"Human Capital"

Regarding "human capital," the memo maintains that "an increasingly important source of comparative advantage among advanced countries has been an increasingly abundant supply of sophisticated labor skills." As a result, the memo continues, "Proximity to markets and access to raw materials, energy, and unskilled labor are reduced in importance."

The general conclusion flowing from this, according to the memo, is that "government at all levels can improve U.S. competitiveness through investing in better education for people of all ages, aiming education at future job needs, and providing citizens with the intellectual flexibility required to cope with a rapidly changing world."

According to the memo, "this job is not being done well enough." It prescribes, "Educational standards need to be revised and upgraded. . .," adding, "While a heavy focus should be placed on basic education of young people, there also needs to be a greater emphasis on continuing education to expand workforce knowledge, skills, and occupational mobility."

It adds, without elaboration, "Other means of reducing barriers to worker mobility, including possible changes in the pension system, warrant further investigation."

Research and Development

The research and development report to the Economic Policy Council glosses over many more specific ideas contained in a Sept. 26 report circulated within the working group. The memo to the Economic Policy Council simply stresses the importance of technology, of basic research, and of protections for intellectual property. It notes that the U.S. government, as a major funder of R&D, "is in the best position to ensure adequate incentives for effective dissemination and commercialization of federally funded science and technology."

The six-page Sept. 26 report goes into more specifics on "ideas" generated within a "sub-working group" on R&D. The basic thrust should be on increasing emphasis on basic research while at the same time facilitating commercial exploitation of basic research, according to the report.

Several recommendations from the White House Office of Science and Technology Policy are included in the report, such as increasing support for basic R&D at universities, especially for equipment and facilities. The science office also suggested "ensur[ing] that all international science and technology agreements the U.S. concludes or supports with federal funds address adequately the linked problems of equity, reciprocal access, and intellectual property and patent and copyright protection." Raising business awareness of the increasing opportunities for cooperative R&D ventures with reduced antitrust exposure is also proposed.

The science office also urged a restructuring of the science and technology services provided by U.S. embassies, by staffing the embassies with persons trained in science and engineering and experienced in R&D management from U.S. government technical agencies, universities, and the private sector.

A number of points in the Sept. 26 report are followed by parenthetical notations indicate that the Economic Policy Council has already approved the recommendation. One such idea is that "all major R&D agencies should make a stronger commitment to build up university-based scientific and engineering research that bears on technology and industrial competitiveness, especially through multi-disciplinary basic science and technology centers such as the University Research Initiative of the Department of Defense and the Engineering Research Centers of the National Science Foundation." The report continues, "As a first step, these agencies should reallocate resources within their R&D budgets to support this activity," says the report, noting Economic Policy Council concurrence. The science office has urged increased funding for such centers, the report notes.

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Venture Capitalists Are Plugging Into Superconductors

Competition for Profits Is Sparked by Discovery of the New Materials

By David Stipp
Staff Reporter of The Wall Street Journal

Products based on recently discovered superconductors are still just twinkles in researchers' eyes. But ventures aimed at reaping profits from the new materials are quickly springing up.

Companies with such names as American Superconductor Corp. are being formed, and at least five university-industry consortia are being set up for superconductor research and development. Entrepreneurs are talking about a national sweepstakes among states to form "Oxide Valley," a Silicon Valley-like concentration of ventures to develop the new copper-oxide superconductors. And industry, government and university representatives are meeting in Washington this week to discuss ways to speed commercialization of the new superconductors.

To many venture capitalists, however, it still seems too early to place big bets on the new superconductors—materials that conduct electricity without resistance. Despite recent excitement about potential applications—such as faster computers, levitated trains and frictionless bearings—the new materials are still largely mysterious and difficult to work with.

Stiff Competition

Moreover, start-up companies already face stiff competition from large concerns with big research staffs in the race to commercialize the new superconductors. Even the basic research finding that started the race came from a big company: Last year, two scientists at International Business Machines Corp. discovered the new, ceramic superconductors, which work at less frigid, more cheaply attained temperatures than formerly known ones do.

"It's an area that is obvious to a lot of major corporations, and that will make it hard to carve out a protected niche," says Reid Dennis, a partner of Institutional Venture Partners in Menlo Park, Calif. "An awful lot of money is going to be lost by a lot of people trying to invest in this."

Though acknowledging that IBM and other big companies may dominate some areas of the nascent industry, many venture capitalists expect it to evolve largely from start-ups that spring out of universities, as biotechnology did. "I expect in short order that we will see a wave of new companies formed to develop specific applications in fields like medical imaging, motors and transportation," says John Doerr, a partner at San Francisco-based Kleiner, Perkins, Caufield & Byers, a venture-capital firm.

Venture capitalists also are mindful of difficulties that start-up companies could face getting and protecting patents on the new superconductors. Such problems stem partly from the fact that there is no widely accepted theory to explain how they work.

"If you had a good theory, you could write a patent application specifying a broad class of materials," says George Reichenbach, a venture capitalist with Advent International in Boston. "But since we don't know how they work, patents can only deal with specific compounds people make." He adds that a patent on a particular compound is hard to protect because competitors often can make materials whose chemical compositions are slightly different—and thus aren't covered by the patent—but that have the same properties.

"Since we think the likelihood of anyone getting a strong patent on composition is small," says Mr. Reichenbach, "we're looking at trying to find researchers and companies with clever manufacturing processes and knowledge of specific applications" to invest in.

