Remote sensing for private investments

"As I walked around this conference, I detected a sense of nostalgia for the heyday of the sixties, " observed Joseph F. Shea, vice president of Raytheon, at the recent meeting in Boston of the American Astronautical Society. "At that time, aerospace programs were fueled by a space budget representing over 1 percent of the gross national product. Today's budget is two-tenths of that amount and shrinking."

Throughout the formal presentations, the banquet speeches and the smoky hallway discussions, the common refrain among scientists and engineers was that present National Aeronautics and Space Administration funding levels are too low to maintain U.S. leadership in space. And it was often suggested that the survival of an innovative space technology in the current fiscal climate will depend on attracting large financial investments from the private sector.

"We cannot look to the government for continuous funding or to create markets for space-based products and services," said Klaus Heiss, president of Econ, Inc. "We are at a critical threshold today. The question is not whether outer space is ready for private investment, but whether the government and the aerospace industry are ready for private investment in space."

One problem identified by Heiss is that the aerospace industry is extremely capital poor. Compared with other industries, such as utilities and communications, the aerospace companies are the most equity under-financed industry in the United States. One reason for this is that aerospace sells more than 60 percent of its products to government, and the profitability of these sales is encumbered with elaborate procurement regulations and a "cost-plus-fixed-fee mentality."

"In order to connect aerospace with large pools of funds, we need something like a Space Bank," proposed Heiss. "This would be created for the same reason we created the World Bank: Space is an underdeveloped area with vast resource potential that needs long-term financing."

The success of commercial communications satellites is often cited as a guide for future earth observation programs, like the next generation of multi-spectral scanners such as the thematic mapper. "There isn't a single oil or mining company that hasn't accessed Landsat data," claimed Edward A. Flinn, head of NASA's Geodynamics Program. "U.S. resource companies today spend over $2 billion annually to explore for new mineral deposits....Surely there is a market out there to support remote sensing, especially with thermal infrared and microwave technology soon to be able to produce three-dimensional geological maps."

Richard Hesselbacher, manager of General Electric's Advanced Space Programs, told the AAS meeting that remote sensing could conceivably become a private operation within a decade or two. But NASA must first show that new multi-spectral scanners can generate reliable and marketable products before private capital will get involved. It is unlikely, said Hesselbacher, that industrial consortiums will underwrite new remote sensing satellites on their own because of the high risk, long lead times and high cost of transportation to orbit. To accelerate innovation of this technology, Hesselbacher suggested, a broad range of joint government-industry activities must be initiated, based on a no-exchange-of-funds concept, with protection of both public interests and private patents.

"If we are going to have large-scale private investment in space," warned John Meyer of the Harvard Business School, "then the rules of the game are going to change. The risks of investment are going to have to be absorbed by the market and not by what the government is willing or not willing to do. And the rewards for this risk should be commensurate."

In the area of materials science, the payoffs for industry in space could be immense. At present, the NASA Materials Processing in Space (MPS) program is geared to preliminary Shuttle/Spacelab studies of materials behavior in a microgravity environment. Some of the materials to be studied could lead to breakthroughs in areas such as stronger alloys, ultrapure glasses, superior electronic components and exotic pharmaceuticals.

Later, in mid-1986, the Materials Experiment Carrier (MEC), with its 25 kilowatt power system, is expected to become operational. Preliminary studies indicate that by using the free-flying MEC rather than the Shuttle as a platform for materials processing, a cost reduction of about one order of magnitude can be achieved. The design goal is to keep costs close to $30,000 per sample processed.

"The widest public benefits will come through the application of MPS technology to marketplace needs," said Richard L. Brown of the NASA-Marshall Space Flight Center. "Thus, private sector involvement is a prerequisite to public benefits. Over the past two years, NASA has been working with industrial firms to develop incentives and mechanisms needed to bring about early adoption and diffusion of MPS technology in the private sector. And I am glad to say that the results to date, though limited, are encouraging." □

Photocopy fuss: This time IBM

The U.S. Environmental Protection Agency once again has a copier chemical on its hands. This past spring it began investigating the potential carcinogenicity of the nitropyrene present in certain Xerox Corp. toners, or chemical darkeners (SN: 4/19/80, p. 246). Now, EPA is investigating trinitrofluorenone (TNF), a printing chemical used by IBM Corp.

TNF is a photoelectrically active ingredient of the mixture that coats the printing drums in the IBM copiers I and II and laser printer 3800. Earlier this year, IBM officials informed EPA that this chemical — which may escape from the printing drums onto copy or into the air and spent toner — causes gene mutations in bacterial and mammalian cell assays. EPA officials met with IBM to discuss not only these recently conducted studies, but also 1968 studies initiated by IBM to test the potential carcinogenicity of TNF in rats via inhalation exposure and skin applications. In a preliminary evaluation of this information, EPA reports that the inhalation and dermal studies are inadequate to assess the carcinogenic potential of TNF but that based on the cell assays, TNF is a suspect mutagen and carcinogen in living organisms.

EPA is continuing its investigation of both the Xerox toner and the TNF used by IBM. The agency is evaluating additional toner data from Xerox — tests on hamsters along with the bacterial studies reported in the Aug. 29 SCIENCE — and is awaiting more TNF data from IBM. Meanwhile, the National Institute for Occupational Safety and Health is writing a soon-to-be-released Current Intelligence Bulletin, or temporary guidance document, on use of TNF.

As in the Xerox case, the issue with IBM is twofold: the potential hazard to office personnel of a particular copier chemical and also whether the company has wrongfully concealed earlier knowledge of the chemical's potential toxicity. "According to minutes from meetings of top IBM decision-making committees, IBM knew since before 1970 that the substance used in its photocopying process, trinitrofluorenone (TNF), is a [potential] carcinogen," reports the Sept. 15 COMPUTER WORLD. But in a letter to that trade journal's editor, IBM Chairman Frank T. Cary chastises COMPUTER WORLD reporters for implying that "for ten years IBM concealed from the EPA knowledge that TNF is a possible carcinogen. That is incorrect. TNF's carcinogenic potential was described in the scientific literature at that time [initial evidence for the potential carcinogenic activity of TNF stems from a report in the July 7, 1962, SCIENCE] as was IBM's use of the chemical in the copier photoconductor." In addition, explains Cary, it wasn't until 1977 that companies were required under EPA's Toxic Substances Control Act to report *new* toxicological findings. According to Cary, "We had no new information to report until 1980." □