone information should be in Microsoft Office 2000 compatible format. Milestone review (1) is the kickoff meeting that will be held at the performer's site when an agreement/contract has been negotiated. Milestone reviews (2), (3), and (4) will occur at a site or sites to be designated by the Government early in Phase I.

4.0 PROPOSAL PREPARATION INSTRUCTIONS

This section of the solicitation provides the Offeror guidance for developing and submitting the FALCON Phase I proposal. The Offeror should carefully read and ensure that their proposal responds to the entire solicitation document.

Both Tasks 1 and 2 as identified herein will be evaluated and awarded from this solicitation as stand alone agreements/contracts. The Offeror may propose to only one of the two tasks or to both tasks. However, the Offeror must submit a separate (stand alone) proposal for each task if proposing to more than one task. In addition, the Offeror may submit only one proposal per task.

4.1 Work Outline

The Offeror should develop a program work outline or Work Breakdown Structure (WBS) based on a common numbering system, and should use the work outline and numbering system to integrate the proposal documents, including the TDD, and IMS. The TDD and IMS numbering should be consistent down to a level of detail sufficient to highlight the significant points discussed throughout the proposal.

4.2 Proposal Structure

As discussed in paragraph 2.4.1. of this solicitation, FAR based proposals which represent "Best Value", all factors considered, will be selected for negotiation leading to award. For those selected, the Government will evaluate their Other Transaction proposal material and negotiate an overall best task accomplishment approach, both contract instrument types considered. To conduct this evaluation, offerors should submit 3 separate volumes. Volumes 1 and 2 will be FAR based technical and cost proposals, respectively, which respond to either task 1 or task 2 as identified herein. These volumes will fully support award of the FAR based contract provided as Section 6.0.

Volume 3 will be a "Delta Proposal" which fully supports award of the OTA model agreement provided herein as Section 7.0. The "Delta Proposal" shall clearly identify changes to the proposed FAR based technical and cost proposals (Volumes 1 and 2) which results from an award of an Other Transaction Agreement.

The Offeror should organize its task proposals using the following outline, and should clearly and fully address each of the specified topic areas within the identified sections of each volume. The required content of each task proposal is discussed in the following paragraphs:

4.3 Task 1 – Small Launch Vehicle Volume 1 Technical Proposal
4.4 Task 2 – Hypersonic Weapon Systems Volume 1 Technical Proposal
4.5 Volume 2 – FAR Based Cost Proposal (same format for both tasks)
4.6 Volume 3 – OTA Based Cost Proposal (same format for both tasks)

Deviation from the objectives stated within this solicitation is acceptable provided that 1) the desired approach is acknowledged, and 2) a credible explanation of the proposed alternate approach that better meets or exceeds the program vision is provided. Credible innovative approaches, all factors considered, could be viewed favorably for purposes of evaluation.

4.3 Task 1 – Small Launch Vehicle Volume 1 Technical Proposal

The following outline should be used for the Task 1 Technical Proposal. A brief description of each section follows.

Volume 1
- 1.0 Executive Summary
- 2.0 Technical Approach
  - 2.1 Notional Operational System
    - 2.1.1 Concept Description and Capabilities
    - 2.1.2 Initial CONOPS
    - 2.1.3 Supporting Analytical/Experimental Basis
    - 2.1.4 Technology Challenges
  - 2.2 Program Approach – Enabling the Vision
  - 2.3 Phase I Scope of Work
  - 2.4 Systems Engineering Process
  - 2.5 Analytical Performance Tools
  - 2.6 CONOPS Methodology
  - 2.7 Cost Estimating Methodology
- 3.0 Management Approach and Program Team
  - 3.1 Phase I Program Management Tools
    - 3.1.1 Task Description Document (TDD)
    - 3.1.2 Integrated Master Schedule (IMS)
    - 3.1.3 Payable Milestone Plan (PMP)
  - 3.2 Contractor Team Relationship and Capabilities
    - 3.2.1 Teaming Arrangements and Dynamics
    - 3.2.2 Organizational Structure and Key Personnel
    - 3.2.3 Manufacturing and Experimental Facilities
    - 3.2.4 Past Performance

4.3.1 Executive Summary

The Executive Summary should provide the introduction to the proposal. It is meant to be a top-level discussion of the Offeror's program vision and objectives. The Executive Summary should consider all phases of the program and describe how the proposed technology demonstration program would be implemented. As a minimum, the Executive Summary should include a brief description of the following:

- Program Vision and Objectives
- Proposed Operational System description
- Technical Approach Summary
- Top-Level Program Schedule

- Corporate commitment and its fit into the corporate structure/vision
- Description of planned or implemented streamlined/innovative business practices, if any

4.3.2 Technical Approach

The Technical Approach section of the proposal should describe the Offeror's vision of the system (s) it proposes to develop as part of the FALCON program. The Offeror should provide an overview of the process it would utilize in the course of conducting over the three program phases to accomplish its envisioned system end state. A more detailed description of the tasks to be performed and the products generated during Phase I should be provided. Finally, the Offeror should discuss the tools, methodologies and processes it intends to utilize in executing Phase I and succeeding phases of the FALCON program. The Technical Approach should address Section 3.1 Task 1, SLV, Objectives, and all of the technical parts of this solicitation. It is particularly important that the proposal emphasize Phase I conceptual designs of the Operational and Demonstration Systems and their associated CONOPS, along with the demonstration planning activities. The Offeror should strive to illustrate a logical, concise, quantified, and substantiated program path. The elements described below are desired components of the technical approach section.

