

Visionaries and geniuses share a common trait:  
the ability to transcend life's experiences and leap  
vast intellectual distances  
to set a new course for others to follow.

November 30, 2006

Dear Colleague:

This release of the NIAC Phase I Call for Proposals, CP 07-01, continues NIAC's process to identify and nurture revolutionary advanced concepts having a significant impact on the future of aeronautics and space. We invite you to respond with innovative and technically credible advanced concepts that will initiate a paradigm shift and redefine the possible in aeronautics and space.

NIAC is particularly interested in receiving proposals for innovative and visionary concepts that could make significant leaps beyond current plans and programs for aerospace endeavors and be supportive of the recently announced NASA goals for human and robotic exploration of the solar system.

NIAC hosted the 8<sup>th</sup> NIAC Annual Meeting on October 17<sup>th</sup> and 18<sup>th</sup> in Tucson, AZ. The purpose of the meeting was to offer an opportunity for the currently funded, Phase II Fellows and NIAC Student Fellows to present the results of their concept development efforts and to encourage the on-going dialogue between all attendees. You may find it helpful to review Phase II Fellows' presentations to gather a perspective of the concepts that NIAC has recently funded. Descriptions of other previously funded concepts are also available on the NIAC website by clicking on the button "Funded Studies" on the NIAC homepage.

Many of you in the technical community are familiar with previous NIAC Calls for Proposals. You should especially note that there are some changes in this Call and you should read the Call carefully. Note in particular that we are now requesting a one page abstract (see section C.1.b for details) and the maximum file size for the technical proposal has increased to 1 MB. Please check the NIAC website periodically to receive any updates or additional guidance regarding CP 07-01. **Proposals are due no later than 23:59 PM EST February 12<sup>th</sup>, 2007. Anticipated contract start date is September 1, 2007.**

We look forward to reviewing your contributions to this exciting endeavor.

Sincerely yours,

Robert A. Cassanova, PhD  
Director, NIAC

Diana E. Jennings, PhD  
Associate Director, NIAC

**NIAC CP 07-01**

# **CALL FOR PROPOSALS**

**PHASE I ADVANCED  
AERONAUTICAL / SPACE  
CONCEPT STUDIES**

**Proposals Due: February 12, 2007**

## INTRODUCTION

Imagination will often carry us to worlds that never were.  
But without it we go nowhere. - Carl Sagan

Maximizing humankind's potential here on Earth and beyond challenges modern thinkers and researchers to consider fresh approaches to aeronautics, spaceflight, exploration and colonization of off-world environments. Innovative yet scientifically credible concepts lay the groundwork for ambitious and far-reaching missions. To address this need for NASA, the Universities Space Research Association (USRA) founded the NASA Institute for Advanced Concepts (NIAC) (<http://www.niac.usra.edu>).

Since 1998, NIAC has served as an incubator for revolutionary new ideas. Through NIAC, systems and architectures have been developed for flight inside and outside of the Earth's atmosphere, exploration of other planets, understanding the Earth and the Earth's solar system environment, and significant expansion of our knowledge of the cosmos. By supporting innovative and visionary concepts aimed decades into the future, NIAC-funded research affects our interpretation of and appreciation for near-term aerospace challenges. As an independent institute external to NASA, NIAC provides a visible, recognized and high-level entry point for outside thinkers and researchers.

The NIAC has achieved recognition from the National Research Council and NASA for its philosophy and process for advanced concepts development. Its philosophy is to approach grand problems, specifically the kinds of challenges considered by NASA, with an eye towards credible, yet revolutionary solutions. Its process rests on scientific credibility as established through independent peer review. NIAC concepts are structured for implementation within a ten to 40 year time-frame, but their impact can extend even further. The ultimate goal of the NIAC process is to infuse the most successful advanced concepts into mainstream NASA plans and programs, thereby expanding our vision of future possibilities.