Research at MIT

Similar ideas led George McKinney of American Research & Development Inc., a Boston venture-capital firm, to two Massachusetts Institute of Technology researchers in February. The researchers, Gregory Yurek and John Vander Sande, are developing a process to make wire and other products from malleable, metal precursors, which, before heat treatment that produces superconductivity, are far easier to shape than the brittle, ceramic materials are in final form.

"We think the greatest opportunity in the near term will be in fabricating processes," says Mr. McKinney, who spearheaded the formation in April of American Superconductor, a start-up company based on the MIT process. Indeed, the technique his company plans to develop is a particularly hot idea in superconductor research—at least three other research teams, including ones at Boston's Northeastern University and at Argonne National Laboratory near Chicago, are working on closely related processes.

Mr. Vander Sande, an MIT materials scientist, says much work remains to be done to make the process commercially useful. But he and other American Superconductor participants already envision their company as a major player in the fledgling industry. They have added several other MIT researchers to the scientific team and plan to establish a facility outside the school by October. The venture team also has expanded to include Rothschild Ventures Inc., a unit of Rothschild Inc., and other investors may soon join.

"It may sound corny, but our goal is to build the American superconductor corporation," says T.L. Loucks, a Rothschild partner. He adds that the company already is lining up potential partners and customers, such as makers of electric motors and cables.

Venture capitalists agree that paybacks from investments in start-up superconductor companies are probably years away. "We're taking a long-term bet," says Mr. McKinney, who predicts that American Superconductor may not make significant profits for seven to 10 years.

Some Take Research Tack

Noting that the new superconductor industry is likely to remain a research game for years, some investors are hoping to achieve relatively quick returns by developing materials and instruments for such research. "Instead of waiting for big future payoffs, we're being more pragmatic and investing in technology that will provide information to superconductor researchers," says Sam Colella, a partner of Menlo Park's Institutional Venture Partners. He declined to elaborate, for competitive reasons.

Taking a similar tack, Guernsey Coating Laboratories, a small Ventura, Calif., concern founded five years ago to develop thin-film technology, plans to coat objects with superconducting ceramics for researchers. Though it hasn't perfected the process yet, the company recently advertised it in a physics journal and already has received dozens of inquiries from prospective customers, says Peter Guernsey, the company's president.

To get their feet wet without going overboard, some superconductor investors are supporting university research, which typically gives them priority in licensing patents that result. "Our premise is to establish a small research group" at MIT, says Laurence Storch, a lawyer in Washington, D.C., and co-founder of a new superconductor company named Conductor Technologies Inc. "We're in no rush to set up an outside laboratory until the technology matures more. The whole thing is still frothy, and we want to make sure we're not going off on something half-baked."

Many universities aren't waiting for venture capitalists to come to them. "Almost any professor working on superconductivity who is worth his salt wants to start a company," says Advent International's Mr. Reichenbach. Adds Steven Roth, a partner at Aegis Funds in Boston, researchers "are coming out of the woodwork" with proposals for new superconductor companies.

Several universities are forming superconductor-research groups and consortia, and are seeking funds from companies and government agencies to support their work. Lehigh University in Bethlehem, Pa., for example, expects to raise about $400,000 from a dozen companies to establish a consortium within a few weeks, says Donald Smyth, director of the school's materials research center.

Two of the most ambitious new university initiatives are at the State University of New York at Buffalo and at the University of Houston, recently designated by Texas as the site of the state's new Texas Center for Superconductivity. With an expected $4 million in initial funding, the Houston center will employ 200 people in nine groups to tackle problems in pure and applied research, says Roy Weinstein, associate director of the center.

Reagan Offers Steps to Aid Private Sector In Finding Ways to Use Superconductors

By Gerald F. Seib
Staff Reporter of The Wall Street Journal

WASHINGTON—President Reagan announced a package of government steps designed to help the private sector develop commercial applications of new electrical superconducting materials.

The package, which he summarized in a speech at a conference here on superconductivity, includes proposed legislation to allow more joint ventures under federal antitrust law and plans for shifting more federal research funds into superconductivity projects.

Recently discovered superconducting materials transmit electricity without resistance, allowing electrical currents to be carried without loss of energy over great distances. Compared with superconductors already in use, the new materials work at higher temperatures that are cheaper to attain. They have a wide variety of potential applications—in computers, medical devices and electronics—but are still in the research phase, and major commercial uses are expected to be at least several years away.

Earlier Initiatives

Several of the administration's proposed steps are modifications of earlier initiatives to promote commercial use of high technology in general, announced by President Reagan in his State of the Union address in January. Some, notably a proposal to protect some technical information from release under the Freedom of Information Act, haven't made much progress in Congress. But by focusing attention specifically on the popular superconductivity issue, the administration may hope the ideas have a greater chance of success on Capitol Hill.

White House aides stressed that their aim is to ensure that American manufacturers, rather than Japanese or European competitors, take the lead in commercial development.

Mr. Reagan warned that "for the promise of superconductivity to become real, it must bridge the gap from the laboratory to the marketplace, it must make the transition from a scientific phenomenon to an everyday reality, from a specialty item to a commodity."

Highlights of Plan

Specifically, Mr. Reagan said he will:

—Seek legislation to ease antitrust laws governing joint production ventures; increase patent protection for manufacturing processes, and authorize federal agencies to withhold from release under the Freedom of Information Act some commercially valuable technical information.

