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Space Administration**

May 5, 2004

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**MASTER
NASA RESEARCH ANNOUNCEMENT**

Advanced Information Systems Technology (AIST)

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**Master
NASA Research Announcement
Soliciting Prototyping Proposals
for
Period Ending
May 4, 2009**

**NNG04ZY4000N
ISSUED MAY 5, 2004**

**Earth Science Technology Office
Goddard Space Flight Center
Greenbelt, MD 20771**

Table of Contents

| | |
|---|----|
| I. Executive Summary | 2 |
| II. Introduction..... | 2 |
| III. AIST NRA Solicitation..... | 4 |
| Appendix A: Specific Guidelines and Requirements for Proposers..... | 9 |
| Appendix B: Instructions for responding to NASA Research Announcements..... | 15 |
| Appendix C: Proposal Cover Sheet and Required Certifications, Disclosures, and Assurances . | 22 |
| Appendix D: Budget Summary..... | 26 |
| Appendix E: Reporting Requirements..... | 28 |
| Appendix F: Definition Of Technology Readiness Levels..... | 31 |
| Appendix G: Acronyms | 33 |

MASTER NASA RESEARCH ANNOUNCEMENT

Advanced Information Systems Technology

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I. Executive Summary

The Advanced Information Systems Technology (AIST) program is part of the Earth Science Technology Office (ESTO) within NASA's Earth Science Enterprise (ESE). This AIST Master NASA Research Announcement (NRA) is part of a rapid response, peer-reviewed process that responds to specific ESE information system needs that complement existing NASA technology investments.

This Master NRA will serve as the umbrella solicitation from which multiple mini-solicitations may be made over the next five years. The process will enable awards to be made approximately three to four months after the release of a mini-solicitation under this Master NRA, to better reflect the rapid pace of Information Technology (IT) advances. Innovations are solicited from the Earth and Information Science communities to address the advanced information system technology needs of the ESE.

Prospective proposers are advised that safety is a top priority for all of NASA's programs. Safety is the freedom from those conditions that can cause death, injury, occupational illness, damage to or loss of equipment or property, or damage to the environment. NASA's safety priority is to protect: (1) the public, (2) astronauts and pilots, (3) the NASA work force (including employees working under NASA award instruments), and (4) high-value equipment and property.

II. Introduction

The NASA vision is: *To improve life here*
 To extend life to there
 To find life beyond

The NASA mission is: *To understand and protect our home planet*
 To explore the Universe and search for life
 To inspire the next generation of explorers

 ...as only NASA can.

(a) Office of Earth Science

The ESE is one of six NASA enterprises seeking to fulfill the agency's vision and carry out its mission (<http://www.earth.nasa.gov/visions/index.html>). The ESE mission is to understand and protect our home planet by using our view from space to study the Earth system and improve

predictions of Earth system change. The ESE, working with its domestic and international partners, provides accurate, objective scientific data and analyses to advance our understanding of Earth system processes and to help policy makers and citizens achieve economic growth and effective, responsible stewardship of Earth's resources. The ESE research program aims to acquire deeper scientific understanding of the components of the Earth system, their interactions, and the consequences of changes in the Earth system for life. These interactions occur on a continuum of spatial and temporal scales ranging from short-term weather to long-term climate and motions of the solid Earth, and from local and regional to global.

The frontier of Earth system science is to: (1) explore interactions among the major components of the Earth system – continents, oceans, atmosphere, ice, and life, (2) distinguish natural from human-induced causes of change, and (3) understand and predict the consequences of change. NASA has established six scientific focus areas for these complex processes. These scientific focus areas are: Atmospheric Composition, Carbon Cycle and Ecosystems, Climate Variability and Change, Earth Surface and Interior, Water and Energy Cycle, and Weather. Roadmaps have been developed to summarize the technology, observations, modeling, field campaigns, basic research, and partnerships needed over time to achieve the long-term goals for each of these focus areas (<http://earth.nasa.gov/roadmaps/>). ESE focus areas are interrelated and must eventually be integrated to arrive at a fully interactive and realistic Earth system representation. All ESE focus areas are applicable to this NRA.

Five fundamental questions drive ESE research:

- How is the global Earth system changing?
- What are the primary causes of change in the Earth system?
- How does the Earth system respond to natural and human-induced changes?
- What are the consequences of change in the Earth system for human civilization?
- How will the Earth system change in the future?

NASA's ESE (<http://earth.nasa.gov/>) studies Earth as an interconnected system of atmosphere, oceans, landmasses and life. Using the unique perspective available from space and suborbital platforms, NASA acquires, processes, and delivers very large (gigabyte to terabyte) volumes of remote sensing and related observations and information to public and governmental entities. This information is used by scientists to understand and solve major scientific mysteries, and by practitioners and policy makers to solve practical, societal problems, and/or establish sound policy decisions. The ESE technology program is responsible for planning technology development activities so that major technical risks are retired prior to the selection of its scientific missions. The ESE takes advantage of the powerful capabilities of remotely sensed geospatial information and advances in information system technologies to achieve its science and applications objectives, decrease costs, and increase the accessibility and utility of Earth Science data.

(b) Earth Science Technology Office

ESTO manages the development of advanced technologies and applications that are needed for cost-effective missions. ESTO plays a major role in shaping ESE research and application programs of the future, aggressively pursuing promising scientific and engineering concepts, and

ensures that the program maintains an effective balance of investments in order to advance technology development.

(c) Advanced Information Systems Technology Program

IT advances play a critical role in collecting, handling, and managing very large amounts of data and information in space and on the ground. The objectives of the AIST Program are to identify, develop and (where appropriate) demonstrate advanced information system technologies which:

- Enable new Earth observation measurements and information products,
- Increase the accessibility and utility of Earth science data, and
- Reduce the risk, cost, size, and development time of ESE space-based and ground-based information systems.

The AIST Program is designed to bring information system technologies to a Technology Readiness Level (TRL) that allows integration into existing or future technology/science research and development programs, or infusion into existing or planned subsystems/systems to enable timely and affordable delivery of information to users. The TRL scale is used to assess the maturity of a particular technology (see Appendix F for TRL definitions). The AIST Program accepts technology developments at various stages of maturity and advances the TRL through appropriate risk reduction activities such as requirements analysis, conceptual design, prototypes and proof-of-concept demonstrations.

III. AIST NRA Solicitation

(a) Background and Solicitation Justification

The needs of the ESE IT program change with evolving program requirements, technology advancements, and systems evolution. ESTO is responsible for the integration of technology development programs into a single comprehensive program for the ESE. The AIST program – a component of ESTO – is continually performing technology projection analyses, investment portfolio evaluations, and gap analyses to identify specific IT topics not addressed by existing awards that require immediate investment. The AIST program must be in a position to respond to the rapid changes in the IT arena, in which the life cycle of a technology, or generation of a specific technology, can be measured in months rather than years. The entire process – from release of a mini-solicitation under this Master NRA to proposal submittal, review, and award – should take no more than three to four months. The AIST Program requires this relatively short duration, responsive solicitation process to maintain a flexible, robust IT program for the ESE.

(b) Reference Source Material

This Master NRA provides a vehicle to fund development activities that will form part of a technology investment portfolio aimed at reducing the risk, cost, and development time of Earth observing systems, or enabling new Earth observation information products as a direct result of enhanced information technology capabilities. To understand the ESE priorities, review the source material and links found on the ESTO web site (www.esto.nasa.gov).

