NASA Institute for Advanced Concepts

NIAC CP 00-02

CALL FOR PROPOSALS

PHASE I
ADVANCED AERONAUTICAL/SPACE CONCEPT STUDIES

Proposals Due: **February 18, 2001**

INTRODUCTION

The Universities Space Research Association (USRA) has established the National Aeronautics and Space Administration (NASA) Institute for Advanced Concepts (NIAC) under contract from NASA Headquarters through the Goddard Space Flight Center. The NIAC has been formed for the explicit purpose of being an independent source of revolutionary aeronautical and space concepts that could dramatically impact how NASA develops and conducts its mission. The institute is to provide a highly visible, recognized and high-level entry point for outside thinkers and researchers.

The purpose of the NIAC is to provide an independent, open forum for the external analysis and definition of space and aeronautics advanced concepts to complement the advanced concepts activities conducted within the NASA Enterprises. The NIAC will have advanced concepts as its sole focus. It shall focus on revolutionary concepts - specifically systems and architectures - that can have a major impact on missions of the NASA Enterprises in the time frame of 10 to 40 years in the future. It will generate ideas for how the current NASA Agenda can be done better; it will expand our vision of future possibilities. The scope of the NIAC is based on the National Space Policy, the NASA Strategic Plan, the NASA Enterprise Strategic Plans and future mission plans of the NASA Enterprises, but it will be bounded only by the horizons of human imagination.

Normal development of the NIAC advanced concepts will be carried out through issuance of research grants or subcontracts in a two-phased approach. Phase I awards of approximately $50K-$75K will be for 6 months to validate the viability of the proposed concept and definition of major feasibility issues. Phase II award(s) of from $350K-$500K for a period of 18-24 months would study the major feasibility issues associated with cost, performance, development time and key technology issues. Both Phase I and Phase II awards will be competitively selected by the NIAC based on an independent peer review. Principal investigators (PIs) receiving NIAC grants will be designated a NIAC Fellow.

Phase II award(s) will only be made based on a down select from successfully completed Phase I efforts.

Phase I awards based on proposals received from this Call for Proposals (CP 00-02) are planned for the spring of 2001. A Phase II CP will be issued in the fall of 2001. Also at this time, a new Phase I CP will be issued thereby beginning a new cycle.

This NIAC CP is a solicitation for advanced aeronautical and/or space concept studies. Participation in these studies is open to all categories of domestic individuals and organizations. Foreign entities at any level of participation are not eligible for funding from the NIAC. This includes proposals from domestic entities that include foreign entity participation.

Minority and disadvantaged institutions and organizations are encouraged to respond to this CP.

NASA organizations, including the Jet Propulsion Lab, are excluded from receiving funding for any phase.

A peer review process shall be used to competitively award grants or contracts based on proposals with the highest technical merit. The NIAC staff and participants in peer reviews will

follow a Conflict of Interest Avoidance Plan developed by USRA. All participants will certify as to their adherence to the Plan.

A task of the NIAC is to operate as a virtual institute relying very heavily on the potential of the Internet to share ideas. As an example, the complete text of this CP, along with other potentially relevant information, are available through the World Wide Web on the NIAC homepage at the URL address http://www.niac.usra.edu/.

All interested parties need to be aware that the NIAC intends to publicly make available the results of all funded advanced concept studies. This being the case, the institute actively discourages the use of proprietary data and/or trade secrets (see Appendix A).

The NIAC is functionally independent of NASA and the concepts it selects for government support will be the result of an external review by respected technical experts. NASA intends that the best products of the institute will be infused into NASA's and the nation's future programs, within the constraints of budget realities. The NIAC will attract revolutionary ideas from a greatly expanded community and will create a dynamic interchange of competing future options. This interchange will be a completely open debate and discussion; participation will be limited only by the quality of proposers' ideas. The NIAC appreciates your interest and cooperation in the Phase I study program.

SCOPE

"Expand our vision of future possibilities"

The NIAC encourages potential proposers to focus their thoughts and stretch their imagination decades into the future in an aggressive pursuit of concepts that will "leap-frog" the evolution of current aerospace systems and can be the framework for future NASA missions and programs. While the NIAC seeks concepts that stretch the imagination, these concepts should be based on sound scientific principles.

