

**Next Generation Space Telescope Program**

**GUIDELINES AND CRITERIA FOR THE  
NEAR-INFRARED CAMERA (NIRCam)  
PHASE A CONCEPT STUDY**

**July 8, 2002**

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**GUIDELINES AND CRITERIA FOR THE  
NIRCam PHASE A CONCEPT STUDY**

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INTRODUCTION

The NIRCam concept study will constitute the investigation's requirements definition phase (Phase A) of the formulation sub-process as outlined in NPG 7120.5A, *NASA Program and Project Management Processes and Requirements*. The purpose of this concept study is to better define the investigation, its implementation requirements, and its risks, as well as to describe the detailed plans for including Canadian components in the NIRCam, education and public outreach, and small disadvantaged businesses.

The proposer shall investigate a NIRCam implementation.

Upon completion of the concept study, proposers will submit a Concept Study Report (CSR) for NASA review. The CSR is to be a self-contained document; that is, selected investigators should not assume that NASA reviewers will have seen or even have access to the original proposal. Please note that all program constraints, guidelines, definitions, and requirements given in the AO are still valid for the CSR except as noted herein.

Part I of this document discusses the criteria to be used by NASA for the evaluation of the CSR's. Part II provides guidance for preparation of the CSR's. Appendix A provides definitions of cost element terms used in the cost plan section of this document. Appendix B provides evaluation criteria, requirements, and guidelines for the Education and Public Outreach aspects of the CSR.

PART I - REVIEW CRITERIA

The NASA review of the Concept Study Report will be conducted in much the same fashion as the evaluation of the proposals as discussed in Section 5.0 of the AO. However, in addition to considering any changes to the science objectives from those in the phase one proposal, this review will consider, in detail, all factors related to the probability of success in developing the NIRCam and to the realism of the proposed costs to NASA. This review will also consider other factors that enhance the return on NASA's investment in the investigation such as education and public outreach, and small disadvantaged business activities. It is expected that plans for these elements of the investigations will be taken to the next level of detail and maturity along with the development of the science, engineering, management plans, and cost.

Successful development of the NIRCam demands, in addition to technical merit, that the investigation be achievable within the established constraints on cost and schedule. The information requested in Part II of this document will enable the review panel to determine how well the NIRCam team understands the complexity of its investigation, its technical risks, and any weaknesses that require specific action during Phase B.

The criteria for evaluating the concept study are as follows:

- Scientific merit of the proposed investigation
- Technical merit and feasibility of the proposed investigation
- Feasibility of the proposed approach for implementation, including cost risk
- Quality of plans for incorporating Canadian contributions
- Quality of plans for education and public outreach
- Quality of plans for small disadvantaged business activities and involvement of minority institutions.

The first two criteria are the same as described in Section 5.2 of the AO. The science objectives must not change from those given in the proposal. Any changes to science implementation will be carefully evaluated. If there are no substantive changes in the science implementation, then the scientific merit and the technical merit of the investigation will not be reviewed. Assuming that there are no changes to the proposed science or its implementation, the emphasis of the review will be on the other criteria, more fully described below. Of these criteria, the feasibility of proposed approach for implementation (which includes a detailed look at the technical feasibility of the science implementation) is of more importance than the combination of the other three criteria, which are of equal importance.

**Feasibility of the Approach to NIRCcam Implementation, including Cost Risk**

The information requested in Part II of this document will be used to evaluate the investigation in detail for the feasibility of its implementation. The feasibility criterion in the AO will be supplemented with the following considerations:

The review will consider the NIRCcam Instrument Development Team's (IDT) understanding of the processes, products, and activities required to accomplish development of all elements, the integration of all elements, and the adequacy of the approach including reserves and margins. The technical approach will be examined in its entirety to ensure that: (1) all elements and processes are addressed, (2) weaknesses and design issues are understood and plans for resolution have been identified, (3) fundamental design trades have been identified and studies planned and (4) primary performance parameters have been identified and minimum thresholds established. The overall approach (including schedule), the specific design concepts, and the known hardware/software will be evaluated for soundness, achievability, and maturity. Resiliency, design performance margins, and compatibility with ISIM and other NGST interface requirements (see Appendix C of the Announcement of Opportunity for NGST Flight Investigations AO-01-OSS-05) and schedules will be factors in this review. The IDT should indicate how their design might affect the other NGST instruments (e.g., available fields of view, thermal requirements, contamination, etc.). The IDT should address how developmental problems with new technology will be addressed in order to ensure success. The experience and expertise of the development organizations will be important factors in assessing the probability of success. Innovative cost effective features, processes, or approaches will be rewarded if proven sound.

The credibility and realism of the cost estimates and the planned financial resiliency will be evaluated. The underlying rationales for the cost estimates, including reserves, and the development schedule, including schedule margins, will be factors in this review. The IDT resource estimate must include margin and be within the resource constraints for the NGST Program (see Cost Estimating Relationships and Guidelines in Appendix C of the Announcement of Opportunity for NGST Flight Investigations AO-01-OSS-05). The IDT resource estimate must be reconciled with a NGST parametric cost estimate. The IDT will perform this reconciliation (to within 15%) together with the NGST parametric cost estimation team.

The information provided in the Management section should demonstrate the plans, processes, tools, and organization for managing and controlling the development and operation of the instrument development, including performance measurement and reporting. The soundness and completeness of the approach and the probability that the management team can assure success will be evaluated by reviewing the organizational structure (including roles, responsibilities, accountability, and decision making process) and the processes, plans, and strategies the team will use to manage the various instrument elements. Factors in this evaluation will include: clear lines of authority, clean interfaces, prudent scheduling and cost control mechanisms, review processes, and demonstrated awareness of all necessary management processes. The

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adequacy of the planned risk management activities and their associated budgets are also factored into this evaluation. Additional factors in the evaluation of the probability of instrument development success will include the experience, expertise, and commitment of key personnel and the organizations to which they are attached, the adequacy of facilities and equipment proposed for the task, the adequacy of the team's approach to risk management, and the adequacy of the management and control mechanism. Innovative management processes and plans will be rewarded if proven to be sound.

The completeness of the Phase B plans will be considered in determining the adequacy of the Phase B approach. This will include an evaluation of the activities/products, the organizations responsible for those activities/products, and the schedule to accomplish the activities/products.

### **Quality of Plans for Incorporating the Canadian Contribution**

The plan for including a Canadian Space Agency (CSA) provided contribution in the NIRCcam will be reviewed to determine the extent to which it meets the guidelines given in section 3.3 of the AO, provides clean hardware, software and management interfaces, and complies with International Trafficking in Arms Regulations (ITAR). In addition, the progress made in producing a memorandum of understanding, or contract with prospective Canadian suppliers will be judged.