Note: Uniform Resource Locators (URLs) are subject to change over the lifetime of this solicitation. Please check the ESTO web site for the latest links.

(c) Specific Solicitation Process

As analyses or situations warrant, a list of specific technology questions or areas of current concern will be formulated and announced under this Master NRA via the Federal Business Opportunities (<http://www.fedbizops.gov/>), the Federal Grants (<http://www.fedgrants.gov/>), and on the NASA Acquisition Internet Service (NAIS) web site (<http://prod.nais.nasa.gov/>). Processes common to all solicitations are as follows:

1. Each mini-solicitation will have its own list of proposed topics or questions of interest, background information, and any other pertinent data, i.e., each announcement will stand on its own.
2. Each mini-solicitation announcement will be posted for two (2) weeks and have a submission period of 45 to 60 days, as specified in the mini-solicitation.
3. All proposals shall be submitted through an on-line electronic handbooks (e-Books) submission system. A paperless system, the e-Books submission system will contain all the required data, information, and proposal fields necessary to submit a proposal. The Master NRA home page site, accessible via <http://esto.nasa.gov/>, will be included in each mini-solicitation announcement, and will link users to the e-Book proposal submission system. One printed, signed original of the entire proposal with all required forms must also be submitted via the postal service or equivalent means.
4. All submitted proposals will be peer reviewed on-line, via the e-Books system.
5. All selected proposals will result in the award of grants, cooperative agreements, or other appropriate vehicles. Contracts are specifically excluded as a contractual vehicle in this Master NRA (supersedes directions in Appendix B). NOTE: the Grants and Cooperative Handbook (14 CFR 1260), Section A, 1260.4 (b) requires 50% cost sharing from commercial firms awarded grants or cooperative agreements when the commercial firm is expected to receive substantial compensating benefits for performance of the work.

Although each mini-solicitation will be self contained, i.e., will stand on its own for the topic area(s) being solicited, proposers *must* be knowledgeable of, and adhere to, all processes, instructions, restrictions, and guidelines set forth in this document. This Master NRA will be the governing solicitation.

(d) General Solicitation Guidelines

Participation in this program is open to all categories of domestic and foreign organizations, including educational institutions, industry, non-profit institutions, NASA centers, and other U.S. agencies. In accordance with NASA policy, all investigations by foreign participants will be conducted without any exchange of funds, i.e., an investigator whose home institution is outside the United States cannot be funded by NASA. Late proposals will not be considered.

Funds for selected projects will be awarded to the Principal Investigator's (PI's) organization only. The award and management of any subcontracts or consultants are the responsibility of the PI's organization.

Testbeds needed for testing, verification, or validation of components, subsystems, and/or systems (both hardware and software) can be included and budgeted as an integral part of a

proposed technology effort, but will not be funded as a stand-alone proposal. Coordination for the utilization of special purpose equipment, facilities, etc., is the responsibility of the proposer.

Specific guidelines to proposers are contained in Appendix A and apply to this Master NRA only. Appendix B contains general NASA guidelines for the preparation of proposals solicited by this Master NRA.

(e) Technology Readiness Level Guidance

Proposers must identify the entry TRL, the planned exit TRL, and success criteria in their proposal. Past and ongoing work on the research activity should determine the entry TRL; the proposer must substantiate the entry TRL in the proposal (see Appendix F).

Over the duration of the research, the goal of the activity must be to advance the technology by at least one (1) TRL. For example, an activity can enter the technology development activity at TRL 3 and exit at TRL 4 or higher. A responsive proposal will demonstrate advancement of a least one TRL within the proposed performance period.

For this Master NRA, the entry TRL must be between 1 and 6, inclusive. Studies or developments within this Master NRA will be restricted to an exit TRL less than or equal to 7. Each mini-solicitation will contain additional TRL guidance.

(f) Funding

The funding available for each mini-solicitation under this Master NRA will limit the number and magnitude of the proposals awarded. The ESE expects that a total of 5 to 12 proposals will be awarded annually, with values in the approximate range of \$50,000 to \$300,000 per year per award. Budget guidance will be included in each mini-solicitation.

NOTE: The NASA Grants and Cooperative Agreements Handbook, Section A, 1260.4 (b), specifies that awards to commercial firms via grants and cooperative agreements require 50% cost sharing when the commercial firm is expected to receive substantial compensating benefits for performance of the work.

Funds are not currently available for awards under this Master NRA. The Government's obligation to make award(s) is contingent upon the availability of appropriated funds from which payment can be made and the receipt of proposals that NASA determines are acceptable for award under this Master NRA. No additional funds above the initially specified award value will be available.

(g) Period of Performance

Awards will be made for the full period of performance, not to exceed 24 months. If a grant or cooperative agreement is awarded, it will be subject to annual review according to the criteria specified in the NASA Grant and Cooperative Agreement Handbook (14 CFR 1260). Proposals must define clear, measurable achievements for each year of performance. Guidance for the period of performance will be included in each mini-solicitation.

(h) Guidance to Proposers; Procedures

Proposals should be prepared and submitted in accordance with specific information provided in Appendices A-G of this Announcement. Appendix A provides specific instructions for proposers to this announcement. Appendix B contains the general instructions needed for

preparation of solicited proposals in response to NRAs. Appendix C provides a sample of the proposal cover sheet, the list of required declarations, and information on requisite certifications and disclosures. All proposals submitted to NASA in response to this announcement must include a completed, signed cover sheet. Appendix D contains a budget summary worksheet with instructions for its use. Appendix E provides detailed reporting requirements for awardees. Appendix F defines the Technology Readiness Levels. Appendix G contains a list of acronyms.

Selecting Official: George Komar, Program Manager
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Number of Copies: One printed, signed original (postal submission)
One electronic copy (internet submission)

Acceptable Formats: Portable Document Format (PDF) (preferred), Microsoft Word, WordPerfect; PDF (preferred), Microsoft Excel, Microsoft Word, WordPerfect for cost information

Length of Proposal: Ten (10) non-reduced, single space 8.5 x 11-inch typewritten pages
(see Appendix A, Section II (J))

Internet Submission: <http://esto.nasa.gov/>
Follow the links to the appropriate e-Book.

Proposals must be submitted via the e-Books system to be accepted for evaluation.

Postal Submission: NASA AIST Program Support Office
REI Systems, Inc.
4041 Powder Mill Road, Suite 311
Beltsville, MD 20705-3106

Proposals submitted to any address other than the one specified will not be accepted.

(i) Selection Schedule

All proposals submitted in response to each mini-solicitation issued under this announcement are due in accordance with the schedule announced with each mini-solicitation. Late proposals will not be considered.

Your interest in participating in this opportunity is appreciated.

George J. Komar
Program Manager
Earth Science Technology Office

Enclosures:

- Appendix A. Specific Guidelines and Requirements for Proposers
- Appendix B. Instructions for Responding to NASA Research Announcements
- Appendix C. Proposal Cover Sheet, and Required Certifications, Disclosures, and Assurances
- Appendix D. Budget Summary
- Appendix E. Reporting Requirements
- Appendix F. Definition of Technology Readiness Levels
- Appendix G. Acronyms

APPENDIX A
SPECIFIC GUIDELINES AND REQUIREMENTS FOR PROPOSERS

I. Evaluation Factors

The following evaluation factors will be used to evaluate the proposals. They replace and supersede those contained in Appendix B, paragraph (i) Evaluation Factors.

