FINDINGS

Finding 1: The OSSA strategic planning process has proved effective in garnering improved funding for space science projects because it has successfully involved a broad cross section of the space science community in setting science priorities within the scientific disciplines. Yet, in its planning for future projects, OSSA often fails to be realistic about probable future budgets. OSSA **also needs to find better mechanisms for containing cost and schedule growth after projects are underway.**

OSSA committees, composed of discipline specialists, set scientific priorities for each discipline OSSA supports. OSSA has used the priority-setting process, in which proposed projects are closely scrutinized by teams of scientists, to build a strong constituency for its projects within the Administration and within Congress. As currently structured, the process is geared to steady increases in funding, but has difficulty responding to funding decreases. However, the Appropriations Committees' Conference Report for fiscal year 1992 limits NASA's 1993 funding allocations to increases of no more than 5 percent,[2] which is much less than the increases OSSA has recently experienced.[3] Hence, OSSA will have to adjust its planning and priority-setting processes accordingly.

OSSA could improve its priority-setting process by developing improved methods for establishing priorities across disciplinary boundaries. This will not be easy because it involves making judgments about the relative value of projects from widely different fields. A report from the Space Studies Board of the National Academy of Sciences on setting priorities in space research provides some guidance for such an effort.[4] OSSA may

---

2 **"The conferees concur in the Senate language enumerating a series of principles designed to adjust NASA's expectations and strategic planning to leaner budget allocations in the coming years." Conference Report on the 1992 Appropriations for the Veteran's Administration, Housing and Urban Development, and Independent Agencies, House of Representatives Report 102-226 (to accompany H.R. 2519), Sept. 27, 1991, p.54. The Senate language directs that "the agency should assume no more than 5 percent actual growth in fiscal year 1993": Senate Report 102-107, July 11, 1991 (to accompany H.R. 2519), p. 130.**

3 OSSA's budget has doubled in real terms since fiscal year 1982.

4 National Academy of Sciences Space Studies Board, Task Group on Priorities in Space Research, Phase 1, *Setting Priorities for Space Research: Opportunities and imperatives* **(Washington, DC: National Academy Press, 1992).**

have to develop mechanisms for canceling or drastically reprogramming projects that show signs of greatly overrunning their budgets, in order to maintain the scientific viability of other projects in its portfolio.

OSSA may also wish to examine the experience of industry in organizing strategic planning processes and in managing research and development assets. Although few industrial methods would be directly applicable to NASA's case, an examination of OSSA's processes by groups possessing expertise in "work process redesigns might prove beneficial in leading OSSA to new approaches for more effectively managing OSSA's considerable fiscal and intellectual assets.

Finding 2: The OSSA process could benefit from improved mechanisms to provide more systematic feedback to OSSA concerning the realism, flexibility, and success of previous plans.

Each strategic plan could formally include information regarding the key assumptions about resources available to OSSA and the amount of flexibility available if budgets do not meet expectations. However, improvements in OSSA's priority-setting process and in its management of the space science budget might still be undercut by instabilities caused by changes in the expected yearly NASA budgets, both within the Administration and within Congress.

Because the available budget is such a key factor in the successful conclusion of a project, Congress may wish to ask an independent institution to examine the historic impacts on OSSA's program of the annual fluctuations that result from changing congressional appropriations and from internal NASA rebudgeting. Such a study could also examine the consequences of launch delays, cost overruns, and under estimates for spacecraft systems development, and provide guidance for future OSSA planning.

5 **Methods used to analyze how a business practice is currently conducted, that also examine the charactistics of the customers for the output of the process, and determines which steps in the process add value or not.**

Finding 3: The lack of flight opportunities for science missions is a major impediment to maintaining high quality space science.

With the limited projected budget increases, more frequent access to space would require funding more smaller missions. The smaller missions could allow more frequent access to space for experimenters because they would not take as long as larger, more expensive missions to execute. They could also be much more effective in training graduate students because, among other things, they might allow a student to follow a project through from start to finish. Yet, in the yearly budget process, new starts for small missions tend to receive as close scrutiny as the large missions. Hence, NASA tends to expend nearly as much effort on them as on the larger ones. If Congress were to continue to encourage the proposal of smaller missions, NASA would find it easier to include a higher proportion of smaller missions in its mix of projects.[6]

Finding 4: Multidisciplinary projects, and those which serve both scientific and engineering goals, face especially difficult hurdles in the competition for funding within OSSA.

OSSA is responsible for microgravity research. It is also responsible for all of the research and medical applications to support human presence in space. Both areas of scientific research are multidisciplinary "laboratory sciences" and both depend upon, and provide information and other support for, the space shuttle and space station programs. Yet despite the fact that they serve both research and operational needs, these two disciplines have difficulty competing with more traditional disciplines such as astronomy and astrophysics, space physics, and planetary science. If NASA wishes to encourage these

6 **In directing that NASA submit a strategic plan to the Senate Commitee on Appropriations, the Committee directed that the plan "should emphasize a mix of small-, medium-, and large-sized missions": Senate Committee on Appropriations, Report 102-107 (to accompany H.R. 2519), July 11, 1991, p. 131.**

two multidisciplinary efforts, it will have to devote more effort to ensuring that they are adequately funded.

Finding 5: Congressional "earmarking" of funds for specific space science programs and projects undercuts scientists efforts to prioritize proposed space science projects, and adds to the skepticism scientists have developed regarding the authorization and appropriations processes within Congress.

Congressional earmarking for projects related to space science and space applications is part of recent trends[7] in federal funding of science and technology projects. Several workshop participants expressed dismay about the practice, which they see as counterproductive, since most earmarked projects have not undergone the intensive scrutiny of projects that are part of the OSSA priority-setting process.

7 See the general discussion of the results of earmarking for science projects in Eliot Marshall, "Pork: Washington's Growth Industry," *Science, vol.* 254, pp. 640-61, 1991.