### **Quality of Plans for Education and Public Outreach**

The investigation must include an Education/Public Outreach component as part of its Concept Study Report. The criteria to be used to evaluate the E/PO component is given in Appendix B of this document and described further in the document *Explanatory Guide to the NASA Office of Space Science Education and Public Outreach Evaluation Criteria* (April 1999) which may be found by linking through the Education and Public Outreach Web site at the URL <http://spacescience.nasa.gov> or through the SMEX library. See also section 3.9 of the AO, and section H and Appendix B of this document for further details on the E/PO requirements.

### **Quality of Plans for Small Disadvantaged Business Activities and involvement of Minority Institutions.**

The small disadvantaged business plan will be evaluated to determine the extent to which it meets the participation requirements and goals given in section XI of the AO. See section I3 of this document for further information.

PART II - REQUIRED QUANTITIES, MEDIA, FORMAT, AND CONTENT

An original and 25 copies of the Concept Study Report are required. An additional 25 copies of the Fact Sheet (see Section C, below) are required. In addition, a PDF version of the CSR is required. The required uniform format and contents are summarized below. Failure to follow this outline may result in reduced ratings during the evaluation process.

When changes have been made to any data provided with the original proposal as a result of the concept study, these changes from the proposal should be clearly identified. The content of each requirement is discussed in the subsequent paragraphs. Note that all program constraints, guidelines, requirements, and definitions given in the AO are still valid for the Concept Study Report except as noted herein.

[NOTE: foldout pages shall not exceed 28 x 43 cm; i.e., 11 x 17 inches]. Three-ring binders may be used.

- A foldout page counts as one page
- All pages other than foldout pages shall be 8.5 x 11 inches or A4 European Standard
- Single- or double-column format is acceptable.
- In complying with the page limit, no page may contain more than 45 lines of text and the type font must not be smaller than 12-point except within figures and tables, where the type font must not be smaller than 10-point.

The following page limits apply:

<b>Section</b>	<b>Page Limit</b>
A. Cover Page and Investigation Summary	no page limit (be brief)
B. Table of Contents	2
C. Fact Sheet	2
D. Executive Summary	5
E. Science Investigation (changes highlighted)	65
F. Technical Approach	No page limit (be brief)
G. Management Plan	No page limit (be brief)
H. Education, Public Outreach Plans	No page limit (be brief)
I. Technology, and Small Disadvantaged Business Plans	2
J. Phase B Plan	10
K. Cost Plan for Phases B through E	No page limit, but data must be presented in formats described; be brief
L. Appendices (No other appendices permitted) Statement(s) of Work for Each Contract Option Data Management Plan Any Incentive Plan(s) Any NASA PI Proposing Team Technical Content of Any International Agreements Discussion on Compliance with U.S. Export Laws and Regulations – Update from Proposal Acronyms List Reference List (Optional)	No page limit, but small size encouraged

A. COVER PAGE AND INVESTIGATION SUMMARY

A Cover Page and Investigation Summary must be a part of the CSR document, but will not be counted against the page limit. It must be signed by the Principal Investigator. Create a custom cover page that contains the following information. The full names of the Principal Investigator and the authorizing official, their addresses with zip code, telephone and fax numbers, and electronic mail addresses, are required, as well as the names, institutions, and E-mail addresses of all participants, the total NASA OSS Cost, and a 200-word Summary.

B. TABLE OF CONTENTS

The CSR shall contain a table of contents that parallel the outline provided in Sections C through K below.

C. FACT SHEET

A Fact Sheet that provides a brief summary of the investigation must be included. The information conveyed on the Fact Sheet should include the following: science objectives (including the importance of the science to the NASA science themes), instrument overview, instrument development management (including teaming arrangement as known), major elements of the E/PO program, schedule, and cost estimate. Other relevant information, including figures or drawings, may be included at the IDT's discretion. The Fact Sheet is restricted to two pages (preferably a double-sided single sheet).

D. EXECUTIVE SUMMARY

The Executive Summary is to be a summary of the contents of the CSR and is to include an overview of the baseline investigation including its scientific objectives, the technical approach, management plan, cost estimate, education and public outreach, Canadian participation plan, technology, and small disadvantaged business plans. The Executive Summary should be no more than five pages in length.

E. SCIENCE INVESTIGATION

This section shall describe the science investigation resulting from the Concept Study. Any de-scoping of, or changes to, the investigation from the baseline and minimum science success criteria defined in the proposal must be identified and the rationale for the change(s) given. Changes may be highlighted in bold with column marking for easy identification or may be provided in a change matrix giving the original (proposed) requirement, the new requirement, rationale for the change, and its location within the CSR. If there are no changes, this section must be repeated identically from the proposal with a statement that there are no changes.

Special attention should be given to assuring that both the planning and resources are adequate to analyze, interpret, all the data produced by the instrument commissioning

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and calibration activities. Resources include cost, schedule, and work-hours for scientific interpretation of results and publication.

The study should clearly identify the science impacts resulting from a U.S. only NIRCcam should a Canadian contribution not materialize.

F. TECHNICAL APPROACH

The Technical Approach section should detail the method and procedures for investigation definition, design, development, testing, integration, and instrument commissioning. A discussion of all new/advanced technologies planned for the investigation should be provided and include backup plans with scheduled decision criteria if those technologies cannot be made ready. This section should also detail the expected products and end items associated with each phase. The IDT has the freedom to use their own processes, procedures, and methods. The use of innovative processes, techniques, and activities by IDTs in accomplishing their objectives is encouraged when cost, schedule, technical improvements, and risk containment can be demonstrated. The benefits and risks, if any, of any such processes and products should be discussed. This section must be complete in itself without the need to request additional data, although duplications may be avoided by reference to other sections of the CSR if necessary.

1. Technical Approach Overview. This section should provide a brief overview of the technical approach including its key challenges.
2. Instrumentation Details. This section should describe the NIRCcam. Highlight any changes to the instrument or its performance since submission of the proposal. Information pertinent to the accommodation of the instrumentation in the Integrated Science Instrument Module (ISIM) should also be included. In particular, compliance with the NIRCcam Interface Requirements must be demonstrated. (see the NGST AO Library [<http://www.ngst.nasa.gov/cgi-bin/doc?Id=871>] for the NIRCcam Interface Requirements Document). Subsystem characteristics and requirements should be described. Such characteristics include: mass, volume, and power requirements; pointing requirements; new developments needed; and a space qualification plan. Include where appropriate: block diagrams, layouts, calibration plans, operational and control considerations, and software development. Any design features incorporated to effect cost savings should be identified. A summary of the resource elements of the instrument design concept, including key margins, should be provided. The rationale for margin allocation should be provided. Those design margins that are driving costs should be identified.
3. NIRCcam Integration. This section should characterize the interface between the instruments and the ISIM. These include, but are not limited to: volumetric envelope, fields of view, weight, power requirements, thermal requirements, command and telemetry requirements, sensitivity to or generation of contamination (e.g., electromagnetic interference, gaseous

effluents, etc.), data processing requirements, as well as the planned process for physically and analytically integrating them with the ISIM. The testing strategy of the NIRCcam, prior to integration with the ISIM, should be discussed.

