
Program Control: A Growing Career Opportunity

by Bill Sneed

Program control, an integral part of program and project management, is emerging as a management discipline in its own right. Program control can be a career goal in itself, or can become a steppingstone to project and program management and even beyond. There are various ways to achieve a position in program control, and we will discuss some of these routes in the following pages.

Program Control: A Definition

The discipline of program control covers a lot of territory. According to the Phillips Model, developed in 1987, program control covers program plans and requirements, resources management, schedule management, documentation and data management, and configuration management. Each of these subdisciplines is in itself complex (see Figure 1). These functions will vary from organization to organization and with the size and complexity of a program or project. Additional functions sometimes assigned to the program control organization are logistics management and management information systems. Program control involves planning, organizing, directing, budgeting, and controlling; and it involves measuring performance against the baselines of content, scope, configuration, schedule, and cost of a project or program.

Program control management also requires the manager to develop and maintain an integrated planning base of program requirements and development plans. Once

the baselines are set, the manager is expected to analyze and evaluate performance and alternatives each step of the way and to revise the baselines if necessary. For ultimate program control, the successful manager needs an efficient system of reports, reviews, and action feedbacks.

Program Control at NASA

At NASA, program control as a management science took hold in the 1960s with the Apollo program — a demonstrated success that was listed as the greatest engineering achievement of the past 25 years by the National Academy of Engineering. With the proliferation of exciting and challenging new programs and projects made possible by recent increases in the agency's budget, the need for program control is increasing. Especially with the recent loss of many senior managers, NASA needs and will continue to need additional people to implement its on-going and emerging programs and projects. This growth will create tremendous career opportunities for people who have a desire to participate in a direct and meaningful way in the management of programs and projects having great national, scientific or technological significance.

Program control functions are organizationally grouped in different ways by the various NASA Headquarters program offices and the Field Centers. The Office of Space Flight (OSF) and its Centers group most all of the functions under an organiza-