The NIAC advanced concept proposals should be aimed well beyond the evolution of technical approaches that occupy current programs and set new, **revolutionary** directions that can offer the prospect of significant and dramatic advances in aeronautics and space. We are seeking advanced concepts, ***specifically systems and architectures***, that are revolutionary, and which ***will expand our vision of future possibilities***. In the context of the NIAC requirements, successful proposals for advanced concepts will be:

- ***Revolutionary, new and not duplicative of previously studied concepts,***
- ***An architecture or system,***
- ***Described in a mission context,***
- ***Adequately substantiated with a description of the scientific principles that form the basis for the concept,***
- ***Largely independent of existing technology or a unique combination of systems and technologies.***

Systems and Architectures for Aeronautics and Space

The NIAC seeks proposals for advanced concepts that are appropriate for NASA missions. The NASA Strategic Plan and NASA Enterprise Strategic Plans provide valuable background information about the visions of future aeronautics and space programs and should be considered as a starting point for the development of revolutionary concepts being sought by the NIAC. The proposer should become familiar with the information supplied in the NASA website, http://www.nasa.gov/, which provides valuable insight into the NASA mission, Enterprise activities and future directions.

NIAC Advanced Concepts

Figure 1 depicts the relationship between the current NASA programs, technology and the NIAC mission for development of advanced concepts aimed at the time period of 10 to 40 years into the future. The general thrust of the NIAC advanced concepts is to develop revolutionary ideas which have a potential for leaping well past the current plans and can expand the vision of NASA's long-range strategic plans. The NIAC advanced concepts must be focused on achieving a decision point for implementation of an architecture or system in the time period of 10-40 years into the future. Since these concepts may be largely independent of existing technology, these revolutionary architectures and systems may provide the rationale and driving force for the identification and focusing of future efforts on critical, enabling technology. However, the NIAC is not interested in funding technology concepts or technology development which, by their very nature, are narrowly focused on the development and performance of subsystems or components.

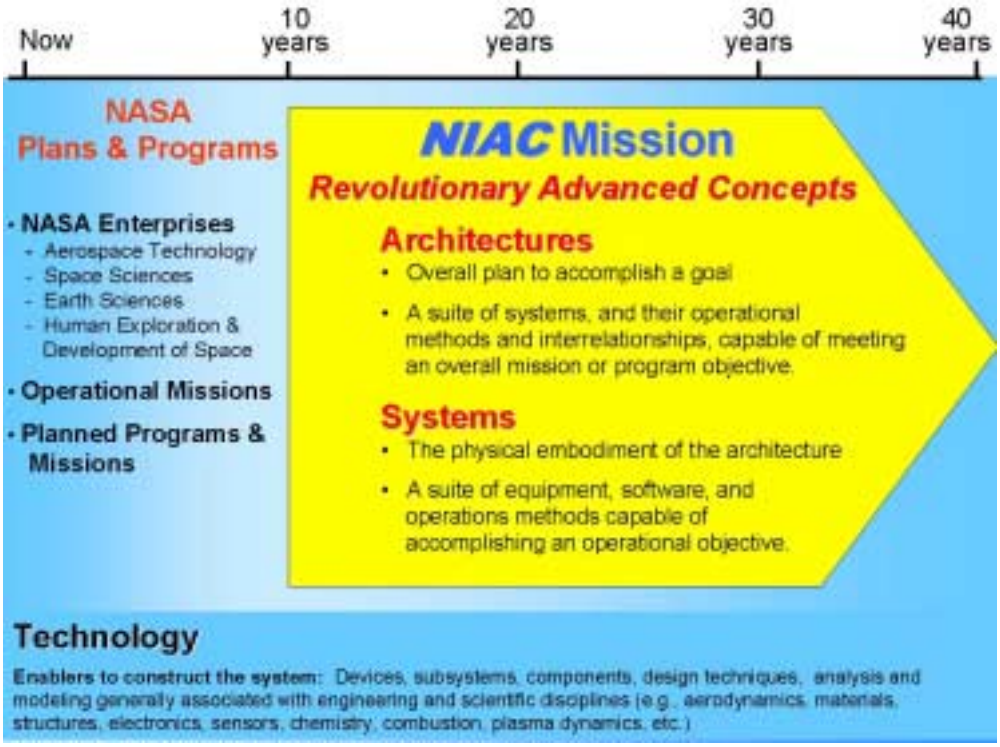

Figure 1: NIAC Advanced Concepts Mission

Websites for Additional Aeronautics and Space Technical Background

Additional insights on the future of aeronautics and space gathered from members of the science and engineering community can be found in some of the committee reports and projects organized through The National Academies accessed through http://www.nationalacademies.org/.

The NIAC webpage, http://www.niac.usra.edu/studies/, provides links to the abstracts or final reports of funded NIAC grants and contracts that should be considered examples of the class of concepts of interest to the NIAC. The webpage also provides links to websites related to currently funded NIAC advanced concepts.

The NASA website, http://nasatechnology.nasa.gov/ provides a current overview of technology projects underway at the NASA Centers and contractor locations.

Visionary Challenges of Aeronautics and Space

The following sections contain a brief summary of the major challenges that drive future directions in aeronautics and space.

