

# US wants to lift R&D spending to 3% of GDP

**Washington.** The United States should raise its total spending on research and development (R&D) from 2.6 per cent of gross domestic product to around 3 per cent, according to a long-awaited science 'white paper' due to be released this week by the Clinton administration.

The policy document is the first such statement by a US administration since 1979. It proposes that this "modest increment" should be shared by the federal government and the private sector. But it does not give a date by which it suggests that this target should be met.

The white paper, entitled *Science in the National Interest*, was due to be released yesterday by vice president Al Gore. It sets five goals for US science: world leadership "across the frontiers of scientific knowledge"; better connections between research and national goals; more partnership with industry; a better education for scientists and engineers; and improved scientific education for the public at large.

The policy document — which had been criticized before its release for failing to address specifics (see *Nature* 370, 5; 1994) — also says that technology and fundamental science depend on each other, and should not be regarded as competitors for funds. "Today's science and technology enterprise

is more like an ecosystem than a production line," it says.

This updates the view of Vannevar Bush, who laid down the framework for US government support for science 50 years ago in his report *Science: The Endless Frontier*. The new document says that Bush's conception of "a competition between basic and applied research" has been superseded by an "interdependence of basic research, applied research and technology".

The document lists a number of critical problems facing US science, including a lack of cash for new university laboratories, a lack of mission for government laboratories, and the need for new mechanisms to fund large international or long-term projects. But rather than offering solutions, it tends to refer such problems back to Clinton's cabinet-level National Science and Technology Council (NSTC).

M. R. C. Greenwood of the White House's Office of Science and Technology Policy (OSTP), who co-ordinated the preparation of the paper, says however that its main objective was to clarify the reasons for investing in fundamental research. "It makes a clear statement that this is a critical investment that must be made, even in a tight fiscal environment," she says.

The document pledges a cross-govern-

ment review of all federal laboratories, and repeats proposals for tax changes to encourage industrial R&D and private-sector contributions to new university research facilities. Noting the need for billions of dollars to renovate university laboratories, it promises that the NSTC will "develop options for how to implement the federal investment as a systematic, long-term, multi-agency, merit-reviewed program".

The NSTC will also, it pledges, "recommend policies for long-term multinational agreements for the support of large scientific projects". The administration also says it will "work with Congress to find mechanisms for long-term authorization and budgeting commitments" for large US and international projects.

The administration has also named the 19 members of the President's Committee of Advisors on Science and Technology (PCAST), the body announced last November to support the NSTC. It will be co-chaired by OSTP director John Gibbons and former Hewlett-Packard boss John Young. Its members include Peter Raven, director of the Missouri Botanical Garden, Charles Vest, president of the Massachusetts Institute of Technology, other senior academics and half-a-dozen industrial chief executives.

**Colin Macilwain**

## Europe weighs bid to extend life of sensing satellite

**Paris.** A proposal from the European Space Agency (ESA) to extend the operation of its remote-sensing satellite ERS-1 beyond the end of the year, enabling it to operate in tandem with its successor ERS-2, is hanging in the balance. The 15 member states of ESA involved in the programme say that they may have difficulty in finding the small amount of further funding needed.

ESA had hoped to keep ERS-1 operating for a further year, after almost half of the 400 proposals for ERS-2 experiments asked for ERS-1 to be kept in operation in tandem (40 proposals depend on tandem operation). Scientists say that if ERS-1 is shut down in December, an opportunity to carry out unique research at little cost, using the two satellites simultaneously, will have been wasted.

The ECU920 million (US\$1.3 billion) ERS-1 was launched in 1991. Its main instruments are a radar altimeter, which gives precise measurements of the height of the ocean surface and ice sheets, and a synthetic aperture radar, which provides images with a resolution of 10 cm that can also be used for interferometry.

ERS-1 is regarded as one of ESA's most successful science missions, and the agency has had no difficulty finding backers for ERS-2. But even last year it had to struggle to raise the relatively small sum needed to

operate the satellite for a third year. Member states have so far failed to agree whether to provide the ECU8 million it would cost to keep ERS-1 running through 1995.

ERS-2 is scheduled for launch around Christmas, although it will not enter service

"best ice thickness maps of the Antarctic we've ever had". He says that ERS-1's synthetic aperture radar — which penetrates fogs and snowstorms — has been providing high quality pictures of the ice surface and of fractures and crevassing within it.

Interferometry, comparing two pictures of the same area taken at different times, when combined with radar altimeter data, is giving "a completely new understanding of the dynamics of ice sheets", says Vaughan.

But ERS-1 revisits the same location every three, 35 or 186 days, depending on which orbiting cycle it is in, while 35 days is the maximum time limit for interferometry. Using the satellite in tandem with ERS-2 would reduce the time between visits to one or eight days, and also increase the area covered. "With ERS-1 we can do some interferometry, but flying ERS-1 and 2 together we could do the whole [Antarctic] continent," says Vaughan.

An official at the British National Space Centre says that money is likely to be forthcoming to keep ERS-1 in operation during the three months before ERS-2 becomes operational. But he adds that scientists will have to make a full case for further tandem operations if this is to win funding at the next meeting of the board in September.

**Declan Butler**

IMAGE  
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REASONS

**ERS-1: failure to prolong mission 'would waste an invaluable opportunity'.**

until three months later. ESA wants to keep ERS-1 in operation during this three months, and then run it in tandem with ERS-2 for a further nine months.

One ERS-1 user, David Vaughan of the British Antarctic Survey, says that ERS-1's radar altimeter has already provided the