—Establish an advisory group of industry and academic experts to advise the administration.

—Encourage federal agencies to shift funds in existing budgets into superconductivity research and order them to emphasize such research in budgets for the next two fiscal years.

—Ask the Defense Department to speed up work on military applications and the Commerce Department to accelerate development of other devices.

—Direct the Patent and Trademark Office to speed processing.

—Negotiate more American opportunities to participate in Japanese government-supported research and development.

New York Times July 29, 1987

Reagan, Citing Foreign Challenge, Outlines Superconductivity Plan

By JAMES GLEICK
Special to The New York Times

WASHINGTON, July 28 — Responding to the perception of a strong challenge from Japan and other countries, President Reagan announced a broad Federal program today to help American businesses translate the scientific promise of superconductivity into marketable technologies.

Mr. Reagan described it as an "11-point Superconductivity Initiative," the points ranging from a new advisory panel of "wise men" to proposed legislation that would strengthen patent protection and relax antitrust rules. The plan includes establishing, at Government laboratories, four special centers for research into superconducting materials — substances that carry electric current without the slightest loss to resistance. Further, the military plans to spend $150 million in the next three years to speed potential applications in ships and weaponry.

A Major Commitment

"Science tells us that the breakthroughs in superconductivity bring us to the threshold of a new age," Mr. Reagan said at a Federal conference on the commercial applications of superconductivity. "It is our task at this conference to herald in that new age with a rush."

Flanked by the Secretaries of State, Defense and Energy — and paying tribute to Secretary of Commerce Malcolm Baldridge, a scheduled speaker before his death in a rodeo accident Saturday — the President outlined what amounted to an extraordinary Government commitment to a breakthrough in pure science.

The President's program comes eight months after the first announcement that physicists had discovered a new class of superconducting materials.

Past superconductors, already used to make powerful magnets in medical imaging machines and particle accelerators, only worked in extreme cold and required so much refrigeration that they were relegated to the realm of esoterica. The new materials become superconducting with much less cooling, opening the door to small, fast computers, frictionless levitating trains, extremely efficient electrical transmission lines and perhaps many other everyday applications.

"The effects of all these discoveries will change the world in ways that we will all have to stretch our imaginations to conceive," said the White House Science Adviser, Dr. William R. Graham.

A driving motivation for the initiative, Administration officials said, is the fear of well-coordinated foreign competition on a new high-technology battleground. Japan and the Soviet Union have set in motion national programs on superconductivity.

"It's not so much a fear as a certain realization," Dr. Graham said in an interview. "The Japanese will move very aggressively in this area. And where 20 years ago we had the luxury of moving in advanced technology at our own pace, today Japan and several other countries are very sophisticated technically and very strong competitors and very aggressive in moving technical discoveries to the marketplace."

The legislative part of the President's program ties three proposals together in one bill under the rubric of superconductivity. Antitrust laws would be relaxed to make joint ventures easier for manufacturers; patent laws would be strengthened to allow companies to seek damages when imported products infringe patents and — the proposal likely to be most controversial — the Freedom of Information Act would be modified to allow Government laboratories to withhold commercially valuable scientific information.

The Administration is also ordering the Patent and Trademark Office to speed up processing applications involving superconductivity. Other agencies are being asked to switch financing toward superconductivity research wherever possible.

Concern About Military

The President, continuing his series of public appearances during the Iran-contra hearings, spoke in an anecdotal, quotation-filled talk of "an age of mind over matter," in which scientists are pioneers pursuing the American Dream.

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Dr. Graham, the President's Science Adviser, said that while he believes in international openness in science, this was not a scientific meeting. "We really wanted to have a meeting of our home team," he said, "our industries, our Government labs, our Administration, our research community."

Engineering Problems

A frantic international research effort by thousands of physicists in recent months has brought an increasingly sharp sense of the engineering problems that will have to be overcome on the way from the laboratory to the marketplace.

The materials are easy to make in small quantities. One physicist, Angelica Stacy of the University of California at Berkeley, spoke today of the "Julia Child approach — some people are using coffee grinders and microwave ovens." But mass production brings difficulties, and the superconductors become unstable when exposed to moisture and carbon dioxide.

Because the materials are brittle ceramics, the production of wire for magnets or transmission lines will also pose engineering difficulties, and the Department of Energy has set up a special wire-making project at the Argonne National Laboratory in Illinois.

One reason for the Administration's concern about the road to commercial applications is the likelihood that the most rewarding technologies will require a long, sustained commitment of investment without the solace of immediate compensation on corporate balance sheets. In the 1970's, the failure of the American electronics industry to make that kind of commitment turned video recording technology, for example, into a strictly Japanese consumer product.

Redirection of Financing

"Other countries, particularly Japan, have shown that such commitment can produce spectacular results," said Erich Bloch, the head of the National Science Foundation. If American industry is not willing to look ahead more than a year or two at a time, he said, "then others will reap the benefits of the insights that our laboratories have produced."

For now, at least, the initiative involves a redirection of money from other research rather than new financing, a White House aide said. And Federal officials took pains to say their policy would be guided by the President's belief that private enterprise must remain responsible for developing commercial products.

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Commercializing Superconductors

Reagan Announces Program to Beat Foreign Competitors

By Kathy Sawyer
Washington Post Staff Writer

Hailing a "new arena for the spirit of enterprise," President Reagan yesterday announced an 11-point program to help the U.S. beat its foreign competitors to the punch in commercializing new superconductor technologies.