Earth Science

NASA's Earth Science (ES) activity concerns itself with the question:

How is the Earth system changing, and what are the consequences for human civilization?

In addressing this overarching question, ES uses the global view from space to provide accurate and objective scientific knowledge on the present and future state of the Earth system and to make this knowledge available for policy decisions and practical applications. ES uses the following steps in developing this scientific knowledge:

- Characterize the Earth system,
- Understand the forces at work on the Earth system and the response of the Earth system to these forces, and
- Predict the future evolution of the Earth system and its relationship to human activity, and validate this predictive capability.

ES seeks revolutionary measurement concepts based on cutting edge knowledge in theory and modeling, physics, chemistry, and biology. ES wants to ensure the use of Earth science products to make central contributions to sustain and improve the quality of life on this planet.

Critical challenges being addressed by the ES activity include:

New Scientific Understanding

- Penetrating the Earth's skin to understand crustal and core dynamics, including the state of stress and rheology of the lithosphere.
- Remotely measuring characteristics of the Earth beyond current capabilities, such as monitoring: species and biodiversity, three dimensional ocean phenomena (from the surface to the deep ocean floor), atmospheric composition (including surface level pollutants and aerosol composition), etc.
- Opening new frontiers to understanding of the long-term history and future development of the Earth

Global Observations

- Developing architectures and implementation strategies for the deployment, maintenance, and seamless integration of diverse, distributed measurement and modeling capabilities into a smart, adaptable, and robust Earth science "sensor web."
- Applying new perspectives (integrated in situ and remote, multistatic sensing) and new orbits (LaGrange points, non-Keplerian using solar sails, Molniya orbits, high Earth orbits).

Validated Prediction Capability

- Two week weather prediction
- Decadal climate/ environmental prediction
- Decadal land cover, ecosystem, and biosphere prediction
- Regional prediction of air and water quality
- Timely and accurate prediction of natural hazards
- Timely prediction of environmental health and disease vectors
- Improved understanding and management of natural resources

Data Processing and Dissemination

- Easy, ubiquitous use of ES data by science, applications, operational, commercial, policy makers, state and local government, education, student, and public users
- Developing systems to deliver ES data and intelligently enhance the ability of human understanding to utilize these complex observational and modeling data.

Examples of activities that link Earth science to other space science disciplines:

- Comparative planetology, understanding processes on a planetary scale under a range of conditions (gravity, solar radiation, orbital inclination, atmospheric composition, etc.).
- Understanding the variability of the Sun and its impact on the Earth's climate, such as studying the "solar cycle" of other Sun-like stars to increase the sample size for predicting future solar variability.
- Understanding the signatures of life on Earth, and how they may relate to planned, future observations of Earth-like planets around sun-like stars.
- Understanding if there may be records of the early Earth, such as material ejected by a major impact and preserved relatively unchanged, that may answer questions about the evolution of the Earth system and the origin of life.
- Understand the linkage between the near-space environment (such as the thermosphere, ionosphere, and mesosphere) and the Earth's environment.

Human Exploration and Development of Space

The Grand Challenge for the Human Exploration and Development of Space (HEDS) activity is to make possible *the safe, affordable and effective exploration and development of our solar system – and eventually space beyond our solar system – by humans and their agents*. In order to achieve this Grand Challenge, we must make possible...

- Safe, fully self-sufficient and self-sustaining integrated human and robotic presence in space and on other planets, independent from Earth and for indefinite periods of time.
- A profound improvement in our knowledge, and ability to predict the effects of gravity and the space environment on biological, chemical and physical processes, and living organisms.
- An order of magnitude improvement in safety and reliability while achieving a two-order-of-magnitude reduction in the costs of space activities compared to 1990 levels/projections, including the areas of transportation to and through space, systems used in space and on planetary surfaces, and space operations.
- A dramatic increase in the value of HEDS programs in areas that directly affect quality of life, scientific knowledge, commercial development of space, human experience, education and technology.

AeroSpace Technology

NASA's Aerospace Technology activity is focused on aeronautics and space transportation systems with an emphasis on:

Revolutionize Air Transportation Mobility:

Revolutionary advances in air transportation safety, affordability and environmental compatibility that will expand this form of transportation globally through technology development including:

- Ultra-low emissions, combustion-based propulsion systems for air transport;
- Fuel cell based electric propulsion systems for aircraft;

- Near-all weather conditions access for private citizen to aviation transportation which is equivalent to current levels of access with automotive transportation;
- Fully automated air traffic management from "gate to gate," including user selected routing;
- Reduction in door-to-door transportation time;
- Ultra-quiet aircraft technology to enable noise levels no greater than ambient conditions, including noise generated from supersonic flight;
- Advanced aircraft structures that are highly damage tolerant, or self-healing, and require less maintenance than current structures;
- Aircraft configurations which allow airport operations regardless of crosswind conditions and are independent of in-flight icing conditions.

