

SCIENCE MISSION DIRECTORATE POLICY

EXPERIENCE REQUIREMENTS FOR MISSION PRINCIPAL INVESTIGATORS

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Responsible SMD Official: Chief Scientist

Section 1 – Background

(a) The Science Mission Directorate (SMD) implements its missions in two basic ways: NASA-directed missions; and Principal Investigator (PI)-Led Announcement of Opportunity (AO) solicited missions. NASA-directed missions are managed by a cadre of personnel who are typically well trained and experienced in implementing spaceflight projects. PIs on AO selected missions, however, may come from a wide range of institutions with highly varying backgrounds. These institutions include NASA Field Centers, Federally Funded Research and Development Centers (FFRDCs), academic institutions, industry, and other places, where regardless of their other qualifications and attributes, the scientists may or may not have acquired the level of experience and training necessary to successfully manage a spaceflight project. This level of competence is absolutely essential because *SMD holds PIs accountable for all aspects of implementation of PI-led missions.*

(b) SMD has therefore determined that a prudent step toward successful execution of PI-led missions is to ensure that future selected PIs will have the experience and training necessary to enable them to better manage their missions. This directive establishes a policy defining the level of experience required to qualify as a PI for the various mission classes and mandates the establishment of a PI training program.

Section 2 – PI Experience

In order for a scientist to propose a space flight mission that individual must have excellent scientific credentials and a significant amount of experience in conducting and leading science investigations. This experience will be a valuable component in the successful completion of the space flight mission. However, space flight investigations are quite different from more conventional experimentation in that they carry additional inherent risks. They are unique in that once launched, the experimental hardware is inaccessible to the investigator. Any anomalies in the hardware or the data must be analyzed and addressed remotely. Also these investigations are carried out in hostile space environments that are quite different from terrestrial investigations. Many of these environments have never before been visited and therefore are not well understood. These environmental differences, and potential uncertainties, have major implications on design and selection of hardware. These experiments are also typically one-of-a-kind and require new technology development necessary to the successful completion of the experiment. This further increases risk in all areas of cost, schedule and performance. Also the experiment is usually mass, volume, and power constrained, which complicates the design and

configuration. There can also be changes originating outside of the project such as changing requirements and budgets. Additionally these missions are conducted in a high profile environment such that any anomalies are immediately visible to the general public. Collectively, these types of challenges make leading a spaceflight mission one of the most difficult jobs in the world.

Given these challenges, the SMD has determined that previous experience with space flight hardware in a leadership role is a key attribute for successful completion of a PI-led NASA science mission. SMD has therefore established minimum required experience levels that the prospective PI must have in order to qualify as a mission PI for missions of varying levels of cost. These experience levels are defined in Table 1 and are to be used in all subsequent SMD Announcements of Opportunity.

Table 1 – Principal Investigator Experience Level Required for Different Mission Cost Classes

Mission Cost Class [1]	Minimum Required PI Experience [2,3]
Large Missions	Either (i) at least four years experience in a lead role [4] for a single orbital or deep space mission which will be launched prior to AO downselection or (ii) two experiences of at least two years each in lead roles [4] on orbital or deep space missions and/or orbital or deep space instruments, all of which will be launched prior to AO downselection.
Medium Missions	At least two years of experience in a lead role [4] for an orbital or deep space mission or instrument that will be launched prior to AO downselection.
Small Missions	At least two years of experience in a lead role [4] for a space project (orbital, deep space, or suborbital) such as a mission, instrument, or experiment.
Large Non-Mission Projects [5]	At least two years of experience as a participant in a space project (orbital, deep space, or suborbital) such as a mission, instrument, or experiment.
Small Non-Mission Projects [5]	None

[1] Mission cost class will be identified in the AO.

[2] Experience must include the development of flight hardware. Pre-proposal and Phase A concept studies do not meet this requirement.

[3] Unless otherwise changed in the AO.

[4] Lead role includes the responsibilities of a Principal Investigator (PI), Project Manager (PM), Project Scientist (PS), and Deputy PI/PM/PS.

[5] Non-mission projects include instruments and Missions of Opportunity.

Section 3 – PI Training

NASA projects are carried out under a strict governance model and under a set of defined program and project management directives and policies. They are also executed using well established project management and systems engineering methodologies and processes. SMD requires that PIs must be aware of these directives, policies, and methodologies, as well as fundamental leadership principles, and other associated areas. Therefore, SMD is establishing a 1 week course for current and potential PIs to enhance their knowledge in areas that are deemed necessary to successfully execute a PI-led SMD science mission.

The specific objectives of the Mission PI Training Course are as follows:

- Provide a basic understanding of the fundamental elements of project management and systems engineering;
- Introduce the primary policies and directives needed to guide the development and flight of a space science mission;
- Provide an appreciation of the systems approach;
- Provide an overview of the NASA organization and infrastructure; and
- Enhance leadership skills.

Course attendance will not be required prior to selection as mission PI for an SMD mission. However, selected mission PIs will be required to sign an agreement to attend the course within one year of approval into Phase B. Also mission PIs will be required to retake the course at least once every seven years in order to remain current on project management policies and practices. Mission PIs selected prior to December 1, 2007, are required to take the course within three years of the approval of this policy document.

Selected and prospective mission PIs will be able to view the course content online but they must attend in order to meet the mission PI eligibility requirements.

The Mission PI Training Course will be in addition to, and not be a substitute for, the experience requirements defined in Section 2.

Approved:

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For Science Mission Directorate

Date