A: I think the science office under Carter was basically emasculated. I don't think it was a White House advisory office in any obvious way, and it should have been. Science and technology are too important for this country not to have that person at the same level as the national security adviser or anyone else who is an immediate adviser to the President. It has to be that kind of an office. If Governor Reagan does not recognize it as such, then a lot of us are going to have to do everything we can to convince him. . . .

Q: Have you spoken with him about this?

A: No. I am scheduled to meet with him on Friday [12 December]. But the main point that I want to talk to the President-elect about is the perspective we must have relative to a long-term involvement in space. We are in competition with the Soviet Union in space, and they are proceeding with much clearer purpose, albeit with inferior technology. There is no question in my mind but that the future of human relations on earth will be determined by the kind of civilization that is dominant in the beneficial and defense uses of space technology. The Soviets recognize that; we have not recognized it.

The historical analogy is clear. Our position with respect to the "new ocean of space" is completely analogous to the British nation's position with respect to the oceans over the last several centuries, until World War I. We cannot turn our backs on that. The schedule we assume—that's an item for debate. But to say that we will not compete, that we are going to allow the Soviet Union, representing a civilization of oppression, to dominate human activity in near-earth space, or on the planets, or anywhere else, would be to turn our backs literally on the survival of freedom on this planet.—ELIOT MARSHALL

Simon Ramo's Prescriptions for Innovation

A Reagan adviser says America's technology slip is showing, and offers some remedies

A clue to Ronald Reagan's future science policy may be found in the thoughts of Simon Ramo, the energetic and vocal director of TRW, Inc., now serving as cochairman of Reagan's science and technology task force. Ramo is not a close personal friend of Reagan's, but he is well known and well liked among the wealthy industrialists who compose the president-elect's brain trust. Moreover, the science policy issues confronting the new Administration have long been the object of Ramo's scrutiny, and he already has in mind a blueprint for improving U.S. industrial and technological performance—a blueprint that includes sweeping changes in regulation, taxes, patents, and federal subsidies for applied research.

Ramo's blueprint is derived largely from his experience as founder and a director of the Ramo-Woolridge Corporation, which became TRW in 1965. TRW makes auto parts, advanced electronics, spacecraft, and machinery parts. Under the direction of Ramo and his cofounders, TRW prospered mightily through various recessions, a rise and fall in defense spending, and a severe cutback of the space program. Its annual sales currently stand at nearly $5 billion. Ramo's concern for technology policy stems from a conviction that his company's stellar achievements need not be unique.

Ramo, 67, has recently published two books that offer insights into his thinking, *America's Technology Slip*, and *The Management of Innovative Technological Corporations*.* The former, aimed at the lay public, is said by its publisher to be enjoying strong sales. The book's theme parallels that of earlier Ramo publications: The United States "is experiencing the malaise, dislocations, and frustrations of an immense, almost uncontrollable imbalance between rapidly accelerating technological advance and lagging social progress." America has the technological tools it needs in order to be competitive in world markets and prosperous at home, but it does not know what to make of them. "We can be likened to a group of inept carpenters," Ramo says, injuring ourselves and others, not knowing what to build, and then blaming the tools instead.

What is needed to reduce inflation and enhance productivity is a more favorable climate for innovation, Ramo says. The government can go a long way toward creating this environment by permitting accelerated depreciation of plant equipment, eliminating capital gains and savings income taxes, and reducing the tax on corporate income, relying solely on taxation of shareholder income.

Ramo believes the climate for innovation can be improved by better decision-making and more leadership at the federal level. Specifically, this means reaching a broader consensus on the benefits of such controversial technologies as nuclear power, pesticides, or synthetic fuels. As Ramo sees it, innovation is too often hamstrung by disagreements over such pressing issues—typically between corporations on the one hand and politicians and their constituents on the other.

Ramo rejects the average industrialist's view that "any problem the nation faces can best be handled by the government's keeping its hands off and leaving everything to the private sector." He suggests that such opinions are hypocritical. "Many executives are quite accustomed to delivering a luncheon address on the benefits of free enterprise and the ills of control by government, then hurrying to meet with government agencies from which they seek contracts, special subsidies, and general favors." He needles Reagan himself by writing that, "stopping inflation is not simply a matter of 'getting the government off our backs.' "

Drawing on his experience in various space and defense programs, Ramo insists that government involvement in R & D is necessary. "Private investment at risk is not consistent with situations in which government responsibilities . . . are in the end unavoidable, or where proprietary know-how developed at private expense is difficult to protect from competitors." Agriculture, energy, and defense are categories of R & D where ultimate federal decisions are crucial to profitability, and are thus legitimate areas for federal subsidy. The difficulty arises when the government attaches too many rules to its money, mini-

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mizing the salutary effects. "In the interest of being sure that government money is not stolen or misused on foolish projects, there is now a good deal of pointless dissipation in costly preliminaries before a grant can be obtained," Ramo writes. "The fundings should be committed long-term and there should be a minimum of administrative burdens or trys for zero waste."

