US panel says research can be assessed

[WASHINGTON] A committee of the US National Academy of Sciences said last week that an effective assessment of research performance must take into account three factors: the quality of the research, its contribution to world leadership in various fields, and its relevance to the goals of funding agencies.

The Committee on Science, Engineering and Public Policy (COSEPUP) said that, despite serious doubts, research performance can be assessed — applied research easily, basic research with more difficulty.

The report is a response to attempts by research agencies to implement the Government Performance and Results Act (GPRA), which requires federal agencies to measure how their programmes benefit taxpayers.

The committee, chaired by Phillip A. Griffiths, director of the Institute for Advanced Study in Princeton, cites the pros and cons of common measures of research quality such as bibliometric analysis, economic rate of return, peer review, case studies, retrospective analysis, and benchmarking.

All feature in evaluations. But a magic element is needed, it says: "expert review", an assessment of the "quality–relevance–leadership troika". Making such an assessment requires unique and seldom-used combinations of expertise, it adds.

The 80-page report stresses the development of research talent in fields critical to agency missions. Most performance plans have lacked such goals, says COSEPUP. But it emphasizes that education and training are essential in any research performance plan.

COSEPUP warns that focusing on short-term results can undermine the whole purpose of evaluation. This echoes the National Science Foundation's struggles to comply with GPRA. The foundation was the first agency to release a performance plan geared to its fiscal year 2000 budget proposals.

The committee also suggests extending GPRA by developing assessments of programmes involving several agencies — such as global change research, or the information technology initiative announced earlier this month in the Clinton administration's 2000 research and development budget.

COSEPUP says the administration should designate lead agencies to ensure that interagency programmes are well coordinated, a task that usually falls to the Office of Science and Technology Policy (OSTP) as the operating arm of the National Science and Technology Council.

OSTP has submitted its own GPRA strategic plan, but has yet to release any performance plan. It may need to if GPRA assessors in Congress adopt COSEPUP's coordination recommendation. In a final recommendation, COSEPUP says that researchers must take a leading role for the whole process to work.

In its original form, agencies had to submit strategic plans to GPRA by September 1997, performance plans by spring 1998, and performance reports by March 2000. All performance plans are now in, although some remain in outline form, and many are being revised.

Committee member Morris Tanenbaum, former chairman of the AT&T telecommunications corporation, says GPRA is critical to give researchers a better understanding of government and Congress a better understanding of research. Wil Lepkowski

Giant radio telescope will boost search for extraterrestrial life

[BOSTON] **Scientists at the University of California at Berkeley and the SETI Institute — named after the Search for Extraterrestrial Intelligence — plan to build a new radio telescope that is described as a 'paradigm shift' in the design and construction of such instruments.**

The proposed 'One Hectare Telescope' (1hT), consists of an array of 500 to 1,000 small satellite dishes with a combined collecting area of 10,000 m^2 (one hectare). This would make it the world's largest telescope devoted mainly to SETI. The 1hT is intended to be a prototype for the Square Kilometer Array (SKA), which is being planned by an international consortium of radio astronomers for general research.

The 1hT effort was launched last summer after agreement was reached between Berkeley and the SETI Institute. "The germ of this project goes back to late spring when we were thinking about how to build SKA and decided that an array of small dishes would be the way to go," says project scientist John Dreher, an astronomer now based at both institutions. "But the Square Kilometer Array may not be built until 2010, and we didn't want to wait that long."

Preliminary funding has been secured through 1999 and part of 2000, and some radio dishes have already been purchased. Researchers soon hope to experiment with an array of ten dishes, probably installed at Berkeley's Hat Creek Observatory.

SETI INSTITUTE

Big ears: the one-hectare telescope will be a prototype for a square-kilometre array.

The one-hectare array could be built by 2004, either at Hat Creek or at other 'radio-quiet' sites in California currently under consideration, assuming that the SETI Institute can raise the necessary funds.

By using commercial technology, the team hopes to keep the costs of the array below $25 million, a tenth of the cost of a conventional telescope of comparable size.

In contrast to a big telescope, a small dish can look at a big chunk of the sky. "That chunk might contain ten stars plus other astronomical sources, and we can observe all of them simultaneously," says SETI Institute astronomer Jill Tarter. "So my [SETI] search goes ten times more quickly, or I can spend ten times as long on each target."

With the new telescope's enhanced sensitivity, Tarter and her colleagues can expand their "target list" from 1,000 Sun-like stars to 10,000 or even 100,000. The 1hT's large field of view will allow radio astronomers to study large-scale sources. "It's big enough to see the whole Sun," says Dreher. The instrument will also be well suited to looking at pulsars, comets and a variety of dim sources, such as gas clouds.

The telescope will reveal the "low-frequency Universe" at greater distances than before, says James Moran, a radio astronomer at the Harvard–Smithsonian Center for Astrophysics. "But its greatest contribution will be the development of really cheap technology that could be used in the Square Kilometer Array."

The SKA, in turn, will "open doors for us", says Leo Blitz, director of Berkeley's radio astronomy lab. "It will enable us to measure the primordial hydrogen out of which the first galaxies formed."

SETI investigators could conduct deeper surveys using the SKA, bringing more stars into range, and it would be sensitive enough to pick up 'leakage' radiation from stars — meaning that researchers would no longer be limited to searching for civilizations that are intentionally beaming our Solar System.

"That will bring the SETI search to the realm where we can actually determine the frequency of civilizations like ours," Blitz says. "Of course, most people engaged in this search are not after statistics. They hope to find something that shows we are not alone." Steve Nadis