

**National Aeronautics and
Space Administration**

Issued September 10, 2002

NRA-02-OES-04

RESEARCH ANNOUNCEMENT

**ADVANCED INFORMATION SYSTEMS TECHNOLOGY (AIST)
PROGRAM**

Proposals due November 8, 2002

OMB Approval No. 2700-0087

**ADVANCED INFORMATION SYSTEMS TECHNOLOGY
(AIST) PROGRAM**

**NASA Research Announcement
Soliciting Research Proposals
For
Period Ending
November 8, 2002**

**NRA 02-OES-04
Issued September 10, 2002**

**Office of Earth Science
National Aeronautics and Space Administration
Washington, DC 20546**

EARTH SCIENCE ENTERPRISE ADVANCED INFORMATION SYSTEMS TECHNOLOGY (AIST) PROGRAM

The National Aeronautics and Space Administration (NASA) announces the solicitation of proposals for focused technology development within the Advanced Information Systems Technology (AIST) Program in support of the Earth Science Enterprise (ESE). The AIST program seeks proposals for information systems technologies that will support and enhance the ESE science and applications objectives in the 21st century.

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.

I. 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) The NASA Earth Science Enterprise

The NASA ESE (<http://earth.nasa.gov/>) studies Earth as an interconnected system of atmosphere, oceans, continents and life to "understand and protect our home planet" and to "improve life here." 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. These observations and information are used by scientists to understand and answer major scientific questions, and by practitioners and policy makers to solve practical, societal problems and/or establish sound policy decisions. 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.

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. ESE technology programs that support this commitment include the Advanced

Component Technology (ACT) Program, the Computational Technologies (CT) Project, the Instrument Incubator Program (IIP), the New Millennium Program (NMP), and the AIST Program.

(b) AIST Program

Information Technology (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 (<http://esto.nasa.gov/programs/aist/>) 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 G 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.

II. NASA Research Announcement (NRA) Solicitation

(a) Background and Solicitation Justification

An initial AIST solicitation (NRA-99-OES-08) released in Fiscal Year 2000 emphasized on-board spacecraft technologies. Subsequent user community workshops and continued monitoring of ESE missions in the formulation or analyses stages have affirmed that several of these areas of space-based IT continue to be of interest to the ESE. Additionally, the ESE has been identifying technologies for the next generation ESE data and information system and high-end computing technologies for modeling.

(b) Proposal Research Topics

This NASA Research Announcement (NRA) solicits hardware and/or software technology proposals in any of the four topic areas cited below. For the purposes of this solicitation, all proposed technologies must have an entry TRL between 3 and 6 (see Appendix G for TRL definitions). *The entry TRL must be substantiated in the proposal.*

Testbeds needed for testing, verification, or validation of components, subsystems, and/or systems (both hardware and software) can be included and costed 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.

Topic Area 1: On-Board Data Processing

As computing architectures and environments increase in performance and flexibility, on-board processing for direct distribution of data products to users becomes more viable. Direct distribution of data products will in turn enable faster response to interesting or rare events, as well as to time-critical events such as natural disasters. Technologies that support the storage, handling, processing and distribution of sensor data on-board the spacecraft are sought. Examples include, but are not limited to:

- Memory and data storage technologies;
- High performance processing architectures, reconfigurable computing environments;
- On-board processing software tools such as Field Programmable Gate Array (FPGA) tool sets;
- High-speed intra-spacecraft communications bus; and
- Lossless and lossy data compression techniques for data storage and transmission.

Topic Area 2: Space-Based Communication Networks

A significant challenge for future earth observing satellites will be establishing and maintaining a viable communications network among constellations of satellites operating in diverse orbits. The AIST program will support applied research on space-based communications that supports data transfer from satellite to satellite, or from satellite to ground. Examples include, but are not limited to:

- Network infrastructure, autonomous network management, and network management tools; and
- Commercially compatible standards and protocols that will provide connectivity from scientist to instrument (end-to-end) and for distributed information systems in space.