His "Superconductivity Initiative" calls for an increase in research money for the Defense Department, "quick start" grants for commercial applications, a relaxation of antitrust laws to permit joint production ventures, stricter patent laws and the withholding from release under the Freedom of Information Act of "commercially valuable" scientific information developed in government laboratories.

"Science tells us that the breakthroughs in superconductivity bring us to the threshold of a new age," the president, flanked by Secretary of State George P. Shultz, Secretary of Defense Caspar W. Weinberger and other top officials, told a gathering of more than 1,000 American scientists, engineers, venture capitalists and entrepreneurs at the Washington Hilton.

"It is our task at this conference to herald in that new age with a rush .... For the promise of superconductivity to become real, it must bridge the gap from the laboratory to the marketplace, it must make the transition from a scientific phenomenon to an everyday reality, from a specialty item to a commodity," he said.

The discovery last October of high-temperature superconductors, which carry electricity without losing energy to resistance, set off a global competition to develop the commercial potential of the new materials.

Reagan's speech was the latest indication of mounting concern that while the United States is a leader in laboratory breakthroughs, it has repeatedly lost out to others—notably the Japanese—in the struggle to convert these advances to practical applications for the marketplace.

Among the potential uses envisioned by scientists are high speed trains that hurtle frictionlessly on cushions of magnetic force; supercomputers several times faster, more powerful and also smaller and cheaper than those used today; lighter, more efficient electric motors of all kinds; and advanced radar, submarine tracking, and ultrafast processing of electronic signals useful in high-tech weaponry.

In general, turning the recent discoveries into practical technologies "will be a long and difficult process," National Science Foundation chairman Erich Bloch told the group, echoing other speakers.

Dr. Sibley Burnette, while with GA Technologies, sold 53 superconducting magnets used in hospital diagnostic devices. To get to the market, he told the conference yesterday, "We broke every rule in the policy and procedures manual." One necessity, he added, is getting someone to freeze the design in timely fashion, despite the "disappointed engineers" who constantly come up with ways to make it better.

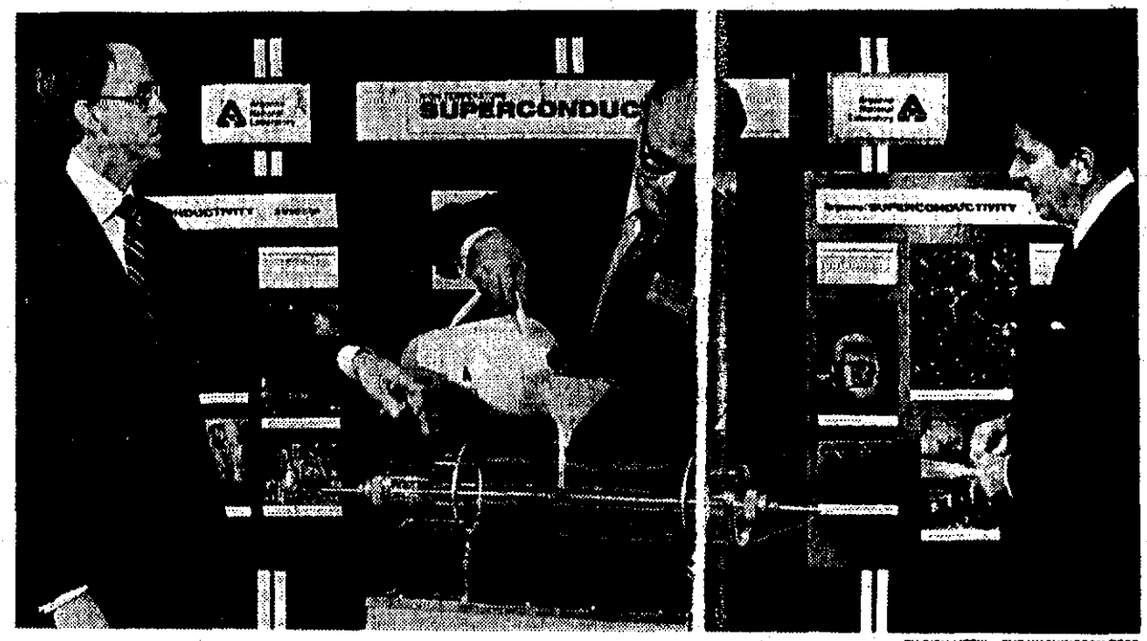
Although Reagan favors self-help by industry, he said the federal government would do all it can to foster private-sector development of superconductor technology and noted that his administration is proposing to double the National Science Foundation budget over the next five years.

His proposal yesterday follows an executive order in April to promote partnership between federal laboratories and the private sector. The plan also includes the creation of what he called a "Wise Man" Advisory Group on Superconductivity, made up of five people from industry and academia, to advise the administration on policy, and it proposes the establishment of a number of "Superconductivity Research Centers" by the Departments of Energy and Commerce, the National Aeronautics and Space Administration and other institutions.

The first specific and dramatic increase in government research funding, with more expected to follow, went to the Pentagon. The initiative calls for the Defense Department to spend nearly $150 million over the next three years "to ensure use of superconductivity technologies in military systems." All federal agencies combined are currently spending a total of $3 million a year on superconductivity research, according to Phil Hoff, an Energy Department spokesman.

Several of Reagan's proposals require congressional approval. A previous effort to weaken FOIA requirements got nowhere.