4.3.2.1 Notional Operational System

This section should describe the Offeror's initial vision of its Small Launch Vehicle Operational System, in terms of its conceptual design, associated attributes and CONOPS. The discussion should demonstrate how the Offeror's proposed system concept meets or exceeds the overall program performance objectives and vision both as a CAV booster and small satellite launch vehicle. The Offeror should discuss its experimental and/or analytical basis that substantiates its assertions that its concept will achieve or exceed program objectives related to performance, cost and responsiveness. The Offeror should identify and discuss the major technologies that must be further developed and technical challenges must be addressed specific to its concept that need to be addressed by the program in order to achieve a successful flight demonstration in Phase II.

4.3.2.2 Program Approach – Enabling the Vision

The Offeror should provide an overview of its programmatic approach to address key technical challenges and mature its Small Launch Vehicle concept through flight demonstration. The Offeror should consider major program objectives not only concerning development and demonstration of its SLV, but also the need to address payload interface requirements especially those associated with the planned integrated CAV/SLV flight demonstration in Phase III. The Offeror should identify major events and products, their purpose and when they would occur. The Offeror should also describe the final product and associated capability at the end of Phase III and what further steps would be required to mature its concept to operational status.

4.3.2.3 Phase I Scope of Work

This section should describe in detail those tasks the Offeror proposes to perform in Phase I toward achieving the program objectives and products as outlined in Section 3.1 Task 1, SLV, Objectives. The Offeror should explain the purpose and rationale for the approach it proposes to the extent they are not already self-evident. The Offeror should discuss in particular any differences between the desired Phase I products as delineated in Sections 3.1.1, 3.1.2, and 3.1.3 and those it proposes to generate.

4.3.2.4 Systems Engineering Process

The proposal should describe a complete systems engineering process for conducting Phase I of the program. The proposal should describe how the Offeror will iteratively execute analyses and studies to develop an optimized Operational System conceptual design and an Demonstration System conceptual design that is traceable to the Operational System design.

4.3.2.5 Analytical Performance Tools

The proposal should describe the analytical performance tools that will be used to accomplish the analysis and study process described in Section 4.3.2.3.

4.3.2.6 CONOPS Methodology

The Offeror should describe how it intends to develop the CONOPS for both the CAV-OS and Small Satellite Launcher Operational System. Any special analytical tools or processes should be discussed. The Offeror should also discuss how it intends to substantiate claims it makes concerning benefits to system performance, launch cost, and/or responsiveness as a result of implementing novel and/or innovative CONOPS practices.

4.3.2.7 Cost Estimating Methodology

The Offeror should explain how it intends to generate ROM operational launch costs associated with both the SLV-OS and the Small Satellite Launcher Operational System. If analytic cost estimating relationships and/or cost models will be used, the Offeror needs to discuss how these models will be or have been validated. Likewise, if a bottoms-up component level cost estimating methodology is planned, the Offeror should provide a basis to substantiate these costs.

4.3.3 Management Approach and Program Team

This section of the proposal should describe the approach to be used in managing the Phase I program and the program team that will execute the Phase I program. This section should discuss how the Offeror's team will be organized to implement the

program and how the work will be planned and organized to achieve the program objectives. In addition, the Offeror should discuss the extent to which it has senior level management commitment to the FALCON program. The elements described below are required components of the proposed Management Approach and Program Team.

4.3.3.1 Phase I Program Management Tools

The Offeror should develop and submit as part of its Phase I proposal the management tools for executing Phase I of the program. The Offeror should describe how these tools address the program objectives and how these tools will be utilized to manage the Phase I program. The set of tools should be updated as needed by the contractors, subject to acceptance by the Government. The management tools should consist of the following:

- Task Description Document (TDD)
- Integrated Master Schedule (IMS)
- Payable Milestone Plan (PMP)

A description of each of these tools is provided in the following paragraphs. These tools should clearly be linked to one another.

i. Task Description Document (TDD)

The TDD describes the work effort, to the individual task level, necessary to meet the milestones and Statement of Objectives for Phase I of the program as described in Section 3.0. The TDD should define work at least to a level of 3 or higher to explain the details of the Offeror's approach toward meeting program objectives.

ii. Integrated Master Schedule (IMS)

The IMS should provide a timeline for each significant Phase I task. These timelines should indicate a planned start date and completion date and identify specific events, accomplishments and milestones. The IMS should portray in a clear fashion the time-relationship of Phase I tasks and identify the Phase I critical path(s). Definitions and characteristics of the key elements of the IMS are given below.

