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Perplexing Changes in Our Science Community

Leaders of the scientific community have so often employed panic tactics to expand federal spending for research that skepticism now often greets their contentions that all is not well in the house of science.

Nevertheless, though present-day American science remains productive and rich by the standards of any other nation, it would be prudent to listen to what some of the sager, non-alarmist heads of the profession are saying. They are not proclaiming doom. Rather, they are expressing puzzlement and concern over a complex of changes now taking place in the innards of an enterprise on which we all depend for improvements in the treatment of disease, industrial and agricultural productivity, defense, energy sources and environmental purity. Thus we find Frank Press, the competent and calm White House science adviser, saying—in a mood of perplexity—that "Profound things are happening in the sociology of science that we won't understand for 10 years." What does he mean?

Press, in harmony with many of his colleagues in the federal science establishment, is not so much concerned about the availability of money for science—though that's a problem, too, given the fact that purchasing power for basic research has been on a plateau for a decade. What they are more concerned about are the long-term consequences of institutional changes that are squeezing a lot of youth, spring and vitality out of the conduct of research. For example:

• Throughout academe, a glut of tenured professors—hired in the boom days of the space era—is choking up job opportunities for newly graduated scientists. In 1968, youngsters were plentiful on physics faculties, 40 per cent having received their Ph.D.s within the previous seven years. By 1975, the figure was 19 per cent.

• Confronted with a new Ph.D. proletariat, academe has responded with the little-noted creation of a caste system that provides scientific labor at lower cost and without the long-term job commitments that have traditionally characterized university employment. Candidates not deemed suitable for faculty appointments are hired for what is referred to as the "doctoral research staff." Relatively low in status, and without job security, these researchers rarely have an opportunity to develop their professional potential; they're hired hands, usually working on someone else's project.

• Undergraduate teaching posts—which have long provided an invisible subsidy for graduate training—are on the brink of a major decline as lower birthrates begin to show up in lower undergraduate enrollments.

• The scarcity economy in academic science has spawned a spirit of caution among young researchers anxious to make their mark. Department chairmen report that doctoral candidates are increasingly shunning longshot thesis projects in favor of safe and sure problems.

• Meanwhile, industry has generally reoriented its research priorities in favor of short-term payoffs, rather than long-term inquiries of a fundamental nature. There are exceptions, but, by and large, science is a shrinking enterprise on the American industrial scene, whereas in West Germany and Japan, it's coming up fast. And the American shift is occurring at a time when, in a number of fields, including agriculture and pharmaceuticals, it is widely held that basic scientific knowledge has been pretty well exploited and that new developments must await new scientific understandings.

These and other problems have inspired an assortment of diagnoses and prescriptions for American science. Among them are urgings for academe and industry to enter into collaboration on major scientific projects and for government to help break the tenure logjam by subsidizing early retirements of academic faculty.

At the moment, however, the institutional base of science is being reshaped by forces that are only dimly understood. No one, in fact, is certain that these changes will be detrimental to the quality and productivity of science, as distinguished from its lifestyle. The scientific community, after all, remains large and well financed. But it is becoming different, and that's why many of the statesmen of science wish they had a better understanding of what this will mean for their profession and its ability to fulfill the demand for continued production of knowledge.

"By and large, science is a shrinking enterprise on the American industrial scene, whereas in West Germany and Japan, it's coming up fast."

Jack Anderson

Small Firms Stinted on Research

Following their ephochal 1903 Kitty Hawk flight, the Wright brothers got a five-year runaround from Washington before receiving any government financial help to pursue their aeronautical research. Small-time inventors and innovative businessmen today are getting the same short shrift, even though billions are being doled out by the federal government for research and development.

Butter-fat corporations lap up the cream from the research subsidies, even though they're interested more in profits and cost-cutting than new inventive breakthroughs. Small companies with fewer than 1,000 employes get skim milk from the federal churn.

Yet the little enterprising businesses rather than the corporate giants have been responsible for such developments in this country as insulin, zippers, power steering, ball point pens and self-winding watches. This was in keeping with the tradition of individual inventive geniuses symbolized by the Wright brothers, Alexander Graham Bell, Samuel Morse and Thomas Edison.

The superiority of small business research has been cited in a study which the Office of Management and Budget strangely never published. The study credited firms having than 1,000 employes with almost half of the industrial innovations between 1953 and 1973.

According to the study, 16 small technology firms created 25,553 jobs for American workers during the 20-year period because they came up with new ideas. Yet the budget office was advised that small firms were drawing inadequate funding from the government, getting less than 4 percent of the research and development layouts.

Spurred by the report, the budget office drafted a memo intended for all federal agencies, urging vigorous efforts to channel more of the research to small businesses "which are having difficulty in competing in the big leagues."

The memo added, "there is considerable evidence that the small proportion of federal research and development work that is being awarded to small technologically based firms is contributing to a serious loss of high technology capabilities in our nation. It is important that we see some real progress within the first 18 months of the administration."

This ringing call for a new deal was never sent to the agencies. Les Fettig, head of the office that was supposed to be directing the crusade, said the report and the memo were news to him until we asked what happened. He explained that the documents "fell through the cracks" during the transition period between the Ford and Carter administrations.

Fettig said his office is alert to the problem and is taking steps to make it easier for small businesses to get research and development help.

Footnote: Investigation shows that the Energy Department under James Schlesinger has been perhaps the worst offender in government in encouraging research at the Little League level. The department claimed it awarded 10.3 percent of its research contracts to small operators in the 1977 fiscal year. The General Accounting Office has challenged the statistic. GAO auditors found the amount was about 2.6 percent, because the Eenergy Department has counted subcontracts that trickle down from the big corporations.

Postal Proposal — An idea that could help reduce the postal deficit and provide the pay increase postal workers are demanding has been run up the flagpole for Postmaster General William F. Bolger. He seems ready to salute it.

Bolger is giving serious attention to the imaginative proposal of Miami public relations wizard Hank Meyer that the hundreds of thousands of mail boxes and postal delivery trucks throughout the United States be used as advertising space.

Meyer stressed in his private presentation to Bolger that he wasn't suggesting the Postal Service provide billboard-style space for promoting junk products. Under his plan, the advertising and public service messages would be subject to approval of the postal authorities.

Vacant space is available on an estimated 180,000 postal vehicles and 400,000 street deposit boxes, which could be rented for advertising.

Bolger still hasn't made a decision but if the Postal Service adopts the idea, an advertising agency would be selected by competitive bidding to run the ad operation.

On the last page of the Business Week article, there is a story about a small company who wouldn't take Government funds because of possible loss of invention rights. The company gave the Japanese 49% of the company for the necessary venture capital rather than lose these rights.

Norm.

VANISHING INNOVATION

A hostile climate for new ideas and products is threatening the technological superiority of the U. S.

A grim mood prevails today among industrial research managers. America's vaunted technological superiority of the 1950s and 1960s is vanishing, they fear, the victim of wrongheaded federal policy, neglect, uncertain business conditions, and shortsighted corporate management. They complain that their labs are no longer as committed to new ideas as they once were and that the pressures on their resources have driven them into a defensive research shell, where true innovation is sacrificed to the certainty of near-term returns. Some researchers are bitter about their own companies' lax attitudes toward innovation, but as a group they tend to blame Washington for most of their troubles. "[Government officials] keep asking us, 'Where are the golden eggs?' " explains Sam W. Tinsley, director of corporate technology at Union Carbide Corp., "while the other part of their apparatus is beating hell out of the goose that lays them."

That message—and its implications for the overall health of the U. S. economy—is starting to get through. Following months of informal but intense lobbying led by such executives as N. Bruce Hannay, vice-president for research and patents at Bell Telephone Laboratories Inc., and Arthur M. Bueche, vice-president for research and development at General Electric Co., the White House has ordered up a massive, 28-agency review of the role government plays in helping or hindering the health of industrial innovation. "Federal policy affecting industrial R&D and innovation must be carefully reconsidered," wrote Stuart E. Eizenstat, the White House's domestic policy adviser, in a recent memo outlining the review's intent.

