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# ***COMPETITIVENESS POLICY COUNCIL***

*Washington, DC*

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*C. Fred Bergsten*  
*Chairman*

March 31, 1994

*Rand Araskog*

*John J. Barry*

MEMORANDUM TO CRITICAL TECHNOLOGIES SUBCOUNCIL MEMEBERS

*William Graves*

From: Erich Bloch and David Cheney

*John J. Murphy*

Subject: Update on Subcouncil Activities

*Edward V. Regan*

*Bruce Scott*

*Albert Shanker*

Enclosed is a draft report of the Subcouncil's recent work to be included in the full Council's annual report to the President and Congress. The Council will draw upon the Subcouncil's report in drafting the technology section of its annual report, which is expected to be released in late April or early May. In order to meet this deadline, we need your comments on our draft report by the close of business April 11, so that we can prepare it for publication together with the Council's annual report.

*Alexander Trowbridge*

*Laura D'Andrea Tyson*

*Edward O. Vetter*

*Lynn Williams*

We remain involved in the debate on the National Competitiveness Act. The House of Representatives approved its version (HR 820) and the Senate passed its version (S 4) on March 16 after an acrimonious debate. Both bills now go to conference, where their differences have to be ironed out. Enclosed is a draft letter we plan to send to the House and Senate conferees raising issues of concern to the Subcouncil. In order to have some influence over the outcome of this debate, we need to circulate this letter to the appropriate people as soon as possible. We would therefore appreciate if you would communicate your comments, either over the phone (202-785-3990) or by facsimile (202-785-3998), also by the close of business, April 11.

The next meeting of the Critical Technologies Subcouncil is scheduled for June 7, 1994. we will discuss progress made in implementing our recommendations and will begin looking at the FY1996 budget. Following up on our last meeting, we have asked Bob White to chair a working group to address criteria to govern participation by US and foreign-owned companies in Federal R&D programs. We also expect to do some further work, in conjunction with the Council's Subcouncil on Capital Allocation, on issues affecting the financing of technology by large companies. Both of these issues will also be on the agenda for the June 7 meeting. We will provide you more details about the meeting as the date approaches.

Thank you very much for your assistance.

## **DRAFT**

### **Report of the Subcouncil on Critical Technologies, April 1994**

#### **Summary**

There has been substantial progress made toward implementing CPC's technology recommendations but much work remains. The Administration's technology program and its FY1995 budget are closely aligned with the subcouncil's recommendations and the Administration has made major progress in developing civilian industrial technology programs. Much work remains, however, in the following areas:

- The rationale for the technology agenda needs to be reemphasized, and its bipartisan origins and nature should be recognized.
- There needs to be continued work to implement 95 R&D budget and continue the changes in same direction the FY 1996 budget cycle.
- There needs to be a new focus on the way Congress addresses technology issues.
- There must be a new emphasis on evaluating the results of technology programs in the agencies and making changes as necessary.
- There is a need to re-emphasize some of the CPC's technology recommendations that have not yet been adopted, including provisions to stimulate investment in technology through tax changes and programs to bring universities and industry together.

The Subcouncil on Critical Technologies has examined proposals in pending legislation for new criteria for participation by U.S. and foreign companies in federal R&D programs, and proposals for new programs to help finance the commercialization of technology. The subcouncil has commented on these proposals, and also plans continued work in these areas.

#### **Introduction**

In its March 1993 report, *Technology Policy for a Competitive America*, the Subcouncil on Critical Technologies set forth a comprehensive set of recommendations to improve the contribution of technology to the nation's economic welfare. These recommendations, based on an consensus developed in the technology community over the last five years, represented a proposal for a new U.S. science and technology policy, one oriented to meet the new challenge of international economic competition rather than the former military challenge of the cold war.

The recommendations sought to do five basic things:

- \* Shift resources from defense-only technology development to civilian and dual use technology needs while maintaining a constant total R&D budget.
- \* Expand industry driven, cost-shared R&D programs (where industry must commit its own funds and choose the direction of the R&D) to help lower the risk of commercializing technology.
- \* Strengthen programs where R&D for government missions can also help promote industrial competitiveness through stimulating new markets or developing new technologies.
- \* Improve the infrastructure for technology development and manufacturing in the United States to encourage companies to choose to conduct R&D and manufacturing here. This infrastructure consists of small manufacturer, skilled workers, and testing capabilities.
- \* Improve the management of R&D to incorporate more private sector input and better coordinate Federal programs.

The goal of these recommendations is to improve America's economic performance by using Federal funds more efficiently and effectively. Our nation's ability to have ample, well-paying jobs and a high standard of living clearly depends on our ability to develop and deploy technology. New technology helps create the new industries that generate new jobs and helps existing industries improve their productivity. Even when the deployment of new technologies seems to require fewer workers, the reality in today's competitive world is that the alternative is for more jobs to go to foreign factories.

This agenda was developed and agreed to by a bipartisan group that included officials of the Reagan and Bush Administrations, and many who are now serving in the Clinton Administration. It was adopted by the full competitiveness policy council as part of an overall package that increased investments in the future while reducing the budget deficit.

## **Implementation of CPC Recommendations**

### **Progress Made**

We have been gratified that the Clinton Administration adopted nearly all of the CPC's technology agenda, first in its policy document of last year *Technology for Americas Economic Growth, A New Direction to Build Economic Strength*, and, most recently, in its FY 1995 budget submission. Appendix I lists in detail these recommendations and the progress made.

### Civilian/Defense R&D Ratios

|                                     | FY93 | FY94 | FY95 |
|-------------------------------------|------|------|------|
| <b>Dual Use Counted as Defense</b>  |      |      |      |
| Civilian R&D                        | 41%  | 44%  | 44%  |
| Defense R&D                         | 59%  | 56%  | 56%  |
| <b>Dual Use Counted as Civilian</b> |      |      |      |
| Civilian R&D                        | 43%  | 47%  | 46%  |
| Defense R&D                         | 57%  | 53%  | 53%  |

Source: Budget of the United States, Fiscal Year 1995

The Administration's budget proposes major increases in industrial technology programs, including:

- The Technology Reinvestment Project, which uses over \$500 million/year in defense funds to support civilian and dual used technology related projects.
- The Advanced Technology Program in the National Institutes for Standards and Technology (NIST), which is requested to grow to \$450 million in FY1995 and \$750 million in FY1995, as recommended by the subcouncil.
- The core programs at NIST, which should enable NIST to expand its services to industry.
- Multiagency technology transfer programs, which develop partnerships with industry and fund for cooperative R&D agreements.

### Civilian/Dual Use Industrial Technology Programs

|                                                   | FY93             | FY94 | FY95 | % Change<br>FY94-FY95 |
|---------------------------------------------------|------------------|------|------|-----------------------|
|                                                   | (\$ in millions) |      |      |                       |
| <b>Advanced Technology<br/>Program (NIST)</b>     | 68               | 200  | 451  | 128%                  |
| <b>Technology Reinvestment<br/>Project (ARPA)</b> | 472              | 554  | 625  | 13%                   |
| <b>Manufacturing Extension<br/>Program (NIST)</b> | 18               | 30   | 61   | 103%                  |
| <b>Technology Transfer</b>                        | 384              | 551  | 865  | 57%                   |

(CRADAs, several agencies)

Source: Budget of the United States, Fiscal Year 1995

The Administration also has proposed major increases in projects where technology not only serves government mission but also helps develop technologies or markets for commercial industry. Several areas that the Administration has given high priority are:

- Facilitating the development of the National Information Infrastructure (NII). The NII can open up a vast number of new services and capabilities, from distance learning to new modes of manufacturing and engineering, that can help improve U.S. competitiveness. The NII also can be expected to stimulate new markets for hardware, software and services.
- Developing "clean cars" , intelligent vehicle/highways systems, and environmentally benign manufacturing systems.

The Administration has also proposed steps to improve the infrastructure for manufacturing, such as expanding the Manufacturing Extension Program at NIST as recommended by the CPC. This should help many small and medium sized manufacturing firms to modernize and will lay the ground work for industry to move ahead in new technology approaches for manufacturing.

A additional significant step is the formation of the National Science and Technology Council. This new, cabinet-level council chaired by the President, along with its committees, has the potential to better coordinate and prioritize R&D across the Federal agencies. It also can provide a focal point for private sector input to government. The Committee on Civilian Industrial Technology will be particularly important in areas related to competitiveness.

The fact that these changes have been proposed within a tight overall budget is evidence of the strong Administration commitment to technology as an engine of economic growth. The Subcouncil strongly supports these key parts of the President's budget, which are consistent with our previous recommendations.