This document includes the following:

- Descriptions of grand visions identified by NASA and NIAC
- A brief description of NIAC and its mission
- An overview and set of detailed instructions for response to this, NIAC's 2007 Call for Phase I proposals

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>.

# GRAND VISIONS

“We aim above the mark to hit the mark.” - Ralph Waldo Emerson

Over the last 100 years of scientific and engineering development, there have been many notable concepts, technical accomplishments and scientific breakthroughs that have had a revolutionary impact on transportation within the Earth’s atmosphere, the exploration of our solar system and beyond, and on our understanding of the cosmos. These breakthroughs have their motivation in grand visions for progress in science, exploration and transportation.

NIAC seeks systems and architectures that respond to grand visions as shown in Table 1, derived from recent meetings and in consultation with NASA mission directorates. The list is illustrative of the level of challenges for which NIAC intends to inspire solutions. It should not be taken to be a definitive compilation of subjects, or suggestive of preferred topical areas as is typically included in a NASA Research Announcement, or a “Broad Agency Announcement” soliciting proposals. Instead, it is provided as a calibration of currently identifiable visions for aeronautics and space.

**Table 1: Examples of grand visions**

<p><b>Self-sustaining, human presence throughout the solar system</b></p> <ul style="list-style-type: none"><li>• Human adaptation, physiological and psychological, to long range missions</li><li>• Innovative contingency support, including rescue, response, repair and Earth quality medical care off-planet</li><li>• Radiation protection for spacecraft and planetary surface areas, OR, reduction of the radiation environment around planetary destinations</li><li>• Novel ways to integrate the unique capabilities of humans and machines , reducing the workload of human operators of complex vehicle systems</li><li>• Multidestination systems that enable humans to efficiently and productively conduct highly mobile dexterous work outside of their habitation</li><li>• New technologies for high density power sources in human-rated surface systems</li><li>• Systems and technology to enable modification and control of planetary environments</li></ul> <p><b>Responsive, timely, adaptive exploration architectures to exploit targets of scientific interest</b></p> <ul style="list-style-type: none"><li>• Develop systems for exploration of extreme environments and currently inaccessible places</li><li>• Image layers deep within the Sun, Earth, or other planetary bodies</li></ul> <p><b>Innovative methods for understanding and imaging the cosmos</b></p> <ul style="list-style-type: none"><li>• Exploit under-utilized portions of the cosmic electromagnetic spectrum, energetic particle flux, or exotic physics to investigate cosmological and planetary phenomena and properties (cosmic rays, neutron star collisions, gravitational waves, dark matter)</li><li>• A natural synthetic aperture radar or telescope</li><li>• Neutrino focusing for astronomy</li><li>• Resolve spectral and/or topographical details on planets outside of our solar system</li></ul> <p><b>Novel searches for life—including evidence of Earth’s Origins</b></p> <ul style="list-style-type: none"><li>• Novel methods for the search for extraterrestrial life (extant, extinct, and intelligent)</li><li>• Robust planetary protection systems for preventing both forward- and back-contamination</li></ul> <p><b>Truly autonomous robotic operations for exploration and habitation of space, Moon, Mars and beyond</b></p> <ul style="list-style-type: none"><li>• Self-building, self-healing, self-fueling, sustaining humans and machines without resupply</li><li>• Evolvable systems, structures and vehicles</li></ul> <p><b>Revolutionary systems for information processing in space and during exploration</b></p> <ul style="list-style-type: none"><li>• Innovative sensor suites with intelligent pre-processing of data</li><li>• Develop knowledge from massive data sets from multiple sources</li><li>• Provide for a virtual presence anywhere in the solar system and beyond</li></ul> <p><b>From doorstep to destination-seamless, intermodal systems for fast, efficient, cost-effective transportation</b></p> <ul style="list-style-type: none"><li>• Concepts to greatly increase the capacity of air space systems though new ways</li><li>• Self-monitoring, intelligent vehicles that anticipate hardware failures and provide unprecedented levels of control under the worst of conditions.</li><li>• Truly advanced and innovative vehicle concepts to provide an unlimited range of services</li><li>• Propellantless propulsion and rocket-free transportation to Earth orbit</li></ul>
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For further calibration of currently identifiable visions for aeronautics and space, the proposer is invited to explore web resources made available by NASA. In 2004 NASA reorganized to best implement its vision for the future with the formation of four Mission Directorates: Exploration Systems, Space Operations, Science, and Aeronautics Research. Exploration Systems sets priorities and directs the identification, development, and validation of exploration systems and related technologies. Aeronautics Research was created to reflect NASA's commitment to aviation research and aeronautics technologies for the nation's civil and defense interests. Space Operations provides critical enabling capabilities supporting science, research and exploration. Finally, the Science Mission Directorate carries out the scientific exploration of the Earth, Moon, Mars and beyond.