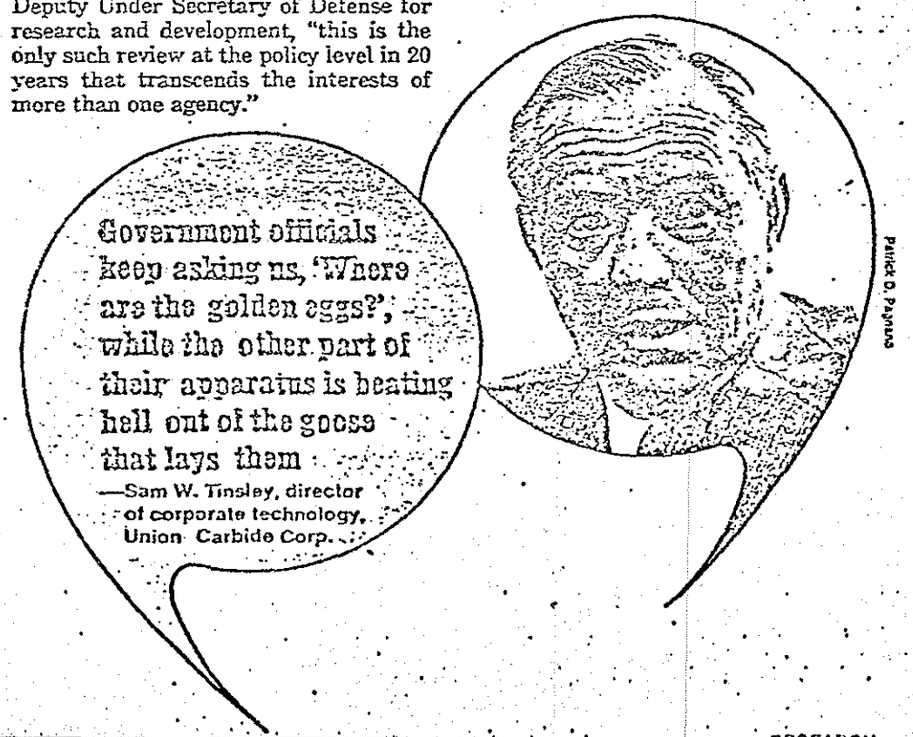
One thing that the study clearly will not accomplish is a quick fix for the deepening innovation crisis. The problem is regarded as immensely complex by the Administration, and is inextricably tied to other economic dilemmas now facing Carter's White House.

"Historically, the government's role has been to buy more science and R&D," says Martin J. Cooper, director of the strategic planning division at the National Science Foundation (NSF). "Now maybe we better go with investment incentives." Says Jordan J. Baruch, Assistant Commerce Secretary for science and technology, who will be the review's day-to-day manager: "This study developed in an environment of people concerned about economics, business, and technology."

The Administration's concern is underscored by the fact that it is organized as a domestic policy review, the highest sort of attention a problem can receive within the executive branch. Among its objectives, such a review must produce options for corrective action by the President. According to Ruth M. Davis, Deputy Under Secretary of Defense for research and development, "this is the only such review at the policy level in 20 years that transcends the interests of more than one agency."

The White House also seems determined not to conduct the study in a governmental vacuum. Baruch is soliciting input from groups such as the Industrial Research Institute (IRI), the Business Roundtable, and the Conference Board. "We want both CEOs and R&D vice-presidents," says a White House official. Labor groups have been asked to participate, too, along with public-interest groups. Congressional leaders such as Senator Adlai E. Stevenson (D-Ill.), chairman of the Senate subcommittee on science, technology, and space, have been brought into the early planning. And the 28 agencies involved extend beyond obvious candidates, such as the Environmental Protection Agency, to the Justice Dept. and even the Small Business Administration.

The study's scope is so sweeping, in



fact, that some federal officials are talking about a "thundering herd" approach to policymaking. But one government science manager demurs. "It beats having one guy write a national energy program in three months," he snips.

Philip M. Smith, an assistant to Presidential science adviser Frank Press and an early organizer of the study, concedes that "a lot of people have told us that we are likely to fail." But such skepticism, he believes, does not take into account the considerable clout of those involved in the effort. Commerce Secretary Juanita M. Kreps, for example, is chairing the study, and she heads a coordinating committee whose members include Charles L. Schultze, chairman of the Council of Economic Advisers, Administration inflation fighter and chief trade negotiator Robert S. Strauss, and Zbigniew Brzezinski, Carter's national security adviser. Even more important is the support of Eizenstat, who, says Smith, "is very interested in this particular review."

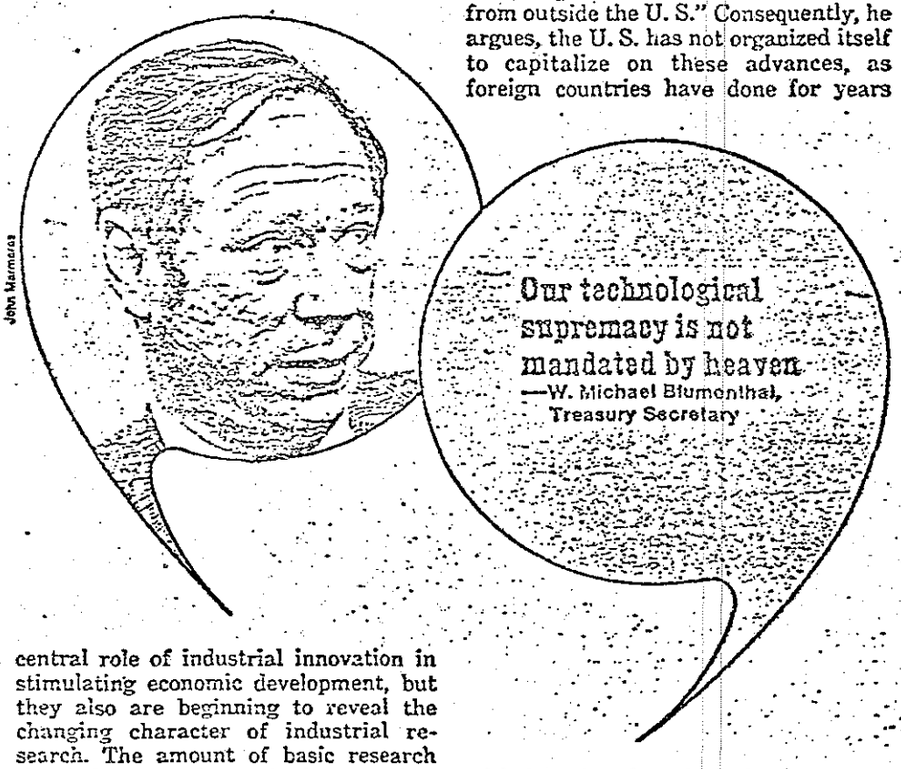
Finding 'new directions'

On the other hand, there is already grumbling within the Agriculture Dept., which was left off Kreps's committee. "We are red-faced," says a high-ranking Agriculture official. "We are out of the project because this Administration and those before it do not place any priority on agricultural research." However, Jordan Baruch insists that the department will play a role in the study. Agriculture experts point out that farm commodity exports of over $24 billion play a key role in the U. S. balance of payments. They note also that superior technology is the basis of the commanding American position among world food exporters.

Whatever its outcome, the White House policy review is being undertaken at a time when, as Frank Press puts it, "we badly need some new directions." Many experts view with alarm the declining federal dollar commitment to R&D, which has dropped from 3% of gross national product in 1963 to just 2.2% this year. For its part, industry as a whole has more or less matched the inflation rate and then some with its own spending. But such macroscale indicators do not tell all. "We've got to find out what the story is sector by sector, because each industry is going to be different," says Press. "We also have to find out what's going on abroad."

Better data on the relationship between industrial innovation and the health of the economy are becoming available. According to a 1977 Commerce Dept. report, for instance, technological innovation was responsible for 45% of the nation's economic growth from 1929 to 1969. The study went on to compare the performance of technology-intensive manufacturers with that of other industries from 1957 to 1973, and found that the high-technology companies created jobs 88% faster than other businesses, while their productivity grew 38% faster.

The numbers help to establish the central role of industrial innovation in stimulating economic development, but they also are beginning to reveal the changing character of industrial research. The amount of basic research that industry performs, for instance, has dropped to just 16% two years ago from 38% of the national total in 1956.



And a new IRI survey of member companies for the National Science Foundation demonstrates how federal policy has directly altered the nature of the research effort in another way, making it more and more defensive. The study shows that surveyed companies increased R&D spending devoted to proposed legislation by a striking 19.3%, compounded annually, from 1974 to 1977. And the rate was 16% a year for R&D devoted to Occupational Safety & Health Administration (OSHA) requirements. "When overall R&D spending is not growing nearly this fast," note the survey's authors, George E. Manners Jr. and Howard K. Nason, "other categories of effort—especially research—must be suffering."