In addition, several other positive changes took place over the last year. The Congress approved and the President signed into law legislation to modify the National Cooperative Research Act to give joint production ventures the same antitrust protection as joint R&D ventures. This should help companies find ways to cooperate to increase their international competitiveness, especially in capital intensive technologies. In addition, the Department of Defense has begun to revise its procurement regulations in ways that should save money and ultimately stimulate commercial innovation.

## **Further Work Needed**

Although it is tempting to celebrate the adoption of many recommendations in the FY95 budget as a major success, it is important to recognize that this is only the first step in implementing an effective U.S. technology policy. The changes needed are structural in nature and cannot be fully accomplished in a single year. For our technology recommendations to accomplish their goals several things must happen:

- Congress must appropriate funds for programmatic increases in the President's budget request in FY1995
- The work must continue, both in the Administration and the Congress, in the FY96 and FY97 budgets. This promises to become increasingly difficult under the caps in the budget agreement.
- The government and private sector must work together to ensure that the new and expanded programs work as intended, and that they are evaluated and modified as necessary.
- The changes must become institutionalized through organizational changes in both the Congress and the Administration.

In our interim report of last fall, we were concerned about the lack of articulation of the rationale and the importance of the changes we and the Administration are proposing. Many of the proposals had their roots in programs developed during the previous Administration and should be able to enjoy strong, bipartisan support in the Congress. As the recent debate in the Senate over S. 4 revealed, however, the breadth of this support can erode quickly if underlying rationale is misunderstood. It is important to emphasize and reemphasize the following points:

- \* The proposals are bipartisan in origin and support. This has been especially true for the Advanced Technology Program and Manufacturing Extension Programs in NIST.
- \* The R&D slated for increases is industry driven and leverages private sector R&D.
- \* The emphasis is on refocusing Federal R&D to increase its contribution to economic growth, not spending new money
- \* It is a program of long term investment, not current consumption.

- \* The changes proposed to build closer links between companies and universities and Federal laboratories are increasingly essential as companies have cut expenses, including long-term R&D, to stay internationally competitive.
- \* The proposal are consistent with a program of deficit reduction in the short-term, and are essential for the growth that will lead to deficit reduction in the long term.

In addition to making further progress in the areas that the Administration has supported, there are several key areas that are not reflected in the FY 1995 budget. Our recommendations to improve the economic environment for technology development and manufacturing, such as to make permanent the research and experimentation tax credit, to expand this credit to include process R&D, and to establish an investment tax credit for manufacturing equipment have not be adopted. Although the U.S. economic environment looks more favorable relative to its competitors, due to the strong yen and lower U.S. interest rates, this improvement may be temporary.

In addition, there has been little progress towards adopting the recommendations we proposed to help build stronger linkages between universities and industry. Our proposals for expanding the program of NSF funded research centers, for giving companies additional tax incentives for funding university research, and for establish stronger programs to exchange personnel between industry, universities, and national laboratories, have not been adopted. We continue to believe that these are not only good ideas, but essential parts of developing a stronger total national technology enterprise.

### **New Focus Needed on Congress and Implementation in Agencies**

Now that significant progress has been made in the Administration towards developing a coherent technology policy to promote economic growth, the new focus of attention must be on getting Congressional approval and on effective implementation in the agencies.

**Congress** In recent years, supporters in the Congress have championed many aspects of the program outlined here. Nevertheless, major challenges will be faced in implementing the President's budget. For example:

- The 1990 and 1993 budget agreements put in place rigid caps on total discretionary spending. The FY1995 budget meets those spending caps, but pays for the increases in key technology programs with cuts elsewhere that the Congress has rejected many times before.
- The Department of Commerce's technology programs, which contain some of the largest and highest priority increases, are funded through the same appropriations subcommittee that funds the Department of Justice, whose crime-related



programs are likely to receive larger increases. Unless the total allocation to that subcommittee increases substantially, it will be very difficult meet the targets for the Commerce Department programs. There are similar difficulties in other appropriations subcommittees.

- Political earmarking poses a serious threat to the success of the new technology programs. Earmarking can undermine the effectiveness and the legitimacy of technology programs, and must be avoided.

The subcouncil will work with Congress over the next year to support the key provisions of the President's R&D budget. Over the long term however, more fundamental changes are needed.

Although the Administration has adopted an ambitious new approach to managing its R&D budget, the nation will not have a well managed R&D program until comparable, and more difficult, steps are taken to improve the management of science and technology in the Congress. The R&D budget is highly fragmented in Congress, divided among nine Appropriations Subcommittees. The authorizing committee that has the clearest focus on the R&D budget, the House Committee on Science, Space, and Technology, authorizes less than 30 percent of the R&D budget. This fragmentation makes it very difficult to set priorities, especially for multiagency programs.

In its recommendations last year, the Subcouncil on Critical Technologies noted the need to establish a better process in Congress to make decisions on science and technology, such as realigning appropriations subcommittees to bring more key technology programs under a smaller number of subcommittees, or by establishing a process by which authorizing and appropriating committees together can examine the whole R&D budget. These recommendations are increasingly important.

**Agencies** As the many of recommendations have been adopted by the Administration, attention must turn to the details of implementation of the programs by the agencies. It is important that the new or expanded civilian industrial technology programs include:

- Stronger relations with the private sector to ensure that programs are meeting the needs of industry; in some cases industry will need to develop new structures to be able to work constructively with government;
- Metrics to measure their success; and
- Timely analysis and evaluation.

Many new programs, such as the ATP program, already include these features. It is to be expected that that some programs will not perform up to expectations and these will need to be modified quickly.

### **New Work of the Subcouncil**

In the last few months, the subcouncil focused its attention on several issues contained in major legislation now before the Congress, especially House bill H.R. 820, the National Competitiveness Act, and its Senate counterpart, S. 4. Two controversial issues in this legislation that we examined in detail were (1) eligibility for U.S. and foreign companies to participate in Federal R&D programs and (2) Federal support for financing the commercialization of technology. These issues also have broader long-term importance beyond the current legislation.

### **Eligibility of U.S. and Foreign Companies to Participate in Federal R&D Programs**

An issue that arises in many technology programs is that of which companies should be allowed to participate. In particular:

- Should U.S.-owned companies that manufacture their products or source components abroad be allowed to participate?
- Under what conditions should foreign-owned companies be allowed to participate?

At present, different Federal R&D programs have different, and sometimes ambiguous eligibility requirements, leading to confusion in companies about whether or not they are eligible. For example, Department of Energy Cooperative R&D Agreements (CRADAs) require that the technologies developed by "substantially manufactured" in the United States. A provisions in H.R. 820 would establish new and more restrictive requirements for participation in Commerce Department programs. Companies participating in programs funded under the legislation would have to manufacture and source components for any technology derived from the programs in the United States, and participating companies would have to be either U.S.-owned or incorporated in a country that provides reciprocal benefits, market access, and intellectual property rights to U.S. companies. The issue is whether these restrictions are in the national interest.

We believe that this provision, though well intended, is counterproductive to the goal of creating jobs and improving the standard of living in the United States for two reasons. First, it is overly restrictive and would prevent from participation in Federal R&D programs many companies that could be expected to contribute substantially to jobs in the United States. These include in some cases U.S. companies that operate internationally and in other cases foreign-owned companies that can contribute substantially to the U.S. economy.

Second, the provision would put a substantial burden on companies that want to participate in government technology programs by increasing the costs and paperwork required. It would also require increased resources in the Department of Commerce to evaluate proposals based on these criteria. As a result, the provision in the legislation would work against the goal of developing closer and more effective industry-government relationships.

The view of the subcouncil is that eligibility decisions should be based on a broad determination of benefit to the U.S. economy. Although ownership, location of manufacturing, and location of research and development each are indicators of the value to the U.S. economy, there are many instances where companies that do not meet some of the criteria could contribute a great deal to the U.S. economy. It is difficult to develop a rigid set of criteria that applies to all situations. Administrators need to be given flexibility to make decisions based on a number of criteria, within guidelines.

In some industries the location of manufacturing may be of less importance. In the computer industry, for example, manufacturing may be a small part of the total value added, and it may be desirable for U.S. companies to manufacture overseas if it allows them to be more competitive and therefore keep more of the high paying research and development, design, software development, and marketing jobs in the United States.