Exploration Systems: <http://exploration.nasa.gov>

Space Operations: <http://www.hq.nasa.gov/osf>

Aeronautics Research: <http://www.aero-space.nasa.gov>

Science Mission Directorate: <http://science.hq.nasa.gov>

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 web page also provides links to websites related to currently funded NIAC advanced concepts.

## WHAT NIAC SEEKS

To raise new questions, new possibilities, to regard old problems from a new angle, requires creative imagination and marks real advance in science. -Albert Einstein

Through eight years of working with the advanced concepts community and study of the processes and accomplishments of innovators, the NIAC has come to characterize revolutionary concepts and paradigms as having some or all of the following attributes:

- **The genius is in the generalities, and not the details.**
- **The new idea illuminates a pathway towards a significant expansion of knowledge.**
- **It inspires others to produce useful science and further elaboration of the fundamental idea.**
- **It triggers a transformation of intuition.**
- **Revolutionary paradigm shifts are often simple, elegant, majestic, beautiful and are characterized by order and symmetry.**

The NIAC encourages potential proposers to use creativity and imagination to aggressively pursue concepts that will “leap-frog” the evolution of current aerospace systems and can be the framework for future NASA missions and programs. The NIAC advanced concepts must be focused on achieving a decision point for implementation of an architecture or system in the 10-40 year timeframe. **While the NIAC seeks concepts that stretch the imagination, these concepts should be based on sound scientific principles.** We are seeking advanced concepts, *specifically systems and architectures*, that are revolutionary, and which *will expand our vision of future possibilities and may inspire a paradigm shift in our approach to the challenges of aeronautics and space.*

In the context of the NIAC requirements, successful proposals for advanced concepts will be:

- *Revolutionary, new and not duplicative of concepts previously studied by NASA,*
- *An architecture or system,*
- *Described in an NASA aeronautics and/or space 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.*

The NIAC is particularly interested in receiving proposals for innovative and visionary concepts from disciplines that are normally focused on non-aerospace endeavors and may have the potential for innovative application in the aerospace sector. These concepts may be emerging at the interface of traditional disciplines where innovation often springs forth in non-aerospace fields.

**The NIAC is specifically NOT interested in concepts that have one or more of the following characteristics:**

- *Evolutionary, not revolutionary;*
- *Duplicative of concepts previously studied by NASA;*
- *Not an architecture or system;*
- *Not placed into a NASA aeronautics and/or space mission context;*
- *Inadequately substantiated with a description of the scientific principles that form the basis for the concept;*
- *Uses existing technology or a combination of systems and technologies without introducing a significantly unique or innovative concept;*
- *Continues the development of technology concepts that by their very nature, are narrowly focused on the development and performance of subsystems or components;*
- *Incrementally extends the performance of an aerospace system or previously studied concept, or develops a new specialized instrument or high performance material;*
- *Accomplishes 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;*
- *Develops a concept that is solely based on technically unsubstantiated science fiction;*
- *Proposes a program, workshop plan, or literature search to solve a problem or attain a goal with no specifically described architecture or system;*
- *Solely performs research experiments on fundamental processes or theoretical derivations with no connection to an overall architecture or system.*