The two-day conference was sponsored by the White House and the Department of Energy, Reagan said, "so that business and science can cross-fertilize." It has stirred controversy because of a decision engineered by Reagan science adviser William R. Graham Jr. to bar foreign officials and business representatives, even though the meeting was open to both foreign and domestic press.



BY RICH LIPSKI—THE WASHINGTON POST

Reagan looks on as science aide William Graham, left, and Argonne Laboratory's Alan Schriesheim perform experiment.

NEW YORK TIMES July 29, 1987

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To get their feet wet without going overboard, some superconductor investors are supporting university research, which typically gives them priority in licensing patents that result. "Our premise is to establish a small research group" at MIT, says Laurence Storch, a lawyer in Washington, D.C., and co-founder of a new superconductor company named Conductor Technologies Inc. "We're in no rush to set up an outside laboratory until the technology matures more. The whole thing is still frothy, and we want to make sure we're not going off on something half-baked."

Many universities aren't waiting for venture capitalists to come to them. "Almost any professor working on superconductivity who is worth his salt wants to start a company," says Advent International's Mr. Reichenbach. Adds Steven Roth, a partner at Aegis Funds in Boston, researchers "are coming out of the woodwork" with proposals for new superconductor companies.

Several universities are forming superconductor-research groups and consortia, and are seeking funds from companies and government agencies to support their work. Lehigh University in Bethlehem, Pa., for example, expects to raise about $400,000 from a dozen companies to establish a consortium within a few weeks, says Donald Smyth, director of the school's materials research center.

Two of the most ambitious new univesrity initiatives are at the State University of New York at Buffalo and at the University of Houston, recently designated by Texas as the site of the state's new Texas Center for Superconductivity. With an expected $4 million in initial funding, the Houston center will employ 200 people in nine groups to tackle problems in pure and applied research, says Roy Weinstein, associate director of the center.

Reagan Offers Steps to Aid Private Sector In Finding Ways to Use Superconductors

By Gerald F. Seib
Staff Reporter of The Wall Street Journal

WASHINGTON—President Reagan announced a package of government steps designed to help the private sector develop commercial applications of new electrical superconducting materials.

The package, which he summarized in a speech at a conference here on superconductivity, includes proposed legislation to allow more joint ventures under federal antitrust law and plans for shifting more federal research funds into superconductivity projects.

Recently discovered superconducting materials transmit electricity without resistance, allowing electrical currents to be carried without loss of energy over great distances. Compared with superconductors already in use, the new materials work at higher temperatures that are cheaper to attain. They have a wide variety of potential applications—in computers, medical devices and electronics—but are still in the research phase, and major commercial uses are expected to be at least several years away.

Earlier Initiatives

Several of the administration's proposed steps are modifications of earlier initiatives to promote commercial use of high technology in general, announced by President Reagan in his State of the Union address in January. Some, notably a proposal to protect some technical information from release under the Freedom of Information Act, haven't made much progress in Congress. But by focusing attention specifically on the popular superconductivity issue, the administration may hope the ideas have a greater chance of success on Capitol Hill.

White House aides stressed that their aim is to ensure that American manufacturers, rather than Japanese or European competitors, take the lead in commercial development.

Mr. Reagan warned that "for the promise of superconductivity to become real, it must bridge the gap from the laboratory to the marketplace, it must make the transition from a scientific phenomenon to an everyday reality, from a specialty item to a commodity."

Highlights of Plan

Specifically, Mr. Reagan said he will:

—Seek legislation to ease antitrust laws governing joint production ventures; increase patent protection for manufacturing processes, and authorize federal agencies to withhold from release under the Freedom of Information Act some commercially valuable technical information.

—Establish an advisory group of industry and academic experts to advise the administration.

—Encourage federal agencies to shift funds in existing budgets into superconductivity research and order them to emphasize such research in budgets for the next two fiscal years.

—Ask the Defense Department to speed up work on military applications and the Commerce Department to accelerate development of other devices.

—Direct the Patent and Trademark Office to speed processing.

—Negotiate more American opportunities to participate in Japanese government-supported research and development.

UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Productivity, Technology and Innovation
Washington, D.C. 20230
(202) 377-1984

22 JUN 1987

To:

From: Norman Latker
Director, Office of Federal Technology Management

Subject: Important Article on Superconductivity

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The article also discusses an interview with Dr. Chu from the University of Houston. As reported earlier Houston has filed patent applications on the Chu discoveries which are also the outgrowth of an NSF grant. Notwithstanding, Chu is quoted as saying, "Many venture capitalists and others have contacted me and members of my team, but we have never gotten to a serious stage because I have been too busy with lab work." Investigation indicates that Houston does not yet have a designated Technology Licensing Office set up to negotiate with the private sector, but officials are meeting to respond to this need.

If there are concerns about transfer of public sector superconductor technology, or for that matter any technology, the article suggests that a high priority be given to development of management at the laboratory level who can seriously entertain private sector offers of assistance. That is the intention of Section 1. (b)(1)(A) of the Executive Order 12591 which requires Federal agencies to delegate the authority to enter into cooperative agreements to the Directors of agency laboratories.

Attachment

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The Rich Promise Of Superconductors

By BARNABY J. FEDER

IN venture capital circles, where major scientific advances pump up investment activity the way adrenalin sets the human pulse racing, recent breakthroughs in the esoteric field of superconductivity are sparking visions of new riches.