In some other cases it may also make little sense to deny companies that manufacture overseas the use of technology derived from Federal R&D. For example, it makes little sense to require that a U.S. company that manufactures in the United States and Europe to use environmental technologies developed with Federal funds only in its U.S. plants. In the construction industry, the equivalent of manufacturing must be done at the site, either in the U.S. or overseas, and it would make little sense to prevent U.S. owned international construction companies from using technologies developed in part with Federal funds to improve their competitiveness everywhere in the world.

In some cases, it may be desirable to bring a foreign-owned partner into a federally funded research project if that partner has technology that can contribute to the competitiveness of the U.S. industry. For example, in order to establish a competitive domestic flat panel display industry, it may be desirable to bring in foreign companies with high volume manufacturing expertise that U.S. companies lack. This kind of interaction might be precluded under the proposed legislation.

These examples indicate that there are many cases where judgment is needed to determine whether the participation of foreign companies or U.S. companies that will apply the technology overseas is in the U.S. economic interest. The current statutory language for the Advanced Technology Program in the Department of Commerce allows such judgment and has worked

well with few problems. This language gives the Secretary of Commerce discretion to determine if a company's participation is in the national interest, based on certain factors. The language was the subject of extensive debate when the program was established and should not be replaced until alternative language has been fully analyzed and debated.

We believe this is, and will continue to be, an important issue. The CPC will continue to work on this issue in depth over the next few months to develop proposals for criteria that can be used by many science and technology agencies.

### **The Federal Role in Financing Technology.**

Pending legislation (S.4, H.R. 820) would establish a program by which the Federal government would make loans to technology development finance corporations, which would then invest in early stage financing for new technology ventures. A working group of the subcouncil reviewed this issue in detail. There was agreement on the need to address the financing of technology, but there were concerns with some of the specific provisions in the legislation.

The subcouncil believes that although there may be a need for increased early stage financing, the main problem is in later stage financing for capital intensive projects. Early stage financing from a variety of sources, including individuals, venture capitalists, state programs, and Federal R&D programs (such as the Small Business Innovative Research program). There is also adequate later stage financing for projects with high potential that are not too expensive. Venture capital firms receive and evaluate a very large number of proposals and believe that they collectively are able to fund a large percentage of the proposals that have merit, as long as the projects are not too large. When too much money entered the venture capital in the 1980s, too much money chased too few good projects, and profits disappeared.

The main problem is in funding very expensive projects. Venture funds commonly finance projects in the \$3-4 million range. Funds will cooperate to jointly fund projects up to \$30 million. Venture capital markets can not adequately fund start-ups that require greater amounts before the company is bought or goes public. Some ventures, such as ones to commercialize semiconductor lithography or flat panel displays, need much larger amounts of funding.

It is especially difficult to fund large projects if the projected rates of return are low or take a long time to be realized. For example, in some technologies, the competitors, often Japanese companies, are willing to take lower (or even negative) returns for a long period to maintain their market position. This may be the case in several electronics, materials and equipment industries. In some technologies there may be a high social rate of return but a low private rate of return. For example, in capital equipment industries the private returns to investors may not be high, but innovations can provide large benefits for the downstream industries.

In many of these cases, large U.S. companies would be a natural place to look to for financing. For a variety of reasons, however, U.S. companies seem less willing than in the past to provide this financing. There are few companies willing or able to support projects that benefit an entire industry, as IBM or AT&T once did. This is an issue that the subcouncil plans to examine in more detail.

There was agreement that the government has a legitimate role in improving the financing of technology, provided that it complements rather than competes with the private markets. Government interests are different from those of venture capitalists; the government seeks high social returns rather than high private returns. For example, venture capitalists sometimes to cooperate to avoid having too many startups competing with each other, which would lower returns. Government, however, might want to encourage more start-ups because it would provide more competition in the market, perhaps making a more competitive U.S. industry and lowering costs to customers.

It was agreed that appropriate roles for government are:

- Creating an overall economic environment that is favorable to capital formation.
- Making markets more efficient by improving information on available technologies.
- Helping to fund larger projects beyond the capabilities of the venture capital markets, with the provision that the private sector substantially shares in the cost and risk.
- Helping to fund projects that are strategically important but where private returns might not be adequate.

There were concerns raised with some of the specific provisions in the pending legislation. For examples, the venture capital markets, as currently structured, could not make use of the loan provisions in H.R. 820. Venture funds generally receive investments from partners which are then invested into technology ventures. If a venture fund were to borrow additional funds from the Federal government to invest in technology ventures, and if those ventures then failed, the partners in the venture would then not only lose the money they originally invested, but also would be liable to pay back the loan from the Federal government. This would not be acceptable to the partners, who are not willing to put at risk amounts greater than their investment.

It was noted that H.R. 820 gives the Department of Commerce until the beginning of FY 95 to explore alternatives and develop an operating plan that could fix these problems, and we strongly support that provision in the legislation.

## **Future Work**

The subcouncil plans to continue its work in several areas. We will continue our work to monitor the implementation of our recommendations. We have also formed a working group to develop for criteria and guidelines for the participation of U.S. and foreign companies in Federal R&D programs that could be used across Federal agencies. We also plan to continue work, jointly with the CPC's Subcouncil on Capital Allocation, on the role of large companies in financing technology.

The Subcouncil also identified the need for a better analysis of the true content of the Federal R&D budget. There is concern that much activity, especially in the defense budget, is classified as R&D but is much different in character than R&D conducted in either the civilian agencies or in the private sector. Much of this work is for the testing and evaluation of weapons, rather true R&D. As a result, Federal and national R&D figures are both inflated and skewed, leading to false comparisons with other countries, and perhaps poor decisions.

## Appendix 1

### STATUS OF CPC TECHNOLOGY SUBCOUNCIL RECOMMENDATIONS

#### RECOMMENDATION

#### ACTION TAKEN

#### INCREASE NATIONAL INVESTMENT IN CIVILIAN AND DUAL USE R&D

**Make Permanent R&E Tax Credit**

Temporary credit extended

Extend credit to include process R&D on  
existing products

Not adopted

Establish additional 25% credit for  
industry-sponsored academic R&D

Not adopted

Establish 10% credit for first 2 years  
of new consortia

Not adopted

**Shift \$7.2 billion from defense to civilian/  
dual use R&D to balance R&D budget**

Adopted as policy goal; significant  
progress being made

Expand DOC ATP program to \$750/yr w/in  
5 years

Adopted as policy; increases on target

Increase NSF ERCs to 100; expand other  
NSF centers

Small increase in number of ERCs

Strengthen NIST Intramural R&D

Adopted as policy; increases made

Increase funding and private sector  
participation in FCCSET Technology Initiatives

Increases for some initiatives;  
end results unclear

Reallocate 10% (20% in 3 years) of DOE  
and NASA labs R&D to support jointly planned  
and funded industry/government R&D

Adopted as policy; implementation  
proceeding

Increase support for NIH cooperative  
programs with industry

SBIR & CRADAs expanded; small business  
tech transfer program started

Increase support for (D)ARPA dual-use  
technology development (increase by \$600 million  
by FY 1995)

Adopted as policy; implemented through  
TRP and legislation

## RECOMMENDATION

### PROMOTE THE COMMERCIALIZATION OF STRATEGIC TECHNOLOGY

Establish government-industry-university pilot development and demonstration projects in technology areas of mutual gov.-ind. benefit

- communications and networking
- environmental technologies
- more efficient transportation systems

Extend provisions of National Cooperative Research Act to joint production ventures

Modify procurement regulations to provide market for advanced commercial technologies

- Priority to commercial specifications
- Select to minimize life cycle costs
- Base on performance stds
- Allow agencies to experiment to flexibly procure leading edge technologies

Authorize ARPA, ATP,&NIH to purchase equity or provide loans/loan guarantees to support commercialization of technologies developed through R&D contracts

## ACTION TAKEN

Several projects are advancing:

- National Information Infrastructure
- environmentally benign manufacturing
- clean car initiative

Legislation signed into law

Adopted in technology policy report, Reinventing Government"; reforms proceeding in some agencies, such as DOD.

Different technology financing provisions in S.4, H.R. 820. Outlook unclear.



## RECOMMENDATION

## ACTION TAKEN

### CREATING A WORLD CLASS TECHNOLOGY BASE

NSF to fund 20-30 engineering/management graduate programs

under consideration

NSF to fund fellowship program for grad. & post-doc engineers to spend time in industry university and government labs.

under consideration

NSF to fund fellowship to encourage movement of industrial scientists and engineers to academia.

under consideration

Improve access to govt.-owned facilities and equipment.

?

Establish information networks for the exchange of technical and manufacturing info.