## THE NIAC PROCESS and MISSION

The NIAC was established by The Universities Space Research Association (USRA) under contract from NASA Headquarters through the Goddard Space Flight Center. This Call is an important part of the portfolio of activities used by NIAC to foster the identification and early development of revolutionary advanced concepts. As captured in Figure 1, the NIAC Process relies on collaboration with and inspiration of all constituencies of the technical community; soliciting, reviewing and selecting revolutionary proposals, nurturing and eventually incorporating the best of these in NASA's portfolio and planning. Principal investigators (PIs) receiving NIAC contracts are designated as NIAC Fellows.

**Figure 1: NIAC's Approach to Identification and Development of Advanced Concepts**

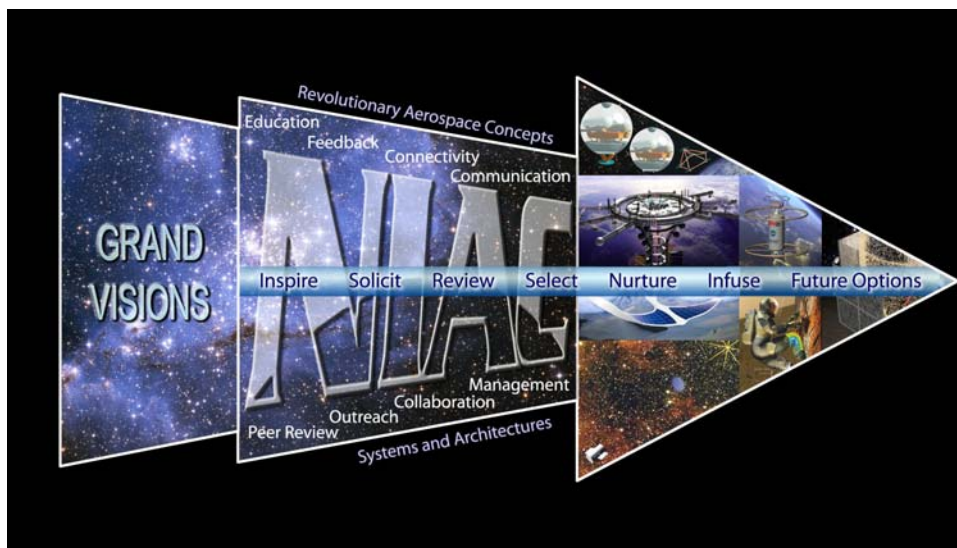
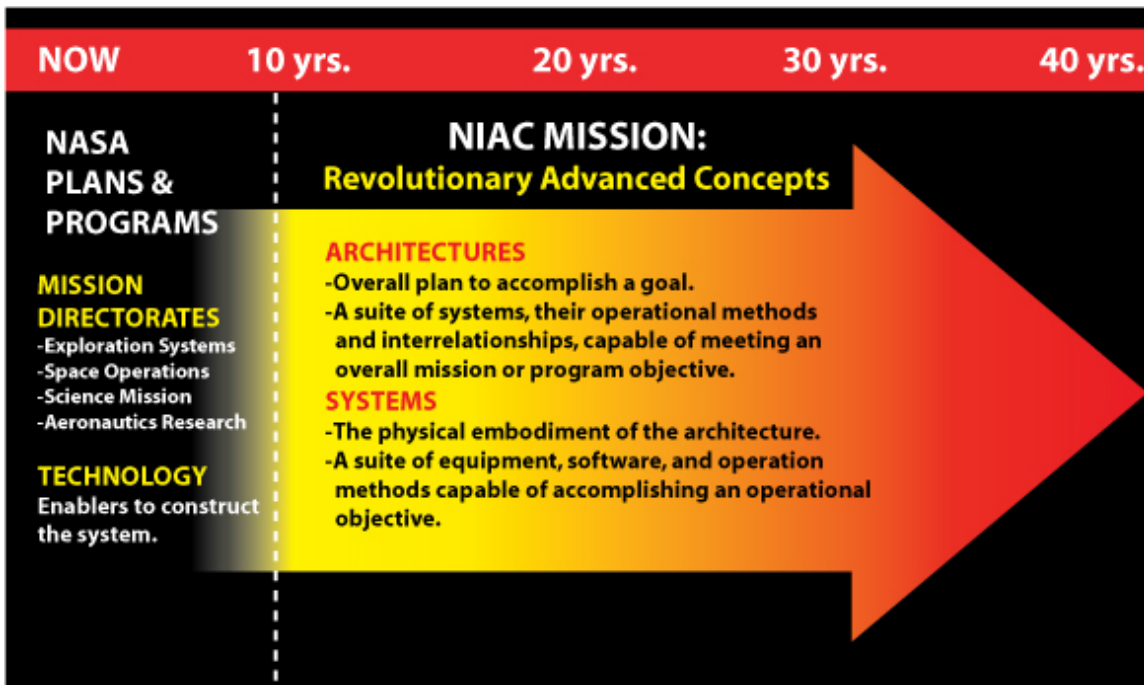


