

4.5.1 Single Principal Investigator

Explorer mission investigation teams must be led by a single PI who may be from any category of U.S. or non-U.S. organization, including educational institutions, industry, not-for-profit organizations, Federally Funded Research and Development Centers (FFRDCs), NASA Centers, the Jet Propulsion Laboratory (JPL), and other Government agencies. Teams may be formed from any combination of these institutions. Note that the level of detail required in the proposal (and the Phase A concept study report) is the same regardless of what organizations are partners in the investigation team, even a NASA Center.

A single PI must be designated in each proposal and is the central person in charge of each investigation, with full responsibility for its scientific integrity, for the integrity of all other aspects of the mission, and for the execution of the investigation within the committed cost and schedule. The PI is accountable to NASA for the scientific success of the investigation and must be prepared to recommend project termination when, in his/her judgment, the successful achievement of established minimum science objectives is not likely to be achievable within the committed cost and schedule. Proposal teams may wish to designate a mission chief scientist responsible for the mission science in addition to a PI responsible for mission development and leadership.

The PI is held responsible to NASA if the project, including scientific results publication, can not be completed within the committed cost and schedule.

PIs for SMEX missions (hereafter called mission PIs) must demonstrate minimum experience qualifications that are designed to demonstrate relevant experience exercising responsibility, authority, and management of a space project in the areas of leadership, planning, implementation, and approval.

The minimum requisite experience that shall be demonstrated for the mission PI is showing that the person proposed for this position has previously carried out the duties of a key position for at least two years in a space project that has launched or is under development for launch. There are three parts to the minimum space flight experience standards for a mission PI: the mission PI must have (a) senior project experience on a (b) project that has gone or will go into (c) space or near-space.

- (a) A mission PI must have served for at least two years and carried out the duties of the PI, the Deputy PI, the Project Scientist (PS), the Deputy PS, PM, or Deputy PM on a qualifying space project. It is acceptable to have carried out the duties of one of the named positions (PI, Deputy PI, PS, Deputy PS, PM, Deputy PM) under a different title as long as the position entailed the same roles and responsibilities (see Appendix H).
- (b) A qualifying space project can be a full mission, an instrument, or an experiment (e.g., shuttle attached payloads, suborbital projects, and portions of missions/instruments).

- (c) The qualifying project must have been a “space” project. A space project is one that goes into the space or near-space environment. Space projects include suborbital projects (sounding rockets, scientific balloons), orbital projects, and deep space projects. For the purpose of this AO, a suborbital experiment that reached greater than 100K feet can be considered to have gone into “space”. The space project must have launched or be under development for launch. Experience with aircraft and ground based project development, with missions that are in Phase A or with those in the proposal stage is not sufficient to provide space flight experience for a prospective mission PI.

See Section I.8 of Appendix B for directions on how to demonstrate that the proposed mission PI meets the minimum space flight experience requirements. Using Table B7 the proposal must demonstrate that the proposed mission PI has relevant experience exercising responsibility, authority, and management of a space project in the areas of leadership, planning, implementation, and approval (see Appendix H).

NASA offers the opportunity of pre-screening Principal Investigator (PI) experience requirements to prospective proposers (Section 7.1.7).

Proposed SMEX investigations that are led by mission PIs lacking in demonstrated, relevant, and appropriate experience sufficient to meet these requirements will be declared noncompliant and will not be reviewed or selected. For proposals in which the proposed mission PI has the required space flight experience, the experience of the proposed mission PI will be a factor in the evaluation of the proposal.

Other senior mission science team personnel, such as Mission Deputy PI, PS, Mission Chief Scientist, Science Team Lead, and instrument PIs, that may be involved in proposed PI-led SMEX missions need not meet the space flight experience standards described above for the mission PI, though their experience level will remain a factor in proposal evaluation.

PIs for MOs are not required to meet the same space flight experience standards that a mission PI must meet. Although there are no specified minimum standards for a MO PI, a MO PI must demonstrate within the proposal that his/her qualifications and experience is sufficient to ensure the success of the investigation. The experience of the proposed mission PI will be a factor in the evaluation of the proposal.

--- end of Section 4.5.1 ---

I. APPENDICES

The following additional information is required to be supplied with the proposal as Appendices and, as such, will not be counted within the specified page limit. NO OTHER APPENDICES ARE PERMITTED.

8. Demonstration of Minimum Space Flight Experience for the PI

For SMEX PIs only. Not required for MO PIs. It is expected that this information should take no more than 2 pages.

Table B7 must be completed to demonstrate that the proposal PI meets the requirements for space flight experience that are described in Section 4.5.1. Specific project(s) must be identified. The roles, responsibilities, and authorities of the proposal PI on those project(s) must be described. Experience in all four areas – leadership, planning, implementation, approval – as described in Appendix H, must be demonstrated by completing all sections of Table B7.

Although only a single space flight experience is required to qualify the proposal PI to be a SMEX mission PI, Table B7 may be duplicated as many times as necessary to demonstrate that the proposed mission PI has relevant experience in all four of the job areas described in Appendix H.

TABLE B7
 PRINCIPAL INVESTIGATOR SPACE FLIGHT EXPERIENCE

Name of PI	
PI Institution	
Space Project	
Project launch date or planned launch date	
Space or near-space environment (e.g. orbital, deep space, etc.)	
Title of position held	
If different title, position with the same roles and responsibilities	
Dates position held	
Role, responsibilities, authority (Leadership)	
Role, responsibilities, authority (Planning)	
Role, responsibilities, authority (Implementation)	
Role, responsibilities, authority (Approval)	

APPENDIX H

ROLES AND RESPONSIBILITIES FOR PRINCIPAL INVESTIGATOR, PROJECT SCIENTIST, AND PROJECT MANAGER

This is a short description of the roles and responsibilities for the PI and the PS of a space mission, instrument, experiment, or project.