4. Canadian Component Integration. This section should characterize the interface between the Canadian supplied components and those from the U.S. partner(s). These include, but are not limited to: volumetric envelope, weight, power requirements, thermal requirements, command and telemetry requirements, sensitivity to or generation of contamination (e.g., electromagnetic interference, gaseous effluents, etc.), data processing requirements, as well as the planned process and schedule for physically and analytically integrating them within the NIRCcam. The testing strategy of the Canadian components, prior to integration with the NIRCcam, should be discussed
5. Manufacturing, Integration, and Test. This section should describe the manufacturing strategy to produce, test, and verify the hardware/software necessary to develop the NIRCcam. It should include a description of the main processes/procedures planned in the fabrication of flight hardware, software, production personnel resources, incorporation of new technology/materials, and the preliminary test and verification program. The environmental tests planned should be discussed and test margins and durations for the environmental test program specified. Part burn-in requirements that will be used for the program should also be defined. Describe the approach for transitioning from design to manufacturing and specify data products that will be used to assure producibility and adequate tooling availability.

The approach, techniques, and facilities planned for integration, test and verification consistent with the schedule and cost, should be described. A preliminary schedule for manufacturing, integration, and test activities should be included. A description of the planned end items, including engineering and qualification hardware, should be included.

6. Flight Software and Data Systems. Describe the software design heritage and software development approach and its relationship to the NGST flight system software development
7. Facilities. Provide a description of any new, or modifications to existing, facilities, laboratory equipment, and ground support equipment (GSE) (including those of the team's contractors and those of NASA and other U.S. Government agencies) required to execute the investigation. The outline of new facilities and equipment should also indicate the lead time involved and the planned schedule for construction, modification, and/or acquisition of the facilities.

8. Product Assurance, Mission Assurance and Safety. This section should describe the process by which the product quality is assured to meet the customer's specifications, including identification of trade studies, the parts selection strategy, and the plans to incorporate new technology. This section should also describe the product assurance plan, including plans for problem/failure reporting, inspections, quality control, parts selection and control, reliability, safety assurance, and software validation. In addition, investigators should be aware of mission assurance topics of recent Agency-level special emphasis for all NASA missions. Such topics include Red Team Reviews, subsystem-level Failure Mode Effects Analysis, and Probabilistic Risk Assessment with its subset of analysis tools, Continuous Risk Management, and Software Independent Verification and Validation.

## G. MANAGEMENT PLAN

This section sets forth the investigator's approach for managing the work, including the E/PO portion of the program, the recognition of essential management functions, and the overall integration of these functions. This section should specifically discuss the decision-making process to be used by the team, focusing particularly on the roles of the Principal Investigator and Project Manager in that process. The management plan gives insight into the organizations proposed for the work, including the internal operations and lines of authority with delegations, together with internal interfaces and relationships with NASA, CSA, major subcontractors, and associated investigators. It also identifies the institutional commitment of all team members (including team members responsible for E/PO), and the institutional roles and responsibilities. The use of innovative processes, techniques, and activities by mission teams in accomplishing their objectives is encouraged; however, they should be employed only when cost, schedule, or technical improvements can be demonstrated and specific enabling assumptions are identified.

1. Team Member Responsibilities. This section should describe the roles, responsibilities, time commitment, and experience of all team member organizations and key personnel such as E/PO personnel, with particular emphasis placed on the responsibilities assigned to the Principal Investigator, the Project Manager, and other key personnel. In addition, information should be provided which indicates what percentage of time key personnel will devote to the NIRCams, the duration of service, and how changes in personnel will be accomplished. (Note: The experience of the PI and science team members does not need to be included in this section since that is addressed in the science investigation section.)
  - a. Organizational Structure. The management organizational structure of the investigation team must be described in the CSR. A Work Breakdown Structure (WBS) must be provided. The CSR must describe the responsibilities of each team member organization and its contributions to the investigation. Each key position, including its roles and responsibilities, how each key position fits into the organization, and the basic

qualifications required for each position, must be described. A discussion of the unique or proprietary capabilities that each member organization brings to the team, along with a description of the availability of personnel at each partner organization to meet staffing needs should be included. The contractual and financial relationships between team partners should be discussed.

Summarize the relevant institutional experience in this section, and refer to supporting detail included in Section K2, Relevant Experience and Past Performance. If experience for a partner is not equivalent to, or better than, the requirements for the NIRCcam, explain how confidence can be gained that the investigation can be accomplished within cost and schedule constraints.

- b. Experience and Commitment of Key Personnel. Provide a history of experience explaining the relationship of the previous experience to each key individual's role; include the complexity of the work and the results.
  - i. Principal Investigator. The role(s), responsibilities, and time commitment of the Principal Investigator should be discussed.
  - ii. Project Manager. The role, responsibilities, time commitment, and experience of the Project Manager should be discussed.
  - iii. Other Key Personnel. The roles, responsibilities, time commitments, and experience of other key personnel in the investigation including Co-Investigators should be described.
2. Management Processes and Plans. This section should describe the management processes and plans necessary for the logical and timely pursuit of the work (including E/PO), accompanied by a description of the work plan. This section should also describe the methods of hardware and software acquisition. The management processes which the investigator team uses, including the relationship between organizations and key personnel should be discussed, including the following, as applicable: systems engineering and integration; requirements development; configuration management; schedule management; team member coordination and communication; progress reporting, both internal and to NASA; performance measurement; and resource management. This discussion should include all phases of the instrument development including preliminary analysis, technical definition, the design and development, and operations phases, along with the expected products and results from each phase. Unique tools, processes, or methods that will be used by the investigation team should be clearly identified and their benefits discussed. All project elements should be covered to assure a clear understanding of project-wide implementation.
3. Schedules. The schedule and workflow for the complete instrument development should be clearly defined, and the method and tools to be used for internal review, control, and direction discussed. Schedules for all major

activities, interdependencies between major items, deliveries of end items, critical paths, schedule margins, and long-lead procurement needs (defined as hardware procurements required before the start of Phase C/D) should be clearly identified and discussed.

4. Risk Management. This section should describe the approach to, and plans for, risk management to be taken by the team, both in the overall instrument design and in the individual systems and subsystems. Plans for using standard risk management tools, especially fault tree analysis, probabilistic risk assessments, and failure modes and effects analyses, should be described. Particular emphasis should be placed on describing how the various elements of risk, including new technologies used, will be managed to ensure successful delivery of the NIRCam within cost and schedule constraints. Investigations dependent on new technology will be penalized for risk if adequate plans to ensure success of the investigation are not described. The top 3 risks and their mitigation plans should be discussed.

A summary of reserves in cost and schedule should be identified by Phase and project element and year and the rationale for them discussed. The specific means by which integrated costs, schedule, and technical performance will be tracked and managed should be defined. Specific reserves and the timing of their application should be described. Management of the reserves and margins, including who in the management organization manages the reserves and when and how the reserves are released, should be discussed. This should include the strategy for maintaining reserves as a function of cost-to-completion. All funded schedule margins should be identified. The relationship between the use of such reserves, margins, potential de-scope options, and their effect on cost, schedule, and performance should be fully discussed. When considering potential de-scope options, consider the investigation as a total system including operations.