Figure 2 depicts the relationship between current NASA programs, technology and the NIAC mission for development of advanced concepts and underscores the criterion that NIAC concepts are intended for implementation 10 to 40 years into the future. The general thrust of the NIAC advanced concepts is to develop revolutionary ideas which have a potential for leaping well past the current plans to expand the vision of NASA's long-range strategic plans. 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 focus of future efforts on critical, enabling technology.

**Figure 2: NIAC Advanced Concepts Mission**



After a concept has been developed and nurtured through the NIAC process, it is NASA's intent that the most promising concepts will be transitioned into its program for additional study and follow-on funding. NIAC works closely with NIAC Fellows and NASA representatives to explore the technical and programmatic potential for NIAC advanced concepts to be infused into NASA's long range plans. Figure 3 illustrates a few of the advanced concepts that have successfully transitioned into NASA's long range plans.

**Figure 3. Transition and Infusion of Key NIAC Concepts into Long Range Plans**





## DESCRIPTION OF AWARDS

Normal development of the NIAC advanced concepts will be carried out through issuance of research grants and contracts in a two-phased approach. Phase I grants of approximately \$50K-\$75K will be for 7 months to validate the viability of the proposed concept and definition of major feasibility issues. **This Call invites Phase I proposals ONLY.**

Phase II award(s) would study the major feasibility issues associated with cost, performance, development time and key technology issues. **Phase II award(s) will only be made based on a down-select from successfully completed Phase I efforts.** Only NIAC Phase I Fellows who have not previously received a Phase II contract based on their Phase I concept are invited to submit a Phase II proposal. If a Phase II proposal is not selected for funding, the investigator will be allowed to resubmit a Phase II proposal based on the same concept in response to one future Phase II Call (again subject to the terms and due date of that Call).

Both Phase I and Phase II awards will be competitively selected by NIAC based on an independent peer review. Principal investigators (PIs) receiving NIAC contracts will be designated as NIAC Fellows.

### Eligibility:

- Participation in these studies is open to all categories of **domestic** individuals and organizations. Minority and disadvantaged institutions and organizations are encouraged to respond to this CP.
- **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.
- **NASA organizations, including the Jet Propulsion Laboratory, are excluded** from receiving funding for any phase.

### Proposal Review Process:

The NIAC is functionally independent of NASA and the concepts it selects for government support result from an external peer review process by respected technical experts. This process competitively awards grants or contracts based on proposals with the highest technical merit. The NIAC staff and participants in peer reviews follow a Conflict of Interest Avoidance Plan developed by USRA. All participants certify as to their adherence to the Plan.