Other observers compare the viability of industrial innovation in the U. S. with that of foreign countries. One expert is J. Herbert Hollomon, director of the Center for Policy Alternatives at Massachusetts Institute of Technology. According to Hollomon, a reason the U. S. is losing its leadership is that "we're arrogant—we have an NIH [not invented here] complex at the very time a majority of technological advances is bound to come from outside the U. S." Consequently, he argues, the U. S. has not organized itself to capitalize on these advances, as foreign countries have done for years with American knowhow. Since as much as two-thirds of all R&D is now conducted by foreign laboratories, Hollomon says, it should be no surprise that they have taken the lead in such technologies as textile machinery and steel production.

"We essentially prohibited West Germany and Japan from defense and space research," says Hollomon. "So it's no accident they concentrated on commercial fields." He adds: "I believe other nations better understand that the innovation process is important."

Says a research director for one high-technology company: "For a country like ours, the technology leader of the world, what has been happening is downright embarrassing." Indeed, even the presumed sources of strength in a consum-

er-oriented society are today under intense pressure. "Our experience with Japan in the consumer electronics industry—namely televisions, radios, audio, and transceiver equipment—shows some of our weaknesses," testified Gary C. Hufbauer, a Deputy Assistant Treasury Secretary, before a congressional subcommittee. In 1977, he said, "we had a $3.6 billion trade deficit with Japan in high-technology goods, and about two-thirds of this was accounted for by imports of consumer electronic goods."

The role of regulation

The cumulative response to these developments has been alarm. "The system has now sharpened its pencils in a way that discourages changes that are major," worries Robert A. Frosch, head of the National Aeronautics & Space Administration. "We have been so busy with other things that we may have inadvertently told the people who think up ideas to go away."

Even labor unions, which historically have left R&D decision-making up to corporate board rooms, now are complaining about lack of innovation. "Having helped to develop and pay for this technology," says Benjamin A. Sharman, international affairs director of the International Association of Machinists, "American workers have a right to demand government responsibility for using it to create new products, more jobs, better working conditions, and general prosperity." And Charles C. Kimble, research director of the Electrical, Radio & Machine Workers union, goes so far as to suggest that labor should now have a say in how industrial research money is spent.

Among research managers themselves, excessive or contradictory federal regulatory policy is the single greatest complaint. Hannay of Bell Labs points to Food & Drug Administration requirements as a case in point. According to one study, says Hannay, a 1938 application for adrenaline in oil was presented to the FDA in 27 pages. In 1958, a treatment for pinworms took 439 pages to describe. "By 1972," he says, "a skeletal muscle relaxant involved 456 volumes, each 2 in. thick—76 ft. in total thickness and weighing one ton."

Regulation, says Tinsley of Union Carbide, has put a bottleneck on new-product development in the chemical industry and has so added to the cost of getting any new chemical approved that only those targeted at a vast, assured market are attempted today. Food and drug industry researchers echo that complaint. "Today," says Al S. Clausi, director of technical research at General Foods Corp., "our industry does work that is fostered by unreal and invalid public concerns."

But regulation can have less obvious impacts, such as forcing an industry to stick with old technology rather than to experiment with new approaches to problems. "The overall effect of regulations on the auto industry has been to build an envelope around the internal-combustion device and the whole car structure," says Harvard Business School Professor William J. Abernathy, who specializes in technology management. " 'Don't do anything really new, don't change.' That's what these regulations say." Paul F. Chenea, vice-president for research at General Motors Corp., agrees. "You just don't have time to explore wild new ideas when a new rule is so closely coupled to your current business," he says.

'The science of the matter'

In Congress, where the regulatory laws are written, such thinking has so far found a small audience. "A great number of the regulations that we would call environmental . . . may actually be self-defeating," muses Harrison H. Schmitt, the former astronaut from New Mexico who is the ranking Republican on Stevenson's Senate subcommittee. "Instead of looking at pollution controls, if we were looking at building a more efficient and therefore less-polluting engine, we would not only be solving our environmental problems, but we would be producing a new thing for export."

Schmitt is one of only three federal legislators with the semblance of a science background. "We probably have

How antitrust charges can limit R&D payoffs

Companies that make it across the development minefield and bring superior technology to market still may find a threat on the other side: monopolization charges that keep them from fully exploiting the technology. As old as that problem is, such charges can come as a shock, as they did to Du Pont Co. last April.

Courts established decades ago that the Sherman act prevents a company with a hammerlock on a particular industry from making sound, otherwise perfectly legal business decisions that would, however, perpetuate its dominance. In 1945, for example, Judge Learned Hand found evidence that Aluminum Co. of America unlawfully monopolized its industry by its tendency to "double and redouble capacity" as demand increased. That, said Hand, locked would-be competitors out of the expanding market.

In a similar vein, the Federal Trade Commission said three months ago that Du Pont had used "unfair means" to keep competitors from increasing their share of the expanding market for titanium dioxide, a widely used paint pigment. "The complaint is wholly without basis," says Irving S. Shapiro, the company's chairman.

40% share. Superior technology clearly contributes to Du Pont's dominance. In the 1950s, the company devoted a decade of work—and what a spokesman will peg only at "many millions of dollars"—to develop a new way of making TiO_2. Although the highly automated, continuous process went on stream more than 20 years ago, it still tops the processes used by such competitors as NL Industries, SCM, and American Cyanamid, because it uses cheaper raw materials and produces less acid waste.

The problem with the government arises because Du Pont's 40% share of the $700 million-a-year market is still growing. That alone is enough to send government lawyers poking about for actions that can be attacked. According to Alfred F. Dougherty Jr., head of the commission's antitrust arm, even a 30% chunk of the market "could be a dominant position if all the other firms in the market had a much lower share." In fact, Justice Dept. antitrust chief John H. Shenefield asked his staff to look at Du Pont's TiO_2 policies only to find the FTC there ahead of him.

Du Pont's Shapiro: The FTC's "complaint is wholly without basis."

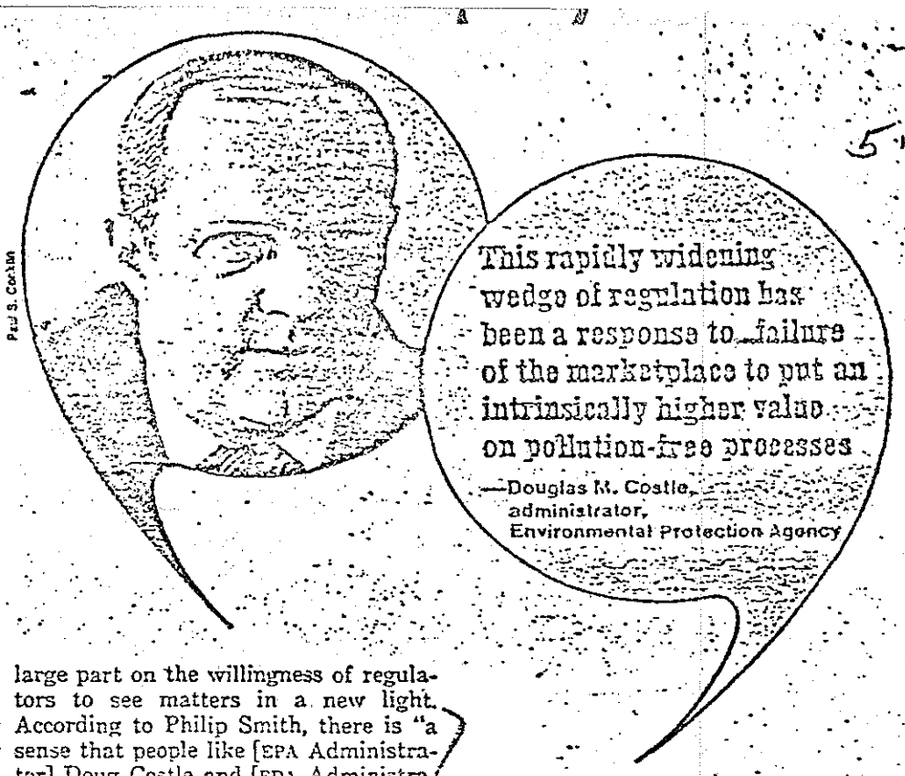
Basically, the FTC says that Du Pont keeps its market share by expanding capacity before the market is ready for more production, thereby forestalling competitors' expansion plans. Du Pont, says the FTC, should get rid of one of two current TiO_2 facilities and a new plant at De Lisle, Miss., that would begin production next year. The FTC staff also wants the company to take competitors under its wing by giving them, royalty-free, the superior technology and knowhow it has built up over the past 25 years.

exercised very poor judgment in the past," he says, "because the Congress overall—members as well as staff—have not been able to understand what is possible technologically and what is not, and therefore not been able to relate the costs [of legislation]."