- Tasks: Work to be completed in support of a specific significant milestone or functional accomplishment
- Calendar Schedule: Detailed schedule (specific start and end dates) of the period of performance for each work effort.

The Offeror may implement the IMS in its own format and should maintain and update this document as needed.

iii. Payable Milestone Plan (PMP)

The Government intends to pay the contractor based on accomplishments at scheduled milestone events as outlined in the Payable Milestone Plan. Accomplishments should be significant and measurable. The purpose of the milestone events is to review technical and programmatic progress in the program. The Offeror's PMP should include the dates, accomplishment criteria and payable amounts for the payable milestones. At a minimum, the proposed PMP should correspond to the milestone event schedule and accomplishment criteria outlined in Section 3.0 of this solicitation.

4.3.3.2 Contractor Team Relationship and Capabilities

4.3.3.2.1 Teaming Arrangements and Dynamics

The proposal should identify the major participants of the Offerors team and/or subcontractors and how the interactions of the team will result in achieving the program objectives. If the teaming arrangement is based on a prime-subcontractor relationship, the proposal should include a summary of the subcontractor arrangements, identifying the duration of the commitment relative to Phase I. The Offeror should include the following additional elements within the discussion:

- The status of negotiations among team members
- The extent to which subcontractors/team mates have committed to their described responsibilities, and have agreed to the projected prices and terms offered
- Describe the extent to which the subcontractors/teammates have agreed to the Governments requirement for data rights throughout the life of the program
- Articles of collaboration, which fully describe divisions of effort, extent of liability, anticipated investment by partners, roles and responsibilities, identification of lead persons and their responsibilities
- The extent to which the team will interact synergistically in regards to overall program decisions
- The team dynamics that will provide flexibility and adaptability to parallel and/or emerging programs

4.3.3.2.2 Organizational Structure and Key Personnel

The Offeror should describe the organizational structure of the proposed program team and define the responsibilities and authority for key positions. Key management and technical personnel should be identified and short resumes provided for each.

4.3.3.2.3 Manufacturing and Experimental Facilities

The Offeror will identify and describe manufacturing and experimental facilities needed and available to perform the entire program in a manner that meets all program objectives.

4.3.3.2.4 Past Performance

Each Offeror should provide information in this section that describes its team's past performance relevant to the SLV Task of the FALCON Program. Past performance information can include Government contracts or agreements, commercial/non-government contracted work or internally funded efforts. This Offeror-provided information will be evaluated, as well as data from other Government sources, in determining the Offeror's ability to fully execute all three phases of the SLV Task.

Relevant contracts/agreements may include data performed by other divisions, corporate management, critical subcontractors, or teaming subcontractors if these resources will be similarly used on the FALCON Program. The following data from current and past contracts should be included:

- Company/Division Name
- Program Title as Listed on the Contract
- Contracting Agency
- Contract Number/Agreement Number
- A Brief Description of the Effort Performed
- Type of Contract/Agreement
- Period of Performance
- Original Contract Dollar Value and Current/Final Contract Dollar Value
- Original Completion Date and Final Completion Date
- Customer Technical and Contract Points of Contact, Address and Telephone Number

Offerors are expected to briefly explain what aspects of the contracts/agreements and other efforts are relevant to the FALCON Program in terms of achieving desired product performance, cost and schedule performance, and risk reduction efforts. The Offerors can also submit information that explains past performance problems and how they have been overcome.

4.4 Task 2 – Hypersonic Weapon Systems Volume 1 Technical Proposal

The following outline should be used for the Task 2 Technical Proposal. A brief description of each section follows.

Volume 1
- 1.0 Executive Summary
- 2.0 Technical Approach
  - 2.1 CAV Notional Operational System
    - 2.1.1 Concept Description and Capabilities
    - 2.1.2 Initial CONOPS
    - 2.1.3 Supporting Analytical/Experimental Basis
    - 2.1.4 Technology Challenges
  - 2.2 HCV Notional Operational System

2.2.1 Concept description and capabilities
2.2.2 Initial CONOPS
2.2.3 Supporting Analytical/Experimental Basis
2.2.4 Technology Challenges
2.3 Program Approach – Enabling the Vision
2.4 Phase I Scope of Work
2.5 Systems Engineering Process
2.6 Analytical Performance Tools
2.7 CONOPS Methodology
3.0 Management Approach and Program Team
3.1 Phase I Program Management Tools
3.1.1 Task Description Document (TDD)
3.1.2 Integrated Master Schedule (IMS)
3.1.3 Payable Milestone Plan (PMP)
3.2 Contractor Team Relationship and Capabilities
3.2.1 Teaming Arrangements and Dynamics
3.2.2 Organizational Structure and Key Personnel
3.2.3 Manufacturing and Experimental Facilities
3.2.4 Past Performance