A. Factor 1: Relevance to ESE Programs as Defined in Reference Source Material (40% of total value)

1. The element's or subsystem's relevance and potential contribution to NASA's scientific and technical areas of emphasis, including the potential to enable new information products and/or measurements.
2. The potential of the element or subsystem to be integrated, once matured, into an operational system. Integration potential will be assessed in part on the basis of the entry TRL and planned exit TRL.
3. The potential for the element or subsystem to reduce the risk, cost, size, and development time of ESE systems. Potential cost reductions should be clearly stated and substantiated to the extent possible, with supporting analysis indicating scalability.

B. Factor 2: Technical Merit (30% of total value)

1. Feasibility and merit of the proposed technical approach to achieve the technology analysis or development objectives; possibility of commercial benefit.
2. Degree of innovation of the proposed technology analysis or development concepts and approach.
3. Justification of the technology readiness level (TRL) for the proposed research. For this Master NRA, the entry TRL must be between 1 and 6 inclusive, with the exit TRL no higher than 7. Each mini-solicitation will contain additional TRL guidance.
4. Feasibility of obtaining the potential reduction in risk, cost, size, and development time with the proposed element, subsystem, or system and measurable TRL increases. The TRL must advance by at least one (1) level during the life of the project.

C. Factor 3: Cost and Programmatic Realism (30% of total value)

1. Adequacy and realism of proposed milestones and associated success criteria.
2. Cost realism of the proposed budget.
3. Adherence to sound and consistent management practices appropriate to the TRL of the proposed task.
4. Past performance and related experience in the proposed area of study or technology development.
5. Qualifications of key personnel and adequacy of facilities, staff, and equipment to support the proposed activity.
6. Commitment of the organization's management to the proposed technology development (evidenced by cost and resource sharing, prior teaming arrangements, etc.). Proposers

must identify any current, pending, or previous investment in the proposed activity by any entity and provide supporting documentation.

II. Proposal Preparation Guidance

Proposers should periodically check the ESTO web site for any updates to this Master NRA:

<http://esto.nasa.gov/>

The technical proposal shall address each of the items below, which supplement and/or modify the guidance provided in Appendix B.

- A. Appendix B, Paragraph (c)(1) Transmittal Letter or Prefatory Material. Each proposal will require a signed Proposal Cover Sheet and Certifications, as described in Appendix C.
- B. Appendix B, Paragraph (c)(3) Abstract. Provide an overall description of the proposal in abstract form, not to exceed 250 words. Include: (a) Objectives and benefits; (b) Outline of proposed work and methodology, (c) period of performance and (d) entry/exit TRL.
- C. Appendix B, Paragraph (c)(4) Project Description, subparagraph (i):

The Project Description must include the following information: Items 1-5 below, and items D, E, F, and I, as well as those items specified in Appendix B that are not modified by this Appendix A.

1. Description of Proposed Technology - Provide a description of the proposed element, subsystem, or system technology. Describe the technical approach and include an operational concept or use scenario of the proposed element, subsystem, or system technology that addresses ESE needs. Discuss any possible commercial benefits.
2. Applicability to ESE Missions – Describe the benefit to ESE systems and science capabilities, as related to future science measurements that could use the proposed elements, subsystems, or systems. If appropriate, include a discussion of potential technology infusion paths to ESE missions for proposed element, subsystem, or system technologies.
3. Comparative Technology Assessment – Describe the anticipated advantages of this element, subsystem, or system technology compared to those currently in use, e.g., reduced size, mass, power, volume or cost; improved performance; or enabling of a new capability not previously possible. Review the current state of the art and relate to the current state of the proposed work.
4. TRL Assessment – Provide the current TRL assessment of the element, subsystem, or system technology, and the anticipated progression of TRLs throughout the proposed effort. See Appendix F for guidance on TRLs. *Failure to include and substantiate TRL assessments may be a cause for non-selection.*
5. Schedule Milestones – Provide a Statement of Work that concisely describes each task or milestone to be accomplished in the course of the research and development. Define the success criteria associated with each task or milestone. Also include a milestone chart that identifies critical dates and deliverables in the research and development program. Identify the roles of key personnel.

Subawards for portions of the research project are acceptable, and are the responsibility of the proposing organization.

- D. Appendix B, Paragraph (c)(4) Project Description, subparagraph (ii). Complete cost information for the entire duration of the project must be provided.
- E. Appendix B, Paragraph (c)(6) Personnel. Include a list of Key Personnel and identify experience relevant to the proposed activity. *The Key Personnel list is included in the overall page count and must include, as a minimum, the PI.*

Optionally, one-page résumés for Key Personnel may be supplied; these résumés are not included in the overall page count.

- F. Appendix B, Paragraph (c)(7) Facilities and Equipment, subparagraph (ii). Before requesting a major item of capital equipment, the proposer should determine if sharing or loan of equipment already within the organization is a feasible alternative.
- G. Appendix B, Paragraph (c)(8) Proposed Costs (U.S. Proposals Only), subparagraph (i). Full cost accounting (FCA) is required in all proposals, including those submitted by U.S. Government agencies. Cost sharing or matching arrangements should also be indicated, if applicable. Ensure that all costs to support reporting requirements, including travel, are included in the budget submission. Major subcontractor costs, i.e., 50% or more of requested funds, should be itemized in a manner similar to that specified in the subject paragraph. Supporting data for proposed costs, including major subcontractor costs, should not exceed six (6), non-reduced, 8.5 x 11-inch typewritten pages, excluding those tables required in Appendix D Budget Summary. Supporting cost data may be submitted in any of the following formats: PDF (preferred), Microsoft Excel, Microsoft Word, or WordPerfect. No embedded, expandable tables are permitted in Microsoft Excel spreadsheets.

A monthly cost phasing plan, identifying estimated expenditures for each month of the proposed project, shall be submitted to facilitate award negotiation. The monthly cost phasing plan *is* included in the 6-page limit specified above. The Proposed Costs 6-page limitation is separate from the 10-page limitation set forth in Paragraph J.

- H. Appendix B, Paragraph (c)(8) Proposed Costs (U.S. Proposals Only), subparagraph (ii). Explanatory notes (i.e., supporting cost data) should accompany the cost proposal to provide clarification of items in the cost proposal that are not self-evident.
- I. Appendix B, Paragraph (c)(11) Special Matters, subparagraph (ii). Proposers should include a brief description of the organization, its facilities, and previous work experience in the field of the proposal.

Optionally, one-page letters of endorsement, e.g., for facilities and laboratory support, management support, technology utilization commitment, etc., may be supplied; these letters of endorsement are not included in the overall page count.

- J. Appendix B, Paragraph (e) Length and Page Format. The maximum length of each proposal's Project Description is limited to ten (10) non-reduced, single-spaced typewritten pages (not to exceed 1.5 Megabytes (MB)) for the total of the Description of Proposed Technology, Applicability to ESE Missions, Comparative Technology Assessment, TRL Assessment, Schedule Milestones, Management Approach, Personnel (excluding optional, one-page résumés and/or letters of endorsement), Facilities and Equipment, Security,

Current Support, and Special Matters sections. In other words, the whole proposal, excluding the Proposal Cover Sheet, Abstract and the Certifications required by Appendix C, Proposed Costs and Budget information, and optional résumés and letters of endorsement is limited to ten (10) pages. Each side of a sheet of paper containing text or figures is considered a page. Use type font 12 point or larger, minimum one-inch margins and standard 8.5 x 11-inch paper. As all pictures and graphs are included in the page count, proposers are encouraged to limit the use of these unless they provide unique information that cannot be derived from the printed text. Proposals that exceed the 10-page limit will be truncated at 10 pages, and only that portion provided to reviewers for evaluation.