- . Discuss how any new or advanced technology relates to the proposed investigation, including: (1) the technology readiness level (TRL) maturation plan(s) and (2) insertion of technology into the project. The functions that the new or advanced technology performs and how it will be demonstrated for the investigation should be described. The IDT should be aware of an NGST Program requirement that all mission enabling technologies must be demonstrated at TRL 6 by the time of the NGST Non-Advocate Review (NAR). Reports must show a credible plan for meeting this schedule requirement.
5. Government Furnished Property, Services, Facilities, etc. This section should clearly delineate the Government-furnished property, services, facilities, etc. required to accomplish all phases of the NIRCam development and delivery.

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6. CSA Furnished Property, Services, Facilities, etc. This section should clearly delineate the CSA-furnished property, services, facilities, etc. required to accomplish all phases of the NIRCcam development and delivery.
7. Reviews. This section should list the planned major project reviews during the NIRCcam development and the approximate time frame of each. The objective of each review should be indicated. The ISIM Project Office will chair systems-level reviews. Allowance should also be made for government-initiated independent assessment reviews, such as Confirmation Assessments, Independent Annual Reviews and Red Team Reviews. It should be noted that regular reviews of the progress of the E/PO component of the missions should be held in the same way that progress on the scientific and technical aspects are reviewed.
8. Reporting. This section should clearly describe the approach to reporting progress to the Government and indicate the progress reviews the Government is invited to attend to provide independent oversight. The process, including the individual or organization responsible for reporting integrated cost, schedule, and technical performance should be discussed. A description of the information to be presented should be included. Planned project status reporting should include quarterly presentations to the NGST Program, monthly status reporting to the ISIM Project Office.

## H. EDUCATION AND PUBLIC OUTREACH PLAN

The education and public outreach plan should provide a summary of the benefits offered by the NIRCcam beyond the scientific benefits brought by obtaining and analyzing the desired scientific data.

- Education and Public Outreach Activities. This section should build upon and extend the discussion of E/PO activities given in the proposal. The concept study should explicitly demonstrate how the Principal Investigator and his/her Team intend to realize the goals of the OSS education and public outreach strategy as reflected in the implementation plan for that strategy. It should contain a description of E/PO objectives and the planned activities to be undertaken to achieve those objectives; demonstrate how those plans will actually be implemented (including a timeline for the execution of the of the E/PO program); discuss how the program will be evaluated; describe the intended involvement of the Principal Investigator and or key science team members in the E/PO effort; address the involvement of educational personnel as well as plans/commitments for partnerships and collaborations with education and outreach organizations; describe how the effort will be organized and managed (including the identification of key personnel who will be actually responsible for overseeing and implementing the E/PO effort); and explain the requested E/PO budget (including expenditures for Co-Is and subcontractors) showing how that budget is related to and supports the planned program. Where appropriate reference may be made to budget

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information contained in Section J.5. Plans for developing and disseminating education/outreach products and materials, for contributing to the training of underserved and/or underutilized groups in science and technology, and for coordination of the planned E/PO program with other OSS-sponsored education and outreach programs should be addressed. The relationship of the planned E/PO program to any unique scientific or technical aspects of the mission should also be discussed. Details of organizational and management arrangements described in the “Management Plan” may be included by reference and do not have to be repeated in this section of the concept study. Letters of support/commitment from partners/subcontractors and resumes of key E/PO personnel should be included in the appendices to the concept study report. See Appendix B of this document for additional information about the OSS E/PO program, detailed criteria to be used to evaluate the “quality of plans for education and public outreach”, and assistance available to help develop the E/PO portion of the concept study and to identify suitable opportunities for partnerships with the E/PO community.

I. SMALL AND DISADVANTAGED BUSINESS PLAN

Small Disadvantaged Business and Other Minority Institutions. A summary plan is required specifying the proposed investigation’s commitment to meet NASA’s SDB and other minority institution participation goals as described in Section XI of Appendix A of the AO. In addition, as also specified in Appendix A, subcontracting plans will be required to execute the contract option for investigation implementation.

J. TECHNICAL DEFINITION (PHASE B) PLAN

This section should describe the plans and products for the technical definition phase (Phase B) of the Project. This section should identify the key engineering tradeoffs and options to be investigated during the Phase B and should identify those issues, technologies, and decision points critical to NIRCcam success. These plans should include a detailed schedule and define the products (including a Project Plan) and the schedule for their delivery.

K. COST PLAN

The cost plan should provide information on the anticipated costs for phases B through E for the preferred baseline launch date. A detailed cost proposal with cost or pricing data as defined in FAR 15.401 is required for Phases B/C/D/E. A discussion of the basis of estimate should be provided with a discussion of heritage and commonality with other programs. Quantify and explain any cost savings that result from heritage. All costs, including all contributions made to the investigation, should be included. The IDT should complete a summary of total cost by fiscal year as shown in **Figure 1**, Total NIRCcam Cost Funding Profile. The purpose of this summary is to present all costs for the project *on one page*, by project phase (B through E), by participating

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organization, and by fiscal year. If obligation authority in excess of identified costs is required, the proposal must also indicate the authority needed by year.

In addition, for each phase of the investigation (B, /C/D, and E) a Time Phased Cost Breakdown for each Work Breakdown Structure (WBS) element, as shown in **Figure 2**, should be completed. Use only the line items shown in Figure 2 that are relevant for each phase of the project. The purpose of this set of Figures is to provide detailed insight into how the project allocates funding during each phase of work.

The cost of the entire project, expressed in Real Year dollars, should be summarized on one page, and presented in the format shown in **Figure 3**. The purpose of Figure 3 is to (1) provide detailed insight into project costs by cost element and (2) provide a basis for comparison of the project proposed cost with the evaluation team's independent cost analysis. Identify each reserve amount to the lowest level consistent with the proposed reserve management strategy. For example, if each subsystem manager will have spending authority over a reserve for the subsystem, each such amount should be identified separately. If more convenient, the reserve details may be shown in a separate table, with totals reported as shown in Figure 3. Show costs for all development elements by recurring and non-recurring components in the format of **Figure 4**. Show costs (NASA OSS and contributed) associated with each Co-Investigator in the format of **Figure 5**.

The CSR should include a list of all contributions provided by non-OSS NASA Centers, including Civil Servant services, as well as the cost for the use of Government facilities and equipment on a full-cost accounting basis. All direct and indirect costs associated with the work performed at NASA Centers should be fully costed and accounted for in the proposal and summarized using the template provided in **Figure 6**. The purpose of this data is twofold: 1) to determine those costs that are included in the NASA OSS cost but are not funded out of the NGST program, and 2) to determine civil service contributions that are not included in the NASA OSS cost. The IDT should work with the NGST Program Office to develop estimates for these costs.

Note that the definitions for cost element terms shown in the cost figures are given in Appendix A of this document. This is not to be confused with the elements of the cost listed in 1.e below.