Jason M. Salsbury, director of the chemical research division at American Cyanamid Co., pleads, "Before the lawyers write the legislation, let them know the science of the matter." Not only may some mandates be beyond what industry can legitimately perform, he says, but the rules force a conservative approach to science. One key indicator of this trend is the increasing number of toxicologists now employed in chemical company research labs. "Toxicologists don't innovate," notes Frank H. Henley, vice-president for research and engineering at Lever Bros. Co.

Then there is the regulatory bias against new ideas. In the EPA's grant programs for waste-water treatment at the municipal level, for instance, equipment specifications must be written so that gear can be procured from more than one source. That means a company with a unique process is discriminated against. What is more, the mandate for cost effectiveness precludes trying out innovative approaches whose value can only be measured if someone is willing to gamble on them.

If the domestic policy review is to solve such questions, it will depend in large part on the willingness of regulators to see matters in a new light. According to Philip Smith, there is "a sense that people like [EPA Administrator] Doug Costle and [FDA Administrator] Don Kennedy want to work with industry, and they don't want to fight all the time. I think we have a team of people now in government that may be able to do something."



Paul S. Conklin

The investment climate

But industry should not expect a major overhaul of regulatory practices to emerge from the study. EPA Administrator Douglas M. Costle concedes "a tremendous growth in the last decade in health and safety regulations—13 major statutes in our area alone." Though Costle agrees that the economic impact of such rules should be more closely quantified, he contends that "this rapidly widening wedge of regulation has been a response to a massive market failure—failure of the marketplace to put an intrinsically higher value on pollution-free processes."

Most regulators agree that not enough research has been done on the true nature of the environmental problems they are empowered to combat, but they also argue that regulation has led to cost-saving practices, especially in the area of resource recovery, where closed-cycle processes now help capture reusable material. OSHA officials also cite examples where the agency has laid down rules that have led to cost-cutting innovations. But Eula Bingham, the OSHA administrator, emphasizes that the "legislatively determined directive of protecting all exposed employees against material impairment of health or bodily function" requires tough regulation without quantitative weighing of costs and benefits. "Worker safety and health," she insists, "are to be heavily favored over the economic burdens of compliance."

Bingham and her boss, Labor Secretary Ray Marshall, may represent an increasingly isolated view, however. Economic issues have come to dominate thinking within the Carter Administration, and it is precisely these questions that industry has stressed in its discussions with science adviser Press and other White House officials. Just over a month ago, Treasury Secretary W. Michael Blumenthal told a meeting of financial analysts in Bal Harbour, Fla., "We are now devoting a very sizable chunk of our private investment to meeting government regulatory standards . . . and in some of these areas we may well be reaching a breaking point." Blumenthal also noted: "Our technological supremacy is not mandated by heaven. Unless we pay close attention to it and invest in it, it *will* disappear."

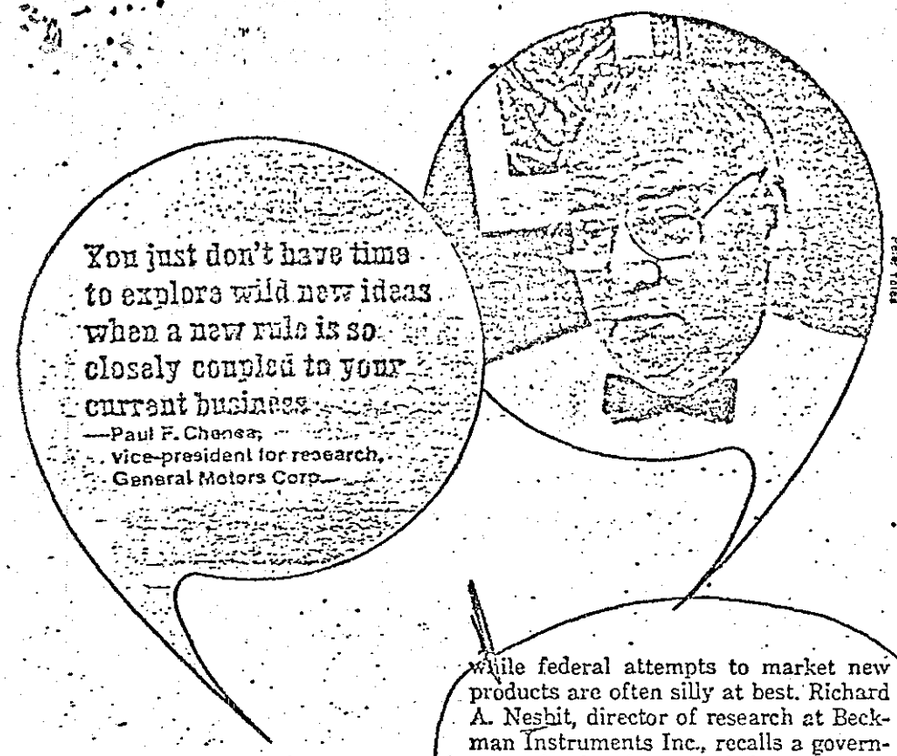
A month before the Blumenthal speech, GE's Bueche suggested to an American Chemical Society gathering that "we step back and look at R&D for what it really is: an investment. It is an investment that, like more conventional investments, has become increasingly less attractive."

Bueche, along with most other research managers, rejects the idea of direct federal subsidies to industrial R&D. Instead, he points out that "perhaps 90% of the total investment required for a successful innovation is downstream from R&D, [and thus] it becomes . . . clear why we must concentrate on the overall investment climate." Bueche attacks Administration proposals to eliminate special tax treatment of long-term capital gains, plumps for more

Whether the need for such onerous penalties can be established—before an FTC judge, the full commission, then a court of appeals and, perhaps, the Supreme Court—may take years to determine. But the approach is not unusual in monopolization cases.

The Xerox case. Just a year ago, the Justice Dept. ended such a suit against Industrial Electronic Engineers Inc. by getting the California company to promise royalty-free licenses to all comers on patents it had used to dominate the market for rear-projection readout equipment for electronic data-processing systems. And three years ago, the FTC settled a complaint by getting Xerox Corp. to open its portfolio of 1,700 copier patents to competitors. Xerox had to license three patents—chosen by the competitors—free. Fees for use of the rest were strictly limited by the FTC.

As severe as those measures may seem, and as discouraging to innovation, the antitrusters contend that it is the only way rivals can eat into a monopolist's dominance of a market. Says Alan R. Palmer, assistant director of the FTC's antitrust arm: "We have to look to what relief will really be effective."



rapid investment write-offs, and says "it is extremely important to provide stronger incentives for technological innovation by making permanent and more liberal the 10% investment tax credit."

Critics in industry

Bueche's arguments suggest the broad—yet often indirect—way in which federal policy runs counter to the best interests of innovation. Fear of antitrust moves from the Federal Trade Commission or the Justice Dept., for instance, has prevented many companies from sharing research aimed at a problem common throughout an industry—including new technology aimed at solving regulatory questions. At General Electric, the legal staff must now be notified if a competitor visits a company research facility, even if no proprietary material is involved.

For their part, Justice Dept. trustbusters claim that fears that their policies stifle innovation are not justified. They say they are flexible enough to recognize the differences in the pace of innovation from industry to industry, and that is why they allow a fair number of mergers among electronics companies. "That's an industry where you don't have to worry about someone cornering the market," says Jon M. Joyce, an economist in the Justice Dept.'s antitrust division. "There's just a lot of guys out there with good ideas."

Industry further claims that the inability to secure exclusive licenses on government-sponsored research leaves much good technology on the shelves, while federal attempts to market new products are often silly at best. Richard A. Neshit, director of research at Beckman Instruments Inc., recalls a government circular that waxed rhapsodic over the federal commitment of billions of dollars to R&D. Included with the letter was a syringe for sampling fecal matter, and the suggestion that Beckman might want to license the technology. "I wondered if they spent billions to develop that," Nesbit recalls. "The contrast was ludicrous."