4.4.1 Executive Summary

The Executive Summary is meant to be an executive level description of key elements and unique features of each the Offeror's operational system vision. It should address all phases of the program and describe how the proposed technology demonstration program would be implemented. The Offeror should discuss the inter-relationship between its Enhanced CAV and Hypersonic Cruise Vehicle concepts. As a minimum, the Executive Summary should include a brief description of the following:

- Program Vision and Objectives
- Proposed Operational System description
- Technical Approach Summary
- Top-Level Program Schedule
- Corporate commitment and its fit into the corporate structure/vision
- Description of planned or implemented streamlined/innovative business practices, if any

4.4.2 Technical Approach

The Technical Approach section of the proposal provides the Offeror the opportunity to explain and substantiate the significant technical features of its program. This section should describe in detail the Offeror's vision of the near-term and fart-term hypersonic, global reach system designs it proposes to develop in the Hypersonic Weapons System Task (Task 2) of the FALCON program. The Offeror should provide an overview of the process it would utilize in the course of conducting the three program phases to accomplish HWS program objectives. A more detailed description of the tasks to be

performed and the products generated during Phase I should be provided. Finally, the Offeror should discuss the tools, methodologies and processes it intends to utilize in executing Phase I and succeeding phases of the FALCON program. The Technical Approach should address Section 3.2, Task 2 Hypersonic Weapon Systems (HWS) Objectives, as well as all technical parts of this solicitation. It is particularly important that the Offeror's proposal emphasize Phase I conceptual designs of the operational and demonstration systems and their associated CONOPS, along with the demonstration planning activities. The Offeror should strive to illustrate a logical, concise, quantified, and substantiated program path. The elements described below are desired components of the technical approach section.

4.4.2.1 CAV Notional Operational System

This section should describe the Offeror's initial vision of both its CAV and Enhanced CAV Operational Systems, in terms of its conceptual design, associated attributes and CONOPS, and describe how it meets the overall program performance objectives and vision. The Offeror should discuss its experimental and/or analytical basis that substantiates its assertions that its concept will achieve program objectives related to performance and responsiveness. The Offeror should identify the major technical challenges specific to its concept that need to be addressed by the program in order to achieve a series of successful flight demonstrations in Phases II and III.

4.4.2.2 HCV Notional Operational System

This section should describe the Offeror's initial vision of its HCV-OS in terms of its conceptual design, associated attributes and CONOPS and how it meets or exceeds the overall program performance objectives and vision. The Offeror should discuss its experimental and/or analytical basis that substantiates its assertions that its concept will achieve program objectives related to performance and responsiveness. The Offeror should identify the major technical challenges specific to its concept that need to be addressed by the program in order to achieve a successful flight demonstration in Phase III.

4.4.2.3 Program Approach – Enabling the Vision

The Offeror should provide an overview of its programmatic approach that it would follow to mature a common set key technologies that would enable both CAV and HCV operational systems, integrate these technologies into CAV and HCV demonstration system designs, and validate the flight readiness of these technologies by conducting multiple flight demonstrations addressing CAV and HCV operational objectives in Phases II and III.. The Offeror should identify major events and products, their purpose and when they would occur. The Offeror should also describe the final product(s), associated capability at the end of Phase III and what further steps would be required to mature its system concepts to operational status.

4.4.2.4 Phase I Scope of Work

This section should describe in detail those tasks the Offeror proposes to perform in Phase I toward achieving the program objectives and the products as outlined in Section 3.2, Task 2 Hypersonic Weapon Systems (HWS) Objectives. The Offeror should explain the purpose and rationale for the approach it proposes to the extent they are not already self-evident. The Offeror should discuss in particular any differences between the desired Phase I products as delineated in Section 3.2 and those it proposes to generate.

4.4.2.5 Systems Engineering Process

The proposal should describe a complete systems engineering process for conducting Phase I of the program. The proposal should describe how the Offeror will iteratively execute analyses and studies to develop optimized Operational System conceptual designs and Demonstration System conceptual designs that are traceable to the Operational System designs.

4.4.2.6 Analytical Performance Tools

The proposal should describe the analytical performance tools that will be used to accomplish the analysis and study process described in section 4.4.2.4.

4.4.2.7 CONOPS Methodology

The Offeror should describe how it intends to develop the CONOPS for both the CAV-OS and HCV-OS. Any special analytical tools or processes should be discussed. The Offeror should also discuss how it intends to substantiate claims it makes concerning benefits to system performance, and responsiveness as a result of implementing novel and/or innovative CONOPS practices.

4.4.3 Management Approach and Program Team

This section of the proposal should describe the approach to be used in managing the Phase I program and the program team that will execute the Phase I program. This section should discuss how the Offeror's team will be organized to implement the program and how the work will be planned and organized to achieve the program objectives. In addition, the Offeror should discuss the extent to which it has senior level management commitment to the FALCON program. The elements described below are required components of the proposed Management Approach and Program Team.