Topic Area 3: Mission Automation

Mission automation technologies support all aspects of operating a scientific Earth observation platform, including space, airborne, or in situ. The technologies solicited would automate many aspects of the day-to-day operations activities to reduce the cost of operations and/or development time of information systems, or enable new observations and information products. Examples include, but are not limited to:

- Autonomous in situ data collection and management;
- Automated data system operation assessment and monitoring; and
- Seamless operation across heterogeneous space and ground elements.

Topic Area 4: High-end Computing Technologies for Modeling

ESE Modeling activities are becoming more data driven and compute intensive. Research is required to enable the efficient and transparent interaction of high-end computing models with observational data that may be archived in geographically distributed databases, with disparate formats and contents. Such data archives may hold petabytes of data in product specific formats, without any standard method for describing the data content or organization. Models may need to ingest data from several of these sources. Currently, modelers must manually perform the steps necessary to retrieve the data and convert data with varying formats and organizations into a form specific to the model ingest requirements. The goal of this technology area is to relieve the burden of locating, understanding, accessing and translating these data for model ingest purposes.

Sustainable and efficient performance of complex models on high-end computers remains a labor intensive task. There is a need for research in platform-independent software tools to assist the model developer in attaining and sustaining high throughput and efficiency on such complex models. In order for these tools to be effective they need to support parallel computing architectures, be able to process large amounts of data, and be developed from a user perspective. Examples include, but are not limited to:

- Optimized and automated access, transport, and translation of distributed data inputs for modeling including data mining, data subsetting, and data format conversion; and
- Optimization support for parallel architectures to process large data volumes and execute complex modeling applications, such as application performance evaluation.

(c) **Reference Source Material**

This NRA is 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, a review of the following source material is recommended:

- The ESE home page, available on the World Wide Web (WWW) at <http://earth.nasa.gov/>
- The new *NASA ESE Strategic Plan*, the *NASA ESE Research Strategy 2000-2010*, and the *NASA ESE Applications Strategy for 2002-2012*, <http://earth.nasa.gov/visions/>

- The Earth Science Technology Office (ESTO) home page, <http://esto.nasa.gov/>, is a source of information on the various elements of the Earth Science Technology Program, including ACT, AIST, CT, and IIP
- The AIST Capabilities and Needs database, <http://esto.nasa.gov/programs/aps/aistneeds2002.html>
- The *Report from the Earth Science Enterprise Computational Technology Requirements Workshop*, <http://esto.nasa.gov>

The following websites provide insights into current and future information system activities relevant to this NRA:

- Earth Observing System Data and Information System (EOSDIS), http://spsosun.gsfc.nasa.gov/eosinfo/EOSDIS_Site/index.html
- Earth Science Information Partners (ESIP) Federation, <http://esipfed.org/>
- NMP, <http://nmp.jpl.nasa.gov>
- Strategic Evolution of ESE Data Systems (SEEDS), <http://eos.nasa.gov/seeds/>
- Earth System Modeling Framework, <http://www.esmf.ucar.edu>

(d) Relationship to Other Solicitations

The ESE seeks to augment its information technology capabilities to improve acquisition of and access to data and information products for research, applications and education. To that end, ESE is sponsoring two solicitations – this AIST NRA and, concurrently, a Cooperative Agreement Notice (CAN), "Earth Science REASoN – Research, Education and Applications Solutions Network" (CAN-02-OES-01). Figure 1 illustrates the relationship between the two solicitations regarding subject area, and the purpose of the REASoN projects in relation to needs of the user community.