III. Proposal Submission Guidance

A. The Submission Process

Proposal submission is comprised of two parts:

- Internet submission. The entire proposal, including certifications, must be submitted via the Internet, (<http://esto.nasa.gov> – follow the links to e-Books), in accordance with the guidance provided within the submission e-Book. Components include: cover sheet and certifications, abstract, project description, budget summary, supporting cost data, and optional one-page résumés and letters of endorsement.
- Postal submission. One (1) printed, **signed** original of the entire proposal with all required forms must be submitted via the postal service or equivalent means. The postal submission is the official submission method for determining the received date and time for the proposal.

B. Internet Submission

The AIST program uses an electronic process to manage its program. This management approach requires that a proposing organization have Internet access and an e-mail address. An e-Book for submitting proposals via the Internet is linked to the ESTO web site (<http://esto.nasa.gov>). The e-Book guides users through the required steps to submit a proposal, and issues a secure user identifier and password to each registered user.

1. Word Processor & Spreadsheet. NASA converts all technical proposal files to PDF for evaluation purposes. Therefore, NASA encourages proposers to submit technical proposals in PDF. Other acceptable formats are Microsoft Word and WordPerfect. Budget and supporting cost information may be submitted in PDF (preferred), Microsoft Excel, Microsoft Word or WordPerfect.
2. Graphics. For reasons of space conservation and simplicity the proposer is required to embed graphics within the document.
3. Limitations. While only the paper copy will be screened for administrative compliance, the various files comprising the electronic version are required to exactly reflect the paper version. It is the proposer's responsibility to ensure that the electronic copy of the proposal is the same as the paper copy. NASA will assume they are the same.
4. Virus Check. The proposer is responsible for performing a virus check on all electronic files submitted. As a standard part of entering the proposal files into the processing system, NASA will scan each submitted electronic file for viruses. The detection, by

NASA, of a virus on any submitted electronic file will be cause for rejection of the proposal.

Notes:

- ***Proposals must be submitted via the e-Books to be considered for evaluation.***
- ***After the offeror has submitted all of the required forms via the Internet, the offeror should print the forms locally. These forms must be signed, as appropriate, and included in the postal submission.***

C. Postal submission

The postal submission includes one (1) complete original signed proposal, including paper copies of all original forms submitted using the e-Book. The postal submission is the official submission method for determining the received date and time for the proposal.

1. **Packaging Requirements for Paper Copies of Proposal.** Do not use bindings or special covers. Staple the pages of the proposal in the upper left-hand corner only. Secure packaging is mandatory. NASA cannot process proposals damaged in transit. All items for any proposal must be sent in the same envelope. If more than one proposal is being submitted, each proposal must be in its own envelope, but all proposals may be sent in the same package. Do not send duplicate packages of any proposal as "insurance" that at least one will be received.
2. **Where to Send Proposals.** All proposals that are mailed through the U.S. Postal Service first class, registered, or certified mail; proposals sent by Express Mail or commercial delivery services; or hand-carried proposals must be delivered to the following address between 8:00 a.m. and 5:00 p.m. Eastern time:

NASA AIST Program Support Office
REI Systems, Inc.
4041 Powder Mill Road, Suite 311
Beltsville, MD 20705-3106

Note: Proposals submitted to any address other than the one specified will not be accepted.

The telephone number (301) 937-0888 may be used when required for reference by delivery services.

- D. Deadline for Proposal Receipt.** All proposal submissions (Internet and postal) must be received no later than the date and time specified in the mini-solicitation. Any proposal or portion of a proposal received after that specified date and time will not be considered.

Note: The e-Book server will not be available for Internet submissions after the specified date and time.

- E. Withdrawal of Proposals.** Proposals may be withdrawn by written notice, signed by the designated Authorizing Institutional Official and submitted to:

NASA AIST Program Support Office

REI Systems, Inc.
4041 Powder Mill Road, Suite 311
Beltsville, MD 20705-3106

The withdrawal notice must include the proposal number (assigned by the e-Book) and title.

IV. Reporting Requirements

The following deliverables are required of awarded proposals:

- A. Initial Plans and Reports;
- B. Quarterly Technical Reports;
- C. Interim Review(s);
- D. Annual and Final Review(s); and
- E. Annual and Final Report(s).

Detailed descriptions of these deliverables are provided in Appendix E. In addition, awardees are encouraged to participate in the annual Earth Science Technology Conference (if held).

APPENDIX B
INSTRUCTIONS FOR RESPONDING TO NASA RESEARCH ANNOUNCEMENTS
(1852.235-72, OCTOBER 2002)

(a) General.

(1) Proposals received in response to a NASA Research Announcement (NRA) will be used only for evaluation purposes. NASA does not allow a proposal, the contents of which are not available without restriction from another source, or any unique ideas submitted in response to an NRA to be used as the basis of a solicitation or in negotiation with other organizations, nor is a pre-award synopsis published for individual proposals.

(2) A solicited proposal that results in a NASA award becomes part of the record of that transaction and may be available to the public on specific request; however, information or material that NASA and the awardee mutually agree to be of a privileged nature will be held in confidence to the extent permitted by law, including the Freedom of Information Act.

(3) NRAs contain programmatic information and certain requirements that apply only to proposals prepared in response to that particular announcement. These instructions contain the general proposal preparation information that applies to responses to all NRAs.

(4) A contract, grant, cooperative agreement, or other agreement may be used to accomplish an effort funded in response to an NRA. The NASA contracting officer will determine the appropriate award instrument. Contracts resulting from NRAs are subject to the Federal Acquisition Regulation and the NASA FAR Supplement. Any resultant grants or cooperative agreements will be awarded and administered in accordance with the NASA Grant and Cooperative Agreement Handbook (NPG 5800.1).

(5) NASA does not have mandatory forms or formats for responses to NRAs; however, it is requested that proposals conform to the guidelines in these instructions. NASA may accept proposals without discussion; hence, proposals should initially be as complete as possible and be submitted on the proposers' most favorable terms.

(6) To be considered for award, a submission must, at a minimum, present a specific project within the areas delineated by the NRA; contain sufficient technical and cost information to permit a meaningful evaluation; be signed by an official authorized to legally bind the submitting organization; not merely offer to perform standard services or to just provide computer facilities or services; and not significantly duplicate a more specific current or pending NASA solicitation.

(b) NRA-Specific Items. Several proposal submission items appear in the NRA itself: the unique NRA identifier; when to submit proposals; where to send proposals; number of copies required; and sources for more information. Items included in these instructions may be supplemented by the NRA.

(c) The following information is needed to permit consideration in an objective manner. NRAs will generally specify topics for which additional information or greater detail is desirable. Each proposal copy shall contain all submitted material, including a copy of the transmittal letter if it contains substantive information.

(1) Transmittal Letter or Prefatory Material.

- (i) The legal name and address of the organization and specific division or campus identification if part of a larger organization;
- (ii) A brief, scientifically valid project title intelligible to a scientifically literate reader and suitable for use in the public press;
- (iii) Type of organization: e.g., profit, nonprofit, educational, small business, minority, women-owned, etc.;
- (iv) Name and telephone number of the principal investigator and business personnel who may be contacted during evaluation or negotiation;
- (v) Identification of other organizations that are currently evaluating a proposal for the same efforts;
- (vi) Identification of the NRA, by number and title, to which the proposal is responding;
- (vii) Dollar amount requested, desired starting date, and duration of project;
- (viii) Date of submission; and
- (ix) Signature of a responsible official or authorized representative of the organization, or any other person authorized to legally bind the organization (unless the signature appears on the proposal itself).