4.4.3.1 Phase I Program Management Tools

The Offeror should develop and submit as part of its Phase I proposal the management tools for executing Phase I of the program. The Offeror should describe how these tools address the program objectives and how these tools will be utilized to manage the Phase I program. The set of tools should be updated as needed by the contractors, subject to

acceptance by the Government. The management tools should be consist of the following:

- Task Description Document (TDD)
- Integrated Master Schedule (IMS)
- Payable Milestone Plan (PMP)

i. Task Description Document (TDD)

The TDD describes the work effort necessary to meet the milestones and Statement of Objectives for Phase I of the program as described in Section 3.0. The TDD should include the Offeror's plans for developing all Phase I products. The TDD should define work at least to a level of 3 or higher to explain the details of the Offeror's approach toward meeting program objectives.

ii. Integrated Master Schedule (IMS)

The IMS should provide a timeline for each significant Phase I task. These timelines should indicate a planned start date and completion date and identify specific events, accomplishments and milestones. The IMS should portray in a clear fashion the time-relationship of Phase I tasks and identify the Phase I critical path(s). Definitions and characteristics of the key elements of the IMS are given below.

- Tasks: Work to be completed in support of a specific significant milestone or functional accomplishment
- Calendar Schedule: Detailed schedule (specific start and end) dates of the period of performance for each work effort.

The Offeror may implement the IMS in its own format and should maintain and update this document as needed.

iii. Payable Milestone Plan (PMP)

The Government intends to pay the contractor based on accomplishments at scheduled milestone events as outlined in the Payable Milestone Plan. Accomplishments should be significant and measurable. The purpose of the milestone events is to review technical and programmatic progress in the program. The Offeror's PMP should include the dates, accomplishment criteria and payable amounts for the payable milestones. At a minimum, the proposed PMP should correspond to the milestone event schedule and accomplishment criteria outlined in Section 3.0 of this solicitation.

4.4.3.2 Contractor Team Relationship and Capabilities

4.4.3.2.1 Teaming Arrangements and Dynamics

The proposal should identify the major participants of the Offerors team and/or subcontractors and how the interactions of the team will result in achieving the program objectives. If the teaming arrangement is based on a prime-subcontractor relationship, the proposal should include a summary of the subcontractor arrangements, identifying the duration of the commitment relative to Phase I. The Offeror should include the following additional elements within the discussion:

- The status of negotiations among team members
- The extent to which subcontractors/team mates have committed to their described responsibilities, and have agreed to the projected prices and terms offered
- Describe the extent to which the subcontractors/teammates have agreed to the Governments requirement for data rights throughout the life of the program
- Articles of collaboration, which fully describe divisions of effort, extent of liability, anticipated investment by partners, roles and responsibilities, identification of lead persons and their responsibilities
- The extent to which the team will interact synergistically in regards to overall program decisions
- The team dynamics that will provide flexibility and adaptability to parallel and/or emerging programs

4.4.3.2.2 Organizational Structure and Key Personnel

The Offeror should describe the organizational structure of the proposed program team and define the responsibilities and authority for key positions. Key management and technical personnel should be identified and short resumes provided for each.

4.4.3.2.3 Manufacturing and Experimental Facilities

The Offeror will identify and describe manufacturing and experimental facilities needed and available to perform the entire program in a manner that meets all program objectives.

4.4.3.2.4 Past Performance

Each Offeror should provide information in this section that describes its team's past performance relevant to the HWS Task of the FALCON Program. Past performance information can include Government contracts or agreements, commercial/non-government contracted work or internally funded efforts. This Offeror-provided information will be evaluated, as well as data from other Government sources, in determining the Offeror's ability to fully execute all three phases of the HWS Task.

Relevant contracts/agreements may include data performed by other divisions, corporate management, critical subcontractors, or teaming subcontractors if these resources will be similarly used on the FALCON Program. The following data from current and past contracts should be included:

- Company/Division Name
- Program Title as Listed on the Contract
- Contracting Agency
- Contract Number/Agreement Number
- A Brief Description of the Effort Performed
- Type of Contract/Agreement
- Period of Performance
- Original Contract Dollar Value and Current/Final Contract Dollar Value
- Original Completion Date and Final Completion Date
- Customer Technical and Contract Points of Contact, Address and Telephone Number

Offerors are expected to briefly explain what aspects of the contracts/agreements or internally funded efforts are relevant to the FALCON Program in terms of achieving desired product performance, cost and schedule performance, and risk reduction efforts. The Offerors can also submit information that explains past performance problems and how they have been overcome.

4.5 Volume 2 – FAR Based Cost Proposal (same format for both task proposals)

The following outline should be used for Volume 2 of both task proposals. A brief description of each section follows.