The REASoN CAN solicits proposals which will develop and demonstrate data products and/or information systems and services capabilities in support of the ESE Research, Applications, and Education goals, and which leverage or develop applicable advanced data systems technologies. REASoN projects are to generate science products, enable decision support systems, and support educational products that help the communities address known needs in the Earth science, applications and education communities. Furthermore, REASoN projects will embody Strategic Evolution of Earth Science Enterprise Data Systems (SEEDS) principles to promote the evolution of the ESE network of data systems and services providers over the next decade to ensure the timely delivery of ESE data at an affordable cost. In contrast, the AIST NRA solicits proposals for technology development in support of ESE information system needs in space-based processing, and high-end computing models. The NRA develops research that will support or enable on-board processing, space-based communication networks and more autonomous and distributed mission operations. The NRA also solicits tools to assist modelers in attaining high throughput and model efficiencies for high volume Earth science data models.

Investigators are strongly encouraged to review both solicitations and identify the appropriate mechanism before responding. Information on the REASoN CAN is to be available on-line at <http://research.hq.nasa.gov/research.cfm>. Questions regarding the REASoN CAN should be directed to the point of contact at NASA Headquarters listed in the CAN.

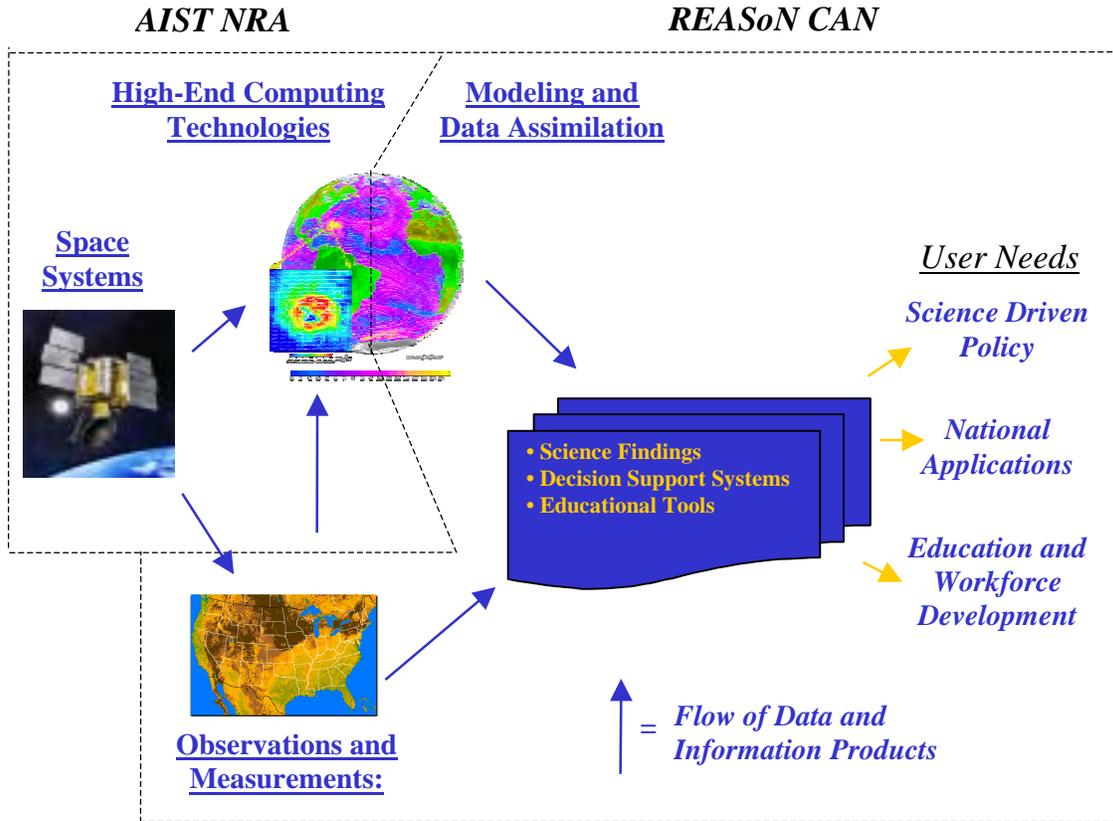


Figure 1. AISt NRA and REASoN CAN Realms

(e) Proposal TRL Requirements

For this solicitation, the entry TRL must be TRL 3 or greater. The proposer 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.