Pioneer Technology & Engineering Innovation:

- Enable a revolution in engineering culture and tools;
- Design for improved safety and survivability;
- Pioneer technology innovation and integration.

Enable Advanced Space Transportation:

Revolutionary advances in the safety, affordability and performance of launch and in-space transportation that would enable:

- New space markets and lead to routine passenger travel to Earth orbit and beyond;
- Affordable new science and exploration missions to the outer regions of the solar system;
- Missions beyond the solar system towards interstellar distances in a forty-year mission horizon.

Space Science

The Space Science activity seeks answers to these age old questions:

How did the Universe Begin and Evolve?

- Look backwards in time toward the early Universe
- Image the universe within one second of the Big Bang
- Reveal new laws of physics

How did we get here?

- Determine the life cycle of the organic Universe
- Uncover the history of the Solar System
- Determine the connection between stars and habitable planets
- Trace the seeds of life on Earth

Where are we going?

- Forecast the cosmic hazards facing humankind in space
- Set the stage for the expansion of humankind throughout the Solar System
- Send spacecraft beyond the Solar System

Are we alone?

- Determine the robustness of life
- Search for life in the Solar System
- Image planets around other stars and search for habitats of life
- Find Definitive Proof of life elsewhere in the Universe

Example Subjects for Revolutionary Concepts

In addition to seeking proposals in all NASA Enterprise mission areas, NIAC especially encourages proposals in areas that have not been adequately represented in previous Phase I Call for Proposal responses. These under-represented areas are:

Earth Sciences
Life Sciences
Biology
Air Transportation
Information systems and software
Human space flight

The following notional concepts are examples which may address a few of the technical focus areas that have not received much attention by the science and engineering community and have been under-represented in previous Phase I proposals received by NIAC. These examples relate to extraordinary technical challenges and provide a calibration for desirable revolutionary conceptualization in a few of the areas of interest to the NIAC:

NOTE: ***The proposer should not feel constrained by this list of advanced concepts that are referenced only as a calibration of "grand" architectures and systems, and are not meant to be comprehensive or suggestive of preferred topical areas.***

- Conduct an Earth system, or Earth/sun system, measurement campaign that may be presently viewed as "impossible", technically or economically.
- Predict and detect the origins of El Nino/Southern Oscillation events.
- Use a space based architecture for the dynamic and comprehensive on-board integration of Earth observing sensors, data processors and communication systems to enable simultaneous, global measurement and timely analysis of the Earth's environment.
- Visualize and remotely sense abyssal life in the ocean, using space or atmospherically based systems and architectures.
- Provide comprehensive data and timely analysis to develop a better understanding of the continuing evolution of the Earth's biosphere and environment.
- Collect data for the estimation of the extent of the biosphere on Earth.
- Provide a materially closed, solar-energetically open, ecosystem to provide life support for human habitation.
- Improve the productivity of the aviation system by reducing portal to portal, aviation transportation time on a global basis.
- Establish a seamless transportation system from the Earth's surface to planetary locations.
- Revolutionize human space flight by providing a human habitat for long duration missions and/or providing methods for human adaptation to the biologically challenging environments in space.
- Enable exploration and commercialization in a diversity of remote environments in space and on planetary surfaces using manned, unmanned and symbiotic human/robotic systems.
- Provide an effective and functional shield for humans and other biological organisms from solar energetic particles and galactic cosmic rays.

The NIAC is specifically NOT interested in concepts that, for example, would:

- Develop a new specialized instrument;
- Develop a new, high performance material;
- Incrementally extend the performance of an aerospace system or previously studied concept;
- Accomplish an incremental system development, technology demonstration, or other supporting development program that is closely linked to an existing NASA program or mission and would be a near-term progression of the existing program or mission;

INSTRUCTIONS FOR RESPONDING TO NIAC CALL FOR PROPOSALS

A. General

1. Proposals received in response to a NIAC CP will be used only for evaluation purposes. A pre-award synopsis is not published for individual proposals.

2. A solicited proposal that results in a NIAC award becomes part of the record of that transaction. It is envisioned that the final report will be available to NASA and the public through the NIAC web page; however, information or material that the NIAC and the awardee mutually agree to be of a privileged nature will be held in confidence to the extent permitted by law.

3. A grant will be used to accomplish the effort funded in response to a NIAC Phase I CP. Grants will be awarded and administered in accordance with the NASA Grant and Cooperative Agreement Handbook (NPG 5800.1) and USRA Procurement Policies.