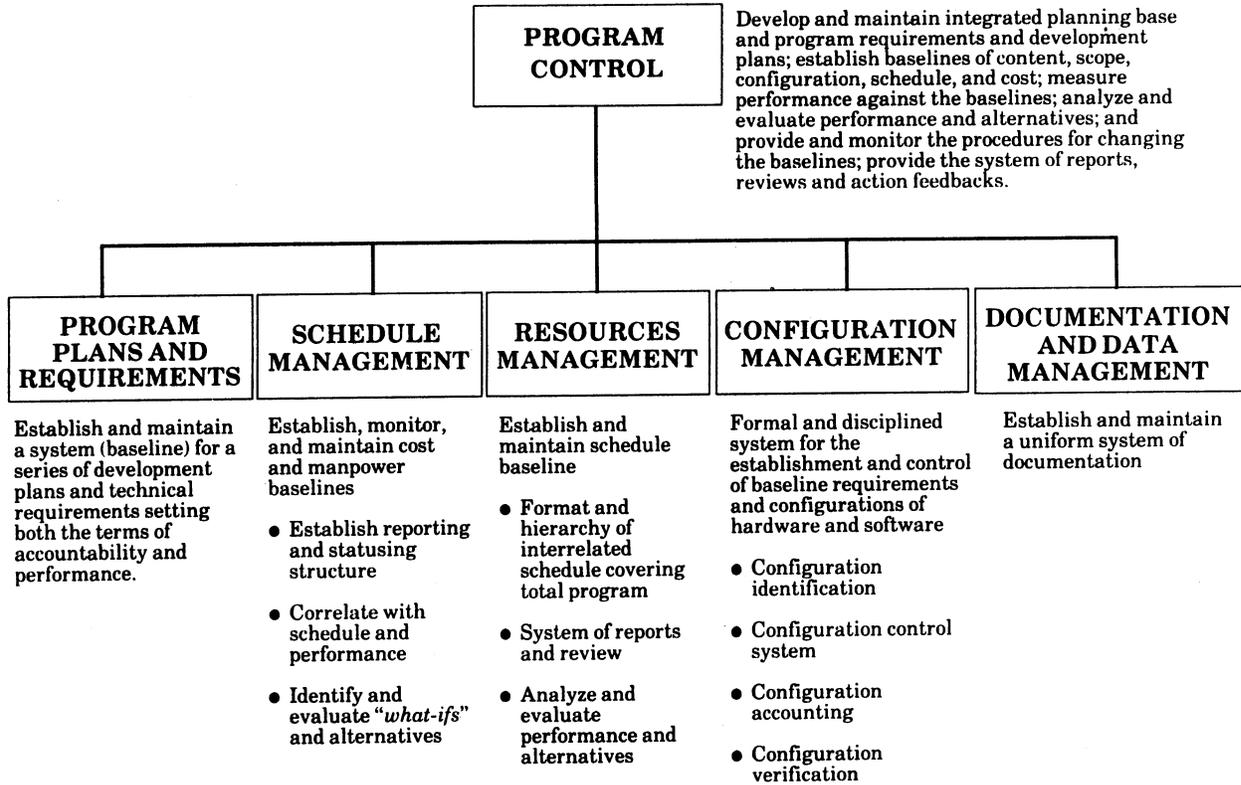


Figure 1. - The Phillips Model of Program Control Disciplines

tional entity referred to as "Program Control." On the other hand, the Office of Space Science and Applications (OSSA) and its Centers normally assign most of the program control functions to the Deputy Project Manager for Resources. Both concepts have met with varying degrees of success, demonstrating that the way the functions are grouped is not an issue for discussion.

What does vary is the relative importance of each function to a particular project or program. Program plans and requirements require the Program Control Chief or Deputy Project Manager to establish and maintain a system — a baseline — for a series of development plans and technical requirements, setting terms for both accountability and performance. Resource management involves the monitoring of both cost and personnel. The manager es-

tablishes a reporting status structure, correlates resources with schedule and performance, and assesses "what-ifs" and their alternatives.

Schedule management is the very center of program control, constantly playing off cost and performance baseline requirements. Schedule is a hierarchy of values covering the entire program, with milestones for reports and review, evaluation points and alternatives. Tradeoffs among schedule, performance, and resources are continual concerns throughout a project or program.

Documentation and data management in the Phillips Model simply require the manager to establish and maintain a uniform system of documentation. Configuration management is a bit more complicated. Configuration identification, control system, accounting, and verification are all re-

quired. The manager is expected to develop a formal and disciplined system to establish and control baseline requirements and configurations of all the hardware and software needed in the project. The Technical and Management Information System (TMIS) now being developed by the Space Station Freedom Program is expected to facilitate these functions.

The effectiveness of the program control functions is indeed measurable. The results of a General Accounting Office audit of 940 projects indicated that costs exceeded plan about 50 percent and that projected schedules ran over by about 33 percent. An analysis of NASA programs indicates that NASA program and projects experience similar cost and schedule performance. With only minor improvements in program control, the cost savings would be enormous.

The importance of the program control discipline to the project manager is readily evident from assessing a typical project management organization structure (see Figure 2). Note that the program control manager reports directly to the project manager. Because of the nature and importance of the program control functions, it is essential that the program control manager be involved in each and every project activity, since nearly all decisions or actions of the project manager will affect project plans, schedules, cost, or configuration.

The program control functions encompass two of the three performance parameters for which a project manager is responsible (technical, schedule and cost performance). Given the importance of the role of the program control discipline to the project management process and the increasing number of programs and projects under way or