Even national accounting procedures draw criticism from industry. A major target is the 1974 ruling by the Financial Accounting Standards Board that stipulated that R&D spending could no longer be treated as a balance sheet item, but must be listed as a direct profit or loss item in the year spent. R. E. McDonald, president and chief operating officer at Sperry Rand Corp., recently told an executive management symposium, "The ramifications of that rule change are quite complex, but the net effect has been to dry up a lot of potential venture capital investments. . . . I can say quite candidly that Univac would not be here today if we had not had the advantage of the old rule for so many years."

The shortage of risk capital has had a tremendous impact on small, technology-oriented companies trying to arrange new public financing. According to a Commerce Dept. survey, 698 such companies found $1.367 billion in public financing in 1969. In 1975, only four such companies were able to raise money publicly, and their numbers rose to just 30 in 1977. Equally ominous is the experience at Union Carbide, which, according to Tinsley, has not been able to compete for venture capital and has thus canceled plans to start a number of small operations built around interesting new technology. Years ago, says Tinsley, Carbide was reasonably successful at getting such funding. "And you must remember that these ideas are perishable," he says. "They don't have much shelf life."

The Treasury Dept., in fact, has an ongoing capital-formation task force that will be integrated into the policy review under the direction of Deputy Secretary Robert Carswell. Carswell notes that "you can't draw a clear line" between R&D support and investment in general, but "if it turns out that we find some form of capital formation gives the economy a greater multiplier effect than another form, we at the Treasury would not shy away from whatever policy would help most."

Washington's changing role

Even as it has pursued policies detrimental to industrial R&D, the federal government has withdrawn as a major initiator of innovation. Research managers generally believe that companies are better equipped than government to bring new technology to society because they are more attuned to market pull. But Lawrence G. Franko of Georgetown University, an international trade expert, recently pointed out to a congressional committee that the U. S. government has in the past played an important role "as a source of demand for new products and processes, and as a constant, forbearing customer in computers, semiconductors, jet aircraft, nuclear-power generation, telecommunications, and even some pharmaceuticals and chemicals. . . ."

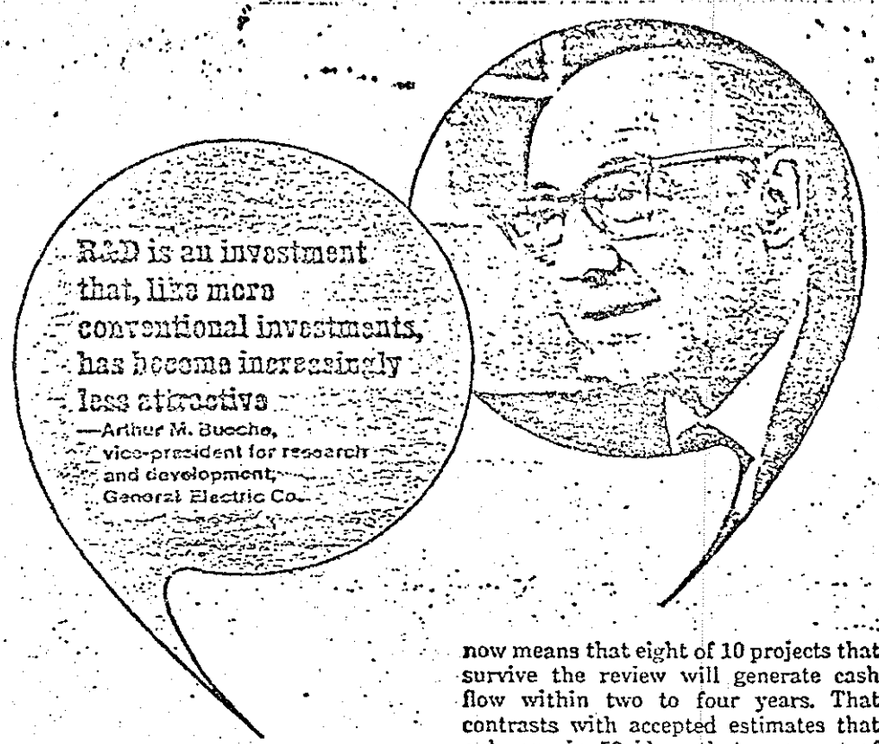
According to the Defense Dept.'s Davis, both Defense and NASA "have faded" in this role, the result of the Vietnam war and concerns over the military-industrial complex. "The consumer marketplace and other government agencies have not been able to pick up where DOD and NASA left off," she says. "The Department of Energy should be able to help with this, but it hasn't yet. And the Department of Transportation just never blossomed in this role." An unreleased IRI study for the Energy Dept. summed up industry's views. The company officers interviewed said government could spur industry's energy R&D only by creating a national energy policy, increasing its managerial competence, and offering financial incentives rather than massive contracts.

On the other hand, there have been some recent, notable government efforts to spur the innovation process. "We've talked to the leading semiconductor companies about our hopes for their innovation," says Davis. She says that the Defense Dept. expects to program $100 million over the next five years for industrial innovation in optical lithography, fabrication techniques involving

electron-beam technology, better chip designing and testing to meet military specifications, and system architecture and software implementation.

At the Transportation Dept., chief scientist John J. Fearnsides wants to involve the private sector much earlier in the government's R&D process, thereby allowing industrial contractors to develop technology alternatives instead of having to cope with rigid specifications at the outset. Such a policy, some believe, might have resulted in major savings for the Bay Area Rapid Transit system, for instance. "It is more expensive to fund a wider range of choices, but only at first," says Fearnsides.

The NSF also has announced a new industry-university grant program for cooperative exploration of "fundamental scientific questions." The aim is to make "a long-term contribution toward product and/or process innovation."



The failures of business

While agreeing on the need for federal policies that bolster innovation, those knowledgeable about industrial research think that the companies themselves share some of the blame for stagnation and must be willing to examine their practices critically. Alfred Rappaport, a professor of accounting and information systems at Northwestern University's graduate school of management, believes that one reason the U. S. lags in R&D is that the incentive compensation systems that corporate executives live under tend to deter intelligent risk-taking. "Incentive programs are almost invariably accounting-numbers oriented and based on short-term earnings results," he says. "That puts management emphasis on short-term business considerations." Another criticism has been of the haphazard way in which companies have launched new R&D programs. In essence, industry should try to learn how to weed out bad ideas early on, say the detractors. To that end, Dexter Corp. has instituted an eight-factor "innovation index" approach to research management that weighs questions such as effectiveness of communications, competitive factors, and timing, and comes up with an "innovation potential" for new ideas. At Continental Group Inc., D. Bruce Merrifield, vice-president of technology, says that "constraint analysis" of new ideas now means that eight of 10 projects that survive the review will generate cash flow within two to four years. That contrasts with accepted estimates that only one in 50 ideas that come out of research labs ever generates cash flow, and not for seven to 10 years.

Large companies often fail to exploit their own resources effectively. In the 1950s and 1960s, some companies set up centralized research facilities, but many of these did not yield the hoped-for synergism—in many cases, apparently, because the different parts of the company were in businesses too unrelated to one another.

On the other hand, Raytheon Co. was highly successful in transferring its microwave expertise to its newly acquired Amana appliance subsidiary in 1967, resulting in the counter-top microwave oven. That was done through a new-products business group set up specifically for such purposes. And more recently, this group, headed by Vice-President Palmer Derby, brought the company's microwave talent to bear on its Caloric subsidiary's product line, resulting in a new, combination microwave-electric range.

In such ways, industry can maximize its potential for innovation in the most adverse environment. But the future health of the nation's economy, many experts believe, requires a much more benign environment for industrial R&D than has existed over the past decade. And Jordan Baruch, the enthusiastic leader of the multi-agency federal study, believes that such an environment is likely to emerge as a result of the Administration's concern.

"We may have bitten off more than we can chew," notes Frank Press, "and it may be that we can't get much done in a year. But even if it takes three or five or 10 years, I think it is historically very important." ■

Turning to Japan for venture capital

The recent drag in U. S. venture-capital commitments has opened opportunities for foreign companies to appropriate American ideas. A case in point is the experience of System Industries Inc., a Sunnyvale (Calif.) manufacturer of minicomputer peripherals.

In 1969, System Industries went to work on a new ink-jet printing process, forming a subsidiary, Silonics Inc., to develop and market it. By 1973, the research phase was over, and a cash-short System Industries went looking for venture capital to tool up for production. Unfortunately, none was there. With a depressed stock market, and recent increases in the maximum tax on capital gains that cut the expected return on such investments in half, the usual capital sources "couldn't justify taking the same risks they used to," says Edwin V. W. Zschau, the company's chairman and chief executive officer.