Work proceeding through NIST MTC program and through NII applications committee

Strengthen and expand federal and state manufacturing extension services (to \$300 million/yr)

Adopted as policy; increases appropriated, authorizing legislation pending.

Investment tax credit for manufacturing equipment (manufacturing subcouncil report)

Not adopted

## **RECOMMENDATION**

### **ORGANIZING U.S. INSTITUTIONS FOR RESULTS**

Create White House Council on Science, Technology, and Environmental Policy, to be chaired by the Vice President to set policy.

Strengthen linkages between OSTP and the Council of Economic Advisors

Strengthen OSTP

Enlarge PCAST and give it authority to create subcouncils to get private sector input on detailed technology problems and issues.

Give PCAST responsibility for conducting joint industry, academic, government prioritization of R&D budget

Strengthen Technology Administration in DOC; make focal point for analyzing industries & tech needs; gathering and disseminating U.S. & international tech. info.; and facilitating domestic and international technological cooperation.

## **ACTION TAKEN**

National Science and Technology Council announced.

National Economic Council formed.

OSTP staff reduced, but influence up  
CTI provides staff support

National Science and Technology Council to have advisory councils

Cross cut of full R&D budget, with aid of NSTC and advisory councils, to help prioritize R&D budget

Technology Administration assuming broader role, budget increase requested for FY95

C. Fred Bergsten  
Chairman  
Competitiveness Policy Council  
1726 M Street, Suite 300  
Washington, DC 20036

Dear Fred:

I am writing to you to express the views of the Subcouncil on Critical Technologies on several issues that will be addressed in the upcoming conference between House Bill 820 (H.R. 820) and Senate Bill 4 (S.4). I urge the Competitiveness Policy Council to support the authorization levels in the House bill, oppose the House language on new eligibility requirements for participation in Federal R&D programs, and support the House language regarding the financing of technology. The rationale for these positions are described below.

### **Authorization Levels**

The authorization levels proposed in the House bill are more consistent with the bipartisan plan proposed by the Subcouncil on Critical Technologies and adopted in the CPC's second annual report. These figures were part of a comprehensive plan to improve U.S. economic competitiveness and to dramatically reduce the budget deficit. They are investments that are essential for long-term economic growth and are consistent with a program of deficit reduction.

### **Eligibility to Participate in Federal R&D Programs**

H.R. 820 contains a new provision (the "Manton amendment") to determine the eligibility of companies to participate in certain Federal R&D programs. We believe that this provision, though well-intended, is counterproductive to the goals of creating jobs and improving the standard of living in the United States. Although we share some of the concerns underlying the attempt to limit participation in Federal R&D to ensure that benefits accrue to U.S. taxpayers, we urge that the provisions not be adopted for two reasons.

First, the provisions are overly restrictive and would prevent from participation in Federal R&D programs many companies that could be expected to contribute substantially to jobs in the United States. These include in some cases U.S.-owned companies that operate internationally and in other cases foreign-owned companies that can contribute substantially to the U.S. economy.

Second, the provisions would put a substantial burden on companies that want to participate in government technology programs by increasing the costs and paperwork required to participate in these programs. It would also require increased resources in the Department of Commerce to evaluate proposals based on these criteria. As a result, the provision in the legislation would work against the goal of developing closer and more effective industry-government relationships.

We believe that it is difficult and undesirable to develop a rigid set of criteria that applies to all situations and urge that administrators be allowed some flexibility within guidelines. The current statutory language for the Advanced Technology Program, which requires the Secretary of Commerce to determine that participation by companies is in the U.S. interest, based on a number of factors, allows such flexibility and has worked well with few problems. It was the subject of extensive debate when it was passed and should not be replaced until alternative language has passed similar scrutiny.

We believe this will continue to be an important issue. The Critical Technologies Subcouncil has set up a working group to develop new guidelines, applicable to many technology agencies, that will address the concerns that have been raised. We expect to have these guidelines ready in the next few months.

### **Financing of Technology**

This issue has been a major focus of the Subcouncil on Critical Technologies since its inception, and it recently examined the financing provisions in the pending legislation in some detail. Both the House and the Senate versions of the legislation contain similar provisions. Both would create a mechanism by which the Federal government would extend loans to investment companies, which would in turn make equity investments to companies commercializing new technologies.

We agree with the premise of the legislation that there are serious problems in financing the commercialization of new technologies. We found these problems to be especially acute for those technologies that require a large amounts of capital to commercialize. We also believe that the government has a proper role in helping to solve these problems. Our review, however, raised questions about many of the mechanisms that have been proposed, including those in S.4 and H.R.820. We believe that the specific mechanisms outlined in the legislation may not be the best.

For this reason, we strongly support a provision in the House bill that would allow improvements to be made in the program. The bill requires the Secretary of Commerce, acting through the Under Secretary for Technology, to consult with other agencies, the states, companies, the financial community, and other parties to develop an operating plan, and in doing so to consider and evaluate alternative approaches to achieving the goals of the program. This would allow the design of a program that we believe could be significantly more effective than the one outlined in the legislation. The subcouncil will be happy to provide further assistance to both Administration and the Congress in this area, if appropriate.

Sincerely,

Erich Bloch

Critical Technologies Subcouncil  
1726 M Street, NW  
Suite 300  
Washington, DC 20036  
February 15, 1994

9:00 a.m. to 4:00 pm.

C. Fred Bergsten  
Chairman  
Competitiveness Policy Council

Howard Rosen  
Executive Director  
Competitiveness Policy Council

Erich Bloch  
Chairman  
Critical Technologies Subcouncil

David Cheney  
Staff Director  
Critical Technologies Subcouncil

**Attendance List**

Frederick M. Bernthal  
Nat'l Science Foundation

Daniel Burton  
Council on Competitiveness

John Cassidy  
United Technologies

Steve Charnovitz  
Competitiveness Policy Council

Gary Cowger  
General Motors

Craig I. Fields  
MCTC

David Goldston  
Office of Congressman Boehlert

Joseph Hezir  
The EOP Group

Lionel S. Johns  
OSTP

Thomas Kalil  
NEC

Duncan Monroe  
Office of Senator Rockefeller

Al Narath  
Sandia Nat'l Labs

Paul Reagan  
Office of Congressman Boucher

Lois Rice  
Brookings Institution

Rick Samans  
Competitiveness Policy Council

Howard Samuel  
Council on Competitiveness

Robert M. White  
Carnegie Mellon University

# COMPETITIVENESS POLICY COUNCIL

Washington, DC

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February 10, 1994

*C. Fred Bergsten*  
*Chairman*

*Rand Araskog*

*John J. Barry*

*William Graves*

*John J. Murphy*

*Edward V. Regan*

*Bruce Scott*

*Albert Shanker*

*Alexander Trowbridge*

*Laura D'Andrea Tyson*

*Edward O. Vetter*

*Lynn Williams*

Memorandum to Critical Technologies Subcouncil Members

From: Erich Bloch and David Cheney

Subject: February 15, 1994 Subcouncil Meeting

This package includes background materials for the February 15th Subcouncil meeting, which will be held from 9:00a.m. to 4:00p.m. at the new Competitiveness Policy Council office at 1726 M Street, NW, Washington, DC. The materials enclosed are:

- |       |                                                                                                                             |
|-------|-----------------------------------------------------------------------------------------------------------------------------|
| Tab 1 | The agenda for the meeting.                                                                                                 |
| Tab 2 | An analysis of the President's FY1995 R&D budget request (modified from a Council on Competitiveness draft analysis).       |
| Tab 3 | The summary of the Subcouncil's working group meeting on financing technology.                                              |
| Tab 4 | A background memo on issues pertaining to criteria for participation by U.S. and foreign companies in Federal R&D projects. |

We look forward to seeing you there.

**COMPETITIVENESS POLICY COUNCIL**

Washington, DC

C. Fred Bergsten  
Chairman

Rand Araskog

John Barry

Laura D'Andrea Tyson

William Graves

John J. Murphy

Edward V. Regan

Bruce Scott

Albert Shanker

Alexander Trowbridge

Edward O. Vetter

Lynn Williams

February 2, 1994

yes

Memorandum to Members of the Critical Technologies Subcouncil

From: Erich Bloch and David Cheney

Subject: February 15th Subcouncil meeting

This is a reminder and an update for the Subcouncil's next meeting, scheduled for 9:00 a.m. to 4:00 p.m. on Tuesday, February 15th. The meeting will be held at the new office of the Competitiveness Policy Council, located at 1726 M Street, NW, Suite 300, Washington, DC 20036. **Please note the new location.**

The meeting will focus on the following four areas:

- 4 • **The FY1995 budget.** The budget is scheduled for release on February 7th. We will review and make recommendations regarding its technology-related provisions.
- 3 • **Financing Technology.** A working group met on January 25 to review and comment on pending legislation and other issues.
- 1 • ✓ **Participation of U.S. and foreign-owned multinational companies in Federal R&D programs.** We are preparing a background paper that summarizes views on this issue.
- 2 • ✓ **Status of Implementation of Technology Policy Recommendations.** We will review progress made towards implementing our recommendations and will set new priorities.