(2) **Restriction on Use and Disclosure of Proposal Information.** Information contained in proposals is used for evaluation purposes only. Offerors or quoters should, in order to maximize protection of trade secrets or other information that is confidential or privileged, place the following notice on the title page of the proposal and specify the information subject to the notice by inserting an appropriate identification in the notice. In any event, information contained in proposals will be protected to the extent permitted by law, but NASA assumes no liability for use and disclosure of information not made subject to the notice.

**Notice
Restriction on Use and Disclosure of Proposal Information**

The information (data) contained in [insert page numbers or other identification] of this proposal constitutes a trade secret and/or information that is commercial or financial and confidential or privileged. It is furnished to the Government in confidence with the understanding that it will not, without permission of the offeror, be used or disclosed other than for evaluation purposes; provided, however, that in the event a contract (or other agreement) is awarded on the basis of this proposal the Government shall have the right to use and disclose this information (data) to the extent provided in the contract (or other agreement). This restriction does not limit the Government's right to use or disclose this information (data) if obtained from another source without restriction.

(3) **Abstract.** Include a concise (200-300 word if not otherwise specified in the NRA) abstract describing the objective and the method of approach.

(4) **Project Description.**

- (i) The main body of the proposal shall be a detailed statement of the work to be undertaken and 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 statement should outline the plan of work, including the broad design of experiments to be undertaken and a description of experimental methods and procedures. The project description should address the evaluation factors in these instructions and any specific factors in the NRA. Any substantial collaboration with individuals not referred to in the budget or use of consultants should be described. Subcontracting significant portions of a research project is discouraged.

(ii) When it is expected that the effort will require more than one year, the proposal should cover the complete project to the extent that it can be reasonably anticipated. Principal emphasis should be on the first year of work, and the description should distinguish clearly between the first year's work and work planned for subsequent years.

(5) Management Approach. For large or complex efforts involving interactions among numerous individuals or other organizations, plans for distribution of responsibilities and arrangements for ensuring a coordinated effort should be described.

(6) Personnel. The principal investigator is responsible for supervision of the work and participates in the conduct of the research regardless of whether or not compensated under the award. A short biographical sketch of the principal investigator, a list of principal publications and any exceptional qualifications should be included. Omit social security number and other personal items, which do not merit consideration in evaluation of the proposal. 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.

(7) Facilities and Equipment.

(i) Describe available facilities and major items of equipment especially adapted or suited to the proposed project, and any additional major equipment that will be required. Identify any Government-owned facilities, industrial plant equipment, or special tooling that are proposed for use. Include evidence of its availability and the cognizant Government points of contact.

(ii) Before requesting a major item of capital equipment, the proposer should determine if sharing or loan of equipment already within the organization is a feasible alternative. Where such arrangements cannot be made, the proposal should so state. The need for items that typically can be used for research and non-research purposes should be explained.

(8) Proposed Costs (U.S. Proposals Only).

(i) Proposals should contain cost and technical parts in one volume: do not use separate "confidential" salary pages. As applicable, include separate cost estimates for salaries and wages; fringe benefits; equipment; expendable materials and supplies; services; domestic and foreign travel; ADP expenses; publication or page charges; consultants; subcontracts; other miscellaneous identifiable direct costs; and indirect costs. List salaries and wages in appropriate organizational categories (e.g., principal investigator, other scientific and engineering professionals, graduate students, research assistants, and

technicians and other non-professional personnel). Estimate all staffing data in terms of staff-months or fractions of full-time.

(ii) Explanatory notes should accompany the cost proposal to provide identification and estimated cost of major capital equipment items to be acquired; purpose and estimated number and lengths of trips planned; basis for indirect cost computation (including date of most recent negotiation and cognizant agency); and clarification of other items in the cost proposal that are not self-evident. List estimated expenses as yearly requirements by major work phases.

(iii) 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). All proposals involving NASA employees as either PI or as a CO-I must be shown in full cost in accordance with Agency full cost accounting standards (www.hq.nasa.gov/fullcost).

(iv) Use of NASA funds--NASA funding may not be used for foreign research efforts at any level, whether as a collaborator or a subcontract (also see paragraph l). The direct purchase of supplies and/or services, which do not constitute research, from non-U.S. sources by U.S. award recipients is permitted. Additionally, in accordance with the National Space Transportation Policy, use of a non-U.S. manufactured launch vehicle is permitted only on a no-exchange-of-funds basis.

(9) **Security.** Proposals should not contain security-classified material. If the research requires access to or may generate security-classified information, the submitter will be required to comply with Government security regulations.

(10) **Current Support.** For other current projects being conducted by the principal investigator, provide title of project, sponsoring agency, and ending date.

(11) **Special Matters.**

(i) 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 current Government-wide guidelines.

(ii) Identify and discuss risk factors and issues throughout the proposal where they are relevant, and your approach to managing these risks.

(iii) Proposers should include a brief description of the organization, its facilities, and previous work experience in the field of the proposal. Identify the cognizant Government audit agency, inspection agency, and administrative contracting officer, when applicable.

(d) **Renewal Proposals.**

(1) Renewal proposals for existing awards will be considered in the same manner as proposals for new endeavors. A renewal proposal should not repeat all of the information that was in the original proposal. The renewal proposal should refer to its predecessor, update the parts that are no longer current, and indicate what elements of the research are expected to be covered during the period for which support is desired. A description of any significant findings since the most recent

progress report should be included. The renewal proposal should treat, in reasonable detail, the plans for the next period, contain a cost estimate, and otherwise adhere to these instructions.

(2) NASA may renew an effort either through amendment of an existing contract or by a new award.

(e) **Length and Page Format.** Unless otherwise specified in the NRA, effort should be made to keep proposals as brief as possible, concentrating on substantive material. **Proposals are not to exceed 20 pages**, including references and figures (cover pages, certifications, budget sheets, and attachments are not included in this page limit). Necessary detailed information, such as reprints, should be included as attachments. A complete set of attachments is necessary for each copy of the proposal. As proposals are not returned, avoid use of "one-of-a-kind" attachments.

(f) **Joint Proposals.**

(1) Where multiple organizations are involved, the proposal may be submitted by only one of them. 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 would be made.

(2) Where a project of a cooperative nature with NASA is contemplated, describe the contributions expected from any participating NASA investigator and agency facilities or equipment, which may be required. The proposal must be confined only to that which the proposing organization can commit itself. "Joint" proposals, which specify the internal arrangements NASA will actually make, are not acceptable as a means of establishing an agency commitment.

(g) **Late Proposals.** Proposals or proposal modifications received after the latest date specified for receipt may be considered if a significant reduction in cost to the Government is probable or if there are significant technical advantages, as compared with proposals previously received.

(h) **Withdrawal.** Proposals may be withdrawn by the proposer at any time before award. Offerors are requested to notify NASA if the proposal is funded by another organization or of other changed circumstances, which dictate termination of evaluation.

(i) **Evaluation Factors.**

(1) Unless otherwise specified in the NRA, the principal elements (of approximately equal weight) considered in evaluating a proposal are its relevance to NASA's objectives, intrinsic merit, and cost.

(2) Evaluation of a proposal's relevance to NASA's objectives includes the consideration of the potential contribution of the effort to NASA's mission.