Over the duration of the research, the activity must advance by at least one 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.

Studies or developments within this NRA will be restricted to an exit TRL less than or equal to 7. These limitations naturally preclude end-to-end system testing or space qualification from being performed in the AIST Program.

(f) Funding

Funding for this NRA will limit the number and magnitude of the proposals awarded. The ESE expects that 15 to 20 proposals will be awarded, with values in the approximate range of \$150,000 to \$500,000 per year.

The U.S. Government's obligation to make awards is contingent upon the availability of appropriated funds from which payment for award purposes can be made and the receipt of proposals that are determined to be acceptable by the Government for award under this announcement. No additional funds above the initially specified award value will be available.

(g) Period of Performance

For this NRA, the Government will award contracts, grants, and cooperative agreements, as appropriate. For contracts, awards will be made for a two-year base period, with a one-year option. Grants and cooperative agreements will be awarded for the full period of performance, not to exceed three years, and are 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.

(h) Rights to Data

Proposers are encouraged to offer cost sharing. If a cost sharing arrangement is proposed, appropriate data rights that recognize the proposer's contributions as well as the Government's rights to access will be negotiated prior to award.

(i) Required Proposal Forms and Submission Process

Proposals should be prepared and submitted in accordance with specific information provided in Appendices A-H 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 instructions for proposal submission. Appendix D provides a sample of the proposal cover sheet, the list of required declarations, and information on requisite certifications and disclosures. Appendix E contains a budget summary worksheet with instructions for its use. Appendix F provides detailed reporting requirements for awardees. Appendix G defines the Technology Readiness Levels. Appendix H contains a list of acronyms. All proposals submitted to NASA in response to this announcement must have a completed signed cover sheet.

Selecting Official: Deputy Associate Administrator
Office of Earth Science
NASA Headquarters

Point of Contact for Program Planning and Solicitation:
Dr. Glenn E. Prescott, Program Coordinator
Office of Earth Science/Code YF
NASA Headquarters
Washington, DC 20546-0001
Tel: (202) 358-0886
Fax:(202) 358-2891
gprescot@hq.nasa.gov

Point of Contact for Implementation:
Steven A. Smith, Program Manager
Earth Science Technology Office
NASA Goddard Space Flight Center
Greenbelt, MD 20771
Tel.: (301) 286-7336
Fax: (301) 286-2756
steven.a.smith@gsfc.nasa.gov

Number of Copies: One printed, signed original plus five (5) paper copies and one magnetic or optical disk (Macintosh or IBM PC compatible format)

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

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

Submit Proposals to: ESE AIST NRA
NASA Peer Review Services, Code Y
500 E Street, SW, Suite 200
Washington, DC 20024-2760

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

(j) Selection Schedule

All proposals submitted in response to this announcement are due in accordance with the following schedule. Late proposals will not be considered.

A complete proposal schedule is given below:

| | |
|----------------------------------|--|
| Proposals due | November 8, 2002, no later than 5:00 p.m. Eastern time |
| Peer Review | November 25 – January 10, 2002 |
| Announcement of Final Selections | January 24, 2003 |

Potential proposers are strongly encouraged to review the NASA Cooperative Agreement Notice CAN-02-OES-01, "Earth Science REASoN – Research, Education and Applications Solutions Network," published concurrently with this announcement. This AIST NRA is research-oriented and intended for development of new technology for mission and super-computing data systems. The CAN focuses on technologies that are applicable to and that will be incorporated within projects to address known science and applications information requirements and Earth Science education needs. Review of both announcements will provide guidance on which opportunity best suits the proposer's interests.

Your interest and cooperation in participating in this opportunity are appreciated.