These four topics should provide the basis for the next Subcouncil report and for input to the third annual Full Council report, which will be published in March. Background materials for the meeting will be sent out after the release of the budget and should reach you on February 10th.

We look forward to seeing you on February 15th.

9: - 2:30  
approx.

1726 M Street, N.W., Suite 300, Washington, DC 20036  
(202) 632-1307 FAX (202) 632-1350

# COMPETITIVENESS POLICY COUNCIL

1726 M Street, N.W., Suite 300, Washington, DC 20036  
(202) 632-1307 FAX (202) 632-1350

Date Rec'd 2/2/94

INFO to

*Johns*  
*Gibbons*  
*McCluskey*  
*Tsang*  
*Talbot*

TO: CRITICAL TECHNOLOGIES SUBCOUNCIL MEMBERS

FROM: C. Fred Bergsten  
Chairman

DATE: February 2, 1994

Number of Pages: 3 (including this cover memo)

SIG of

Stationery

DATE DUE

PLEASE FORWARD TO THE APPROPRIATE MEMBER OF YOUR STAFF

|                                       |                                                        |                                         |                                        |                                    |
|---------------------------------------|--------------------------------------------------------|-----------------------------------------|----------------------------------------|------------------------------------|
| Eleanor Baum<br>Cooper Union          | Frederick Bernthal<br>Nat'l Science Foundation         | Sherwood Boehlert<br>US House of Reps.  | Michael Borrus<br>BRJE, Berkeley       | Rick Boucher<br>US House of Reps.  |
| Lewis Branscomb<br>Harvard University | Dan Burton<br>Council on Competitiveness               | Dennis Chamot<br>AFL - CIO              | John Deutch<br>Dept of Defense         | Craig Fields<br>MCTC               |
| Edward Fort<br>North Carolina A & T   | John Foster<br>TRW, Inc.                               | Mary Good<br>Dept of Commerce           | Joseph Hertz<br>The EOP Group          | Martha Krebs<br>US Dept of Energy  |
| Thomas Kalil<br>The White House       | Richard Lester<br>Mass. Inst of Tech                   | Daniel McCurdy<br>IBM - Research Center | Joseph Morone<br>Rensselaer Poly Tech  | Al Narath<br>Sandia Natl Labs      |
| Richard Nelson<br>Columbia University | Lois Rice<br>Brookings Institute                       | Nathan Rosenberg<br>Stanford University | Howard Samuel<br>Council on Competit   | Hubert Shoemaker<br>Centocor, Inc. |
| Charles Shanley<br>Motorola, Inc.     | Richard Van Atta<br>Inst for Defense Analysis          | Robert White<br>Carnegie Mellon Univ    | Kathleen Peroff<br>Off of Mgt & Budget | Arati Prabhakar<br>NIST            |
| Lionel S. Johns<br>OSFP               | Gary Cowger<br>General Motors Corp                     | John Cassidy<br>United Technologies     | Jeff Bingaman<br>United States Senate  | Don Davis<br>Allen-Bradley Co      |
| Dorothy Robyn<br>Nat Econ Council     | Jay Rockefeller (Bill Reinsch)<br>United States Senate | Ruth Kirschstein<br>NIH                 |                                        |                                    |

If you do not receive all of the pages, please contact us as soon as possible at (202) 632-1307.

THANK YOU!



**CRITICAL TECHNOLOGIES SUBCOUNCIL**

**OF THE**

**COMPETITIVENESS POLICY COUNCIL**

**BACKGROUND MATERIAL**

**FEBRUARY 15, 1994**

**Third Floor  
1726 M Street, NW  
Washington, DC  
9:00 a.m. - 4:00 p.m.**

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## **Competitiveness Policy Council**

### **Critical Technologies Subcouncil**

February 15, 1994

1726 M Street, Suite 300  
Washington, DC 20036

#### **Agenda**

- |                        |                                                                                      |
|------------------------|--------------------------------------------------------------------------------------|
| 9:00 a.m. - 9:30 a.m.  | Competitiveness Implications of the President's FY 1995 Budget<br>C. Fred Bergsten   |
| 9:30 a.m. - 11:30 a.m. | Analysis of the President's FY 1995 R&D Budget                                       |
| 11:30 a.m. - 1:30 p.m. | Financing Technology.<br>(Working lunch)                                             |
| 1:30 p.m. - 2:30 p.m.  | Criteria for participation in Federal R&D programs by U.S. and<br>foreign companies. |
| 2:00 p.m. - 4:00 p.m.  | Subcouncil Recommendations and future work                                           |

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# ANALYSIS OF THE FY 1995 R&D BUDGET

## INTRODUCTION

The overall themes and many of the specific numbers are very close to those recommended by the Competitiveness Policy Council and the Subcouncil on Critical Technologies. The underlying theme of the budget is investment in both people and know how, which characterizes the Administration's policy focus during the past year. In contrast to the cold war years, where the fallout from investments in defense, space and basic research were of serendipitous benefit to civilian technology, today civilian technology itself is the target for direct investment, with fallout into the other areas of R&D.

Highlights of the Administration's strategy for investing in national economic growth include:

- Reaffirming U.S. commitment to fundamental science.
- Increasing the contribution of federal science and technology to economic growth and the environment.
- Regaining our lead in the "cutting edge of research and technological advances".
- Enlisting the cooperation of the private sector in federal initiatives.
- Improving the coordination of federal science and technology investments across the government.

Cost-sharing and cost avoidance are also central themes of the FY1995 budget. The former is apparent in many agency programs that require partnerships with universities and industry and private sector contributions in cash, in-kind or through other vehicles. Cost avoidance is being implemented through elimination of more than 115 lower priority federal programs and reductions in another 300. The Administration has also proposed freezing university overhead at the 1994 level to caps on discretionary spending.

The Administration is also moving to improve the effectiveness of the its federal R&D spending. The Administration's pledge to improve coordination and management within the federal government led to the establishment of the National Science and Technology Council (NSTC), headed by the President, and it's nine oversight committees. The committees, will help coordinate Federal R&D across the agencies and make it easier to prioritize and justify investments in key programs. The President's Council of Advisors on Science and Technology has also been reinstituted to serve as the primary channel for private sector advice to the President and the NSTC. The Administration has been slow in putting the NSTC in place and spelling out the approach it will use to assure timely private sector input into the various committees. The effectiveness of the new organization is therefore hard to judge.

The Administration is also advancing proposals for biennial budgeting and a capital budget to streamline the budget process and "more clearly recognize the special nature and longer term benefits of investments." Both of these proposals could help improve management of the Federal R&D budget.

The following assessment summarizes the specific highlights of the Clinton Administration's technology plan and budget.

#### **AN OVERVIEW OF FEDERAL R&D:**

The President's FY1995 budget submission proposed a 4 percent increase in the Federal R&D budget over FY1994 levels, which is very respectable considering the tight restrictions on discretionary spending and the proposed terminations and reductions in many other areas. The majority of the new funding - \$2.2 billion or 87 percent - will support applied research and development, versus a \$322 million increase in Federal support for basic research. Approximately \$1.4 billion of the growth in applied R&D is allocated to defense.

|                                           | <b>FY93<br/>Actual</b> | <b>FY94<br/>Enacted</b> | <b>FY95<br/>Proposed</b> | <b>% Change<br/>94-95</b> |
|-------------------------------------------|------------------------|-------------------------|--------------------------|---------------------------|
| <b>(\$ in millions)</b>                   |                        |                         |                          |                           |
| <b>Total R&amp;D (without facilities)</b> | <b>69,750</b>          | <b>68,484</b>           | <b>71,029</b>            | <b>4%</b>                 |
| Basic Research                            | 13,362                 | 13,790                  | 14,112                   | 2%                        |
| Applied & Development                     | 56,388                 | 54,693                  | 56,917                   | 4%                        |
| <b>Total R&amp;D (with facilities)</b>    | <b>72,478</b>          | <b>71,073</b>           | <b>73,045</b>            | <b>3%</b>                 |

R&D support for university researchers is also slated to grow 4% to \$12.2 billion in FY 1995. This is an important element of the Administration's commitment to retaining U.S. preeminence in fundamental science. However, due to the tight budget climate the Administration is freezing university overhead at FY 1994 levels.