(3) Evaluation of its intrinsic merit includes the consideration of the following factors of equal importance:

(i) Overall scientific or technical merit of the proposal or unique and innovative methods, approaches, or concepts demonstrated by the proposal.

(ii) Offeror's capabilities, related experience, facilities, techniques, or unique combinations of these, which are integral factors for achieving the proposal objectives.

(iii) The qualifications, capabilities, and experience of the proposed principal investigator, team leader, or key personnel critical in achieving the proposal objectives.

(iv) Overall standing among similar proposals and/or evaluation against the state-of-the-art.

(4) Evaluation of the cost of a proposed effort may include the realism and reasonableness of the proposed cost and available funds. Cost is of substantially less weight than the other factors combined.

(j) **Evaluation Techniques.** Selection decisions will be made following peer and/or scientific review of the proposals. Several evaluation techniques are regularly used within NASA. In all cases proposals are subject to scientific review by discipline specialists in the area of the proposal. Some proposals are reviewed entirely in-house, others are evaluated by a combination of in-house and selected external reviewers, while yet others are subject to the full external peer review technique (with due regard for conflict-of-interest and protection of proposal information), such as by mail or through assembled panels. The final decisions are made by a NASA selecting official. A proposal, which is scientifically and programmatically meritorious, but not selected for award during its initial review, may be included in subsequent reviews unless the proposer requests otherwise.

(k) **Selection for Award.**

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

(2) When a proposal is selected for award, negotiation and award will be handled by the procurement office in the funding installation. The proposal is used as the basis for negotiation. The contracting officer may request certain business data and may forward a model award instrument and other information pertinent to negotiation.

(l) **Additional Guidelines Applicable to Foreign Proposals and Proposals Including Foreign Participation.**

(1) NASA welcomes proposals from outside the U.S. However, foreign entities are generally not eligible for funding from NASA. Therefore, unless otherwise noted in the NRA, proposals from foreign entities should not include a cost plan unless the proposal involves collaboration with a U.S. institution, in which case a cost plan for only the participation of the U.S. entity must be included. Proposals from foreign entities and proposals from U.S. entities that include foreign participation must be endorsed by the respective government agency or funding/sponsoring institution in the country from which the foreign entity is proposing. Such endorsement should indicate that the proposal merits careful consideration by NASA, and if the proposal is selected, sufficient funds will be made available to undertake the activity as proposed.

(2) All foreign proposals must be typewritten in English and comply with all other submission requirements stated in the NRA. All foreign proposals will undergo the same evaluation and selection process as those originating in the U.S. All proposals must be received before the established closing date. Those received after the closing date will be treated in accordance with paragraph (g) of this provision. Sponsoring foreign government agencies or funding institutions may, in exceptional situations, forward a proposal without endorsement if

endorsement is not possible before the announced closing date. In such cases, the NASA sponsoring office should be advised when a decision on endorsement can be expected.

(3) Successful and unsuccessful foreign entities will be contacted directly by the NASA sponsoring office. Copies of these letters will be sent to the foreign sponsor. Should a foreign proposal or a U.S. proposal with foreign participation be selected, NASA's Office of External Relations will arrange with the foreign sponsor for the proposed participation on a no-exchange-of-funds basis, in which NASA and the non-U.S. sponsoring agency or funding institution will each bear the cost of discharging their respective responsibilities.

(4) Depending on the nature and extent of the proposed cooperation, these arrangements may entail:

(i) An exchange of letters between NASA and the foreign sponsor; or

(ii) A formal Agency-to-Agency Memorandum of Understanding (MOU).

(m) **Export Control Guidelines Applicable to Proposals Including Foreign Participation.** Proposals including foreign participation must include a section discussing compliance with U.S. export laws and regulations, e.g., 22 CFR Parts 120-130 and 15 CFR Parts 730-774, as applicable to the circumstances surrounding the particular foreign participation. The discussion must describe in detail the proposed foreign participation and is to include, but not limited to, whether or not the foreign participation may require the prospective proposer to obtain the prior approval of the Department of State or the Department of Commerce via a technical assistance agreement or an export license, or whether a license exemption/exception may apply. If prior approvals via licenses are necessary, discuss whether the license has been applied for or if not, the projected timing of the application and any implications for the schedule. Information regarding U.S. export regulations is available at <http://www.pmdtc.org> and <http://www.bxa.doc.gov>. Proposers are advised that under U.S. law and regulations, spacecraft and their specifically designed, modified, or configured systems, components, and parts are generally considered "Defense Articles" on the United States Munitions List and subject to the provisions of the International Traffic in Arms Regulations (ITAR), 22 CFR Parts 120-130.

(n) **Cancellation of NRA.** NASA reserves the right to make no awards under this NRA and to cancel this NRA. NASA assumes no liability for canceling the NRA or for anyone's failure to receive actual notice of cancellation.

(o) **Data Policy.** NASA's policy is to work cooperatively with other U.S. government agencies and our international partners in the development of a comprehensive capability to observe and understand the Earth. In addition, both National and NASA policy require NASA to support private-sector investment in commercial space activities by committing the U.S. government to purchase commercially available goods and services. NASA will not develop a mission that in any significant way competes with or duplicates commercially available goods or services from U.S. industry.

APPENDIX C
PROPOSAL COVER SHEET AND REQUIRED CERTIFICATIONS, DISCLOSURES,
AND ASSURANCES

The proposal cover sheet will be created by the e-Book for each mini-solicitation. Proposers shall complete one proposal cover sheet for each proposal.

A printed and signed copy is required with the postal submission for each proposal.

The finished cover sheet will include the information shown in the sample. The format may vary slightly.



Proposal Cover Sheet

Proposal Number: _____

Date: ___/___/_____

Name of Submitting Institution:

Congressional District:

Proposal Title:

Certification of Compliance with Applicable Executive Orders and US Code

By submitting the proposal identified in this *Cover Sheet/Proposal Summary* in response to this Research Announcement, the Authorizing Official of the proposing institution (or the individual proposer if there is no proposing institution) as identified below:

- certifies that the statements made in this proposal are true and complete to the best of his/her knowledge;
- agrees to accept the obligations to comply with NASA award terms and conditions if an award is made as a result of this proposal; and
- confirms compliance with all provisions, rules, and stipulations set forth in the two Certifications contained in this NRA [namely, (i) *Assurance of Compliance with the NASA Regulations Pursuant to Nondiscrimination in Federally Assisted Programs, and (ii) Certifications, Disclosures, And Assurances Regarding Lobbying and Debarment & Suspension*].

Willful provision of false information in this proposal and/or its supporting documents, or in reports required under an ensuing award, is a criminal offense (U.S. Code, Title 18, Section 1001).