Volume 2

4.0 FAR-Based Cost Response
5.0 FAR Contract Certifications and Representations

4.5.1 FAR-Based Cost Response

The cost proposal must adhere to FAR requirements including certified cost or pricing data. The cost proposal must contain a summary table as follows:

Labor ($)	
Overhead/fringe ($)	
Direct materials ($)	
Subcontracts ($)	
Consultants ($)	
Travel ($)	
Equipment ($)	
Other costs ($)	
G&A ($)	
COM ($)	
Fee ($)	
Fee (%)	
Total Labor Hours (to Level 2 of work	

outline)	
Prime Labor Hours	
Subcontractor/Consultant labor hours (add rows to break down by organization)	
Total Ave Cost/Labor hour	
% of effort subcontracted	
GFE (add table rows to itemize cost of government laboratories, facilities and agencies)	

Supporting information may be provided in the offeror's format, however it should be clear how the numbers may be aggregated to obtain the values in the summary table.

4.5.2 FAR Contract Certifications and Representations

The FAR model contract including certifications and representations are included in Section 6.0. The offeror should complete these and include them in this section.

4.6 Volume 3 – OTA Based Cost Proposal (same format for both task proposals)

The following outline should be used for Volume 3 of both task proposals. A brief introduction to the use of OTAs as well as a description of each Volume 3 proposal section follows.

Volume 3

6.0 OTA Based Cost Response
7.0 OTA Task Description Document
8.0 Proposed Agreement

4.6.1 Introduction to OTA

Use of Other Transactions Authority (OTA) may provide significant financial and intellectual property advantages for the Government and the Offeror. This flexible authority allows the Offeror to be creative in designing the system and in the selection of the management framework that best suits the proposed technical and management approach.

The government will allow the Offeror to use either commercial or Department of Defense (DoD) streamlined processes, reporting and management practices. The use of OTA requires compliance with applicable laws but allows the latitude to depart from acquisition-specific laws, Federal Acquisition Regulations (FARs), and DoD practices where it makes sense. The Offeror should take full advantage of this latitude to propose innovative/revolutionary approaches to team building. The resulting Offeror proposal must clearly demonstrate a robust method to assure and control costs, quality, reliability, system engineering, program schedule, system design, and test planning and execution.

Commercial, industrial, and corporate specifications and standards can be used in lieu of military specifications and standards where appropriate. Military specifications and standards, if needed, should be used as guides, with any modifications, tailoring, or partial application described.

The offeror's OTA proposal must meet the provisions described in Section 4.6.1.1 below.

4.6.1.1 Section 803

Section 803 of the National Defense Authorization Act for FY2001 (Public Law 106-398) is applicable to the FALCON Program. In summary, for proposals submitted in response to this solicitation (those proposals offering use of an OTA) there must be either at least one nontraditional defense contractor participating to a significant extent in the prototype project; or, if there is no nontraditional defense contractor participating to a significant extent, at least one of the following circumstances exists: at least one third of the total cost of the prototype project is to be paid with funds provided by parties to the transaction other than the Federal Government; or, the senior procurement executive determines that exceptional circumstances justify the use of a transaction that provides for innovative business arrangements or structures that would not be feasible or appropriate under a contract. The Government has discretion in determining the level of "significant extent." Some factors may include:

a) criticality of the technology being contributed
b) role of the non-traditional defense contractor(s) in the design process
c) value of the effort being proposed

The entire amendment to the Authorization Act is available for your convenience at <http://www.darpa.mil/cmo> under "Items of Note" and includes the definition of a nontraditional defense contractor.

As detailed below, Volume 3 must clearly separate the technical and cost-share portion of your proposal from the non-cost share portion of your proposal. Cost contributions for items such as IR&D reimbursement, G&A, cost of money and fee identified separately will meet the solicitation requirement.

4.6.2 OTA Based Cost Response

The cost proposal must contain a summary table as follows:

Labor ($)	
Overhead/fringe ($)	
Direct materials ($)	
Subcontracts ($)	
Consultants ($)	
Travel ($)	
Equipment ($)	

Other costs ($)	
G&A ($)	
COM ($)	
Fee ($)	
Fee (%)	
Total Labor Hours (to Level 2 of work outline)	
Prime Labor Hours	
Subcontractor/Consultant labor hours (add rows to break down by organization)	
Total Ave Cost/Labor hour	
% of effort subcontracted	
GFE (add table rows to itemize cost of government laboratories, facilities and agencies)	
Direct Cost Share ($)	
In-Kind Contributions (list with cost)	
Complementary IRAD (list with cost)	
Non-Traditional Partners (list with cost/organization)	
List of additional tasks with cost/task and labor hours/task (add table rows as needed)	

Supporting information may be provided in the offeror's format, however it should be clear how the numbers may be aggregated to obtain the values in the summary table.

The Offeror should breakdown its cost estimates by major task recognizing that the Government may elect to fund some tasks and not others. Program management and other over-reaching costs will be negotiated as part of agreement negotiations based on those tasks selected for funding. Failing to breakdown costs in this way may result in the Offeror not receiving an agreement award.