"Superconductivity is extremely exciting," said Benjamin Rosen, chairman of the Sevin Rosen Management Company, one of the nation's most successful venture capital firms in the field of electronics. "It's one of those things we have been dreaming about."

Nevertheless, Mr. Rosen said, commercial applications of the new advances in superconductivity are "all too far off to be of real interest to us right now."

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"The plus of the new superconductivity discoveries is that the applications potential is mind-boggling," said Bob Daly, a partner at Boston-based TA Associates, a leading venture capital firm that said it was striving to get to know leading researchers in the field. "The minus is that the weekly announcements of new developments are making it hard to figure out where to invest."

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But early this spring researchers at an International Business Machines Corporation laboratory established that some ceramic-based materials become superconductive at temperatures above that of liquid nitrogen (-320.4 degrees Fahrenheit), a widely used and inexpensive industrial coolant.

It is still far from clear how durable these superconductors would be, what their magnetic characteristics are, or even exactly how they work. Nevertheless, venture capitalists are excited because superconductivity at such relatively high temperatures could have profound implications for the performance of everything from computer chips to electric utilities, and medical diagnosis to superfast trains.

At least one new company has already been formed. Tentatively named the American Superconducting Corporation, it will use seed money provided by American Research and Development of Boston and Rothschild Ventures Inc. of New York, two leading venture capital firms, to take the first steps toward developing a business based on the work of Gregory J. Yurek and John Vander Sande, two professors at the Massachusetts Institute of Technology.

Professors Yurek and Vander Sande disclosed at a Congressional hearing last week that they had developed a method to make the new superconductors out of metal, which would make them far easier to manufacture than the brittle, ceramic-based materials developed by other researchers.

Many venture capitalists compare today's superconductivity scene to the investment situation that evolved in 1973, following the news that researchers had discovered how to transfer genetic material from one living organism to another. Genetic engineering eventually attracted hundreds of entrepreneurs and billions of dollars of investment.

The venture capital community was much smaller in 1973 than it is today. This year, some 2,000 professional venture capitalists are managing a pool of more than $24 billion.

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But to whom will the Government make its commitments? Many of the early discoveries in high-temperature superconductivity have been made by researchers at I.B.M., A.T.&T. and other large companies. Venture capital experts believe that such large companies might lead the way in some capital-intensive applications, but they also see a major role for smaller companies and start-ups.

So far, however, there are few small companies involved with superconductivity to which venture capitalists or the Government can turn. Two companies backed by venture capital are currently marketing products using superconductors built with the "old" technology of cooling metals to well below minus 418 degrees Fahrenheit with liquid helium. They are Hypres Inc. of Elmsforld, N.Y., which makes an oscilloscope for high-speed signal measurement, and Biomagnetics Technologies Inc. of San Diego, which makes devices that measure magnetic fields and brain activity.

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Storage of electricity in giant coils of superconducting material would allow power generated at night, when demand is low, to be stored until it is needed during peak daytime hours.

Smaller, faster computers could be built using superconducting wires to connect chips, allowing more power without dangerous overheating, and superconducting films might be used to make the chips themselves.

High-speed trains, with superconducting magnets on the bottom of the cars, would float on powerful magnetic fields over metal rails. Because they are not subject to friction, they could travel smoothly and quietly at speeds of 300 m.p.h. or more.

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Drawings by Javier Romero

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BUSINESS TECHNOLOGY

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Venture capitalists are not the only ones with a stake in when and how investors will plunge into the superconductivity field. The United States is more reliant than any other industrial nation on the interplay between investors and entrepreneurs. Besides being the source of seed money and other early rounds of financing for many start-up companies, venture capitalists are also a major supplier of management expertise.

Government officials and industry leaders, including venture capitalists themselves, have been wondering aloud whether superconductivity is too important strategically to be left to the kind of laissez-faire growth that has dominated biotechnology.

"This is an unusual case where commitments have to be made rapidly and wisely for international competitive reasons," said George McKinney, the American Research partner who was reached by M.I.T.'s Technology Licensing Office when Professors Yurek and Vander Sande decided they wanted to commercialize their work. "Venture capitalists are looking for an aggressive commitment by the Government. The problem is going to be who will pay for the one-mile test cable when we think we can build a superconducting one."

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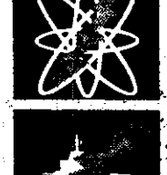

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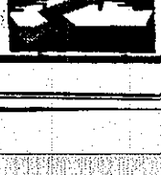

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Drawings by Javier Romero

BNA's Daily Reporter System

DAILY REPORT FOR EXECUTIVES

ECONOMIC ANALYSIS

ADMINISTRATION WORK GROUP MAPS OPTIONS FOR IMPROVING U.S. INDUSTRIAL COMPETITIVENESS

The Reagan Administration's "Working Group on Global Competitiveness" is preparing a variety of recommendations involving the freedom of information, tax, and intellectual property laws, according to three internal Administration documents obtained by BNA.

"While others may prefer a more far-reaching approach," states the Nov. 5 memo, "the working group chose to focus on identifying discrete policy actions, which will incrementally aid our overall competitiveness." The memo was prepared for the Economic Policy Council, which oversees the working group. The memo explains the progress of the working group after several months of deliberations.

The ongoing working group effort represents the Administration interest in resuscitating the "competitiveness" issue after having paid little attention to a 1985 report by the President's Commission on Industrial Competitiveness. The working group memo states that "efforts need to be made to enhance public awareness of the competitiveness issue," and suggests doing so in the State of the Union address.