Ghassem R. Asrar
Associate Administrator for
Office of Earth Science

Enclosures:

- Appendix A. Specific Guidelines and Requirements for Proposers
- Appendix B. Instructions for Responding to NASA Research Announcements
- Appendix C. Instructions for Proposal Submission
- Appendix D. Proposal Cover Page and Required Certifications, Disclosures, and Assurances
- Appendix E. Budget Summary
- Appendix F. Reporting Requirements
- Appendix G. Definition of Technology Readiness Levels
- Appendix H. List of 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. Substantiated justification that the element, subsystem, or system analysis or technical development is at the appropriate level of readiness (TRL). A minimum entry TRL of 3 is required; a maximum exit TRL of 7 is permitted.
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 NRA website (<http://research.hq.nasa.gov>) for any updates to this NRA.

The technical proposal should 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 Proposal Cover Sheet and Certifications, as described in Appendix D.
- B. Appendix B, Paragraph (c)(3) Abstract. Provide an overall description of the proposal in abstract form, not to exceed 250 words.
- 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, and I.

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, which could utilize 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., reduction of 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 TRL levels throughout the proposed effort. See Appendix G for guidance on Technology Readiness Levels. The entry TRL of 3 or above must be substantiated in the proposal. *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.

- 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.*

Optionally, one-page resumes for Key Personnel may be supplied; these resumes 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. To assist in the selection process, proposals that include any U.S. Government costs must submit budgets that clearly

indicate the costs with and without FCA. 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 should be itemized in a manner similar to that specified in the subject paragraph. Proposed cost should not exceed six (6), non-reduced, typewritten pages, excluding those tables required in Appendix E Budget Summary. Supporting cost data is permitted in Microsoft Excel spreadsheet format. However, no imbedded, expandable tables are permitted in the spreadsheets.

A monthly cost phasing plan shall be submitted to facilitate award negotiation. The monthly cost phasing plan is included in the 6-page limit specified above.

- H. Appendix B, Paragraph (c)(8) Proposed Costs (U.S. Proposals Only), subparagraph (ii). Explanatory notes 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.
- J. Appendix B, Paragraph (e) Length. The maximum length of each proposal 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 resumes), Facilities and Equipment, and Special Matters sections. In other words, the whole proposal, excluding the Proposal Cover Sheet, Abstract and the Certifications required by Appendix D, Budget information, and optional resumes 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

The AIST program utilizes an electronic process for management of its program. This management approach requires that a proposing organization have Internet access and an e-mail address. Detailed instructions for proposal submission are provided in Appendix C.

B. Softcopy Data Formatting Requirements

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, WordPerfect, and Postscript. Budget and supporting cost information must be submitted in Excel spreadsheet format.
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 files submitted on magnetic or optical disk. 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 may be cause for rejection of the proposal.

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

ESE AIST NRA
NASA Peer Review Services, Code Y
500 E Street, SW, Suite 200
Washington, DC 20024-2760

The withdrawal notice must include the proposal number and title.

IV. Reporting Requirements

The following deliverables are required of awarded proposals:

- Initial Plans and Reports;
- Monthly Financial Reports;
- Quarterly Technical Reports;
- Interim Review;
- Annual and Final Review(s); and
- Annual and Final Report(s).

Detailed descriptions of these deliverables are provided in Appendix F. 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

NASA Federal Acquisition Regulation (FAR), Supplement (NFS) Part 1852.235-72 , Effective JANUARY 2000 (Modified)

(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 which apply only to proposals prepared in response to that particular announcement. These instructions contain the general proposal preparation information which 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. NASA will determine the appropriate 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) Proposal Guidance. 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).

(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. 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) 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. Unless otherwise specified in the NRA, effort should be made to keep proposals as brief as possible, concentrating on substantive material. Few proposals need exceed 15-20 pages. 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.

(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 Foreign Proposals and Proposals Including Foreign Participation. U.S. 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.