Despite increases in major civilian technology programs, the ratio of defense to civilian R&D remains unchanged at 56 versus 44 percent. If defense dual-use technology programs, such as the Technology Reinvestment Project (TRP), Sematech, and defense funding for high performance computers and communication, are considered to be civilian programs, the civilian share of the R&D budget rises to 47 versus 53 percent for defense. This civilian-defense ratio still falls short of the President's goal of a fifty-fifty split by 3 percentage points.

|                                          | FY93<br>Actual | FY94<br>Enacted | FY95<br>Proposed |
|------------------------------------------|----------------|-----------------|------------------|
| Civilian share of R&D (without-dual use) | 41%            | 44%             | 44%              |
| Defense Share of R&D                     | 59%            | 56%             | 56%              |
| Civilian Share of R&D (with dual-use)    | 43%            | 47%             | 46%              |
| Defense Share of R&D                     | 57%            | 53%             | 53%              |

#### SELECTED AGENCY BUDGETS:

The Administration began to increase funding for key technology agencies and programs last year and continued the trend in this year's budget submission. The Department of Commerce is a clear winner in FY1995, with a proposed budget increase of \$600 million, or 17 percent. The majority of the new budget authority is aimed at expanding civilian technology programs within the National Institute of Standards and Technology (NIST) and the National Telecommunications Information Administration (NTIA). The budget for the Office of the Undersecretary for Technology, which oversees civilian technology programs within Commerce, shows a 100 percent increase to \$12 million.

The National Science Foundation (NSF) shows an increase of 6 percent, or \$182 million for FY1995. The majority of the increase will support NSF's "research and related activities" and will target interagency research initiatives in global change research, high performance computing and manufacturing. NSF funding for "academic research infrastructure" will decrease from \$100 million in FY1994 to \$55 million in FY1995.

The overall budgets of the Department of Energy (DOE) and the National Aeronautic and Space Administration will decrease by 3 percent and 1.4 percent, respectively, in FY1995. However, NASA's year old New Technology Investments (NTI) program will grow 60% to \$67 million in FY1995, and its support of aeronautics research will increase 21 percent to \$347 million. DOE's R&D funding will remain flat at slightly over \$6 billion.

If projected agency budgets for FY1997 are taken into account, Commerce and NIH can expect continued growth throughout the Clinton Administration. However, NSF's budget is only expected to rise another 3 percent between FY1995 and FY1997. This slower rate of growth only falls short of inflation.

|                  | FY93<br>Actual | FY94<br>Enacted | FY95<br>Proposed | FY1997<br>Projected | % Change<br>94-95 |
|------------------|----------------|-----------------|------------------|---------------------|-------------------|
| (\$ in billions) |                |                 |                  |                     |                   |
| Commerce         | 3.2            | 3.6             | 4.2              | 4.7                 | 16.7%             |
| NIH              | 10.3           | 11.0            | 11.5             | 12.5                | 4.7%              |
| NASA             | 14.3           | 14.5            | 14.3             | 14.5                | -1.4%             |
| Energy           | 19.3           | 18.6            | 18.0             | 18.3                | -3.2%             |
| NSF              | 2.7            | 3.0             | 3.2              | 3.3                 | 6.0%              |

#### INDUSTRY-GOVERNMENT PARTNERSHIPS:

The Clinton Administration came to office committed to building stronger links to industry. Last year's budget submission began the process by expanding cooperative technology programs with industry and the FY1995 budget request continues the trend.

The Advanced Technology Program (ATP) within NIST will more than double to \$451 million in FY1995. A significant portion of the new budget authority will support projects in strategic program areas that are currently being selected in cooperation with industry.

The interagency Technology Reinvestment Project (TRP) administered by the Advanced Research Projects Agency will grow from \$554 million to \$625 million in FY1995. The program, which is a cornerstone of the Administration's strategy for commercial-military technology integration, has spurred significant interest from the private sector.

NIST's Manufacturing Extension Partnership (MEP) continues to be the focal point for activities geared towards building a national network to assist small and medium sized businesses. The program's budget will double to \$61 million in FY1995.

Technology transfer budgets of the Federal agencies will reach \$865 in FY1995, a 57% increase over FY1994 levels. Cooperative research and development agreements (CRADAs) between industry and the federal labs are also expected to increase in FY1995, from 2,758 in FY1994 to 3,211 in FY1995. The total cash and non-cash value of the CRADA investments, including both public and private sources, is estimated at \$1.5 billion.



|                            | <b>FY93<br/>Actual</b> | <b>FY94<br/>Enacted</b> | <b>FY95<br/>Proposed</b> | <b>% Change<br/>FY94-FY95</b> |
|----------------------------|------------------------|-------------------------|--------------------------|-------------------------------|
| (\$ in millions)           |                        |                         |                          |                               |
| <b>ATP</b>                 | <b>68</b>              | <b>200</b>              | <b>451</b>               | <b>128%</b>                   |
| <b>TRP</b>                 | <b>472</b>             | <b>554</b>              | <b>625</b>               | <b>13%</b>                    |
| <b>MEP</b>                 | <b>18</b>              | <b>30</b>               | <b>61</b>                | <b>103%</b>                   |
| <b>Technology Transfer</b> | <b>384</b>             | <b>551</b>              | <b>865</b>               | <b>57%</b>                    |

#### **NATIONAL TECHNOLOGY DRIVER PROGRAMS:**

The Administration's budget submission reflects a strong commitment to funding advanced technology initiatives that support infrastructure development and other national technology needs (see the table below for details). The newly created National Science and Technology Council's (NSTC) Committee on Civilian Industrial Technology will manage a \$2 billion cross-agency program to develop advanced manufacturing technologies with broad applications. This is up \$159 million, or 9%, from FY1994. Defense, Energy, Commerce, NASA, and NSF will be the primary performers of the research. Funding for high performance computing and communications (HPCC) will increase 23% in FY1995 and also become part of the new NSTC structure. The cross-agency initiative, which aims to develop and apply HPCC technologies for the national information infrastructure, will be overseen by the NSTC Committee on Information and Communications.

Technology driver programs designed to improve the U.S. transportation system are also slated for increases in FY1995. Key programs including next generation high-speed rail, the intelligent vehicle highway system, and the "Clean Car" initiative, an industry-government partnership to improve fuel economy and enhance the competitiveness of the U.S. automobile industry.

The Administration is targeting improved knowledge of our planet's climate through the U.S. Global Change Research Program, which will reach \$1.8 billion in Fy 1995, an increase of 24% over FY 1994. The technologies developed under the USCRP are expected to help balance economical growth with improve energy efficiency and environmental protection.

|                            | FY93<br>Actual | FY94<br>Enacted | FY95<br>Proposed | % Change<br>FY94-FY95 |
|----------------------------|----------------|-----------------|------------------|-----------------------|
| HPCC                       | 772            | 938             | 1,154            | 23%                   |
| Manufacturing Technologies | NA             | 1,841           | 2,000            | 9%                    |
| "Clean Car" (Energy only)  | 107            | 141             | 175              | 24%                   |
| IVHS                       | 155            | 214             | 289              | 35%                   |
| USGRP                      | 1,338          | 1,446           | 1,794            | 24%                   |

#### **DIFFICULTIES EXPECTED IN CONGRESS:**

Expect a tough road ahead as the budget moves to Congress for approval. With the tight budget caps put in place last year, discretionary spending is tight and increased funding for R&D and other investment programs must be paid for with cuts in other programs. Many of the programs that President Clinton is proposing to eliminate to pay for the new investments have been targeted unsuccessfully for cuts by past Administrations. Moreover, increased investments in science and technology generally have intangible and long-term benefits, which make them difficult for Congress to support compared to programs that have immediate and tangible benefits, and vocal constituents.

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February 8, 1994

Memorandum to Critical Technologies Subcouncil Members

From: Erich Bloch and David Cheney

Subject: Financing Technology

As agreed to at our December 7th meeting, we held a working group meeting to address in more detail the Federal role in helping to finance the commercialization of technology. Participants in this meeting represented venture capital firms, Federal agencies, large and small companies, industry consortia, Congressional committees, and other organizations interested in this issue. A list of participants is attached.