The inflation index provided in Appendix B (Table B-6) of the AO should be used to calculate all real-year dollar amounts, unless an industry forward pricing rate is used. If something other than the provided inflation index is used, the rates used should be documented.

All costs shall include all burdens and profit/fee in real-year dollars by fiscal year, assuming the inflation rates used by NASA (provided above) or specifically identified industry forward pricing rates. Cost and pricing data must be in accordance with the definitions in FAR 15.401

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1. Definition, Design, and Development (Phase B/C/D) Cost Proposal. This section provides a detailed cost proposal for performing Phase B/C/D. The cost proposal should correlate with the plans set forth in the Science, Technical Approach, and Management sections of the concept study
  - a. Work Breakdown Structure. A Work Breakdown Structure (WBS) should be included for Phase B/C/D. The structure of the WBS should be consistent with the plans set forth in the Technical Approach and Management sections of the concept study and the Statement of Work provided as an Appendix to the concept study. The WBS shall be described to the subsystem level. All other elements of the WBS should be to the major task level (e.g., Project Management, Systems Engineering, Ground Support Equipment).
  - b. Workforce Staffing Plan. Provide a workforce staffing plan that is consistent with the Work Breakdown Structure. This workforce staffing plan should include all team member organizations, by organization, and should cover all management, technical (scientific and engineering), and support staff. The workforce staffing plan should be phased by fiscal year. Time commitments for the Principal Investigator, Project Manager, Co-Investigators, and other key personnel should be clearly shown.
  - c. Proposal Pricing Technique. Describe the process and techniques used to develop the Phase B/C/D cost proposal. For portions of the cost proposal developed using a grass-roots methodology, provide the bases from which the estimates were derived and details on how the estimates were extrapolated from the bases. For portions of the cost proposal derived from vendor quotes/historical actuals/catalogue prices/etc. include sufficient information to understand the fidelity of the values. For portions of cost the proposal derived from analogies, describe the value of and the methodology for extrapolating the analogy. For portions of the cost proposal derived parametrically, provide a description of the cost-estimating model(s) and techniques used in the Phase B/C/D cost estimate. Discuss the heritage of the models and/or techniques applied to this estimate, including any known differences between missions contained in the model's data base and key attributes of the proposed mission. Include the assumptions used as the basis for the Phase B/C/D cost and identify those which are critical to cost sensitivity in the investigation. If any "discounts" were assumed in the cost estimates for business practice initiatives or streamlined technical approaches, describe how these have been incorporated in the cost estimate and will be managed by the investigation team.
  - d. Phase B/C/D Time-Phased Cost Summary. Provide a summary of the total Phase B/C/D costs consistent with Figure 2. The Phase B/C/D cost summary should be developed consistent with the Work Breakdown Structure and should include all costs to NASA OSS along with all contributed costs. The Phase B/C/D time phased cost summary should be phased by fiscal year.

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- e. Elements of Cost Breakdown. To effectively evaluate the Phase B/C/D cost proposals, NASA requires cost or pricing data as defined in FAR 15.401 and supporting evidence stating the basis for the estimated costs by the WBS levels used in Figure 2. This information is in addition to that provided in Figure 1-6. The proposal will include, but is not limited to the following elements of cost:
  - i. Direct Labor Cost and Hours by Labor Category.
    - (1) Explain the basis of labor-hour estimates for each of the labor classifications.
    - (2) State the number of productive work-hours per month.
    - (3) Provide a schedule of the direct labor rates used in the proposal. Discuss the basis for developing the proposed direct labor rates for the team member organizations involved; the forward-pricing method (including midpoint, escalation factors, anticipated impact of future union contracts, etc.); and elements included in the rates, such as overtime, shift differential, incentives, allowances, etc.
    - (4) If available, submit evidence of Government approval of direct labor rates for proposal purposes for each labor classification for the proposed performance period.
    - (5) If Civil Servant labor is to be used in support of the Phase B/C/D study, but is not to be charged directly to the investigation, then this labor must be considered as a contribution by a domestic partner, subject to the same restrictions as other contributions by domestic or foreign partners. A discussion of the source of funding for the Civil Servant contributions must be provided.
  - ii. Direct Material. Submit a summary of material and parts costs for each element of the WBS.
  - iii. Subcontracts. Identify fully each effort (task, item, etc. by WBS element) to be subcontracted, and list the selected or potential subcontractors, locations, amount budgeted/proposed, and types of contracts. Explain the adjustments, if any, and the indirect rates (or burdens) applied to the subcontractors' proposed amounts anticipated. Describe fully the cost analysis or price analysis and the negotiations conducted regarding the proposed subcontracts.
  - iv. Other Direct Costs.
    - (1) Travel, Relocation, and Related Costs. Provide a summary of the travel and relocation costs including the number of trips, duration, and purpose of the trips.
    - (2) Computer. Provide a summary of all unique computer-related costs.
    - (3) Consultants. Indicate the specific task area or problem requiring consultant services. Identify the proposed consultants, and state the quoted daily rate, the estimated number of days, and associated costs (such as travel), if any. State whether the consultant has been compensated at the quoted rate for similar services performed in connection with Government contracts.



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initiatives or streamlined technical approaches, describe how these have been incorporated in the cost estimate and will be managed by the investigation team.

- c. Workforce Staffing Plan. Provide a workforce staffing plan (including civil service) which is consistent with the Work Breakdown Structure. This workforce staffing plan should include all team member organizations and should cover all management, manufacturing, technical (scientific and engineering), and support staff. The workforce staffing plan should be phased by fiscal year. Time commitments for the Principal Investigator, Co-Investigators, Project Manager, and other key personnel should be clearly shown.
  - d. Phase E Time-Phased Cost Summary. Provide a summary of the total Phase E costs consistent with Figure 2. The Phase E cost summary should be developed consistent with the Work Breakdown Structure and should include all costs to NASA OSS, along with all contributed costs. The Phase E time phased cost summary should be phased by fiscal year.
  - e. Elements of Cost Break Down. Provide cost or pricing data as defined in FAR 15.401 and supporting evidence stating the basis for the estimated cost including but not limited to the elements of cost described under section K.1.e above.
4. Total Cost Estimate. This section should summarize the estimated costs to be incurred in Phases B through E including: Technical Definition (Phase B); Design and Development Phase (Phase C/D); Operations and Data Analysis Phase (Phase E); and cost of activities associated for social or educational benefits (if not incorporated in any of Phases A through E). Figure 1 should be used to summarize these costs. The total cost estimate should be developed consistent with the Work Breakdown Structure. Detailed plans for any aspects of the NIRCcam not discussed elsewhere in the CSR should be discussed here. Contributions not included in the NASA OSS cost should be clearly identified as separate line items.
  5. Total E/PO Cost Estimate: This section should summarize the estimated costs to be incurred in Phases B through E of the investigation for the E/PO component. And provide supporting budget and workforce details using the E//PO budget and workforce templates contained in Appendix B. This summary should be consistent with and relate directly to the top-level E/PO budget lines in Figures 1-6 as appropriate and describe how these costs relate to the activities, products, programs, partnership arrangements, etc., defined in Section H.