**Figure 4. The NIAC Proposal Review Process**

Figure 4 describes the sequence of events for receipt, review, and selection of advanced concepts for an award. Following electronic logging of a proposal in the NIAC database, the NIAC review process commences with a "Review of Proposals by 3 Internal Reviewers for Competitiveness". Proposals that do not meet the selection criteria described on page 17 of this CP will not be passed to the next level of review. Competitive proposals are subject to scientific review by discipline specialists in the area of the proposal as shown in Figure 4.

**Disclosure:**

All interested parties need to be aware that the NIAC intends to publicly make available the results of all funded advanced concept studies. Final reports generated as a result of NIAC funded concept development and briefings given by NIAC Fellows at NIAC sponsored meetings will be made available to the public on the NIAC website. This being the case, the institute actively discourages the use of proprietary data and/or trade secrets (see Appendix A). 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 attracts revolutionary ideas from a greatly expanded community and will create a dynamic interchange of competing future options. This interchange is a completely open debate and discussion.

## INSTRUCTIONS FOR RESPONDING TO NIAC CALL FOR PROPOSALS 07-01

### A. General

1. Proposals received in response to a NIAC CP will be used only for evaluation purposes.
2. A solicited proposal that results in a NIAC award becomes part of the record of that transaction. 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 contract will be used to accomplish the effort funded in response to a NIAC Phase I CP. Anticipated contract start date is September 1, 2007.
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](mailto: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 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 investigator's (see C.1.c.5) last name and first initial "\_t.pdf" (Example: The principal investigator's name is Thomas Carter. The technical proposal file name is cartert\_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 five (5) characters of the last name and the first character of the first name (Example: cartet\_t.pdf).
    - 2) Technical proposals converted to .pdf shall not exceed 1 MB in size. Proposers are cautioned against using gratuitous graphics that unduly increase the file size and do not contribute to the technical content of the proposal.
    - 3) The cost proposal .pdf file name shall contain "\_c.pdf" following the principal investigator's last name and first initial. (Example: The principal investigator's name is Thomas Carter. The cost proposal file name is cartert\_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 five (5) characters of the last name and the first character of the first name (Example: cartet\_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 07-01 must electronically arrive at the NIAC on or before 23:59 EST February 12, 2007 to be considered in the CP 07-01 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 seven months. The period of performance will commence upon award of the contract.
2. Phase I Deliverables:
  - a. Written status reports to the NIAC Director by the 15<sup>th</sup> day of the third and fifth months following the beginning of the contract.
  - b. A final written report within thirty days following the conclusion of the effort.
  - c. All reports submitted as Portable Document Files (.pdf) attached to an email.
  - d. NIAC Fellow (PI) attendance and a poster describing the proposed study at a NIAC Annual Meeting to be held for two days in October 2007 (at a date and location to be announced), a presentation of a status report at the NIAC Fellows Conference in March 2008 at the NIAC Headquarters in Atlanta, Georgia, or another location in the continental United States.

## **C. Proposal Content and Format**

1. Technical Proposal (1 MB file size maximum)
  - a. Transmittal Letter or Prefatory Material (one-page maximum, not included in the page count of the technical proposal):
    - 1) The legal name and address of the organization and specific division or campus identification, if part of a larger organization.
    - 2) A brief, scientifically valid project title intelligible to a scientifically literate reader and suitable for use in the public press.
    - 3) Type of organization: e.g., profit, nonprofit, educational, small business, minority, woman-owned, Historically Black College or University, etc.
    - 4) Name, telephone number, fax number and e-mail address of the principal investigator and business personnel who may be contacted during evaluation and negotiation.
    - 5) Identification of other organizations that are currently evaluating a proposal for the same effort.
    - 6) Identification of this Call for Proposal by number and title.
    - 7) Dollar amount requested, desired starting date and duration of project.
    - 8) Date of submission.

b. Abstract (*1 page maximum, not included in the page count of the technical proposal*)

Include a one-page abstract that contains the title, PI, PI organization, and summary text that clearly states the essential elements of the proposed concept. This description should be limited to what the concept is and should not try to explain why it is needed or how the study will be executed. If extracted from the body of the proposal, the abstract should be intelligible to a scientifically literate reader and suitable for use in the public press. A good graphic that illustrates the essence of the concept would be valuable.

c. Technical Proposal (*12 pages maximum*)

1) 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.