(End of provision)

APPENDIX C

INSTRUCTIONS FOR PROPOSAL SUBMISSION

Proposal submission is comprised of two parts: Internet submission and postal submission. The Internet submission requires that the cover sheet, abstract, and Full Cost Accounting (FCA) budget be submitted via the SYS-EYFUS website (<http://proposals.hq.nasa.gov/>). A printed signed original of the entire proposal, five (5) copies, and a magnetic or optical disk containing an electronic copy of the proposal must also be submitted via the postal service or equivalent means.

The first step in the submission process is to enter the Proposal Cover Sheet information via the SYS-EYFUS website. The resultant Cover Sheet and associated certifications must be printed and signed by the Principal Investigator (PI) and an official by title of the investigator's organization that is authorized to commit the organization. This authorizing signature also certifies that the proposing institution is in full compliance with the required certifications. These pages will not be counted against the page limit of the proposal.

This Appendix summarizes proposal submission requirements and instructions for SYS-EYFUS and postal submission.

I. SYS-EYFUS Submission

- A. Access the SYS-EYFUS website at <http://proposals.hq.nasa.gov/>
- B. If you obtained a UserID and password in the process of submitting a proposal for a previous research opportunity announcement, the same UserID and password can be used to complete the electronic proposal cover page in response to this research opportunity announcement. Be sure to click on "Edit Personal Information" if any of your contact information in the SYS-EYFUS is not current.

If you do not have a SYS-EYFUS UserID or password, you may obtain one electronically by performing the following steps:

1. Click the hyperlink for new user, which will take you to the Personal Information Search Page.
2. Enter your first and last name. SYS-EYFUS will search for your record information in the SYS-EYFUS database.
3. Enter your personal information as required in the registration form.
4. Select "submit", and a UserID and password will be e-mailed to you.

REGISTER EARLY. Information submitted to the SYS-EYFUS Web site is validated before being officially added to the database. *New users should*

allow two weeks for this validation to occur.

Note: all Co-Investigators (Co-I's) must obtain a UserID and password in order to be added to the Cover Page.

- C. Using your UserID and Password, login to the SYS-EYFUS Web site.
- D. The following items must be submitted via the SYS-EYFUS website. Follow the instructions provided on the SYS-EYFUS website for submission, taking note of additional instructions provided below:
 1. Proposal Cover Sheet
 - a) Enter all cover sheet information, including the specific topic addressed by the proposal, into the form and select the <Submit> button. *Note: Each proposal may address only one topic. **CLICK THE <SUBMIT> BUTTON ONLY ONCE.***
 - b) Print the resultant Cover Sheet to be signed and submitted with the official postal submission of the proposal.
NOTE: SUBMISSION OF THE ELECTRONIC COVER PAGE DOES NOT SATISFY THE DEADLINE FOR PROPOSAL SUBMISSION.
 2. Abstract
 3. Full Cost Accounting budget

Proposers who experience difficulty in using this site may contact the Help Desk at proposals@hq.nasa.gov (or call (202) 479-9376) for assistance. If you are unsure if your information has been successfully submitted, please call the Help Desk. Do NOT re-submit. The Help Desk will be able to promptly tell you if your submission has been received.

II. Postal Submission

- A. Components of Postal Submission. The postal submission includes one (1) complete original signed proposal, five (5) copies, and one (1) magnetic or optical disk (Macintosh or IBM PC compatible) containing the following separate files:
 1. Technical Proposal, including the items listed in Appendix A, Paragraph II (J);
 2. Budget Information, including costs with and without FCA (if required);
 3. Optional Supporting Cost Information; and
 4. Optional One-Page Resumes.

The original proposal must include a *signed cover page* and required certifications obtained from the SYS-EYFUS system. Acceptable formats for the technical proposal and optional resumes include PDF (preferred), Microsoft Word, WordPerfect, or PostScript. The format(s) chosen shall be indicated on the disk label. Budget and optional cost information shall be submitted in Microsoft Excel format. Other forms of submission such as facsimile or e-mail attachments are not acceptable.