4. The NIAC does not intend to hold formal discussions as part of the award process so proposals should be as complete as possible in the initial submission. However, should a question arise after release of this CP and prior to the proposal due date, questions will be entertained under the following ground rules:

   a. Questions should be E-mailed to the NIAC at questions@niac.usra.edu.

   b. The Director of NIAC will review the questions and answer by a return E-mail to the proposer, and/or, will specify a time period when the proposer can call the NIAC for discussions.

   c. Any verbal discussions with potential proposers shall be limited to clarification of the definition of architectures and systems versus technology in the context of a specific concept.

   d. Questions and clarifications of a general nature related to non-proposal-specific issues will be available to the public through the NIAC web pages, http://www.niac.usra.edu. All persons interested in proposing to the NIAC should check this site periodically for information related to this Call.

   e. Due to the potential high volume of questions, the proposer should submit questions as early as possible before the proposal due date. While the NIAC will provide a response as soon as possible, the NIAC assumes no responsibility for the impact of the questions and answers on proposal quality or on the timeliness of the proposal submission.

5. As mentioned in the **Introduction**, the NIAC is chartered to operate as a virtual institute. The NIAC is equipped with the latest office communications systems, electronic technology and staffed at a much lower level than that employed in traditional paper-

based operations. This fact necessitates that proposal transmissions in response to this CP conform to the following requirements:

a. The proposer's technical and cost proposal shall be attached as separate files to one E-Mail and sent to phase1@niac.usra.edu. Both proposals shall be converted by the proposer to a portable document format (.pdf) prior to transmission. Information regarding .pdf is located at http://www.adobe.com/.

   1) The technical proposal .pdf file name shall be the principal investigators (see D.2.e.) first initial and last name "_t.pdf" (Example: The principal investigator's name is Thomas Carter. The technical proposal file name is tcarter_t.pdf). If the proposer's computer operating system limits the number of characters to eight (8) in the file name, then use the first initial and up to the first five (5) characters of the last name (Example: tcarte_t.pdf).

   2) Technical proposals converted to .pdf shall not exceed 300 KB in size.

   3) The cost proposal .pdf file name shall contain "_c.pdf" following the principal investigator's first initial and last name. Example: The principal investigator's name is Thomas Carter. The cost proposal file name is tcarter_c.pdf. If the proposer's computer operating system limits the number of characters to eight (8) in the file name, then use the first initial and up to the first five (5) characters of the last name (Example: tcarte_c.pdf).

   4) There is no electronic file size limitation for the cost proposal. However, proposers are cautioned against using gratuitous graphics that unduly increase the file size.

b. Proposals transmitted by any other method, format or size than that specified above shall not be considered by the NIAC for award.

6. To be considered for award, a submission must present a specific area of study containing sufficient technical and cost information to permit a meaningful evaluation. Also, it must not merely offer to perform standard services or to just provide computer facilities or services, and not significantly duplicate research pursuant to a more specific or pending solicitation.

7. Proposals submitted in response to CP 00-02 must electronically arrive at the NIAC on or before 12:00 midnight on February 18, 2001, to be considered in the CP 00-02 cycle. Furthermore, all proposals must be in English and all costs in U.S. dollars.

B. Schedule and Deliverables

1. Phase I efforts will be for approximately six months. The period of performance will commence upon award of the appropriate contractual instrument.

2. Phase I deliverables:

   a. Monthly written status reports to the NIAC Director.

   b. A final written report at the conclusion of the effort.

   c. NIAC Fellow (PI) participation and presentation of the final report at a NIAC Fellows Conference to be held for two days at NASA Ames Research Center in the summer of 2001.

C. Proposal Content and Format

1. Transmittal Letter or Prefatory Material *(1 page maximum)*

   a. The legal name and address of the organization and specific division or campus identification, if part of a larger organization.

   b. A brief, scientifically valid project title intelligible to a scientifically literate reader and suitable for use in the public press.

   c. Type of organization (e.g., profit, nonprofit, educational, small business, minority, woman-owned, Historically Black College or University, etc.).

   d. Name, telephone number, fax number and E-Mail address of the principal investigator and business personnel who may be contacted during evaluation and negotiation.

   e. Identification of other organizations that are currently evaluating a proposal for the same effort.

   f. Identification of this Call for Proposal by number and title.

   g. Dollar amount requested, desired starting date and duration of project.

   h. Date of submission.