NASA PROCEDURE FOR HANDLING PROPOSALS

This proposal shall be used and disclosed for evaluation purposes only, and a copy of this Government notice shall be applied to any reproduction or abstract thereof. Any authorized restrictive notices that the submitter places on this proposal shall also be strictly complied with. Disclosure of this proposal for any reason outside the Government evaluation purposes shall be made only to the extent authorized by the Government.

| | |
|--|--|
| Principal Investigator Name: Organization: Department: Mailing Address: City, State Zip: Telephone Number: Fax Number: Email Address: Principal Investigator Signature: <hr/> Date: | Authorized Institutional Official Name: Organization: Department: Mailing Address: City, State Zip: Telephone Number: Fax Number: Email Address: Authorized Institutional Official Signature: <hr/> Date: |
|--|--|

Co-Investigator (Co-I):

| Name | Telephone | Email | Institution | Address |
|------|-----------|-------|-------------|---------|
| | | | | |

Budget:

| | | |
|-------|---|-------|
| Year | 1 | _____ |
| | 2 | _____ |
| Total | | _____ |

Assurance of Compliance with the NASA Regulations Pursuant to Nondiscrimination in Federally Assisted Programs

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), Title IX of the Education Amendments of 1972 (20 U.S.C. 1680 et seq.), Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), and the Age Discrimination Act of 1975 (42 U.S.C. 16101 et seq.), and all requirements imposed by or pursuant to the Regulation of the National Aeronautics and Space Administration (14 CFR Part 1250) (hereinafter called "NASA") issued pursuant to these laws, to the end that in accordance with these laws and regulations, no person in the United States shall, on the basis of race, color, national origin, sex, handicapped condition, or age be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity for which the Applicant receives federal financial assistance from NASA; and hereby give assurance that it will immediately take any measure 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 NASA, 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 NASA.

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 NASA, 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 on the Proposal Cover Sheet above are authorized to sign on behalf of the Applicant.

NASA FORM 1206 JUN 2001 PREVIOUS EDITIONS ARE OBSOLETE

CERTIFICATIONS, DISCLOSURES, AND ASSURANCES REGARDING LOBBYING AND DEBARMENT & SUSPENSION

1. LOBBYING

As required by Section 1352, Title 31 of the U.S. Code, and implemented at 14 CFR Part 1271, as defined at 14 CFR Subparts 1271.110 and 1260.117, with each submission that initiates agency consideration of such applicant for award of a Federal contract, grant, or cooperative agreement exceeding \$ 100,000, the applicant must **certify** that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit a Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

2. GOVERNMENTWIDE DEBARMENT AND SUSPENSION

As required by Executive Order 12549, and implemented at 14 CFR 1260.510, for prospective participants in primary covered transactions, as defined at 14 CFR Subparts 1265.510 and 1260.117—

(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 by any Federal department 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 public transaction; violation of Federal or State antitrust statutes 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 this 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.

**APPENDIX D
BUDGET SUMMARY**

The offeror shall complete a budget summary for each proposal in the e-Book for each mini-solicitation. The sample below shows how the summary generated by the e-Book may appear. Please note that the exact format is subject to change over the lifetime of this solicitation.

BUDGET SUMMARY

For period from _____ to _____

- Provide a complete Budget Summary for year one and separate estimated for each subsequent year.
- Enter the proposed estimated costs in Column A (Columns B & C for NASA use only).
- Provide supporting data detailing computations of all estimates in each cost category with narratives as required to fully explain each proposed cost.

| | A | NASA USE ONLY B | C |
|---|----------|----------------------|----------|
| 1. <u>Direct Labor</u> (salaries, wages, and fringe benefits) | _____ | _____ | _____ |
| 2. <u>Other Direct Costs:</u> | | | |
| a. Subcontracts | _____ | _____ | _____ |
| b. Consultants | _____ | _____ | _____ |
| c. Equipment | _____ | _____ | _____ |
| d. Supplies | _____ | _____ | _____ |
| e. Travel | _____ | _____ | _____ |
| f. Other | _____ | _____ | _____ |
| 3. <u>Indirect Costs*</u> | _____ | _____ | _____ |
| 4. <u>Other Applicable Costs</u> | _____ | _____ | _____ |
| 5. <u>SUBTOTAL – Estimated Costs</u> | _____ | _____ | _____ |
| 6. <u>Less Proposed Cost Sharing (if any)</u> | _____ | _____ | _____ |
| 7. <u>Total Estimated Costs</u> | _____ | _____ | XXXXXXXX |
| 8. APPROVED BUDGET | XXXXXXXX | XXXXXXXX | _____ |

*Facilities and Administrative Costs

The table below identifies the components of the budget summary and the required supporting data. Acceptable formats for supporting data include PDF (preferred), Microsoft Excel, Microsoft Word, and WordPerfect, with narrative as required to fully explain each proposed cost.

| Component | Required supporting data |
|------------------------|---|
| Direct Labor | List the titles of personnel, amounts of time to be devoted to the project, rates of pay, and total cost. |
| Subcontracts | Describe the work to be subcontracted, estimated dollar amount, recipient (if known), and the reason for subcontracting. |
| Consultants | Identify consultants to be used, why they are necessary, the time they will spend on the project, and rates of pay (not to exceed the equivalent of the daily rate for Level IV of the Executive Schedule, exclusive of expenses and indirect costs). |
| Equipment | List items costing more than \$5000, including a description of the item and how it will be used in the conduct of the proposed effort. |
| Supplies | Provide the estimated cost. List categories where costs are significant. |
| Travel | Describe the purpose of the proposed travel, including destination and number of travelers where known. No costs for participation in the annual Earth Science Technology Conference should be included in the proposal. Travel expenses for non-government participants will be provided to those awardees selected to participate. |
| Other Direct Costs | Provide an itemized list of these costs. |
| Indirect costs | Identify the Facilities and Administrative (F&A) cost rate(s) and base(s) as approved by the cognizant Federal agency, including the effective period of the rate. |
| Other applicable costs | Identify and explain the need for each item. |
| Cost sharing | If cost sharing is based on specific cost items, identify each item and amount. |

APPENDIX E REPORTING REQUIREMENTS

All status information, presentation material, and report deliverables applicable to this AIST Master NRA shall be submitted using the e-Book accessible via <http://esto.nasa.gov>. All submissions shall be made in PDF (preferred), Microsoft Word, Microsoft Excel, Microsoft PowerPoint, or WordPerfect.

The following deliverables shall be required of awarded proposals. In cases where subcontract arrangements exist, consolidated project reports are the responsibility of the PI. In this context, “Annual” refers to a twelve-month task effort that commences at award.

I. Initial Plans and Reports

Within 15 days of award, the awardee shall prepare a project plan, an initial Quad Chart, and an initial TRL assessment. The initial Quad Chart and initial TRL assessment (and supporting data) shall be uploaded to the appropriate locations in the ESTO e-Book for the subject mini-solicitation.

The Quad Chart shall contain the following information:

1. First Quadrant: A visual, graphic, or other pertinent information
2. Second Quadrant: “Description and Objectives”
3. Third Quadrant: “Approach” and “Co-Is/Partners”
4. Fourth Quadrant: “Schedule and Deliverables”, “Applications/Missions”, and “Entry TRL”.

The Quad Chart shall be updated at least annually, more often if appropriate.

An initial TRL assessment, and the basis for that assessment, shall be provided for the critical technology developments of the activity. The TRL assessment shall be updated at least annually, more often if appropriate.

II. Quarterly Technical Reports

The quarterly technical report shall focus on the preceding three month’s efforts. Each report shall address:

- A. Technical status: The awardee shall summarize accomplishments for the preceding three months, including technical accomplishments (trade study results, requirements analysis, design, etc.), technology development results, and results of tests and/or demonstrations.
- B. Schedule status: The awardee shall address the status of major tasks and the variance from planned versus actual schedule, including tasks completed, tasks in process, tasks expected to complete later than planned, and tasks that are delayed in starting, with rationale for each, and recovery plans as appropriate.

Technical Reports shall be uploaded quarterly to the appropriate location in the ESTO e-Book for the subject mini-solicitation. Reports shall be submitted in PDF, Microsoft Word or PowerPoint compatible formats by the 10th of the required month, or the close of business of the first workday following the 10th if the 10th is on a weekend or a holiday. A

teleconference or brief meeting may be conducted between the ESTO and the awardee to review and discuss each report.