- B. 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.
- C. 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:

ESE AIST NRA
NASA Peer Review Services, Code Y
500 E Street, SW, Suite 200
Washington, DC 20024-2760

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

The telephone number 202-479-9030 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 solicitation. Any proposal or portion of a proposal received after that specified date and time will not be considered.**

APPENDIX D

PROPOSAL COVER PAGE AND REQUIRED CERTIFICATIONS, DISCLOSURES, AND ASSURANCES



Proposal Cover Page

Proposal Number: _____

Date: ___/___/___

Name of Submitting Institution: _____

Congressional District: _____

Proposal Title: _____

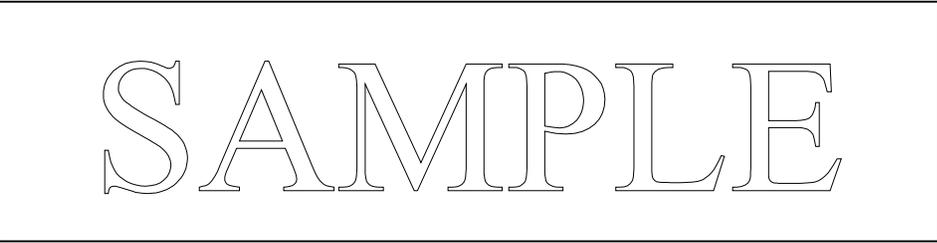
Name of Submitting Institution: _____

Congressional District: _____

Certification of Compliance with Applicable Executive Orders and US Code

By submitting the proposal identified in this Cover Page, the proposing institution as identified below:

- certifies that the statements made in this proposal are true and correct;
- agrees to accept the obligations to comply with all provisions of the Nondiscrimination in Federally Assisted Transactions Act (51 U.S.C. 50401-50405);
- certifies that the proposal does not contain any willful provision of false information in violation of 18 U.S.C. 1001.



...oser if there is no
...rsuant to
18, Section 1001).
...rized restrictive notices
...de only to the extent

This proposal shall be used and disclosed only for the purposes authorized by the Government.

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

Co-Investigator:

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

Budget:

| Year | |
|--------------|--|
| 1 | |
| 2 | |
| 3 | |
| 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.

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.

PROPOSAL SUMMARY (1-PAGE ONLY)

NASA Research Announcement 02-OES-04

For reference only – must be entered at <http://proposals.hq.nasa.gov/>

ABSTRACT: (Single-space, typed, maximum 250 words). Include: (a) Objectives and justification for work; (b) Accomplishments of prior work; (c) Outline of proposed work and methodology.

APPENDIX E

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 as attachments detailed computations of all estimates in each cost category with narratives as required to fully explain each proposed cost. See *Instructions For Budget Summary* on following page for details.

| | A | <u>NASA USE ONLY</u> | |
|---|---------|----------------------|----------|
| | | 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</u> (if any) | _____ | _____ | _____ |
| 7. <u>Total Estimated Costs</u> | _____ | _____ | XXXXXXXX |
| 8. APPROVED BUDGET | XXXXXXX | XXXXXXXX | _____ |

*Facilities and Administrative Costs.

INSTRUCTIONS FOR BUDGET SUMMARY

1. Direct Labor (salaries, wages, and fringe benefits): Attachments should list the number and titles of personnel, amounts of time to be devoted to the project, and rates of pay.
2. Other Direct Costs:
 - a. Subcontracts: Attachments should describe the work to be subcontracted, estimated amount, recipient (if known), and the reason for subcontracting.
 - b. 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).
 - c. Equipment: List items costing more than \$5,000, including a description of the item and how it will be used in the conduct of the basic research proposed.
 - d. Supplies: Provide general categories of needed supplies and the estimated cost.
 - e. Travel: Describe the purpose of the proposed travel, including information on destination and number of travelers where known.
 - f. Other: Enter the total of direct costs not covered by 2a through 2e. Attach an itemized list.
3. Indirect Costs*: Identify F&A cost rate(s) and base(s) as approved by the cognizant Federal agency, including the effective period of the rate.
4. Other Applicable Costs: Enter total explaining the need for each item.
5. Subtotal-Estimated Costs: Enter the sum of items 1 through 4.
6. Less Proposed Cost Sharing (if any): Enter any amount proposed. If cost sharing is based on specific cost items, identify each item and amount in an attachment.
7. Total Estimated Costs: Enter the total after subtracting items 6 from item 5.