2. Technical Proposal *(12 pages and 300KB file size maximum)*

   a. Abstract

      Include a 150-300 word abstract. This abstract should address the evaluation criteria in these instructions.

b. Advanced Concept Description

This section of the technical proposal shall be a detailed description of the concept to be investigated. It should include objectives and expected significance, relation to the present state of knowledge, and relation to previous work done on the project and to related work in progress elsewhere. The concept description should address the evaluation criteria in these instructions.

c. Advanced Concept Development Work Plan

This section of the technical proposal should outline the plan of work and a description of analysis methods and procedures. Also, any substantial collaboration with individuals not referred to in the budget or use of consultants should be described.

d. Management Approach

In the event large or complex efforts involving interactions among numerous individuals or other organizations are proposed, plans for distribution of responsibilities and arrangements for ensuring a coordinated effort should be described.

e. Personnel

The principal investigator (PI) is responsible for supervision of the work and participates in the conduct of the research regardless of whether or not compensated under the award. Include a short biographical sketch of the PI, a list of any publications relevant to the proposed concept and any exceptional qualifications. Omit social security numbers and other personal items that do not merit consideration in evaluation of proposals. Give similar biographical information on other senior professional personnel who will be directly associated with the project. Give the names and titles of any other scientists and technical personnel associated substantially with the project in an advisory capacity. Universities should list the approximate number of students or other assistants, together with information as to their level of academic attainment. Any special industry-university cooperative arrangements should be described. If the proposed concept is selected for grant negotiation, letters of commitment from senior professional personnel who are outside of the PI's organization will be required.

f. Special Matters

1) Include any required statements of environmental impact of the research, human subject or animal care provisions, conflict of interest, or on such other topics as may be required by the nature of the effort and current statutes, executive orders, or other Government-wide guidelines. If the proposed concept is selected for grant negotiation, signed statements from authorized personnel and/or committees will be required.

2) Proposers should include a brief description of the organization, its facilities, and previous work experience in the field of the proposal.

3. Cost Proposal *(No page limit, see* **Appendix B**)

   a. The cost proposal shall be submitted as a separate proposal from the technical proposal. As applicable, include separate cost estimates for direct labor, fringe benefits, equipment, expendable materials and supplies, services, domestic and foreign travel, ADP expenses, publication or page charges, consultants, subcontracts, other miscellaneous direct costs and indirect costs.

   b. Explanatory notes should accompany all elements of cost proposed to provide insight into the justification for each. Also, include basis for indirect cost computation and clarification of other items in the cost proposal that are not self-evident. The award of an otherwise acceptable technical proposal maybe delayed for insufficient cost information regarding the basis of estimate for any or all proposed costs.

   c. Do not use separate "confidential" salary pages. List salaries and wages in appropriate organizational categories (e.g., principal investigator, other scientific and engineering professionals, graduate students, research assistants and technical and other non-professional personnel).

   d. At the conclusion of your cost proposal section, include a p rojected total monthly funding profile. The grand total of this monthly funding profile should very closely approximate the total proposed cost in the cost section.

   e. Allowable costs are governed by FAR Part 31 and the NASA FAR Supplement Part 1831 (and OMB Circulars A-21 for educational institutions and A-122 for nonprofit organizations).

4. Classified Material

   Proposals shall not contain any classified material.

D. Length

A concerted effort should be made to keep proposals as brief as possible, concentrating on substantive material. The maximum technical proposal size is 12 pages and 300KB file size. The proposal transmittal letter shall be included with the technical proposal .pdf file and is not included in the technical proposal page count so long as it does not exceed one page in length. The cost proposal has no page limit. The entire proposal must be in a font size that is readable, in a 8.5 by 11 inch format and contain a minimum of 1 inch margins.

E. Representations/Certifications (*See* Appendix C)

The representations/certifications contained in Appendix C are not to be submitted with either the technical or cost proposals. Should a proposal be selected by the NIAC for a Phase I award, the proposer must supply fully executed originals of these representations/certifications prior to award.

F. Joint Proposals

Where multiple organizations are involved, the proposal must be submitted by only one organization. It should clearly describe the role to be played by the other organizations and indicate the legal and managerial arrangements contemplated. In other instances, simultaneous submission of related proposals from each organization might be appropriate, in which case parallel awards could be made.

G. Late Proposals

A proposal or modification received after the date specified in this Call for Proposals will not be considered by the NIAC during this proposal cycle.

H. Withdrawal

The proposer may withdraw their proposal(s) at any time before award. Proposers are requested to notify the NIAC if the proposal is funded by another organization or of other changed circumstances, which dictate termination of the peer review for that particular proposal.

I. Evaluation Criteria

1. The principle elements (of approximately equal weight) considered in evaluating a proposal is its relevance to NASA's and the NIAC's objectives, intrinsic merit and cost realism. Specific aspects of these elements are as follows:

    a. Is the concept revolutionary rather than evolutionary? To what extent does the proposed activity suggest and explore creative and original concepts?

    b. Is the concept for an architecture or system and have the benefits been qualified in the context of a future NASA mission?

    c. Is the concept substantiated with a description of applicable scientific and technical disciplines necessary for development?

2. Evaluation of the cost of a proposed effort may include the realism and reasonableness of the proposed cost and available funds.