Certified cost or pricing data is not required. However, in order for the Government to determine the reasonableness, realism and completeness of your cost proposal, the following data must be provided for each team member and in a cumulative summary:

Labor: Total labor includes direct labor and all indirect expenses associated with labor, to be used for the Phase I period of performance. Provide a breakdown of labor hours and rates for each category of personnel to be used on this project.
Direct Materials: A by item/unit cost breakdown of the total direct material that will be acquired and/or consumed in the Phase I period of performance. Limit this information to only major items of material (>$1,000) and how the estimated expense was derived.
Subcontracts: Describe major efforts to be subcontracted, the source, estimated cost and the basis for this estimate. A summary cost breakdown should be provided for each subcontract proposed.

Consultants: Any proposed use of an individual not directly employed by the Offeror resulting in a cumulative Phase I cost of $10,000 or more should be detailed. The individual should be identified by name and affiliation, as well as his hourly rate, total number on labor hours, and any other direct costs such as materials or travel that are not accounted for elsewhere in the cost proposal.
Travel: Total proposed travel expenditures relating to the Phase I period of performance. Limit this information to the number of trips, and purpose of each cost.
Equipment: Any equipment to be acquired for the effort. Breakdown the equipment into those items required for Phase I.
Other Costs: Any direct costs not included above. List the item, the estimated cost, and basis for the estimate.

As applicable, the Offeror should provide a total estimated price for the major IR&D and cost sharing activities associated with the program. The Offeror should state whether each IR&D program is dedicated or if it is being pursued to benefit other programs as well. The cost sharing estimate should include the type of cost share, i.e. cash or in-kind. If in-kind is proposed, the Offeror should provide a discussion of how the cost share was valued.
If a teaming arrangement is proposed the above cost information should be provided for all team members.

4.6.3 OTA Task Description Document

The offeror should provide the OTA Task Description Document which is supported by the OTA delta cost proposal. The Offeror's submitted OTA TDD shall use the proposed FAR based TDD as the baseline and modify it utilizing the "track changes" feature of Microsoft Word. It shall be submitted in the "track changes" format.

4.6.4 Proposed Agreement

The Offeror should submit a proposed agreement that follows the outline described in Section 7 (Model Agreement). This section provides specific guidance for preparing Article III and attachment 1 of that Agreement. The model Agreement is meant to provide an idea of the terms and conditions of a typical agreement; it is not meant as a standard "one-size-fits-all" document. The Offeror can propose any changes, additions or deletions to the Model Agreement that it wishes to be addressed during agreement negotiations. Fully explain the rationale for the changes made in an addendum to the Agreement. Rationale located in other areas of the solicitation response may be cross-referenced. The Offeror must submit its draft agreement with its proposal. However, the draft agreement should be a separate, stand-alone document.

4.7 Proposal Procedures

4.7.1 Organization

The Offeror's proposal for each task should be submitted as three volumes in three separate standard three-ring, loose leaf binders (one for each volume) with individual pages unbound and printed single sided. Volume 1 of the Task 1 – Small Launch Vehicle proposal excluding title pages, table of contents, section dividers, etc. should not exceed 30 pages. Volume 1 of the Task 2 – Hypersonic Weapon Systems proposal, excluding section dividers, should not exceed 50 pages. There is no page limit for Volume 2 or 3 for either task. Pages beyond the prescribed page limit for Volume 1 may not be reviewed or otherwise considered during the proposal evaluation process.

Proposal Format and Page Recommendations (Volume 1)

	Pages	
SECTIONS	Task 1	Task 2
Executive Summary	5	10
Technical Approach	15	25
Management Approach and Program Team **	10	15
Total	30	50

** Note – the TDD and IMS are excluded from the page count

4.7.2 Page and Print Information

Each page should be on an 8-1/2" x 11" sheet with a Times New Roman font size of not less than 12 points; however, figures, charts, labels, headers and footers may be submitted with a font size of not less than 8 points. Margins should be at least 1 inch on all sides. Fold out pages will be counted as multiple pages. Any restrictions must be placed with a legend within the proposal on each affected sheet/page. One signed original and eight copies of each proposal volume are required.

4.7.3 Electronic Information

The Offeror is also required to submit its proposal in electronic format, on CD-ROM, in Microsoft Office 2000 compatible format. Four copies of each proposal volume on CD-ROM are required.

4.7.4 Proposal Delivery Information

The deadline for receipt of proposals is XXX XX, 2003, 5:00 PM Eastern Standard Time. All proposals should be mailed or hand-carried to the delivery address as follows:

Defense Advanced Research Projects Agency
Attention: Mr. James B Troutman, CMO
FALCON Solicitation 03-01
3701 N. Fairfax Drive

Arlington, VA 22203-1714

Each volume of the proposal shall be packed and sealed separately and clearly marked to identify the volume number.