**FIGURE 1**  
**TOTAL COST FUNDING PROFILE TEMPLATE**  
 (FY costs\* in Real Year Dollars, Totals in Real Year and FY 2002 Dollars)

Item	FY1	FY2	FY3	FY4	FY5	FYn	...	Total (Real Yr.)	Total (FY 2002)
Phase B	\$	\$	\$	\$	\$	\$	\$	\$	\$
- Organization A									
- Organization B									
- etc.									
Phase C/D	\$	\$	\$	\$	\$	\$	\$	\$	\$
- Organization A									
Phase E									
- Organization A									
E/PO	\$	\$	\$	\$	\$	\$	\$	\$	\$
Other (specify)									
<b>NASA OSS Cost</b>	\$	\$	\$	\$	\$	\$	\$	\$	\$
Contributions by Organization (Non-U.S. or U.S.) to:									
Phase B	\$	\$	\$	\$	\$	\$	\$	\$	\$
- Organization A									
Phase C/D	\$	\$	\$	\$	\$	\$	\$	\$	\$
- Organization A									
Phase E									
- Organization A									
E/PO,	\$	\$	\$	\$	\$	\$	\$	\$	\$
Other									
<b>Contributed Costs (Total)</b>	\$	\$	\$	\$	\$	\$	\$	\$	\$
<b>Totals</b>									\$

\* Costs should include all costs including fee

**FIGURE 2**

(Phased costs in Real Year Dollars, Totals in Real Year and FY2002 Dollars)

<b>TIME PHASED COST BREAKDOWN BY WBS AND MAJOR COST CATEGORY</b>					
<b>WBS/Cost Category Description</b>	<b>FY1</b>	<b>FY2</b>	<b>...</b>	<b>Total (RY\$)</b>	<b>Total (FY2002\$)</b>
<b>Total Direct Labor Cost</b>	\$	\$	\$	\$	\$
WBS 1.0 Management					
WBS 2.0 Instrument					
WBS 2.1 Optics					
WBS 2.2 Mechanisms					
etc.					
<b>Total Subcontract Costs</b>	\$	\$	\$	\$	\$
WBS # and Description					
:					
etc.					
<b>Total Materials &amp; Equipment Cost</b>	\$	\$	\$	\$	\$
WBS # and Description					
:					
etc.					
<b>Total Reserves</b>	\$	\$	\$	\$	\$
WBS # and Description					
:					
etc.					
<b>Total Other Costs</b>	\$	\$	\$	\$	\$
WBS # and Description					
:					
etc.					
Fee					
E/PO					
Other (Specify)					
<b>Total Contract Cost</b>	\$	\$	\$	\$	\$
<b>Total Other Costs to NASA OSS</b>	\$	\$	\$	\$	\$
Other (Specify)					
<b>Total Contributions (Non-U.S. or U.S.)</b>	\$	\$	\$	\$	\$
Organization A:					
WBS # and Description					
etc.					
Organization B:					
WBS # and Description					
etc.					
<b>TOTAL COST FOR PHASE</b>	\$	\$	\$	\$	\$

**Figure 3** Fiscal Year Costs in Fiscal Year 2002 Dollars (to nearest thousand)

(Totals in Real Year and Fiscal Year 2002 Dollars)

<b>Cost Element</b>	FY1	FY2	FY3	...	FYn	Total (FY2002\$)	Total (RYS)
Phase B							
Reserves							
<b>Total Phase B</b>							
Phase C/D							
NIRCam							
Instr Integ, Assy & Test							
<i>Subtotal - Instrument</i>							
Proj Mgmt Analysis/Sys Eng							
Science Team Support							
E/PO							
Other							
<i>Subtotal Phase C/D before Reserves</i>							
Instrument Reserves							
Other Reserves							
<b>Total Phase C/D</b>							
Phase E							
MO&DA							
E/PO, Other*							
<i>Subtotal Phase E before Reserves</i>							
Reserves							
<b>Total Phase E</b>							
Launch Services							
<b>Total NASA OSS Cost</b>	\$	\$	\$	\$	\$	\$	\$
Contributions*							
Total Contributions	\$	\$	\$	\$	\$	\$	\$
<b>Total Cost</b>							\$

\*Specify each item on a separate line; include Education & Public Outreach, facilities, etc.

**Figure 4**  
 Phase C/D Development Costs  
 in Real Year Dollars (to nearest thousand)

<b>Cost Element</b>	Non-Recurring	Recurring	Total (RY\$)	Total (FY2002\$)
Instrument				
Structure and Mechanisms				
Subsystem n				
Any other elements (specify)*				
<b>Total NASA OSS Development Cost</b>				

\* Specify by subsystem/components where possible

**FIGURE 5  
CO-INVESTIGATOR COMMITMENT AND COST  
FUNDING PROFILE TEMPLATE**

(FY costs in Real Year Dollars, Totals in Real Year and FY2002 Dollars)

	Phase B	Phase C/D	Phase E	Total (Real Year)	Total (FY 2002)
<b><i>NASA OSS Cost</i></b>					
Co-I #1 Name/Organization					
Percent Time					
Cost					
Co-I #2 Name/Organization					
Percent Time					
Cost					
Co-I #n Name/Organization					
Percent Time					
Cost					
<b>Total NASA OSS Co-I Cost</b>					
<b><i>Contributions</i></b>					
Co-I #1 Name/Organization					
Percent Time					
Cost					
Co-I #2 Name/Organization					
Percent Time					
Cost					
Co-I #n Name/Organization					
Percent Time					
Cost					
<b>Total Contributed Co-I Cost</b>					

**FIGURE 6**  
**NASA CIVIL SERVICE COSTS**  
**FUNDING PROFILE TEMPLATE**  
(FY costs in Real Year Dollars, Totals in Real Year and FY2002 Dollars)

Item	FY1	FY2	FY3	FY4	FY5	FYn	...	Total (Real Yr.)	Total (FY 2002)
Workforce	\$	\$	\$	\$	\$	\$	\$	\$	\$
- NASA Center A									
- NASA Center B									
- etc.									
Facilities	\$	\$	\$	\$	\$	\$	\$	\$	\$
- NASA Center A									
E/PO, Other*	\$	\$	\$	\$	\$	\$	\$	\$	\$
- NASA Center A									
<b>NASA Civil Service Costs included in NASA OSS Cost</b>	\$	\$	\$	\$	\$	\$	\$	\$	\$
<b>Contributions by NASA Centers</b>									
Workforce	\$	\$	\$	\$	\$	\$	\$	\$	\$
- NASA Center A									
- NASA Center B	\$	\$	\$	\$	\$	\$	\$	\$	\$
- etc.	\$	\$	\$	\$	\$	\$	\$	\$	\$
Facilities									
- NASA Center A									
E/PO, Other*									
- NASA Center A									
<b>Contributed NASA Civil Service costs</b>	\$	\$	\$	\$	\$	\$	\$	\$	\$
<b>Totals</b>									\$

\*Specify each item on a separate line.