J. Selection Process

1. The NIAC Director, based on recommendations from the peer review panels, will make the final selection decision. In all cases, proposals are subject to scientific review by discipline specialists in the area of the proposal.

2. Other factors to be considered by the NIAC Director in the decision process are:

    a. How well qualified is the proposer (individual or team) to conduct the project?

    b. How well conceived and organized is the proposed activity?

K. Selection for Award

1. Following selections, all proposers will be notified by electronic or postal mail of the decision on their proposal. The NIAC may desire to select only a portion of a proposer's area of study, in which case the proposer will be given the opportunity to accept or decline such partial support.

2. When a proposal is not selected for award, the proposer will be notified. The NIAC will explain generally why the proposal was not selected. Proposers desiring additional information may contact the selecting official who will arrange a debriefing.

3. When a proposal is selected for award, USRA personnel will negotiate the award by the NIAC. The proposal is used as the basis for negotiation. Certain business data may be requested prior to award. USRA will forward a model award instrument and other pertinent information to the awardee at the conclusion of negotiations.

L. Cancellation of Requirement

The NIAC reserves the right to make no awards under this CP and to cancel this CP. USRA assumes no liability for canceling the CP or for any entity's failure to receive actual notice of cancellation. USRA will assume no responsibility for costs incurred by any individual or organization in the preparation of a proposal in response to this CP.

APPENDIX A

NASA White Paper on Property Rights

Any ideas or concepts generated during performance of a NIAC subcontract fall under either the Patent Rights clause (or New Technology clause for large businesses) or the Rights in Data - General clause, or both.

If the idea or concept has not been developed in sufficient detail to the level of an "invention" that satisfies statutory requirements, then the information or data on that idea falls exclusively under the Rights in Data - General clause and the Government obtains unlimited rights. Unlimited rights means the right of the Government to use, disclose, reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, in any manner and for any purpose, and to have others to do so.

If the idea or concept is developed to the point that it satisfies the statutory requirements for obtaining a patent, then the "invention" falls under the Patent Rights clause and the contractor can, at its option, decide to pursue patent protection on that invention. If patent protection is pursued by the contractor the contractor will own title to the invention and the Government obtains a minimum government purpose license to use for its purposes, including future procurement. If the contractor decides not to pursue patent protection on the invention then NASA can, at its option, pursue patent protection. NASA would own title to which NASA can license third parties. Due to the nature of the ideas and concepts to be generated, it was our opinion that most, if not all, of the advanced concepts would not be sufficiently developed to satisfy the patentability requirements.

If the idea or concept is software related (with actual code creation), it falls under both the Patent Rights clause and the Rights in Data – General clause. Both patent and copyright protection may be established in software. Under the Rights in Data - General clause NASA does not have to grant the contractor permission to assert claim to copyright in the software if it is the desire of NASA to make the software freely available to the public.

Any ideas generated at private expense, and outside the contract, that are proposed to be "further developed" under the contract, could be marked by the participant as proprietary or a trade secret. If NASA decides it is acceptable for the Institute to consider and accept proprietary ideas then that data would be delivered with a notice or legend as "limited rights data" with appropriate restrictions placed on its dissemination. NASA and the NIAC plan to disseminate all technical information reported to the Institute, accepting such limited rights data could restrict such dissemination and is not recommended.

In summary, in the private sector, ideas may be kept as trade secrets. Ideas that reach the level of inventions may also be kept as trade secrets. There is nothing mandating that someone in the private sector select patent protection as the form of intellectual property over a trade secret as the form of intellectual property. However, in the world of Government contracts, there are no trade secrets to ideas or inventions generated under contracts funded by the Government. Data on ideas can be disseminated. Patent protection is available if the idea or concept has been sufficiently developed to satisfy statutory requirements for obtaining a patent. The patent provides its owner with the right to exclude others from making, using and selling the invention but the idea is fully disclosed in the published patent. Copyright protection, if available, protects the expression of an idea, not the idea itself.

The Patent Rights Clause (52.227-11), or the New Technology Clause (1852.227-70) where appropriate, must flow down to the NIAC subcontractors. The rights and procedures established by the Rights in Data - General clause (52.227-14) should also flow down, although this is not the data clause used in our standard grant instruments if the Institute decides to use a grant.

APPENDIX B

Cost Breakdown Format

	MONTHS					
	1	2	3	4	5	6
DIRECT LABOR						
TOTAL DIRECT LABOR						
OVERHEAD						
Fringe Benefits						
Overhead						
Subcontract						
SUBTOTAL DIRECT LABOR						
MATERIALS						
EQUIPMENT						
SUBCONTRACTS						
TRAVEL						
OTHER DIRECT COSTS						
OTHER						
TOTAL OTHER DIRECT COSTS						
G & A						
SUBTOTAL COSTS						
FEE						
TOTAL PRICE						

APPENDIX C.1.