Simon Ramo

Ramo says that overregulation generally hampers corporate innovation. He suggests that all safety, health, and environmental regulatory agencies should be merged and restricted to narrow, avowedly negative investigation and advocacy. Ultimate regulatory decisions would be made by a politically appointed panel of "experts," following competing presentations by the regulatory agency and the corporation involved. Panels could be arranged by topic, such as nuclear power, food and drugs, occupational safety and health, and environmental pollutants. Ramo told *Science* that he doubts if such drastic recasting will ever occur, but that less sweeping reforms might still permit the separation of decision-makers from the advocacy of regulatory staffs. Currently, agencies such as the Federal Trade Commission and the Nuclear Regulatory Commission act as both prosecutor and jury, he says.

The trick in every technological undertaking is to strike the right balance of government and private participation. Ramo suggests that in some instances the government is gulled into actually doing more than it should, because of excessive timidity on the part of top corporate managers, or merely poor political judgment.

There are three recent instances of unholy industry-government alliance, he writes. The first is the cooperative program on auto research sponsored by Congress and the Carter Administration. "What, besides costly amateurism, can the government contribute in design, manufacturing, or marketing expertise" for the automobile, Ramo asks. The government also agreed to share the $65 million cost of developing a gas turbine auto by 1985. Ramo comments, "if General Motors had thought the approach a really good idea, it obviously would have elected to go ahead" on its own. The government's contribution "comes from taxing GM and other companies and purchasers of cars, and is diluted by the government's administrative costs in making the transfer." Another example is the recently enacted federal synfuels corporation. "This amounts to the government's removing financial backing from the industry professionals [through taxation] and putting it simultaneously into the hands of government amateurs," Ramo writes. The Energy Department should instead have agreed to buy a specified quantity of synthetic fuel for its own use, and then chosen among competing bidders for supply.

Government involvement in such projects could be avoided if large corporations were permitted to form consortiums for risky or expensive research projects, Ramo says. He suggests that an agency be formed within the Commerce Department to foster mergers. "It would seek always a healthy, profitable group of competitors, in contrast with the frequent situation where the nation has one satisfactory large operation plus a string of lesser ones, all of the latter . . . unable to afford adequate technological development."

In those instances where government subsidy becomes necessary, a more flexible patent policy would ensure that subsidized discoveries are brought to market. Instead of holding the patent rights to itself and distributing free licenses, the government "might take a free license . . . but assign all other rights to the inventor or the company that employs the inventor." Through a 50 percent tax on the inventor's net income, the government gets half of the profits from the invention anyway.

Finally, Ramo calls for renewed enthusiasm in both the private and public sectors for education and improvements in manufacturing and production technology, the area where the United States is falling furthest behind its overseas competitors. Even with considerable effort on all these fronts, Ramo says, "we should expect to produce only between a third and a half of future technological breakthroughs. For the future, it is not realistic to imagine we can lead in everything or even most things."

—R. JEFFREY SMITH

For NIH, Business as Usual

Controversial parts of a bill concerning the National Institutes of Health have been cast aside after several months of heated dispute between the biomedical community and legislators.

A standoff between two powerful legislators, Senator Edward Kennedy (D.-Mass.) and Representative Henry Waxman (D.-Calif.) culminated in a compromise bill that contained only routine and minor provisions of earlier versions. The result: business as usual at NIH.

The compromise measure was passed by voice vote in both the House and Senate during the first week in December.

Both Kennedy and Waxman gave up measures that were important to them. Waxman withdrew a proposal to give Congress new control over NIH in the form of periodic authorization. Kennedy, for his part of the compromise, withdrew a measure to establish a presidential advisory council dealing with biomedical research.

Many in the research community regard Kennedy as a hero because he stuck to his guns to oppose Waxman's proposal. Says one lobbyist, "I'm writing Kennedy to thank him for his work. The bill is an acceptable outcome."

Whether Waxman will eventually resurrect his bill is not clear. Although he will continue as chairman of the subcommittee on health and the environment, about one-third of his committee will not be returning in January—including two of his most vigorous supporters of the NIH measure. A subcommittee aide says, "Mr. Waxman is committed to the principles of the [original] bill, but we'll have to review the matter again."

On the Senate side, a subcommittee aide says that Kennedy "still feels strongly about the concept of a council. The issue is not dead." That, however, may simply be a signal to Waxman to expect another fight if the Congressman reintroduces his bill.

Much to the relief of NIH leaders, the compromise legislation did not change the agency's existing power to obtain appropriations with or without specific authorizations. Waxman had