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## **Program Cost Element Definitions**

### **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. Project management for phase E is to be shown as a separate line item under Phase E (Operations).

### **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 spacecraft are included in the Spacecraft Integration, Assembly & Test cost element (see below).

### **Spacecraft Bus**

Spacecraft bus costs include costs incurred to design, develop, and fabricate (or procure) the spacecraft subsystems. Costs for integration and assembly are not included in this element. Component level test and burn-in is included in this cost element. System tests are included in Spacecraft IA&T (see below).

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

S/C integration, assembly and test is the process of integrating all spacecraft subsystems and payloads into a fully tested, operational satellite system. 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.

### **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 C/D (pre-launch) support costs for the science team. (See below for post-launch component.)

### **Pre-Launch GDS/MOS Development**

Includes costs associated with development and acquisition of the ground infrastructure used to transport and deliver the telemetry and other data to/from the Mission Operations Center and the Payload Operations Center. (For more information, refer to *NASA's Mission Operations and Communications Services* document in the DPL.) Includes development of science data processing and analysis capability. Also includes pre-launch training of the command team, development and execution of operations simulations, sequence development, and flight control software. This element includes any mission-unique tracking network development costs.

### **Mission Operations (MO)**

*This cost element refers only to Phase E (post-launch), and must not include costs of any proposed extended mission ("Phase F").* Mission operations comprises all activities required to plan and execute the science objectives, including spacecraft and instrument navigation, control, pointing, health monitoring, and calibration. Costs include all post-launch costs for people, procedures, services, hardware and software to carry out these activities.

### **Data Analysis (DA)**

This cost element refers only to Phase E (post-launch), and must not include costs of any proposed extended mission ("Phase F"), PSP, or DAP. Data analysis activities include collecting, processing, distributing and archiving the scientific data in the appropriate data archive. Costs include all post-launch costs for people, procedures, services, hardware and software to carry out these activities. Includes science team support costs post-launch.

### **Extended Mission ("Phase F")**

Includes costs for MO & DA beyond the planned end of Phase E operations. For example, if one year in orbit at target satisfies the mission science objectives, Phase F funding might support a second year of orbital operations. Be sure to report these costs separately, since they do not count against the mission funding cap.

### **Participating Scientist Program (PSP)**

Includes costs for planned guest investigator programs that are part of the proposed approach. Be sure to report these costs separately, since they do not count against the mission funding cap.

### **Data Analysis Program (DAP)**

Includes costs for any proposed program analyses program that will be competed and funded separately. Be sure to report these costs separately, since they do not count against the mission funding cap.

### **Deep Space Network (DSN) or Other Tracking Services**

DSN/tracking services for communications between the spacecraft and Earth control center and station complexes are acquired through JPL. This line item includes all costs associated with this service for the specific proposed mission profile. (Refer to NASA's Mission Operations and Communications Services, in the Discovery Program Library).

### **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.

### **Launch Services**

Launch vehicles and services are either procured and provided by NASA to launch spacecraft under fixed price contracts, or provided by the proposer. Launch services can be either ELV or Shuttle opportunities. In the case of an ELV launch, launch service price includes procurement of the ELV, spacecraft-to-launch vehicle integration, placement of spacecraft into designated orbit, analysis, post-flight mission data evaluation, oversight of the launch service and coordination of mission-specific integration activities. In the case of a Shuttle launch, launch services cost based on payload weight/volume will be provided by the Space Shuttle upon request by the proposer. Costs will include mission unique, upper stage(s), and integration costs. (For more information, refer to the *DISCOVERY Expendable Launch Opportunities Document* or the *DISCOVERY Space Shuttle Launch Opportunities Document* in the Discovery Program Library.)

### **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.