Keeping only 51%. Next, he explains, "we were thinking about government funding. But we were discouraged from even making a proposal when we learned the government would get data rights and be able to license it to other people. We didn't see why we should give away those rights just to get a little money." What Zschau finally did give up was 49% of Silonics to Konishiroku Photo Industry Co., the Tokyo-based maker of Konica cameras.

In return, the Japanese company has spent $5.5 million on Silonics, which is enough to bring the new printer to market at the National Computer Conference in Anaheim, Calif., in mid-June. "We have one of the most promising imaging technologies for the 1980s," Zschau now complains. "But we only own 51% of it."

8.

Wash. Star
9/3/78

Michael Novak

A day for Enterprise

The last thing this country needs is another holiday. Nevertheless, I would like to propose one: Enterprise Day, to be celebrated on the Monday after the first day of spring. Enterprise Day would be a counterpart to Labor Day. Its purpose would be to honor our most endangered, heavily burdened and most fragile resource: the spirit of enterprise.

The system under which Americans live is not very old. Although it may not survive much longer, in its brief passage through the gloom of history it has cast a lovely light. Most of the progress of science, and the vast part of the world's betterment in the conditions of all people, have occurred during the short tenure of this system. A relatively few of the world's citizens discovered a method for unleashing tremendous energies of initiative and imagination. Such energy has always been available. But no society before had learned how to release it.

The word "enterprise" captured the spirit of adventure that characterized pilgrims and pioneers, founding fathers and builders of industry, sponsors of invention, artists and creative thinkers of every sort. The method was simple: Permit individuals to take risks with their own lives, careers and resources. Stand out of their way and let them go directly to the public. Permit them to reap rewards for offering the public the goods and services the public decided, by its own choices, to accept or to reject.

Such an idea was at first deemed both implausible and faintly immoral. Could individuals be trusted? Did not some officer of Reason need to guide their choices? Were not citizens so corrupt that they would choose badly, squander their resources, and be attracted to lowest common denominators? "The public is a beast," some said. "Only philosopher kings can bring about Utopia," others said.

Nonetheless, enterprise took root in a few small parcels of the world's territories. The power and beauty that broke from them were so astonishing that many other nations wished to imitate their achievements. Some did not wish to trust enterprise. Some tried to reach the same goals through servitude. And Planning. Planned servitude.

Enterprise is a resource more precious to the world than oil. For oil, there are substitutes. For enterprise, there is no equivalent form either of energy or of intelligence. The most complex computer is not as sensitive as the free choices of enterprising individuals. Such individuals are an unending source of invention. They are, alas, easily suppressed. Most societies repress them.

We have reached a decisive turn in Western societies. For several decades, statist politicians could claim to provide more goods and services than enterprise alone. There was truth in this claim. But now the cost of government is high, and the productivity of enterprise is falling. Now it is clear that statism clearly means less of everything. Taxes and inflation, by statist action, climb together. Individuals must settle for lower standards of living.

For the first time in a long time, those who oppose the statists — those who nourish enterprise — are in a position to offer ordinary citizens "more." As enterprise goes up, standards of living go up. As statism rises, so do taxes and inflation, bringing standards of living down.

There is now a huge vested interest in statism. One out of every five voters works for the government. It is time to celebrate the idea of enterprise while it still lives. Labor Day has its importance. It is enterprise that invents the projects on which to labor. Enterprise imagines, labor fulfills. Labor Day needs Enterprise Day as autumn requires spring.

And what would truly make the day distinctive is that it should not be celebrated by taking off from work. There is a far better way: It should be celebrated as a day without taxes. On one day a year, sales taxes should not apply. And all earned income from that day's labors should be exempted from income taxes.

This idea, of course, is playful. But a society lives, more than pragmatists think, by celebrations. If we do not celebrate our distinctive social secrets, we may not immediately lose them, but we are certain to undervalue them.

The Washington Post BUSINESS & FINANCE

SUNDAY, SEPTEMBER 3, 1978 C1

Something's Happened to Yankee Ingenuity

By Bradley Graham
Washington Post Staff Writer

It's been 89 years since Angus Campbell put the first automatic cotton picker to work, 70 years since Henry Ford gassed up his first Model T, 39 years since Du Pont introduced a super fiber called nylon and 30 years since Edwin H. Land marketed the first instant-picture camera.

All of which helps recall a time America's inventive spirit seemed unbounded and unceasing. Ideas flowed to the marketplace as fast and furious as mountain rapids flow downhill.

But what was once thought to be an endless stream of U.S. inventions has of late been trickling out less startling and less competitive products. Meantime, adding pain to the drain, the inventive powers of foreign nations have been in ascendance. The question, once raised in a whisper, is now asked in loud and urgent tones: Has American enterprise lost its innovative touch?

Consider these facts:

• The number of U.S. patents issued per year to U.S. inventors reached a peak in 1971 and has declined steadily since. But the number granted to foreign inventors has increased steadily since 1963. In 1977, foreigners claimed 35 percent of all patents issued in the U.S. across a broad range of fields.

• The U.S. balance of trade has worsened, due not only to increased oil imports, but also to more imports of foreign manufactured goods.

• Productivity, which is partly a function of technological innovation, has slumped severely. In the past decade, the rate of growth in U.S. productivity has averaged only half of what it was the previous 20 years. In contrast, productivity growth rates in Europe and Japan have been on the rise.

• From 1953 to 1965, U.S. investment in research grew at an impressive rate of 10 percent annually in inflation-adjusted dollars. However, investment in research by all sectors in the U.S. over the past 10 years has shown essentially no growth in constant dollars. Further, a number of major U.S. corporations have announced recently they intend to spend even less on long-term basic research and more on development of short-term, quick-profit products.

In a world where power and progress are often measured in terms of technological breakthroughs and scientific prowess, such trends are indeed disturbing.

For a nation that has always prided itself on its tinkerers—on those lone souls who brought forth from their garages and basement labs such revolutionary devices as power steering, the office copier and the zipper—they are downright depressing.

From boardroom to research lab, there is a deepening sense that something has happened to the once unchallengeable Yankee Ingenuity. Just what, though, no one quite knows.

There is today a pervasive perception that the dynamic vitality of the U.S. economy is faltering. This perception appears to be founded on two concerns: first, that America is not as productive as it used to be; and second, that we are somehow not as inventive either. This is the first of two articles this month which will examine these concerns.

Some insist it is in rapid decline, choked by an unfavorable economic climate, government regulation and, perhaps, by the lethargy and shortsightedness of big business. Others say it has simply taken new forms, becoming more subtle and incremental in nature than grand and revolutionary. Either way, the country's genius for invention does not appear, at least, to be what it once was.

Alarm bells are going off all over. First, Michael Boretsky, a senior policy analyst in the Commerce Department: "All the indicators imply that the rate of U.S. innovation is measurably down. It's very disconcerting."

Next, Dr. Alden Bean, director of research for the National Science Foundation: "There's no solid evidence to suggest that the U.S. is going to hell in a handbasket in science and technology. But there is serious cause for concern about some trends we've seen."

After several years of arm-waiving and shouting about waning U.S. innovation, the nation's research establishment finally caught the ear of the White House. Several months ago, the Carter administration launched a major policy review of things to be done to foster innovation in private industry. The study is being coordinated by the Commerce Department and involves more than 15 agencies. A final report, including recommendations for the president, is expected by April.

But many experts say another study is hardly necessary. The worrisome state of innovation in America has been assessed and reported on many times since the first major policy review conducted by Commerce in 1967. In the interim, the problems only have become more obvious.

For one, the economic climate for innovation is poor. The financial incentives that in the past encouraged the rich and the bold to risk their money on slim-chance projects no longer exist, thanks to increases in the capital gains tax and tighter rules on stock options. Inflation, too, has put the squeeze on capital investment by existing corporations.

Also, with the winding down of space and defense programs, government support of industrially performed research has diminished. Throughout the 1950s, the government annually supported more than one-third of industrial research activity. This level of support reached almost 40 percent in 1962, but has been falling consistently and is 25 percent today.

Increased government regulation, too, has increased operating costs and shrunk the share of profits formerly available for research. So has the higher cost of energy.

Together, these developments have forced a shift in industrial research activities from the offensive to the defensive. "Major effort is being diverted into defensive research," said Howard Mason, president of the Industrial Research Institute in St. Louis. "Much more emphasis is being placed on short-term cost reductions than on long-term product and process improvements."