The memo includes few conclusions, but gives the outlines of potential recommendations. Specific ideas being proposed include:

- Having the President issue an executive order mandating that businesses be informed when possibly confidential business information held by the government is about to be released under the Freedom on Information Act. Legislation on this subject passed the House, but not the Senate, so such an order could cause "hostility" from Congress, the report notes. The working group also is considering whether to propose legislation broadening the FOIA trade secret exemption.

- Conditioning support for international science and technology agreements on a requirement that they "address adequately the linked problems of equity, reciprocal access, and intellectual property and patent and copyright protection."

- Establishing "National Medals of Science and Technology," with prizes of $100,000.

- Making changes in the pension system in order to reduce the barriers to worker mobility.

- Altering the system for calculating the tax credit for research and development.

- Reducing the cost of patent litigation by, among other things, requiring that challenges to patent validity on the basis of prior patents and publications must first be considered in an administrative proceeding in the Patent and Trademark Office before they may be asserted in a federal district court.

Overall, the working group told the Economic Policy Council, "Limited discrete actions will attract less press attention than a far-reaching program, but can make important contributions to America's competitive strength without raising unrealistic expectations."

The memo's preamble notes that some areas with great bearing on competitiveness, such as the overall federal budget, are not addressed by the working group. It also notes the importance of trade policy and indicates that it is investigating recommendations to help open markets abroad. The working group, started in August, has focused on four areas: more effective investment in "human capital," research and development, and "federally imposed barriers to competitiveness," and intellectual property.

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"Human Capital"

Regarding "human capital," the memo maintains that "an increasingly important source of comparative advantage among advanced countries has been an increasingly abundant supply of sophisticated labor skills." As a result, the memo continues, "Proximity to markets and access to raw materials, energy, and unskilled labor are reduced in importance."

The general conclusion flowing from this, according to the memo, is that "government at all levels can improve U.S. competitiveness through investing in better education for people of all ages, aiming education at future job needs, and providing citizens with the intellectual flexibility required to cope with a rapidly changing world."

According to the memo, "this job is not being done well enough." It prescribes, "Educational standards need to be revised and upgraded. . .," adding, "While a heavy focus should be placed on basic education of young people, there also needs to be a greater emphasis on continuing education to expand workforce knowledge, skills, and occupational mobility."

It adds, without elaboration, "Other means of reducing barriers to worker mobility, including possible changes in the pension system, warrant further investigation."

Research and Development

The research and development report to the Economic Policy Council glosses over many more specific ideas contained in a Sept. 26 report circulated within the working group. The memo to the Economic Policy Council simply stresses the importance of technology, of basic research, and of protections for intellectual property. It notes that the U.S. government, as a major funder of R&D, "is in the best position to ensure adequate incentives for effective dissemination and commercialization of federally funded science and technology."

The six-page Sept. 26 report goes into more specifics on "ideas" generated within a "sub-working group" on R&D. The basic thrust should be on increasing emphasis on basic research while at the same time facilitating commercial exploitation of basic research, according to the report.

Several recommendations from the White House Office of Science and Technology Policy are included in the report, such as increasing support for basic R&D at universities, especially for equipment and facilities. The science office also suggested "ensur[ing] that all international science and technology agreements the U.S. concludes or supports with federal funds address adequately the linked problems of equity, reciprocal access, and intellectual property and patent and copyright protection." Raising business awareness of the increasing opportunities for cooperative R&D ventures with reduced antitrust exposure is also proposed.

The science office also urged a restructuring of the science and technology services provided by U.S. embassies, by staffing the embassies with persons trained in science and engineering and experienced in R&D management from U.S. government technical agencies, universities, and the private sector.

A number of points in the Sept. 26 report are followed by parenthetical notations indicate that the Economic Policy Council has already approved the recommendation. One such idea is that "all major R&D agencies should make a stronger commitment to build up university-based scientific and engineering research that bears on technology and industrial competitiveness, especially through multi-disciplinary basic science and technology centers such as the University Research Initiative of the Department of Defense and the Engineering Research Centers of the National Science Foundation." The report continues, "As a first step, these agencies should reallocate resources within their R&D budgets to support this activity," says the report, noting Economic Policy Council concurrence. The science office has urged increased funding for such centers, the report notes.

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Tax Changes Weighed

Changes in the tax code to help R&D also are mentioned, with the caveat that such changes be revenue neutral. The main proposal is to change the "creeping base structure" of the existing R&D tax credit—in which the credit is calculated on the increment of a corporation's qualified R&D over the average of its qualified R&D for the three preceding years.

Instead, the working group suggests, "The incentive effect of the credit could be increased by a shift to a fixed base, indexed annually for inflation or some other indexing factor different from the company's own R&D record." The report explains, "Research indicates that with appropriate accompanying adjustments, such a structure could provide several times the marginal incentive for extra R&D without increasing the loss of tax revenue." This proposal is not accompanied by any notation indicating Economic Policy Council approval.

A variety of other working group ideas deal with the commercial use of developments from federal laboratories. "Basic research results should be patented or copyrighted and shared through exclusive or restrictive licensing with prospective developers." Promulgation by the Office of Management and Budget of rules governing the ownership of software and technical data by government contractors is encouraged. Also under consideration is an expansion of the Commerce Department's National Technical Information Service.

