Introduction

A number of citizens of the Soviet Union, and their guests from other countries, have visited the Earth's lower space regime; the Soviet in-orbit space infrastructure, primarily the Salyut space stations (or, as the Soviets say, "orbital stations"), has housed and supplied them there, more or less continuously, for over a dozen years. During this period the total number of hours that Soviet cosmonauts have spent in space has overtaken and is now much greater than the corresponding total for U.S. astronauts. By all accounts, the Soviets are more knowledgeable than the United States in space biology and medicine; in a number of technical areas, notably in the use of automated docking systems, they routinely use techniques that the United States has never demonstrated. It is true, on the other hand, that the Space Shuttle now gives the United States significant capabilities that the Soviets do not have, but it is widely believed on the basis of photographic evidence available from unclassified sources that the Soviet Union is developing both a small space plane and a heavy-lift shuttle expected to be capable of propelling more massive payloads into low-Earth orbit than can its U.S. counterpart.

The Soviet space station program is the cornerstone of an official policy which looks not only toward a permanent Soviet human presence in low-Earth orbit but also toward permanent Soviet settlement of their people on the Moon and Mars. The Soviets take quite seriously the possibility that large numbers of their citizens will one day live in space. Although the Soviets do not often directly communicate detailed results of what has been learned by and from the cosmonauts aboard Salyuts, enough information is available to conclude that they are accomplishing much more than rudimentary scientific investigations: they are providing the data, information, and experience required to design habitats and equipment which will allow individuals to reside for the long-term in space.

The Soviet approach to the development of space capabilities differs significantly from the American. Whereas the United States tends to advance from one space capability to the next by quantum leaps, the Soviet Union tends to modify and adapt technology that is already in hand, thereby increasing its capability in a seemingly more evolutionary or progressive fashion. By thus relying on systems flight-proved in earlier space programs, the Soviets may have been able to restrain costs and minimize the time spent in development and construction. The Soviet space program and the U.S. satellite communications industry are similar in that both allow for the establishment of gradually evolving spacecraft design, and it may be advisable for the United States, in other selected areas of space applications, for example, to adopt some form of the Soviet strategy. Already, NASA's Solar System Exploration Committee (SSEC), emphasizing the importance of system heritability, has advocated a similar approach for planetary science.

The relative merits of automated and human capabilities for performing work in space or, more precisely, the criteria for establishing the optimal mix of the automation and the human presence for particular tasks, are the subjects of considerable debate in the United States. Although the amount of time in space that American astronauts have amassed is nontrivial, there is a certain degree of unreality about this debate because it cannot yet be grounded in extensive experience. The Soviet Union, on the other hand, can draw on a much greater fund of experience as they implement plans for integrating human and machine capabilities for work on future space stations.

Perhaps the most important point to be made here is that the United States and the Soviet Union have cast the issue of humans versus machines in different terms. U.S. space policy is to explore and study space and to use it for general human benefit—and, where appropriate, to involve human beings in actual spaceflight. In addition, both the United States and the Soviet Union use their spaceflight programs involving people to enhance their national images. Soviet space policy, however, goes further; it includes the goal of learning how human beings may reside permanently in space, both as an end in itself and as a means of serving their national purposes. To date, the United States has not committed itself to permanent human occupancy of space as a national goal.