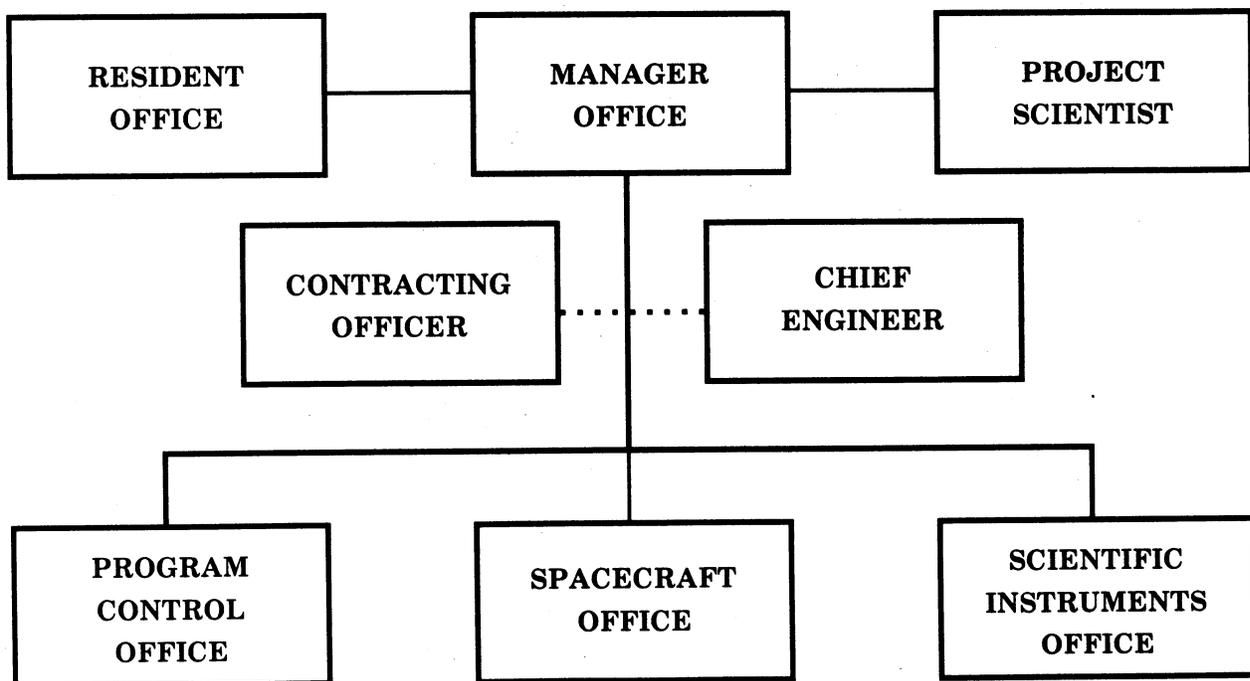
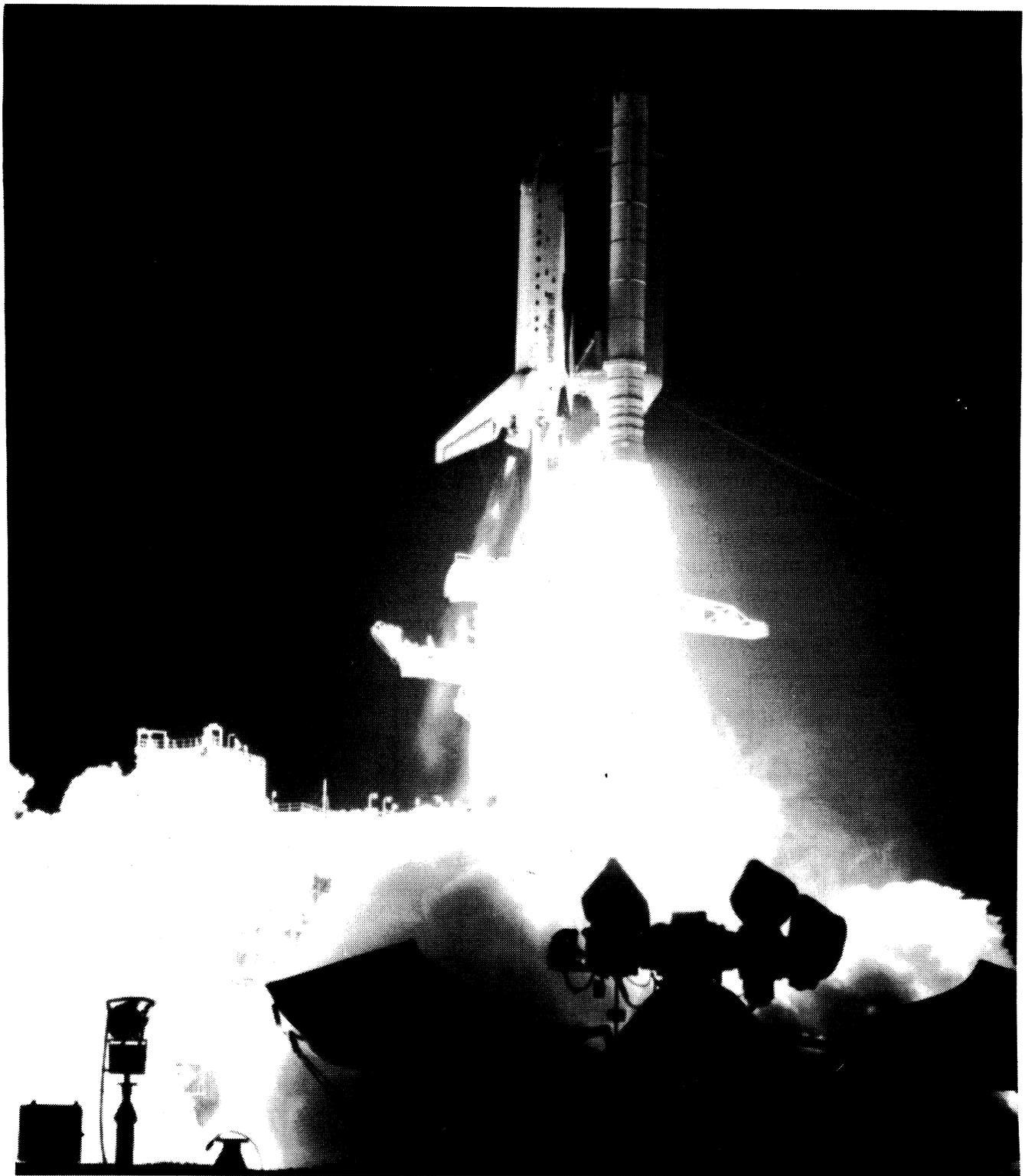