But as important as such external economic factors may be in explaining the innovation slump, there are certain features about the internal structure of corporate America today which some say have had a debilitating effect on innovation.

Writing in the July-August issue of the Harvard Business Review, Alfred Rappaport, professor of business at

See INNOVATE, C2, Col. 1

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INNOVATE, From GI

Northwestern University, blames the research lag on the increasing emphasis American business places on short-term results. Rappaport asserts that management incentive programs are biased toward quick profits at the expense of perhaps smarter long-term investment.

"American business would do well to re-examine its own self-administered incentive systems," Rappaport concludes.

Industrial research today is dominated by a small number of very large corporations. The top 10 percent of those firms doing R&D in 1976 performed almost 70 percent of the total U.S. R&D effort. Ten firms accounted for more than 30 percent of all expenditures that year. This concentration may itself work against innovation.

"A large part of the blame for the lack of innovation lies with the oligopoly nature of American industry," said Mark Green, director of Ralph Nader's Congress Watch. "Big companies get habituated to their products and there is a reluctance to break through. If you already dominate an industry, where is the incentive to take a chance on a new and costly approach?"

But the history of innovation in America is ambiguous on this point. Studies done on whether big business or little business is more inventive have come to no conclusive end as a whole.

Certainly, many major innovations have come from outside an established industry. The ballpoint pen, for instance, was invented by a sculptor, the dial telephone by an undertaker. It took an electrical engineer employed by a shipbuilding firm in the 1930s to develop the automatic transmission, called by some the last major innovation of the auto industry. IBM's disk memory unit, the heart of today's computer, was not the logical outcome of a decision made by IBM management—rather, it was developed in one of its labs as a hobby project, over the stern warning from management that the project had to be dropped because of budget difficulties.

At the same time, certain large firms in the fields of electronics, pharmaceuticals, telecommunications and computers have been highly innovative.

In their seminal study in 1958 on the sources of invention, Harvard professor John Jewkes and his colleagues said they could not conclude that inventions flow primarily from any one source. When the study was revised in 1969, the authors stated only the obvious: that inventions can come from firms of varying size.

Business leaders, of course, refute the charge that they are less innovative today than in the past. "There's no lack on the part of big business to be innovative," said General Motors Corp. Chairman Thomas Murphy in a phone interview. "It's a big country, so we have to be big. We couldn't do all of the things we do if we weren't as large as we are."

To the public, a car may still look like a car. But auto officials say the changes which have taken place inside during the past five years have been as revolutionary as anything which has come before.

"There's a perception problem," said Thomas J. Feaheny, the man in charge of car engineering for Ford Motor Co., where "better ideas" were once not only a management dictum but a successful ad slogan. "We've never been as innovative as we are now. But the things we're doing aren't as glamorous and aren't noticed much by the consumer."

Critics note, however, that what the auto industry heralds as advances in development (the catalytic converter, on-board use of minicomputers to govern fuel efficiency and control pollution, greater use of aluminum and other lightweight durable materials) are, in fact, only more logical applications of off-the-shelf technologies rather than breakthroughs in the state of the art.

Of even greater concern, though, than what has or hasn't happened is the prospect for the future. Many major corporations have tailored research budgets to yield more practicable and immediate results. In 1968, industry allocated as much as 33 percent of its R&D dollar to the "R" part. By last year, this had dropped to 25 percent.

Corporations say the reasons for this shift from research into development have nothing to do with being too big or too comfortable. The reasons, basically, are greater pressures from government regulators to meet health, safety and environmental standards as soon as possible, and greater uncertainty about the likely profitability of longer-term, riskier ventures.

"It used to be much easier to bring new products to market," said Du Pont Chairman Irving Shapiro in an interview. "If you hit something, you'd have more time to develop it. Now it's more difficult.

"Also, the pot of gold at the end of the rainbow just isn't there. The economic environment has changed. Our thinking has had to change, too. It's become more short range."

Added Richard Heckert, Du Pont's senior vice president for R&D: "We're not exploring wholly new areas. We're concentrating instead on opportunities for research in established areas . . . . We are less able to take risks. We have to concentrate on surer projects."

The degree of such thinking does vary from company to company and industry to industry. Certain high-technology fields (instrumentation, computers and electronics) remain rooted in innovation and continue to churn out impressive new products. In other industries, though—particularly those most apt to be subject to regulation and high energy costs (steel, chemicals, paper, packaged goods and autos)—product innovation has leveled.

Part of the difficulty in deciding what to do about the innovation lag is figuring out how to define it. To begin with, innovation defies measurement.

"There are no indicators which you can look at to measure the advancement of knowledge," said NSF's Dr. Bean. "Some people count patents, but that's unreliable in part because some firms don't like to patent things and would rather rely on trade secrets rather than disclose important discoveries. Others count citations in the research literature, but that's unreliable, too."

But even without sure data, many have not hesitated to push the panic button. "You can't use statistics to say there's a problem," said Jordan J. Baruch, the assistant Secretary of Commerce who is directing the government's innovation policy review. "But you'd have to be blind not to see it."

Urgency about the problem is all the greater because America seems uniquely stricken. Western Europe and Japan grow more inventive, or so it appears, while U.S. firms age. Examples abound of foreign firms taking the lead in both new and traditional product areas. The Japanese, for instance, totally eclipsed the American communications industry in the development of video tape recorders. The Germans and Swiss now set the pace in textiles. Inventiveness in the steel industry has centered in Belgium and Austria. Some U.S. cities are even going abroad to scout for new ways to handle old problems. (The Council for International Urban Liaison here publishes a monthly newsletter called Urban Innovations Abroad that goes to 5,000 city officials in the U.S.)

Moreover, U.S. productivity rates have been in a rut for a decade—and that has serious consequences for everyone's real income and for the nation's overall standard of living. Of course, technological change by itself does not make or break productivity. There are other contributing factors, most important among them being capital investment and improved labor skills. But technology is an important ingredient in the mix.

With industry's current bent toward the here and now, there is concern that the U.S. may be cutting its innovative bridges. Some economists, notably Charles P. Kindleberger at MIT, have drawn disturbing parallels between the way U.S. firms are responding to America's battered competitive leads and the responses of British firms in the twilight of the English empire. British firms, just as American firms now, became defensive—that is, rather than redoubling efforts to generate innovations, they curtailed investment and demanded government protection against imports.

Does the current emphasis on small, incremental kinds of advances rather than on big breakthroughs threaten the dominant position the U.S. still holds?

No one is sure. Despite all the studies of innovation and productivity, no one can say whether there is an optimum rate of invention a society should adhere to, or how much innovation is enough.

There does seem to be general agreement, though, on this: The rapid technological growth which the U.S. experienced during the first two decades after World War II was unusual and is not likely to be repeated.

"We made an enormous investment in the war, made some great technological advances during it, and came out of it with a great belief in the power of technological progress," said J. Herbert Hollomon, director for the Center of Policy Alternatives at MIT. "We also were handed an accidental lead, in having survived the war better than anyone else. But one of the things that is increasingly going to be the case is that new technological innovations are going to happen outside the U.S."

Hollomon said that American business has in the past displayed an NIH (not-invented-here) complex, meaning that U.S. managers have been arrogant toward anything not thought up first in America and slow to embrace it. This is one of the things that he said will have to change if American firms hope to continue to compete in world markets. American businesses must learn to be quick to adapt, to exploit foreign inventions as well as their own, he warned.

"The problem is not with basic science," Hollomon said. "The problem really is how effective we can be in adjusting and adapting."

Some have argued that U.S. multinationals may themselves have hastened this competitive bind on America by transferring their best technologies to foreign markets in recent years. Those who say this also urge legislation that would restrict further transfers of technology.

But most who have studied the innovation problem say the solution lies in fostering innovation at home—through a more liberal tax policy, a relaxed regulatory policy, less aggressive antitrust practices and, in general, a more cooperative spirit between business and government such as exists in Japan and the leading Western European countries.

And above all, they argue for greater certainty in government policy. "I think that more than an increase in government support of R&D or a reduction in regulation, what private industry people are interested in is a reduction in uncertainty about government action," said Dr. Bean. "Look, there's enough economic uncertainty in the R&D process without the government."

Times Picayune (NO); 5/30/78 NEW ORLEANS

Profits of Research

Comes now Dr. Sidney Wolfe of the Health Research Group, a Ralph Nader-umbrellaed organization, to protest government policies of managing the benefits of government-financed research.

