

"The Ground Systems Element of the JPL Advanced Projects Design Team"

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Abstract

The Jet Propulsion Laboratory (JPL) has assembled a group of experienced mission and spacecraft designers to serve as a core team for quick response to a wide range of advanced mission study requests. Known as the Advanced Projects Design Team, or "Team X," these engineers represent all of the disciplines necessary to establish the feasibility of a new mission concept and to estimate its cost, including science planning, spacecraft and instrument design, mission analysis, spacecraft system engineering, MOS system engineering, and cost analysis. New mission concepts coming out of JPL pass through Team X before they are presented to NASA Headquarters.

Team X was created to improve both the quality and the speed-of-generation of advanced mission concepts; to develop mission generalists from a pool of experienced engineers; and to create a reusable study process with dedicated facilities, equipment, procedures, and tools.

Team X is comprised the following 14 positions: Ground Systems & Mission Operations, Mission Design, Science, Thermal, Power, Structures, Attitude Control, Telecom-Hardware, Telecom-Systems, Command & Data, Cost, Spacecraft Systems, Propulsion, and Instruments. Individuals are assigned to these positions on a full-time basis and are responsible for assuring that the designs presented or solutions proposed reasonably reflect the concerns and constraints of his area.

The Ground Systems & Mission Operations position on Team X is responsible for design of ground data systems, staffing plans for mission operations teams, and development of the preliminary data acquisition and return strategy for the proposed mission. Reductions in operations costs compared with traditional systems is a major focus of this position. Such reductions are achieved by a variety of system engineering methods: influencing design of the spacecraft itself to make it easier to operate, such as large margins in onboard data storage and telemetry capacity; use of improved onboard computing resources, both hardware and software; establishment of firm project-level operating guidelines; use of fee-for-service arrangements with existing ground system infrastructures; and small operations team size.

This paper provides an overview of the workings Team X, a discussion of the models and designs used by the Ground Systems position, and a description of the experience base that leads us to believe traditional operations costs can be reduced by an order of magnitude.