* Facilities and Administrative (F&A) Costs

APPENDIX F

REPORTING REQUIREMENTS

All AIST NRA status information, presentation material, and report deliverables shall be submitted via the web-based ESTO Award Administration e-Book located at Universal Resource Locator (URL) <http://esto.reisys.com/>. All submissions shall be made in PDF (preferred) Microsoft Word, Microsoft Excel, Microsoft PowerPoint, WordPerfect, or Postscript.

The following deliverables shall be required of awarded proposals. In cases where subcontract arrangements exist, consolidated project reports, including financial reports, are the responsibility of the PI. In this context "Annual" refers to a calendar year task effort which 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 project plan, initial Quad Chart, and initial TRL assessment (and supporting data) shall be uploaded to the appropriate locations in the ESTO e-Book.

The project plan shall identify plans for all technical, schedule and resource activities for the proposed life of the project.

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-I's/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. Monthly Financial Reports

The financial status report shall provide monthly actuals and cumulative totals, and focus on the preceding month's efforts. Each report shall address:

- A. The variance of planned versus actual costs, and include work that has been completed and cost incurred by the project (should be traceable to the schedule), and
- B. The status of major procurements to date.

The monthly financial report shall be uploaded to the appropriate location in the ESTO e-Book by the 10th of each month, or the close of business of the first workday following the 10th if the 10th is on a weekend or a holiday.

III. 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 and expected to complete later than planned, tasks that are delayed 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. Reports shall be submitted in 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.

IV. Interim Review

The awardee shall provide an Interim Review at the end of the first 6-month calendar period, commencing from the date of award. Interim Reviews are required each year. 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.

V. Annual or Final Review

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. 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 the desired end state.

The ESTO office 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 also include a discussion of the planned content of the written report. In addition to hard copy handouts at the review, the review package shall also be uploaded to the appropriate location in the ESTO e-Book at least two (2) working days prior to the review.

VI. 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 of size, mass, power, volume, cost, improved performance, or 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.

VII. 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. 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 G

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 H

LIST OF ACRONYMS

| | |
|--------|---|
| ACT | Advanced Component Technology |
| ADP | Automated Data Processing |
| AIST | Advanced Information Systems Technology |
| CAN | Cooperative Agreement Notice |
| CFR | Code of Federal Regulations |
| Co-I | Co-Investigator |
| CT | Computational Technologies |
| DAAC | Distributed Active Archive Center |
| EOSDIS | Earth Observing System Data and Information System |
| ESE | Earth Science Enterprise |
| ESIP | Earth Science Information Partner |
| ESTO | Earth Science Technology Office |
| F&A | Facilities and Administrative |
| FAR | Federal Acquisition Regulation |
| FCA | Full Cost Accounting |
| FPGA | Field Programmable Gate Array |
| IIP | Instrument Incubator Program |
| IT | Information Technology |
| ITAR | International Traffic in Arms Regulations |
| MB | Megabytes |
| MOU | Memorandum of Understanding |
| NASA | National Aeronautics and Space Administration |
| NFS | NASA FAR Supplement |
| NMP | New Millennium Program |
| NRA | NASA Research Announcement |
| OES | Office of Earth Science |
| OMB | Office of Management and Budget |
| PDF | Portable Document Format |
| PI | Principal Investigator |
| R&D | Research and Development |
| REASoN | Research, Education and Application Solutions Network |
| SEEDS | Strategic Evolution of ESE Data Systems |
| TRL | Technology Readiness Level |
| URL | Universal Resource Locator |
| V&V | Verification and Validation |
| WWW | World Wide Web |