University laboratories license their inventions, made possible by government grants, to private companies for developing and marketing. Money from the licenses is plowed back into research and development. The companies can keep the licenses only long enough to earn back their costs of testing and development. The government gets nothing back.

The General Services Administration now intends to publish a model contract to coordinate the licensing activities of several agencies, especially the National Science Foundation and the Department of Health, Education and Welfare. This plan Dr. Wolfe attacks as a "giveaway of patents whose nature, utility and value are unknown at the time of disposal." The government should "recoup some of its investment."

The Office of Management and Budget has jumped in, asking GSA to hold up on the policy. Its enforcement has been suspended for 120 days.

Government laboratories, such as the Department of Agriculture research center at New Orleans, take out public patents on products they develop, then license them to companies royalty-free. It may indeed be argued that this process is a "giveaway," that the flame-retardant cotton flannels developed here, or the cotton machinery equipment pioneered by USDA here, are extremely valuable to the sleepwear industry or the ginning firms and that the government, which has developed them at taxpayers' expense, should recoup its expenditures.

But from where we sit, the licensing policy with regard to university laboratories is essentially just. It lubricates the process by which technology developed under government grants eventually reaches the public. Inventions developed in university programs, as Howard Bremer, president of the Society of University Patent Administrators, points out, tend to be "very embryonic." Private business has the capital and know-how to test and market the products.

Some reasonable and fair fraction of the resulting profits, however, should revert to the university, and another reasonable and fair slice of the pie should revert to the government. If the product is in reality a technical advance, it will reap enough in the marketplace for these royalties scarcely to be noticed by the manufacturer. But they would represent at least symbolically that the people of the United States have furnished the original endowment for their development.

6/6/78

Can DOE Keep a Secret?

Wall St. Journal 7-17-78

By Walter S. Mossberg

WASHINGTON—In recent years, many members of Congress have worried that the government lacks accurate information on the major U.S. energy companies and the energy reserves they control.

So last summer Congress ordered the Energy Department to assemble a comprehensive, detailed new body of energy information. In unusually specific language, the lawmakers demanded an annual government report showing the revenues, costs, profits, cash flow and investments of the major oil companies, broken down by line of business, type of energy and geographic area.

But the Department's plans to carry out Congress's wishes have run into steely opposition from the industry. The battle is likely to come to a head this month and will probably wind up in court. The opposition threatens either to cripple the government's ability to collect the information Congress wants, or severely curb the government's ability to use it.

The oil companies are insisting that any specific corporate data they supply the Energy Department on the new reports be withheld from other government agencies, notably such law-enforcers as the Justice Department. They say the other agencies should be limited to general summaries of the information which wouldn't identify the data by company name. Otherwise, they warn, they may not cooperate in filling out the reports.

But, after months of agonizing over the industry's threat, the Department decided last month that it would share the information it gets with other agencies. That decision is now open to public comment and will be the subject of a hearing set for today. After that, unless the Department changes its mind, it will become final government policy.

The Government Argument

Law-enforcing agencies, including the Justice Department and the Federal Trade Commission, have argued that they need company-by-company statistics from the Energy Department in order to enforce a multitude of laws, especially the antitrust laws. They say there's only one federal government, and its branches should work together. And they note that the Department can legally compel the companies to fill out the new reports, so they discount the industry's threats.

Michael Pertschuk, chairman of the FTC, told Energy Secretary James Schlesinger that withholding of specific company data from other agencies "would severely handicap the timely enforcement of the laws relating to antitrust and consumer protection." And an FTC staff report concludes "surely it is not in the interests of sound public policy . . . to have separate pockets of relevant information scattered about the government."

Critics of the industry contend the argument over confidentiality is just another tactic in an oil-company effort to deny the government the data it should have to make policy. But the major companies insist they favor the collection and use of the data for policy-making purposes, and government officials say they don't sense any general resistance. Indeed, some industry officials insist that a more industry-oriented energy policy could emerge once the government knows what the companies know. They say they are merely trying to keep secret data confidential.

But oil industry lawyers insist their companies' constitutional rights are at stake in the matter. If the company-supplied data sought by the Energy Department were freely shared with agencies prosecuting or investigating the companies, they say, they would be denied their rights to due process in challenging the government's use of evidence. In effect, they would be forced to testify against themselves, they contend.

Further, the industry insists that data collected by the Department of Energy, largely for statistical and analytical purposes, isn't necessarily accurate or meaningful when used for regulatory or investigatory purposes for which it wasn't intended.

"Shell has nothing to hide," Shell Oil Co. Vice President Robert Thompson declared recently. But he complained that "confidential information submitted by Shell to the DOE for one purpose may be used by another federal agency for an entirely unrelated purpose with the result that such information is both misrepresented and misunderstood."

Last summer Congress ordered the Energy Department to assemble a comprehensive body of energy information. But the Department's plans to carry out Congress's wishes have run into steely opposition from industry.

The companies also contend that spreading their confidential information around the government would increase the chance of leaks, or other releases of the data to the public, the press, and, worst, to competitors. They insist that the law-enforcers can do their jobs with summaries of the data, and that if they want more specific information, they can subpoena it.

Company lawyers argue there are legal precedents for keeping agencies from sharing data with one another, and they are likely to sue the Department as soon as it issues the new financial reporting forms, possibly blocking action for years. Even if lawsuits fail, one industry representative warns "you can fill out a form in a way that is informative or uninformative."

The industry position has outraged some liberal members of Congress and some consumer groups as well. James Flug, director of Energy Action, a private group which frequently opposes the oil industry, says "the companies act like they're going to supply the data out of noblesse oblige, instead of a legal requirement. They're trying to set conditions on it so it can't be used. What have they got to hide?"

Both Sen. Edward Kennedy (D., Mass.) and Rep. John Dingell (D., Mich.) have pushed legislative amendments that would flatly require the sharing of all the data with other agencies, provided those agencies promise to keep the proprietary information from reaching competitors.

The hints of noncooperation from the industry are deeply troubling to Lincoln Moses, who heads the Energy Information Administration, the Energy Department's statistical division. "The obtaining of data," he says, "clearly depends on the cooperation of the respondent."

At the same time, he acknowledges a duty to supply relevant data to other agencies when justified. The 1977 law setting up the Energy Department required that data collected be shared with the Department's own regulatory arms, and a 1975 law required the Department's predecessor agencies to share data with the FTC, the Justice Department, the Interior Department and the General Accounting Office, Congress's investigatory arm.

However, congressional guidance on this point hasn't been consistent. Other laws covering the Energy Department and its predecessor agencies are silent about sharing of specific company data with other agencies. In the past, Congress has specifically barred sharing of such information by the Census Bureau. Some agencies, including the Bureau of Labor Statistics, jealously refuse to share specific data they've collected, fearing their sources will dry up.

To resolve the dilemma, the Department toyed for a while with a two-track system: Two forms would be issued to oil companies, one to collect statistics for general analysis and one to collect data for the law-enforcers. The reasoning was that the companies could balk at, or sue over, the second form without affecting the energy statisticians' ability to gather the information they need.

But that plan would have required legislation, which probably would have had a hard time passing Congress this year. Liberals attacked it as an open invitation for the companies to lie to the law-enforcers. And the companies themselves quibbled over some aspects of the plan.

Action Promised Soon

So the Energy Department is forging ahead with its plan to share the data, on request, with "sister" agencies in government. Officials hope to publish the final regulation soon and issue the reporting forms to the 30 biggest oil companies next month.

The Department defends the plan by noting that all agencies are required to protect from public disclosure truly confidential information, such as trade secrets; therefore, officials reason, sharing of the information with other agencies wouldn't compromise company secrets. The Department promises it will require other agencies to keep confidential those things the Energy Department itself would keep confidential.

To help protect the companies' constitutional rights to due process, Department officials say they'll probably adopt a notification procedure so that companies will know that another agency is about to receive certain data from the Energy Department. That would allow the companies to appeal to judges or hearing officers on a case-by-case basis in order to block the transfer or use of the data by the receiving agencies.

Officially, Mr. Moses and his staff are hopeful that the oil companies will ultimately decide to cooperate and not wreck the new reporting system with half-hearted compliance or lawsuits. But privately, Energy Department planners are bracing for lots of trouble as they proceed to try to get a detailed picture of the nation's energy industry.

Mr. Mossberg, a member of the Journal's Washington bureau, covers energy matters.