These roles and responsibilities are applicable to PI-led projects of varying sizes that involve the development of space hardware, from a suborbital project, to an instrument, to a mission. The generic language should be interpreted in the context of those activities that are within the scope of the PI-led project.

The PI, PS, and PM of a space project all exercise responsibility, authority, and management in the areas of leadership, planning, implementation, and approval when carrying out their respective roles and responsibilities.

Principal Investigator

The PI conceives an investigation and is responsible for carrying it out and reporting its results. The PI is responsible for overall project success as defined in the governing agreement. The PI sets priorities for all aspects of the project including cost, schedule, technical performance, and the reporting of scientific results. The PI and his/her deputies maintain sufficient insight into the development and operational activities to ensure that the cost, schedule, and technical performance of the project remain within established boundaries. The PI is responsible for ensuring that the project remains within its cost and schedule commitments. The PI roles and responsibilities entail exercising responsibility, authority, and management in the following four areas:

1. **Leadership:** Ensure overall project scientific and programmatic success as defined in the governing agreement. Ensure that the project meets all science, technical, cost, and schedule commitments.
2. **Planning:** Assemble and lead the science, management, and technical team to formulate, implement, and operate the project. Assume scientific leadership during all project phases. Establish an experienced team with the proper project management and infrastructure in place to manage and implement the project. For larger projects, approve the appointment of the PM and other key personnel. Organize and lead the science team. The PI may delegate day-to-day management of the project to a PM.
3. **Implementation:** Direct all aspects of project implementation, decision making, and reporting. Review and report technical and programmatic progress and status. Prepare and approve the science requirements document. Approve the project plan and other top level documentation. Approve and review project plans and tests relating to scientific performance and the attainment of science objectives.

4. Approval: Ensure that the project is ready to successfully pass all gateway reviews. For larger projects, demonstrate readiness to transition from Formulation to Implementation at the Confirmation Review. Certify that the mission is ready for launch at the Mission Readiness Review. Approve budgets and make decisions regarding expenditure of resources.

Project Scientist

The PS provides the scientific leadership necessary for the scientific success of a project by insuring that the mission meets or exceeds the scientific requirements. The PS and her/his deputies are integral members of the project management team. The PS roles and responsibilities entail exercising responsibility, authority, and management in the following four areas:

1. Leadership: Provide scientific guidance and oversight of all elements of the project implementation, from the beginning of formulation to the end of science operations. Support development of science requirements, goals and objectives. Support definition of Level-1 specifications.
2. Planning: Takes lead in identifying scientific options for the PI (and PM for larger projects) in all matters regarding science, science policy, and science-engineering trades required to achieve the mission objectives within the schedule and resources available. Participate in project meetings/reviews and be responsible for confirming that scientific requirements will or will not be met.
3. Implementation: Oversee the implementation of the science observation program of the mission. Review and approve plans for calibration, operations, and data analysis.
4. Approval: Review and recommend approval of, and proposed modifications to, the science, and technical requirements. Provide recommendations on mission success criteria. Approve budgets and make decisions regarding expenditure of resources.

For some smaller projects, the PS role carries other titles including Instrument Scientist and Experiment Scientist.

Project Manager

The PM is responsible for the formulation and implementation of the project per the governing agreement. The PM is responsible and accountable for the safety, technical integrity, performance, and mission success of the project, while also meeting programmatic (cost and schedule) commitments. Accomplishing this requires a breadth of skills that depend on the size and complexity of the project; he/she might need to be knowledgeable about governing laws, acquisition regulations, policies affecting project safety, training of direct-report personnel, risk management, environmental management, resource management, project-unique test facilities, software management, responding to external requests for audits, protecting intellectual property and technology, and other aspects of project management.

The PM roles and responsibilities are described in NPR 7120.5D, *NASA Space Flight Program and Project Management Requirements*, Sections 3.1.3 and 3.2.1. The PM roles and responsibilities entail exercising responsibility, authority, and management in the following four areas:

1. **Leadership:** Exercise responsibility and accountability for the safety, technical integrity, performance, and mission success of the project, while also meeting programmatic (cost and schedule) commitments. Implement project budget. Manage project resources. Maintain knowledge of governing laws, acquisition regulations, policies affecting project safety, training of direct-report personnel, risk management, environmental management, resource management, project-unique test facilities, software management, protecting intellectual property and technology, and other aspects of project management.
2. **Planning:** Establish the project office and structure to direct and monitor tasks/activities within project. Initiate, support, and conduct project-level concept studies. Originate project requirements. Develop and approve Project Plan. Develop mission options, conduct trades, and develop cost estimates to support budget. Develop project launch readiness criteria. Support development of content of agreements with international and other government agencies.
3. **Implementation:** Assess project technical, schedule, and cost performance and take action, as appropriate, to mitigate risks. Communicate project performance, issues and risks to senior management and present recovery plans.
4. **Approval:** Prepare for and provide assessment of project readiness to enter Implementation. Conduct readiness reviews leading to key decision points for projects. Certify readiness to proceed past key decision points. Approve budgets and make decisions regarding expenditure of resources.

For some smaller projects, the PM role carries other titles including Instrument Manager and Experiment Manager.