Figure 2. - Typical Project Management Organization Structure



The Space Shuttle Discovery heads for low Earth orbit on the first post-Challenger nocturnal launch. The launch occurred at 7:23 a.m. on November 22, 1989, from Kennedy Space Center. This picture shows a side view of Discovery, one of its two solid rocket boosters and the external tank. Seen from the main engines is the "diamond shock" effect often associated with Shuttle launches.

scheduled to begin in the near future, there will be an increasing demand at NASA for people interested in program control — either as a career in itself or as a pathway to other career objectives.

Training in Program Control: The MSFC Experience

Recruiting and training personnel interested in career opportunities in program control and beyond, especially those already working in the technical disciplines, have been somewhat of a problem at NASA in recent years. This challenge has been met in various ways.

At the Marshall Space Flight Center (MSFC), two training programs were initiated to encourage people to enter into program planning and control and into program management. The first of these training initiatives was established in the Program Development Directorate. It allowed intermediate-level technical personnel to cross over from their technical specialties to program control. After two years of on-the-job training, these people were assigned to a permanent program planning position in a program office or in an institutional directorate.

The second training program was initiated in the Shuttle Projects Office to accommodate aspiring project managers. This program required its participants to serve a period of time in the program control discipline, after which they were moved into key project management positions as the positions became available.

Both of these training programs were highly successful in fulfilling MSFC's critical need for highly qualified program control managers and project managers.

They also provided an effective means for allowing aspiring individuals to achieve their career objectives in project planning and control and project management.

These and other training programs throughout the agency have been instrumental in allowing employees to pursue career goals while at the same time preparing them for key management positions in NASA. Typical positions currently or previously filled by employees who thus rose through the program control ranks are NASA Comptroller, MSFC Comptroller, MSFC Shuttle Projects Manager, Shuttle External Tank Project Manager, Shuttle SSME Project Manager, Shuttle Advanced Solid Rocket Motor Project Manager, Hubble Space Telescope Project Manager, MSFC Assistant Director for Policy and Review, Johnson Space Center Deputy Director for Administration, and Stennis Space Center Associate Director.

Formal Training in Program Control

As an alternative or adjunct to on-the-job training, the NASA Program and Project Management Initiative (PPMI) of the Office of Human Resources and Organizational Development at Headquarters offers courses in project management, advanced project management, program management, and executive project management, as well as a specific skills course in program control.

The Program Control course has as its objective "to present NASA and industry perspectives on the processes used to plan and control resources during the life of a NASA project." Topics covered include resource management; configuration management; logic network and schedule development;

development performance measurement; barriers to assessing progress; parametric cost estimating; contract management; project control system design; and project control procedures and technical requirements. Instruction is by lecture, panel discussions, case studies, and problem-solving exercises. Instructors are NASA managers, aerospace specialists, and professional trainers.

Too frequently, for expediency, employees are promoted or placed into positions for which they are not exceptionally qualified in certain critical skills. Requisite training and progressive job assignments are not properly planned or accomplished in such a way as to prepare the employee to fully assume the many demanding responsibilities of the new position. This has been and still is a fairly common practice for people ascending into key project management and institutional positions — not because of choice, but because of the pressing needs to fill those positions. The results are often the cost and schedule performance trends noted above.

Formal training in program control will qualify aspiring program control managers and project managers to perform the program control functions competently and effectively. Coupled with on-the-job training, completion of the course work that NASA offers will produce qualified, skilled program control personnel.

Planning a Career in Program Control

In planning a career development path, consider the skills and cross-training required to facilitate progress through various job assignments along the career ladder. Many key positions in NASA require an intimate working knowledge of the program planning and control skills enumerated above.

People who select a career in aerospace management should consider both formal training — and a job assignment of a year or two in program planning and control. Proper qualification for any position is important not only for the individual, but for the efficient and cost-effective management of all of NASA's programs. As one of the NASA officials listed above said recently, "Working in the program control discipline for a period of about two years was one of the most valuable, broadening and fulfilling assignments of my entire career."

Those who choose to make program planning and control their ultimate career goal will find tremendous rewards awaiting them as NASA embarks upon new initiatives that will extend human presence in space, expand the frontiers of our knowledge, push the technologies for the betterment of human existence, and afford us a better understanding of ourselves and the universe.