other message was that the final users of data should play a central role in planning missions. "We are not allowing missions to be technology driven by people saying we can build a better sensor, so let's do it," says Southwood. "We start from the point of view of the users."

ESA has challenged Europe's space industry to come up with ideas for Earth Watch missions, including funding plans, by mid-February, and these ideas will be incorporated into the overall Earth-observation strategy to be presented to ESA member states this summer. In addition to the partial industry funding for the chosen Earth Watch missions, member states will be invited to participate on a mission-by-mission basis—in much the same way that programs such as Ariane and the space station are funded now. "Without some external funding [other than ESA]," says Southwood, "I don't think the ministers will implement the Earth Watch program."

Some details of the ESA-funded Earth Explorer missions were also revealed at the Noordwijk meeting. Like ESA's Horizon 2000 space science program, it will comprise both large missions and small satellites selected to complement the scientific work being undertaken by other national and international agencies. For the first time, ESA is proposing that Earth observation receive multiyear funding, freeing the agency from the need to go back and negotiate with member states for every instrument or small satellite, allowing greater flexibility and freedom to plan.

ESA has already carved out some cash from its existing budget for a preliminary study of four proposed missions in the areas defined as Earth Explorer themes: climate studies, Earth's interior, geosphere/biosphere, and environmental change. If the strategy is approved, one mission will be selected in about 18 months; it will be the first of a series of Explorers to be launched every 2 years, starting in about 2004.

One still unresolved question is how these missions will be selected. In the Horizon 2000 program, the scientific community itself picks what missions to back. But Claus Göran Borg, chair of the European industry association of remote-sensing companies, argues that Earth-observation programs should be treated differently. "The whole name of the game is to respond to Europe's needs. This means that there must be a balance between science and politics. In my personal opinion, applications must direct the science." ESA has not yet revealed its thinking on mission selection, but full details of the strategy are due to be released in the next few weeks.

"We are saying to industry, we have finally heard what you are saying; let's see if you mean it."
—David Southwood

All this would come at a bargain price. The total budget for the entire strategy, including Earth Watch, the Explorer program, and accompanying technology development, would be about $430 million by 2005—only two-thirds of the amount ESA is currently paying for Earth observation during the construction phase of ENVISAT.

Reaction from industry and the remote-sensing community has been positive. "The plan so far sounds sensible," says Philipe Masson, an adviser to the French government and a member of the European Science Foundation's space science committee. "This approach fits the trend all over Europe, that governments set policy and industry pays for development," says Borg. "On a strategic level," he adds, "it is sensible that Europe contributes to the world capacity in Earth observing and does not leave it to the Americans or Japanese."

–Helen Gavaghan

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PLANT BREEDING

Biotech Firm in High-Nicotine Intrigue

A small biotech company that specializes in creating miniature vegetables was named last week as a conspirator with an unidentified tobacco company in an alleged scheme to produce a high-nicotine tobacco plant. In a "criminal information" filed on 7 January in Washington, D.C., the U.S. Department of Justice accused DNA Plant Technology Inc. (DNAP) of Oakland, California, of surreptitiously shipping seeds of a tobacco plant called Y-1—a strain that has twice the nicotine content (6%) of normal tobacco—to Brazilian growers during the 1980s.

The Justice Department said in a statement that DNAP is cooperating with federal prosecutors and has agreed to accept a $200,000 fine for a misdemeanor violation of federal law on seed exports. The law, which was repealed in 1991, forbade U.S. growers to export tobacco seeds without a permit. Justice is pursuing this case, government officials say, because it aims to show that tobacco companies tried to manipulate the nicotine in cigarettes.

DNAP spokesperson Michael Vernetti says DNAP signed a contract in 1983 to perform research for a tobacco company, and that DNAP "worked on Y-1 ... pursuant to this agreement" until the contract was terminated in 1994. The Justice Department has not publicly identified the firm it is pursuing as an "unindicted co-conspirator" in the Y-1 project, but government officials confirmed reports that it is the Brown & Williamson (B&W) Tobacco Corp. of Louisville, Kentucky. B&W officials declined to comment other than to confirm that B&W has used Brazilian-grown Y-1 tobacco.

According to a government official who asked to remain anonymous, investigators stumbled onto the Y-1 project in 1994 when the Food and Drug Administration (FDA) was looking into allegations that tobacco companies manipulated the nicotine content of cigarettes. Under former FDA chief David Kessler, the agency argued that cigarette firms should be regulated as drug marketers because they were regulating the level of nicotine—an addictive drug—in their products. The companies denied the charges.

When FDA sleuths began digging into B&W's records, according to the government official, a B&W employee urged them to look into the Y-1 project. After scouring foreign patent registries, FDA found a Brazilian patent describing the plant. One inventor was a researcher at DNAP, a firm known for engineering specialized fruits and vegetables, such as miniature carrots and peppers, sold under the brand names FreshWorld Farms and VegiSnax. According to the government official, DNAP staff explained that the company had been recruited by B&W to breed a sterile form of Y-1. Government officials allege that B&W, which created the Y-1 strain, wanted to ship the plant to foreign growers but retain control of production by making it sterile.

DNAP collaborated with the tobacco company, according to the Justice Department statement, and shipped Y-1 seeds—under code names such as "winter trials" and "special material"—to Brazil by courier. Vernetti confirms that DNAP accepts responsibility for violating the seed-export law.

When confronted with this evidence in 1994, the government official says, B&W executives denied that they were developing Y-1 as a means of altering nicotine levels. Instead, the official says, they claimed that Y-1 tobacco was a "blending tool" used to lower the tar content of cigarettes while keeping other qualities stable. This explanation is likely to come under closer scrutiny as federal prosecutors pursue the FDA's allegations against the tobacco companies. And by raising the specter of criminal conduct in the tobacco industry, the high-nicotine flap could undermine a proposed moratorium on lawsuits against cigarette firms to be reviewed in Congress later this year.

–Eliot Marshall