CERTIFICATION REGARDING DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS -- PRIMARY COVERED TRANSACTIONS

This certification is required by the regulations implementing Executive Order 12549, Debarment and Suspension, 34 CFR Part 85, Section 85.510, Participants' Responsibilities. The regulations were published as Part VII of the May, 1988 Federal Register (pages 19160-19211). Copies of the regulations may be obtained by contacting the U.S. Department of Education, Grants and Contracts Service, 400 Maryland Avenue, S.W. (Room 3633 GSA Regional Office Building No. 3), Washington, D.C. 20202-4725, telephone (202) 732-2505.

1) The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:

   (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal debarment or agency;

   (b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a statute or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

   (c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (1) (b) of the certification; and

   (d) Have not within a three-year period preceding this application/proposal, had one or more public transactions (Federal, State or local) terminated for cause or default.

2) Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

Proposal Title:

_____

Signature: _____ Date: _____

Name and Title: _____

Institution: _____

APPENDIX C.2

Certification Regarding Drug-Free Workplace Requirements Contractors Other Than Individuals

The Contractor certifies that it will provide a drug-free workplace by:

(a) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession or use of a controlled substance is prohibited in the Contractor's workplace and specifying the actions that will be taken against employees for violation of such prohibition:

(b) Establishing a drug-free awareness program to inform employees about --

(1) The dangers of drug abuse in the workplace;
(2) The Contractor's policy of maintaining a drug-free workplace;
(3) Any available drug counseling, rehabilitation, and employees assistance programs; and
(4) The penalties that may be imposed upon employees for drug abuse violations occurring;

(c) Making it a requirement that each employee to be engaged in the performance of the contract be given a copy of the statement required by paragraph (a);

(d) Notifying the employee in the statement required by paragraph (a) that, as a condition of employment under the contract, the employee will --

(1) Abide by the terms of the statement; and
(2) Notify the employer of any criminal drug statute conviction for a violation occurring in the workplace no later than five days after such conviction;

(e) Notifying the agency within ten days after receiving notice under subparagraph (d) (2) from an employee or otherwise receiving actual notice of such conviction;

(f) Taking one of the following actions, within 30 days of receiving notice under subparagraph (d) (2), with respect to any employee who is so convicted --

(1) Taking appropriate personnel action against such an employee, up to and including termination; or
(2) Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or appropriate agency;

(g) Making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs (a), (b), (c), (d), (e) and (f).

Proposal Title: _____

Signature: _____ Date: _____

Name and Title: _____

Institution: _____

APPENDIX C.3

ASSURANCE OF COMPLIANCE WITH THE REGULATIONS UNDER TITLE VI OF THE CIVIL RIGHTS ACT OF 1964

The _____ (institution, corporation, firm or other organization on whose behalf this assurance is signed, hereinafter called "Applicant") HEREBY AGREES THAT it will comply with Title VI of the Civil Rights Act of 1964 (P.L. 88-352) and all requirements issued pursuant to that title, to the end that in accordance with Title VI of that Act and the Regulation, no person in the United States shall, on the ground of race, color or national origin, be excluded from participation in benefits of, or be otherwise subjected to discrimination under any program or activity for which the Applicant receives Federal financial assistance from the Government; and HEREBY GIVES ASSURANCE THAT it will immediately take any measures necessary to effectuate this Agreement.

If any real property or structure thereon is provided or improved with the aid of Federal financial assistance extended to the Applicant by the Government, this assurance shall obligate the Applicant, or in the case of any transfer of such property, any transferee, for the period during which the real property or structure is used for a purpose for which the Federal financial assistance is extended or for another purpose involving the provision of similar services or benefits. If any personal property is so provided, this assurance shall obligate the Applicant for the period during which it retains ownership or possession of the property. In all other cases, this assurance shall obligate the Applicant for the period during which the Federal financial assistance is extended to it by the Government.

THIS ASSURANCE is given in consideration of and for the purpose of obtaining any and all Federal grants, loans, contracts, property, discounts or other Federal financial assistance extended after the date hereof to the Applicant by the Government, including installment payments after such date on account of applications for Federal financial assistance which were approved before such date. The Applicant recognizes and agrees that such Federal financial assistance will be extended in reliance on the representations and agreements made in this assurance, and that the United States shall have the right to seek judicial enforcement of this assurance. This assurance is binding on the Applicant, its successors, transferees, and assignees, and the person or persons whose signatures appear below are authorized to sign this assurance on behalf of the Applicant.

Proposal Title: _____

Signature: _____

Date: _____

Name & Title: _____

Organization Name & Address:

_____

_____

_____

_____