L. APPENDICES

The following additional information is required to be supplied with the Concept Study Report. This information can be included as Appendices to the CSR, and, as such, will not be counted within the specified page limit.

1. Statements of Work for each Contract Option. Provide draft Statement(s) of Work for all potential contracts with NASA. These Statement(s) of Work should (as a minimum) be for each contract option (i.e., Phase B/C/D, and Phase E) and clearly define all deliverables (including science data) for each option, potential requirements for Government facilities and/or Government services, and a schedule for the entire NIRCам effort.
2. Data Management Plan A Data Management Plan is required.
3. Incentive Plan(s). Draft Incentive Plans (if applicable) should be included with the concept study. Incentive Plans should outline contractual incentive features for all major team members. Incentive Plans should include both performance and cost incentives, as appropriate.
4. NASA PI Proposing Teams. The same guidelines as in AO Appendix B apply.
5. International Agreement(s). Draft International Agreement(s) are required for all non-U.S. partners in the investigation. A sample agreement is available at [http://explorer.larc.nasa.gov/explorer/LOA\\_Template.pdf](http://explorer.larc.nasa.gov/explorer/LOA_Template.pdf). The draft language should include (i) a brief summary of the foreign partner's role in the NIRCам, (ii) a list of NASA's responsibilities within the partnership, and (iii) a list of the non-U.S. partner's responsibilities within the partnership. Note that NASA prefers to establish agreements with government funding agencies, not with the institution which will be funded to perform the work.
6. Discussion on Compliance with U.S. Export Laws and Regulations. Provide an update to the discussion in the proposal. Investigations that include international participation, either through involvement of non-U.S. nationals and/or involvement of non-U.S. entities must include a section discussing compliance with U.S. export laws and regulations; e.g., 22 CFR 120-130, et seq. and 15 CFR 730-774, et seq., as applicable to the scenario surrounding the particular international participation. The discussion must describe in detail the proposed international participation and is to include, but not be limited to, whether or not the international participation may require the 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 through Internet URLs <http://www.pmdtc.org> and <http://www.bxa.doc.gov>. IDTs are advised that under

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U.S. law and regulation, spacecraft and their specifically designed, modified or configured systems, components, parts, etc., such as the instrumentation being sought under this AO, are generally considered “Defense Articles” on the United States Munitions List and subject to the provisions of the International Traffic in Arms Regulations, 22 CFR 120-130, et seq.

7. Acronyms List.
8. References List (Optional) Concept studies may provide, as an appendix, a list of reference documents and materials used in the concept study. The documents and materials themselves cannot be submitted, except as a part of the concept study.

APPENDIX A

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PROGRAM COST ELEMENT DEFINITIONS

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**Introduction**

This is a short dictionary of definitions for the cost elements shown in the figures and tables and discussed in the body of this *Criteria and Guidelines for Concept Study* document.

**Project Management/Mission Analysis/Systems Engineering**

Project management costs include all efforts associated with project level planning and directing of prime and subcontractor efforts and interactions, as well as project-level functions such as quality control and product assurance. Mission Analysis includes preflight trajectory analysis and ephemeris development. Systems engineering is the project-level engineering required to ensure that all satellite subsystems and payloads function properly to achieve system goals and requirements. This cost element also includes the data/report generation activities required to produce internal and deliverable documentation.

**Instruments**

Instrument costs include costs incurred to design, develop and fabricate the individual scientific instruments or instrument systems through delivery of the instruments to the spacecraft for integration. Costs for instrument integration, assembly, and test are to be shown separately from instrument development. Costs incurred for integration of the instruments to the ISIM are included in the Integration, Assembly & Test cost element (see below).

**Integration, Assembly & Test (IA&T)**

Integration, assembly and test is the process of integrating all instrument subsystems and into a fully tested, operational ISIM Element. The total cost of IA&T for a satellite includes research/requirements specification, design and scheduling analysis of IA&T procedures, ground support equipment, systems test and evaluation, and test data analyses. Typical satellite system tests include thermal vacuum, thermal cycle, electrical and mechanical functional, acoustic, vibration, electromagnetic compatibility/interference, and pyroshock.

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### **Launch Checkout & Orbital Operations**

Launch checkout and orbital operations support costs are those involving pre-launch planning, launch site support, launch-vehicle integration (spacecraft portion), and the first 30 days of flight operations.

### **Pre-Launch Science Team Support**

Includes all Phase B/C/D (pre-launch) support costs for the science team. (See MO&DA below for post-launch component.)

### **Mission Operations and Data Analysis (MO&DA)**

This cost element refers only to Phase E (post-launch) and has two major components: Mission Operations and Data Analysis. Mission operations comprises all activities required to plan and execute the science objectives, including spacecraft and instrument navigation, control, pointing, health monitoring, and calibration. Data analysis activities include collecting, processing, distributing and archiving the scientific data. MO&DA costs include post-launch all costs for people, procedures, services, hardware and software to carry out these activities. It includes post-launch science team support costs.

### **Education and Public Outreach**

Includes all costs associated with developing and implementing the proposed project's programs for education and public outreach.

### **Project-Unique Facilities**

If the proposed project requires construction or lease of any ground facilities, include here only the portion of costs to be borne by the proposed project, with description of the nature and extent of any cost-sharing arrangements assumed.

### **Reserves**

In that NASA maintains no reserves for missions, reserves should include those project funds that are not allocated specifically to estimated resources, but are held against contingencies or underestimation of resources to mitigate the investigation risk. Reserves should be reported according to the proposed reserve management strategy. For example, if the reserve is divided into funds to be pre-allocated to the flight system and instrument payload, with another portion held at the project level, specific dollar amounts to fund each must be identified.

### **NASA Center Costs (all categories)**

Additional costs borne by the program for NASA Center participation. For example, there may be additional program management/systems engineering costs, above those incurred by the spacecraft prime contractor, which are due to NASA employee participation. These costs must be reported on a full-cost accounting basis.

## APPENDIX B

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EDUCATION/PUBLIC OUTREACH  
EVALUATION CRITERIA AND PROPOSAL PREPARATION

---

The education and public outreach (E/PO) element of the proposal should provide a summary of the benefits offered by the investigation beyond the purely scientific benefits. This section of the proposal should contain a description of E/PO objectives and the planned activities to be undertaken to achieve those objectives; demonstrate how those plans will actually be implemented; discuss how the program will be evaluated; describe the intended involvement of the Principal Investigator and or key science team members in the E/PO effort; address the involvement of educational personnel as well as plans/commitments for partnerships and collaborations with education and outreach organizations; describe how the effort will be organized and managed (including the identification of key personnel who will be actually responsible for overseeing and implementing the E/PO effort); and explain the requested E/PO budget showing how that budget is related to and supports the planned program. Plans for developing and disseminating education/outreach products and materials, for contributing to the training of underserved and/or underutilized groups in science and technology, and for coordination of the planned E/PO program with the umbrella NGST E/PO program should be addressed. Details of organizational and management arrangements described in the Management and Cost Plan may be included by reference and do not have to be repeated in this section of the proposal. Letters of support/commitment from partners and resumes of key E/PO personnel should be included in the appendices to the proposal.