III. Interim Review

For activities equal to or greater than 12 months in duration, the awardee shall provide an Interim Review at the end of the first 6-month calendar period, commencing from the date of award. The awardee must provide a presentation summarizing the work accomplished and results leading up to this Interim Review and must:

- A. Describe the primary findings, technology development results, and technical status, e.g., status of elements, construction of breadboards or prototype implementations, results of tests and/or proof-of-concept demonstrations, etc.
- B. Describe the work planned for the remainder of the project and critical issues that need to be resolved to successfully complete the remaining planned work.
- C. Summarize the cost and schedule status of the project, including any schedule slippage/acceleration. A schedule milestone chart of all major task activities shall be created and maintained and shown at all reviews. A cost data sheet shall be created and maintained, showing total project costs committed, obligated, and costed, along with a graphical representation of the project cost run outs.

The ESTO will conduct the Interim Review via teleconference. The presentation provided at the review will constitute the Interim Report. The presentation shall be uploaded to the appropriate location in the ESTO e-Book at least two (2) working days prior to the review.

IV. Annual or Final Review

For activities equal to or greater than 18 months, the awardee shall provide an Annual Review at the end of the first 12-month calendar period, commencing from the date of award, and a Final Review at the completion of the activity. For activities shorter than 18 months, the awardee shall provide a single Final Review. The awardee shall provide a review summarizing the work accomplished and anticipated results at the end of the task. Each review must include:

- A. A description of the work accomplished and the results leading up to this review.
- B. A summary of the primary findings, technology development results, and technical status, e.g., status of elements, construction of breadboards or prototyping implementations, results of tests and/or demonstrations, etc. The PI may provide a laboratory demonstration, if appropriate, to show technical results and status.
- C. A summary of the cost and schedule status of the project *since inception*.
- D. The Final Review must provide conclusions of the work performed and make recommendations for follow-on activities that should be pursued, with estimates of the cost and schedule to achieve TRL 7 (see Appendix F for TRL definitions).

The ESTO will conduct the review at the PI's facility, or a mutually agreed to location, with length of presentation tailored, as appropriate, depending on the amount of work to be discussed. The Annual or Final Review should be comprehensive, and should include a discussion of the planned content of the written report. In addition to hard copy handouts at

the review, the review package shall be uploaded to the appropriate location in the ESTO e-Book at least two (2) working days prior to the review.

V. Annual or Final Report

The Annual or Final Report shall include the following:

- A. Results of all analyses, element, subsystem, or system designs, breadboards and/or prototyping implementations and designs.
- B. Performance analysis results of tests and/or demonstrations; estimation of reduction(s) in size, mass, power, volume and/or cost; improved performance; description of newly enabled capability; and documentation of technology dependencies.
- C. Tables, graphs, diagrams, curves, sketches, photographs and drawings in sufficient detail to comprehensively explain the results achieved.
- D. An updated TRL assessment, including a rough order of magnitude cost and a description and estimate of the duration of the follow-on activities necessary to achieve TRL 7.
- E. Updated Quad Chart.
- F. At the end of the period of performance, the awardee shall provide a final Accomplishments Quad Chart which contains the following information:
 1. First Quadrant: A visual, graphic, or other pertinent information
 2. Second Quadrant: “Description and Objectives”
 3. Third Quadrant: “Accomplishments”
 4. Fourth Quadrant: “Milestone Schedule”, “Entry TRL”, and “Exit TRL”.

The Annual or Final Report, updated Quad Chart or Accomplishments Quad Chart, and updated TRL assessment shall be uploaded to the appropriate locations in the ESTO e-Book within 10 days of the review.

VI. Annual Earth Science Technology Conference

If held, the awardee is encouraged to participate in an annual technology conference. The Earth Science Technology Conference is an opportunity for NASA planners, managers, technologists and scientists to review the research funded by the Earth Science Technology Office. It is also an opportunity for researchers from NASA, academia and industry to meet with their peers and to better understand NASA Earth Science requirements. *Travel expenses for non-government participants will be provided to those awardees selected to participate. Therefore, no costs for participation in the conference should be included in the proposal.* If selected for participation in the conference, the awardee should be prepared to make a presentation, provide a paper, or create a poster providing a description of the project, the objectives, approach, technical status, and schedule information.

APPENDIX F

DEFINITION OF TECHNOLOGY READINESS LEVELS

TRL 1 Basic principles observed and reported

Transition from scientific research to applied research. Essential characteristics and behaviors of systems and architectures. Descriptive tools are mathematical formulations or algorithms.

TRL 2 Technology concept and/or application formulated

Applied research. Theory and scientific principles are focused on specific application area to define the concept. Characteristics of the application are described. Analytical tools are developed for simulation or analysis of the application.

TRL 3 Analytical and experimental critical function and/or characteristic proof-of-concept

Proof of concept validation. Active Research and Development (R&D) is initiated with analytical and laboratory studies. Demonstration of technical feasibility using breadboard or brassboard implementations that are exercised with representative data.

TRL 4 Component/subsystem validation in laboratory environment

Standalone prototyping implementation and test. Integration of technology elements. Experiments with full-scale problems or data sets.

TRL 5 System/subsystem/component validation in relevant environment

Thorough testing of prototyping in representative environment. Basic technology elements integrated with reasonably realistic supporting elements. Prototyping implementations conform to target environment and interfaces.

TRL 6 System/subsystem model or prototyping demonstration in a relevant end-to-end environment (ground or space)

Prototyping implementations on full-scale realistic problems. Partially integrated with existing systems. Limited documentation available. Engineering feasibility fully demonstrated in actual system application.

TRL 7 System prototyping demonstration in an operational environment (ground or space)

System prototyping demonstration in operational environment. System is at or near scale of the operational system, with most functions available for demonstration and test. Well integrated with collateral and ancillary systems. Limited documentation available.

TRL 8 Actual system completed and "mission qualified" through test and demonstration in an operational environment (ground or space)

End of system development. Fully integrated with operational hardware and software systems. Most user documentation, training documentation, and maintenance documentation completed. All functionality tested in simulated and operational scenarios. Verification and Validation (V&V) completed.

TRL 9 Actual system "mission proven" through successful mission operations (ground or space)

Fully integrated with operational hardware/software systems. Actual system has been thoroughly demonstrated and tested in its operational environment. All documentation completed. Successful operational experience. Sustaining engineering support in place.

**APPENDIX G
ACRONYMS**

| | |
|------------|---|
| ADP..... | Automated Data Processing |
| AIST..... | Advanced Information Systems Technology |
| CFR..... | Code of Federal Regulations |
| Co-I..... | Co-Investigator |
| ESE | Earth Science Enterprise |
| ESTO..... | Earth Science Technology Office |
| F&A | Facilities and Administrative |
| FAR..... | Federal Acquisition Regulation |
| FCA..... | Full Cost Accounting |
| IT..... | Information Technology |
| ITAR | International Traffic in Arms Regulations |
| MB | Megabytes |
| MOU | Memorandum of Understanding |
| NAIS | NASA Acquisition internet Service |
| NASA..... | National Aeronautics and Space Administration |
| NFS | NASA FAR Supplement |
| NRA | NASA Research Announcement |
| OMB | Office of Management and Budget |
| PDF | Portable Document Format |
| PI..... | Principal Investigator |
| R&D..... | Research and Development |
| TRL..... | Technology Readiness Level |
| URL..... | Uniform Resource Locator |
| V&V..... | Verification and Validation |