Research dons urge new budget strategy

U.S. science and technology spending is now too large, and its bearing on national affairs too great, to allow haphazard or uncoordinated management, says National Academy of Sciences (NAS) President Frank Press. Yet all too often that's what happens when the federal budget-setting machinery tackles key issues or developments — such as AIDS research, environmental protection or science education — that must be managed by two or more competing federal agencies, according to a new report Press coauthored. To limit inefficient or redundant investments in such important research areas, the report recommends four changes to the current executive-branch and congressional budget-setting procedures.

The Senate budget committee devoted much of its oversight hearings on science and technology this year to problems resulting from a lack of coordination between the federal government's more than 30 independent agencies. In a provocative address he delivered at the NAS annual meeting last spring, Press offered a proposal aimed at avoiding many such problems (SN: 5/14/88, p.313). The Senate budget committee apparently liked his reasoning, because in a June 6 report it asked NAS, together with the National Academy of Engineering (NAE) and Institute of Medicine (IOM), to detail how they would alter the process for setting and evaluating funding priorities in research areas that bridge disciplines or that must be handled by multiple federal agencies. These recommendations are contained in a terse, 18-page report unveiled on Dec. 20 by three of its authors—Press, NAE President Robert M. White and IOM President Samuel O. Thier.

The administration identifies its budget priorities in terms of the mission-related activities of each federal agency. The new report calls for additionally ranking science and technology priorities in terms of three new categories: the science and technology base, which includes training, research and its infrastructure; programs that contribute significantly to national economic, social and political objectives, such as disease prevention, improved environmental quality or national prestige; and very costly initiatives that promise similarly large payoffs in new knowledge, jobs, prestige, economic growth, social welfare or national security.

To ensure that priority science and technology activities are fostered and managed as well as limited funding will allow, the panel recommends modifying the role of the President's science adviser. He or she would focus much more attention on identifying and articulating priorities within these three new budget categories, and on collaborating with the Office of Management and Budget to see that the administration's budget request to Congress adequately reflects these goals. The panel anticipates that these priorities will at least in part reflect problems identified within the science and technology community by its leaders in government, industry, academia and professional societies.

Congressional budget-writing committees would be asked to state explicitly their science and technology budget priorities. And the new report recommends the President keep tabs — probably through his science adviser—on how well the newly coordinated federal activities achieve the stated priorities, as modified by Congress.

Last, the new study urges that the Bush administration initiate a study to clarify current federal research spending. Department of Defense (DOD) programs today account for about $39 billion of the more than $60 billion spent on federal science and technology activities, Press says. However, his panel estimates, no more than $5.5 billion of DOD's science and technology share truly qualifies as research in the civilian sense—basic and applied research, or exploratory development. Identifying the exact amount of DOD money going into traditional research, Press and his coauthors argue, should make it easier to assess the size of the U.S. role relative to its foreign competitors, and perhaps even lead policymakers to justify increased science and technology spending. *— J. Raloff*

A seventh sun-grazer

Scientists report finding a seventh "sun-grazing" comet in photos taken by the coronagraph aboard the Solar Maximum Mission (Solar Max) satellite. Sun-grazers' orbits carry them so close to the sun that most apparently vaporize or melt in the heat as they pass. The new addition, designated SMM-7 on Dec. 17 after being spotted in photos taken Oct. 24, was too bright to measure. It was one of only two known sun-grazers that actually saturated or overexposed the instrument's detectors (SN: 12/10/88, p.375).

Though solar physics rather than comet-finding is Solar Max's primary role, some scientists in both camps are expressing outrage at NASA's recent decision not to send astronauts to refurbish the satellite's instruments and raise its orbit before the drag of Earth's uppermost atmosphere sends it plunging to its destruction, possibly as soon as 1990. Contributing factors are cost and the lack of an available shuttle mission in time to do the job. □

Sustaining the Uranian rings

A number of researchers have suggested that the rings of Uranus — compared with the solar system, which has been around for some 4.6 billion years — look relatively young, perhaps less than a billion years old. But scientists are traditionally suspicious of explanations whose validity depends on observations made exactly at some key moment. How likely is it that the Voyager 2 spacecraft just happened to be around to photograph the rings during the short span when they existed?

An alternative theory from Larry Esposito of the University of Colorado at Boulder suggests the rings may not be young at all. Instead, he proposes, their chunks keep grinding against one another in a way that continually creates new particles. Without some such regenerative process to sustain them, Esposito notes, the Uranian rings as Voyager 2 saw them would be gone in a billion years or less.

Indeed, many of the particles are so small that they would be dragged down to destruction in that time by the planet's extended hydrogen atmosphere. The motions and present locations of two small Uranian moons known as "shepherd" satellites — believed to be keeping one of the rings as sharp-edged and narrow as it is — suggest they have been doing so for only about that long. Additional shepherds have been proposed for many of the other nine known Uranian rings, though no one has yet identified any in existing photos.

Besides the main rings, Voyager 2's data also showed 50 to 100 tenuous "dust bands" containing smaller particles than the rings. But Esposito says their different positions mean the bands cannot have come from the rings. In a paper submitted to NATURE, he instead proposes that the dust in the bands may have been generated by micrometeoroids colliding with "unseen moonlets," each about 200 meters across, in belts some tens of kilometers wide, as well as by collisions between the moonlets themselves.

"Both the moonlet belt objects and the main rings of Uranus have been created by the breakup of larger objects," he says. Any dust or rings that existed billions of years ago would long since have been removed by atmospheric drag, he says, so some mechanism must be creating new dust. In the solar system's early history, according to Esposito, the material that later became the Uranian ring system may have consisted simply of perhaps 10 to 12 moons, each about 200 kilometers across. Since then, the ring system has been in a continuing state of gradual evolution. *— J. Eberhart*