The focus of the meeting was on the problems that companies, especially small companies, face in commercializing technology. In particular, we wanted to review and comment on some of the pending legislation on this subject as well as proposals made over the years by independent groups. We did not address in any details the problems that large companies face in making investments in technology.

The discussions focused around four issues: (1) the nature of the problem; (2) the appropriate role of government; (3) the effectiveness of specific financing mechanisms; and (4) the political feasibility of different proposals.

**Nature of the Problem**

There was substantial agreement among the participants that the main problems are in later stage financing for capital intensive projects. Early stage financing is available from a variety of sources, including venture capitalists, state programs, and Federal R&D programs (such as the Small Business Innovative Research program and NIST's Advanced Technology Program), although many people believe there is insufficient seed capital. There seems to be adequate later stage financing for projects with high potential that are not too expensive. Venture capital firms receive and evaluate a very large number of proposals and believe that they collectively are able to fund a large percentage of the proposals that have merit, as long as the projects are not too large. When too much money entered the venture capital in the 1980s, too much money chased too few good projects, and profits disappeared.

The main problem is in funding very expensive projects. Venture funds commonly finance projects up to the \$3-4 million. Funds will cooperate to jointly fund projects up to \$30 million. Venture capital markets can not adequately fund start-ups that require greater than \$30 million in funds before the company is bought or goes public. Some proposals, for example those to commercialize semiconductor lithography or flat panel displays, need much larger amounts of funding.

It is especially difficult to fund large projects if the projected returns are not significant or take a long time to be realized. For example, in some technologies, the competitors, often Japanese companies, are willing to take lower (or even negative) returns for a long period to maintain their market position. This may be the case in several electronics, materials and equipment industries. In some technologies there may be a high social rate of return but a low private rate of return. For example, in the capital equipment industries private returns to investors may not be high, but innovations can provide large benefits for the downstream industries.

In many of these cases it would be natural to look to large U.S. companies for financing. For a variety of reasons, however, U.S. companies seem less willing than in the past to provide this financing. There are few companies willing or able to support projects that will benefit an entire industry, as IBM or AT&T once did. Although the meeting did not focus on this issue, it is important to look at ways to encourage large companies to play a greater role in commercializing promising technologies.

### **Appropriate Government Role**

There was agreement that the government has a legitimate role to correct market failures in the financing of technology. This function should complement rather than compete with the private markets.

It was noted that government interests are different from those of venture capitalists; the government seeks high social returns rather than high private returns. For example, venture capitalists sometimes cooperate to avoid having too many startups competing with each other (termed "fratricide"), which would lower returns. Government, however, might want to encourage more start-ups because it would provide more competition in the market, perhaps making a more competitive U.S. industry and lowering costs to customers.

It was agreed that appropriate roles for government are:

- Creating an overall economic environment that is favorable to capital formation.
- Making markets more efficient by improving information on available technologies.

- Helping to fund larger projects beyond the capabilities of the venture capital markets, with the provision that the private sector substantially shares in the cost and risk.
- Helping to fund projects that are strategically important but where private returns might not be adequate.

## **Mechanisms**

The group discussed the financing-related provisions in several pending pieces of legislation, including H.R. 820 and H.R. 3550. and discussed which mechanisms proposed would be effective.

### **H.R. 820 -- The National Competitiveness Act**

This legislation licenses professionally managed technology development companies to borrow money from the Federal government and use the proceeds, along with private capital, to invest in technology ventures. It would explicitly favor early stage financing. The Federal government would make loans rather than equity investments, and the loans would go only to technology development investment companies, not directly to the technology ventures. The bill would also give the Commerce Department the option of coming up with a substitute mechanism.

Although participants supported the goal of increasing the money available to venture capitalists to fund technology ventures, there were several concerns with the specifics of the bill.

First, as noted above, the group believed that the focus should be not be limited to early stage financing.

Second, the venture capital markets, as currently structured, could not make use of the mechanisms in the legislation. Venture funds generally receive investments from partners which are then invested into technology ventures. If a venture fund were to borrow additional funds from the Federal government to invest in technology ventures, and if those ventures then failed, the partners in the venture would then not only lose the money they originally invested, but also would be liable to pay back the loan from the Federal government. This would not be acceptable to the partners, who are not willing to put at risk amounts greater than their investment.

One solution would be to either have the Federal government make an equity investment, rather than a loan, in the venture capital firms. Another solution would be for a Federal equity investment or loan be made directly to the technology venture, rather than through the venture capital firm. This, however, would involve the government in decisions about which ventures to support. A third solution would be to use banks, rather than venture capital firms, as the intermediaries for a loan program.

## **HR 3550 -- The Federal Technology Commercialization and Credit Enhancement Act**

The Federal Technology Commercialization and Credit Enhancement Act would establish a Technology Transfer and Commercialization Financing Corporation. This corporation would be 60% owned by Federal government and would be capitalized by a \$3 billion/yr. appropriation from FY95 to FY98. The Corporation would keep a database of Federal technologies and would serve as a broker and financier of the commercialization of these technologies. The corporation would provides loans, loan guarantees, or makes equity investments for U.S. based consortia, private U.S. businesses and educational institutions in joint projects with U.S. businesses, for development and commercialization of patents, licenses, processes, and technologies.

There was support for the idea of the government making equity investments in technology ventures, as this type of funding was seen as more appropriate for high risk, high return nature of these investments. There was also support for developing better databases on the technologies that are available for development as this would help financiers identify promising technologies and be aware of other alternatives.

There were considerable questions about the details of the proposals, as well as the political feasibility of the size of the appropriations required.

### **Other Proposed Mechanisms**

Several other proposals were discussed.

**Secondary market for business loans.** There was support for steps that would help create a secondary market for business loans, as this could potentially help expand financing for many small businesses.

**Tax-related financing mechanisms.** In general it was felt that tax credits or capital gains tax reductions have relatively little effect on the financing of start-ups. Most start ups have little income, and a significant amount of the financing of venture firms comes from tax exempt sources. One mechanism mentioned that would help small companies would be to allow small companies to sell their net operating losses for tax purposes to large companies. There was interest in this idea, although some similar schemes in the past were misused.

**Make large companies better financiers of small companies.** This might be done through accounting changes. For example, companies are currently required to report on their profit and loss sheets all companies in which they hold more than 20 percent equity. Since small start-ups are typically losing money, there is an incentive for large companies to hold less than 20 percent equity in these companies to keep them off their financial statements. Raising the 20 percent limit to 35 percent might stimulate significantly greater the investments in small companies. Other accounting changes would affect they way big companies work. For example, in Japan, R&D as treated as an investment and depreciated, and this helps companies look profitable much earlier.

More work is needed on barriers that prevent larger companies from financing small companies and this may be an area for future work by the CPC, through both its Critical Technology and Capital Allocation Subcouncils.

In general, there was a desire to increase the number of financing tools, and to experiment with more mechanisms to see which ones are effective.

### **Political Feasibility**

There was agreement that the political environment is much more open to a Federal role in financing technology than in the past. The financing proposal in H.R. 820 (and related provisions in S.4) have passed several political hurdles and could be enacted into law. In the current budget climate, however, any proposal that requires significant appropriations will be very difficult, and there are still concerns about the Federal government providing equity financing for technology ventures.

### **Participants**

(see attachment)



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## **Clinton Presidential Records Digital Records Marker**

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## MEMORANDUM

February 10, 1994

To: CPC Critical Technologies Subcouncil Members

From: Brian Blackstone, CPC, and David Cheney

Re: Participation in US Federal Government Technology Programs

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At the December 7, 1993 meeting, the Critical Technologies Subcouncil discussed the issue of foreign and US-owned multinational companies' participation in federal technology programs. Before making any recommendations on this issue, the Subcouncil asked the staff to lay out the relevant questions and current thinking on the subject. This memo summarizes some of the relevant issues.

There have been several legislative and administrative approaches to the issue of participation by US and foreign multinationals in federal technology programs, and each uses different criteria to decide what companies can participate. For example, companies can participate in the Advanced Technology Program of the Commerce Department if the Secretary of Commerce finds that participation is in the economic interests of the United States based on a consideration of the following factors:

1. Investment in the US in research and development.
2. Contributions to US employment.
3. Agreements to promote manufacturing of products using the supported technology within the US.
4. Agreements to procure parts and materials from competitive suppliers.

These criteria support the notion that participation in federal technology programs should be linked to the US economic interest, but gives the Secretary flexibility to determine what is in "the economic interests of the United States."