Also, the White House Office of Policy Development suggested legislation to establish "National Medals of Science and Technology," and to authorize payments of $100,000 and presentation of gold medals to five persons annually.

Government Barriers To Competitiveness

"Government barriers" to improved competitiveness exist, according to the memo to the Economic Policy Council, which cites the U.S. regulatory burden generally, and criticizes U.S. foreign aid.

"Obstacles that may limit business flexibility and competitiveness," according to the working group, include "multiple taxation of capital investment compared to consumption, which discourages saving and reduces long-term economic growth." It adds, "barriers to business exist, including accounting rules, pension funding requirements, and restrictive labor contracts."

A further category of "obstacle" involves "barriers to corporate financial restructuring, including management tenure, shareholder rights, antitrust laws, bankruptcy laws, and tax treatment of dividends and capital gains." The final obstacle is "the costs and competitive consequences of internalizing external effects of production, such as environmental protection and product liability insurance."

The memo offers no suggestions for removing the obstacles.

Intellectual Property

Protection of intellectual property" receives substantial attention in the memo, which opens by claiming, "Inadequate recognition and protection of intellectual property rights is a serious and growing problem." Most of the proposal track those previously made by the Administration by not enacted into law.

A separate, 13-page report to the Economic Policy Council from the working group on intellectual property, also dated Nov. 5, reflects that group's response to suggestions from the working group on competitiveness.

One such idea is for the President to take action to restrict the release under the Freedom of Information Act of commercially valuable information that was submitted to the

federal government or generated by the federal government, and to widen the FOIA exemption for trade secrets.

Also recommended is that the Administration draft legislation to "broaden the definition of trade secrets to permit agencies to withhold any information that provides a commercial advantage," and to "broaden the definition of 'confidential commercial' information to permit agencies to withhold information if disclosure would be intrinsically harmful to agency programs or private sector interests."

Such provisions would go further than the House-passed HR 4862, which did not alter the commercial secrets exemption, but did provide business with notice of impending FOIA releases. The working group recommends that an executive order be developed to require agencies to notify submitters of a pending request and permit submitters to object to disclosure of their information. "During development, the merits of requiring submitters to identify those parts of submissions that they believe should be withheld should be considered, as well as existing agency practices that are designed to reduce their cost and the administrative burden of notifying the submitter. It is, or course, recognized that this may engender some congressional hostility."

The working group further suggested the submission of legislation that would "permit agencies to withhold government-generated information if premature disclosure would place the government at a disadvantage," a move proposed in response to efforts to obtain earlier release of the minutes of the Federal Reserve Open Market Committee. Also suggested is legislation to permit agencies to withhold information, requested under FOIA, that is controlled under export laws.

Additional recommendations are intended to reduce the cost of patent litigation. In this category, one working group proposal would require "that challenges to patent validity on the basis of prior patents and publications must first be considered in an administrative proceeding in the Patent and Trademark Office before they may be asserted in a district court."

Also suggested is that the Patent and Trademark Office make available to the public its technology file of U.S. patents and English abstracts of Japanese and European patents.

Uniform Trade Secret Law Weighed

The working group on intellectual property also noted that it is considering the desirability of drafting a federal uniform trade secret law. State trade secret laws vary, and proponents of a federal standard "argue that greater uniformity among the states in the subject matter coverage and remedies would provide businessmen with predictability and clarity."

However, the memo also notes that proposing a federal law "would be inconsistent with the Administration's policies on federalism."

"In light of these divergent views, the working group on intellectual property is unable, at this time, to offer a recommendation that the Administration develop and submit to Congress a federal uniform trade secrets law."

-- End of Section P --

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The ongoing working group effort represents the Administration interest in resuscitating the "competitiveness" issue after having paid little attention to a 1985 report by the President's Commission on Industrial Competitiveness. The working group memo states that "efforts need to be made to enhance public awareness of the competitiveness issue," and suggests doing so in the State of the Union address.

The memo includes few conclusions, but gives the outlines of potential recommendations. Specific ideas being proposed include:

- Having the President issue an executive order mandating that businesses be informed when possibly confidential business information held by the government is about to be released under the Freedom on Information Act. Legislation on this subject passed the House, but not the Senate, so such an order could cause "hostility" from Congress, the report notes. The working group also is considering whether to propose legislation broadening the FOIA trade secret exemption.

- Conditioning support for international science and technology agreements on a requirement that they "address adequately the linked problems of equity, reciprocal access, and intellectual property and patent and copyright protection."

- Establishing "National Medals of Science and Technology," with prizes of $100,000.

- Making changes in the pension system in order to reduce the barriers to worker mobility.

- Altering the system for calculating the tax credit for research and development.

- Reducing the cost of patent litigation by, among other things, requiring that challenges to patent validity on the basis of prior patents and publications must first be considered in an administrative proceeding in the Patent and Trademark Office before they may be asserted in a federal district court.

Overall, the working group told the Economic Policy Council, "Limited discrete actions will attract less press attention than a far-reaching program, but can make important contributions to America's competitive strength without raising unrealistic expectations."

The memo's preamble notes that some areas with great bearing on competitiveness, such as the overall federal budget, are not addressed by the working group. It also notes the importance of trade policy and indicates that it is investigating recommendations to help open markets abroad. The working group, started in August, has focused on four areas: more effective investment in "human capital," research and development, and "federally imposed barriers to competitiveness," and intellectual property.

0148-8155/86/$00.50