2) 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.

3) 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.

4) 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 substantially associated 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 contract negotiation, letters of commitment from senior professional personnel who are outside of the PI's organization will be required.

## 5) Special Matters

- a) 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 contract negotiation, signed statements from authorized personnel and/or committees will be required.
- b) Proposers should include a brief description of the organization, its facilities, and previous work experience in the field of the proposal.

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

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.

- a. 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 may be delayed for insufficient cost information regarding the basis of estimate for any or all proposed costs.
- b. Do not use separate “confidential” salary pages. List salaries and wages in appropriate organizational categories (e.g., PI, other scientific and engineering professionals, graduate students, research assistants and technical and other non-professional personnel).
- c. At the conclusion of your cost proposal section, include a projected total monthly funding profile. The grand total of this monthly funding profile should very closely approximate the total proposed cost in the cost section. See Appendix B for an example.
- d. 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).

## 3. 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 14 pages (includes 1 page transmittal letter and 1 page abstract) and 1MB file size.** The proposal transmittal letter and abstract page shall be included with the technical proposal .pdf file and are not included in the technical proposal page count so long as they each do 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 23:59 EST February 12, 2007 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. NIAC Evaluation Criteria**

During the peer review process, principal elements (of approximately equal weight) considered in evaluating a proposal are its relevance to NASA's and the NIAC's objectives, intrinsic merit and cost realism. Specific aspects of these elements are as follows:

- a. How well have the benefits been qualified in the context of a future NASA aeronautics and/or space mission? To what extent is it likely to enable or define a future mission for NASA?
- b. How well is the concept described in the context of a system or architecture?
- c. Is the concept revolutionary rather than evolutionary? To what extent does the proposed activity suggest and explore creative and original concepts that may initiate a revolutionary paradigm change?
- d. How well is the concept substantiated with a description of applicable scientific and technical disciplines necessary for development?
- e. How well conceived and organized is the study work plan, and does the team have appropriate key personnel and proven experience?



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

#### **J. Selection for Award**

The NIAC Director, based on recommendations from the peer review panels, will make the final selection decision.

1. Following the selection of concepts for awards, all proposers will be notified by electronic mail. A list of concepts selected for an award will also be posted on the NIAC website.
2. 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.
3. Proposers desiring additional information about their proposal may contact the NIAC Associate Director (djennings@niac.usra.edu) who will arrange a debriefing by electronic mail.
4. 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.

#### **K. Cancellation of Call for Proposals**

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**

	<b>MONTHS</b>						
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
<b>DIRECT LABOR</b> (by person or labor category, as applicable)							
<b>SUBTOTAL DIRECT LABOR</b>							
<b>OVERHEAD</b>  (List categories as applicable)							
<b>SUBTOTAL OVERHEAD</b>							
<b>MATERIALS</b> (if applicable)							
<b>EQUIPMENT</b> (if applicable)							
<b>SUBCONTRACTS</b> (if applicable)							
<b>TRAVEL</b>							
<b>ANY OTHER DIRECT COSTS</b> (by category, if applicable)							
<b>SUBTOTAL OTHER DIRECT COSTS</b>							
<b>SUBTOTAL COSTS</b>							
<b>G &amp; A</b> (if applicable)							
<b>TOTAL COSTS</b>							
<b>PROFIT/FEE</b> (if applicable)							
<b>TOTAL PRICE</b>							

## 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:

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