Responses not received at the address and time specified above will be considered as a late proposal. It shall be handled in accordance with FAR 15.208

4.7.5 Submission of Classified Information

An Offeror intending to include classified information or data as part of its submission should submit the classified information through the DARPA Deputy Director of Security and Intelligence using the appropriate procedures. Advance planning and coordination is recommended to ensure availability of DARPA security personnel to receive proposal material. All pages submitted through this process shall be counted against the proposal page count identified in paragraph 4.7.1.

4.7.6 Solicitation Questions and Answers

Any questions the Offeror may have regarding this solicitation can only be submitted in writing (i.e., by FAX, e-mail, posted letter, or other means that provides a written record) through the Agreements/Contracts Officer. Once proposals have been received, the Agreements/Contracts Officer may contact the Offeror with questions or clarification requests about the proposal. During the evaluation period, the Offeror should initiate all inquiries through the Agreements/Contracts Officer.

4.7.7 Regulations Governing Objections to Solicitation and Award

Any objections to the terms of this solicitation or to the conduct of receipt, evaluation or award of agreements/contracts must be presented in writing within ten calendar days of (1) the release of this solicitation, or (2) the date the objector knows or should have known the basis for its objection. Objections should be provided in letter format, clearly stating that it is an objection to this solicitation or to the conduct of evaluation or award of an agreement/contract, and providing a clearly detailed factual statement of the basis for objection. Failure to comply with these directions is a basis for summary dismissal of the objection. Mail objections to the address listed in the proposal delivery information.

4.3.8 Non-Government Experts

The Government intends to use support contractors, plus other independent experts to assist in processing and administering proposals during the Source Selection, and to provide advice relative to selected technical areas. These personnel are restricted by their contract from disclosing information contained in any proposal for any purpose to anyone outside of the Source Selection for this effort. Moreover, all personnel used in this capacity are required to enter into separate Organizational Conflict of Interest/Non Disclosure Agreements to this effect. By submission of its proposal, a team agrees that

proposals may be disclosed to these personnel for the purpose of providing this assistance.

APPENDIX I – Future CAV/ORS System Operational Objectives derived from related Joint Requirements Oversight Council (JROC) validated Mission Need Statements

CAV Operational Objectives	ORS Operational Objectives
Hold targets at risk on timelines consistent with commander's intent ▪ High payoff targets - Hard and deeply buried targets - Time sensitive targets - Mobile/relocatable targets - Chemical, biological, radiological, and nuclear production, storage, and launch facilities - Command and control nodes - Integrated air defenses ▪ Strike throughout the depth of an adversary's territory ▪ All azimuth attack ▪ Response times measured in minutes/hours <u>Flexible employment</u> ▪ Operations across the spectrum of conflict ▪ Preplanned and emergent targets ▪ Standoff strike <u>Reliable, accurate, conventional strike</u> ▪ Improved reliability and accuracy to deliver appropriate strike options to meet planned mission effectiveness criteria ▪ Minimize collateral damage ▪ Positive control <u>Linkage to accurate, complete, timely ISR</u> ▪ Rapid targeting/retargeting ▪ In-flight navigational updates ▪ In-flight retargeting ▪ Defense avoidance <u>Survivable</u> ▪ Operate effectively in the defense environment - Defeat anti-access threats - Overcome anti-access threats	<u>Responsive transport</u> ▪ Launch within hours of call-up ▪ Conduct military operations within hours of reaching orbit ▪ Responsive to dynamic threat environment ▪ Responsive to changing mission requirements ▪ Responsive to increased operational tempos/utilization rates <u>Maneuverable</u> ▪ Support the achievement of any earth-centered orbit in 24 hours or less (near-term) ▪ Maneuver from one orbit to any other orbit in less than 48 hours from call-up (far-term) <u>Operable</u> ▪ Minimize operational restrictions due to weather, ranges, and space environment ▪ Reliable, supportable, maintainable, and robust enough to generate required mission rates ▪ Capability to meet required turn-around times (reusable vehicles) <u>Economical</u> <u>Survivable</u> ▪ Overcome threats posed by adversaries ▪ Survive repeated and/or long-term exposure to the space environment <u>Interoperable</u> ▪ Components interoperable with joint and allied operations concepts, command and control concepts, equipment and facilities ▪ Interoperable with NASA and commercial space facilities and equipment ▪ Meet C4ISR Joint Technical Architecture standards

▪ Operate in man-made environments (i.e., nuclear, chemical, biological, electromagnetic) ▪ Operate in hostile information operations environment (e.g., electronic warfare, C2 warfare, information warfare) ▪ Operate effectively in various meteorological, oceanographic, and space weather conditions <u>Affordable</u> ▪ Low life cycle costs ▪ Minimal additional operations, maintenance, support, and security manpower ▪ Maximize existing DoD infrastructure <u>Robust global strike capability</u> ▪ Multi-theater ▪ Global range from CONUS ▪ Minimal over flight ▪ Rapid reload ▪ Sustainable, reliable, and maintainable	<u>Flexible</u> ▪ Possess capability to orbit a variety of payloads ▪ Support multiple theaters with possibly conflicting and simultaneous requirements