Based on the funding guidelines given elsewhere in this AO, the E/PO programs submitted by PI Instrument proposals in response to this Announcement may involve the expenditure of substantial resources. It is generally expected that such E/PO programs will have a breadth and depth commensurate with these resources; will be multifaceted in nature; address a number of different aspects of education and outreach contained in the specific criteria; and have state, regional, or national scope. However, the umbrella GSFC NGST E/PO program is already planning and implementing a number of national efforts. Therefore, the E/PO programs associated with PI Instrument proposals may be more focused and regional in nature and will be judged accordingly.

I. EVALUATION CRITERIA.

There are nine evaluation criteria against which proposed OSS mission E/PO activities will be evaluated—four general criteria, four specific criteria, and one mission criterion.

The general criteria to be applied to the evaluation of all such proposals and that reflect requirements necessary for further consideration of a proposal, are:

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- The quality, scope, and realism of the proposed E/PO program including the adequacy, appropriateness, and realism of the proposed budget;
- The capability and commitment of the proposer and the proposer's team and the direct involvement of one or more science team members in overseeing and carrying out the proposed E/PO program;
- The establishment or continuation of effective partnerships with institutions and/or personnel in the fields of education and/or public outreach as the basis for and an integral element of the proposed E/PO program;
- The adequacy of plans for evaluating the effectiveness and impact of the proposed education/outreach activity.

To ensure that the goals and objectives of the OSS E/PO strategy are realized in practice, proposals will also be evaluated using one or more of the following specific criteria as appropriate. The specific E/PO criteria are:

- For proposals dealing directly with or strongly affecting the formal education system (e.g., through teacher workshops or student programs carried out at informal education institutions such as science museums and planetariums), the degree to which the proposed E/PO effort is aligned with and linked to nationally recognized and endorsed education reform efforts and/or reform efforts at the state or local levels;
- The degree to which the proposed E/PO effort contributes to the training of, involvement in, and broad understanding of science and technology by underserved and/or underutilized groups;
- The potential for the proposed E/PO activity to expand its scope by having an impact beyond the direct beneficiaries, reaching large audiences, being suitable for replication or broad dissemination, or drawing on resources beyond those directly requested in the proposal.
- Plans for coordination of the proposed activities with the umbrella NGST E/PO program will also be explicitly considered in the evaluation process.

The mission criterion to be explicitly considered as part of the evaluation of the E/PO component of all proposals is:

- The relationship of the planned E/PO program to any unique scientific or technical aspects of the mission.

In all cases, note that while creativity and innovation are certainly encouraged, neither of these sets of criteria focuses on the originality of the proposed effort. Instead, NASA seeks assurance that the proposer is personally committed to the E/PO effort and the PI and/or appropriate research team members will be actively involved in carrying out a meaningful, effective, credible, and appropriate E/PO activity; that such an activity has been thoughtfully planned and will be carefully executed; and that the proposed investment of resources will make a significant contribution toward meeting OSS E/PO plans and objectives. OSS wants to see E/PO handled just as thoroughly and professionally as are the scientific and engineering aspects of OSS missions.

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To aid proposers in the preparation of their proposals, as well as to ensure that reviews are carried out on a consistent basis aligned with the OSS Education Strategy and Implementation Plan, an Explanatory Guide to the E/PO evaluation criteria has been prepared and may be found by linking through Education and Public Outreach at the Web site <http://www.space.science.nasa.gov>.

## II. ASSISTANCE FOR THE PREPARATION OF E/PO PROPOSALS.

NASA OSS has established a nation-wide Support Network of space science education/public outreach groups whose purpose is to directly aid space science investigators in identifying and developing high quality E/PO opportunities. This support network provides the coordination, background, and linkages for fostering partnerships between the space science and E/PO communities, and the services needed to establish and maintain a vital national, coordinated, long-term OSS E/PO program. Of particular interest are two elements of this network (which are also described in more detail in the OSS education/outreach implementation plan referred to above):

- Four OSS science theme-oriented E/PO “Forums” are sponsored by NASA OSS to help orchestrate and organize in a comprehensive way the education/outreach aspects of OSS space science missions and research programs, and provide both the space science and education communities with ready access to relevant E/PO programs and products; and
- Five regional E/PO “Broker/Facilitators” are sponsored by NASA OSS to search out and establish high leverage opportunities, arrange alliances between educators and OSS supported scientists, and help scientists turn results from space science missions and programs into educationally appropriate activities suitable for regional and/or national dissemination.

Prospective proposers are strongly encouraged to make use of these groups to help identify suitable E/PO opportunities and arrange appropriate alliances. However, while these Forums and Broker/Facilitators are commissioned by OSS to provide help, the responsibility for actually developing an E/PO program and writing the proposal is that of the proposer. Points of contact and addresses for all of these E/PO Forums and Broker/Facilitators may be found by opening Education and Public Outreach from the menu of the OSS homepage at <http://www.space-science.nasa.gov>.

## III. ADDITIONAL INFORMATION ABOUT THE GSFC NGST E/PO PROGRAM

Additional information about the GSFC NGST E/PO program may be obtained from links in the NGST AO Library (<http://www.ngst.nasa.gov/cgi-bin/doc?Id=871>).

**E/PO Template #1**  
**E/PO Program Budget**

(FY costs in Real Year Dollars, Totals in Real Year and FY 2002 Dollars)

	FY1	FY2	FY3	FYn	Total (Real Yr.)	Total (FY 2002)
Personnel						
Consultants						
Stipends						
Equipment						
Travel						
Supplies						
Subcontract #1						
Subcontract #2						
Subcontract #n						
Misc						
Indirect						
<b>TOTAL</b>						

**E/PO Template #2**  
**Subcontract Budgets**

(Costs in Real Year Dollars, Totals in Real Year and FY 2002 Dollars)

	Subcontract #1	Subcontract #2	Subcontract #n
Personnel			
Consultants			
Stipends			
Equipment			
Travel			
Supplies			
Other			
<b>TOTAL (Real Yr.)</b>			
<b>TOTAL (FY 2000)</b>			

**E/PO Template #3**

**Key Personnel**

(Percent Time Committed/Direct Costs, Including Benefits,  
in Real Year Dollars, Totals in Real Year and FY 2002 Dollars)

	FY1	FY2	FY3	FYn	Total (Real Yr.)	Total (FY 2002)
Institution 1						
PI (% time)						
PI (direct cost)						
E/PO lead (% time)						
E/PO (direct cost)						
Institution 2						
PI (% time)						
PI (direct cost)						
E/PO lead (% time)						
E/PO (direct cost)						
Institution n						
PI (% time)						
PI (direct cost)						
E/PO lead (% time)						
E/PO (direct cost)						