Another legislative proposal puts more restrictive requirements on participation in federal R&D programs. The Manton Amendment to H.R. 820 would limit funding to companies that meet all of the following criteria:

1. Maintain substantial US employment.
2. Agree to manufacture technology in the US.
3. Agree to procure parts and materials from competitive US suppliers.
4. The company is either US owned or incorporated in a country that is open to US companies and protects intellectual property.

Because these criteria must all be met, they would limit the benefits of participation in

Federal R&D programs to a smaller number of companies than the more flexible standard under current law would.

A third example is the "competitiveness clause" in Department of Energy model Cooperative R&D Agreements (CRADAs) that requires that products, processes or services resulting from inventions or intellectual property resulting from CRADAs be "substantially manufactured" in the United States.

An important question is whether more restrictive requirements such as those in H.R. 820 would help or harm US competitiveness. The assumed goal of these requirements is to ensure that federal R&D provides economic benefit to US taxpayers. Although it is clear that a US-owned company that manufactures and conducts R&D in the United States provides economic benefits to the United States, companies that are owned or do some of these activities elsewhere may also provide substantial benefits. The issue is one of where to draw the line and what weight to give each criteria. The following analysis presents views on how ownership, manufacturing, and R&D affect the economic interests of the United States.

## OWNERSHIP

Numerous scholars, most notably Secretary of Labor Robert Reich<sup>1</sup>, argue that in today's economy what is most important is not which policies benefit American-owned firms, but which policies benefit American workers, regardless of who they work for. In this argument, if foreign firms employ American workers, train them, and pay them good salaries, then these companies should be considered as "American" as IBM or General Motors. Therefore these companies should be able to participate in programs designed to benefit "American" companies and workers; such as SEMATECH and other R&D consortia, federal technology programs, federal labs, and federally-funded university research. The argument is that federal programs and university research are intended to benefit the US technology base, and if foreign firms are contributing to the employment and technology base by hiring American workers and investing in R&D, they should be treated as "American."

The same view pertains to US multinationals and argues that these firms should not be able to participate in federal technology programs, or have the government negotiate on their behalf (such as the Bush Administration's efforts regarding Toy's 'r' Us in Japan and US-Japan bilateral semiconductor talks), unless they are conducting the bulk of their R&D and manufacturing in the United States.

Numerous economists and scholars, most notably CEA Chairman Laura Tyson<sup>2</sup>, disagree

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<sup>1</sup>Robert Reich, "Who Is Us?" *Harvard Business Review* (Jan.-Feb. 1990), 53-64.

<sup>2</sup> Laura D'Andrea Tyson, "They Are Not Us: Why American Ownership Still Matters" *The American Prospect* (Winter 1991), 37-49.

with this view, and argue that corporate ownership does matter. They argue that even if foreign firms employ significant numbers of Americans, or if American firms have significant operations abroad, the question should center around who controls the technology, where the high value-added jobs are, and where most of the R&D takes place. Their argument is that foreign firms generally conduct the bulk of their R&D at home, do not pay as much in taxes as US-based firms, and do not put their high value-added jobs in science and engineering in the United States. According to this argument, if the high value-added manufacturing, engineering, and research jobs--the ones which add most to our technology base--are located in the US, and final assembly abroad helps keep these US firms competitive, then US firms should be allowed to benefit from US technology programs.

There is some data on differences between US and foreign-owned companies regarding their influence on trade and domestic R&D.

- US firms exported \$115.3 billion to its foreign affiliates in 1991 while importing \$102.8 in 1991<sup>3</sup>. This trade surplus has remained steady over time.
- Conversely, US affiliates of foreign corporations add sizably to our trade deficit. US affiliates of Japanese companies exported \$41.2 billion in 1991, and imported \$89.7 billion. US affiliates of German firms exported \$7.3 billion in 1991, compared to \$17.4 billion in imports<sup>4</sup>.
- 75% of the merchandise trade deficit consists of imports by foreign-owned subsidiaries into the US<sup>5</sup>.
- In 1986, intra-firm trade accounted for 72 percent of US exports to Japan, compared to 48.5 percent of US exports to Europe<sup>6</sup>.

The link between R&D and ownership is also seen as an important issue in the current debate, especially for high technology, R&D intensive industries. The following table illustrates some points regarding R&D and ownership.

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<sup>3</sup> Bureau of Economic Analysis and the National Association of Manufacturers.

<sup>4</sup> Bureau of Economic Analysis.

<sup>5</sup> Ibid.

<sup>6</sup> Dennis Encarnation, *Investing to Trade: American and Japanese Multinationals in the Pacific Basin*, unpublished manuscript, Harvard Business School, February 1990; and Robert Lawrence, "How Open Is Japan?" paper presented to the Conference on the US and Japan: Trade and Investment, National Bureau of Economic Research, Cambridge, MA. Oct 1989.

R&amp;D As A Percent Of Sales in 1989

| INDUSTRY                       | FOREIGN AFFILIATES | ALL US FIRMS |
|--------------------------------|--------------------|--------------|
| Industrial Chemicals           | 3.74               | 2.82         |
| Pharmaceuticals                | 11.02              | 10.60        |
| Computers & Office Equipment   | 7.97               | 16.10        |
| Audio, Visual & Communications | 4.88               | 13.31        |
| Electronic Components          | 4.92               | 7.28         |
| Motor Vehicles & Equipment     | 0.52               | 3.87         |

Source: Tassey, 1992.

Based on this table, foreign affiliates in the industrial chemicals and pharmaceuticals industries outspend US firms in R&D. Interestingly, those industries have a strong European presence. Foreign affiliates in industries such as automobiles and electronic components, however, which are dominated by the Japanese, are outspent by their American counterparts. This tends to reinforce the popular belief that European affiliates in the US may act more like domestic companies than do Japanese affiliates.

This data suggests that there are substantial differences between US and foreign-owned multinationals in their contribution to US trade performance and the technology base.

## MANUFACTURING

There are several reasons why the location of manufacturing is considered important. First, in general, manufacturing generates many relatively well-paying jobs. In addition, many jobs in R&D and the service sector are closely associated with manufacturing. Finally, manufacturing develops skills that are closely linked to production. There are several reasons why overseas manufacturing can produce US economic benefit. First, overseas manufacturing can increase a firm's price competitiveness in the increasingly competitive global marketplace. Also, to be competitive in foreign markets, it is often necessary to manufacture close to foreign customers. Third, overseas manufacturing contributes to R&D, design, and finance jobs in the US, and additional jobs through the supplier network. Finally, in some, especially high technology industries, manufacturing can be a low percentage of total value-added<sup>7</sup>.

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<sup>7</sup> Kenneth Flamm, "The Computer Industry's Impact on the US Economy" *A White Paper*. Jan. 1991.

Some data on US and foreign manufacturing is as follows.

- Employment by US Majority-Owned manufacturing affiliates abroad decreased from 3,358,000 in 1982 to 3,297,000 in 1991<sup>8</sup>.
- Foreign affiliates employ 2 million Americans in manufacturing (4.8 million total)<sup>9</sup>.
- US affiliates abroad devote a greater share of their operations to manufacturing, while foreign firms operating in the US emphasize retail trade and services (see attachment).

Better data, on the percent of value-added represented by manufacturing in different industries, would be helpful to determine the importance of domestic manufacturing in different industries.

## RESEARCH AND DEVELOPMENT

There are several reasons why the location of R&D is important. First, the location of R&D determines where technical competencies are developed and retained. Relatedly, R&D jobs are generally high wage jobs. Finally, because of R&D's spillover effects and contributions to the overall technology base, it has an important impact on future competitiveness.

There are also several reasons why in some cases location of R&D may not be important. First, in many industries, R&D is often a small part of total value-added. Second, in some cases R&D facilities are set up primarily to transfer technology, often out of the country, rather than develop technology. This criticism has been made of some US R&D facilities owned by Japanese companies.

## CONCLUSION

This brief analysis suggests that ownership, location of manufacturing, and location of R&D each have some connection to benefits to the US economy but that none is an ideal surrogate for the national interest. There are reasons why, in some cases, companies that are foreign-owned, or conduct substantial manufacturing overseas, or conduct substantial R&D overseas, can provide substantial benefits to the economy, and should be allowed to benefit from federal R&D programs. There are also cases where participation by such companies is unlikely to provide benefits to the US economy and may even hurt the US economy by weakening companies providing greater economic benefits to the United States. Flexibility is needed to allow participation in federal R&D programs as long as participants can demonstrate that their participation meets certain standards of providing economic benefits to the United States. The

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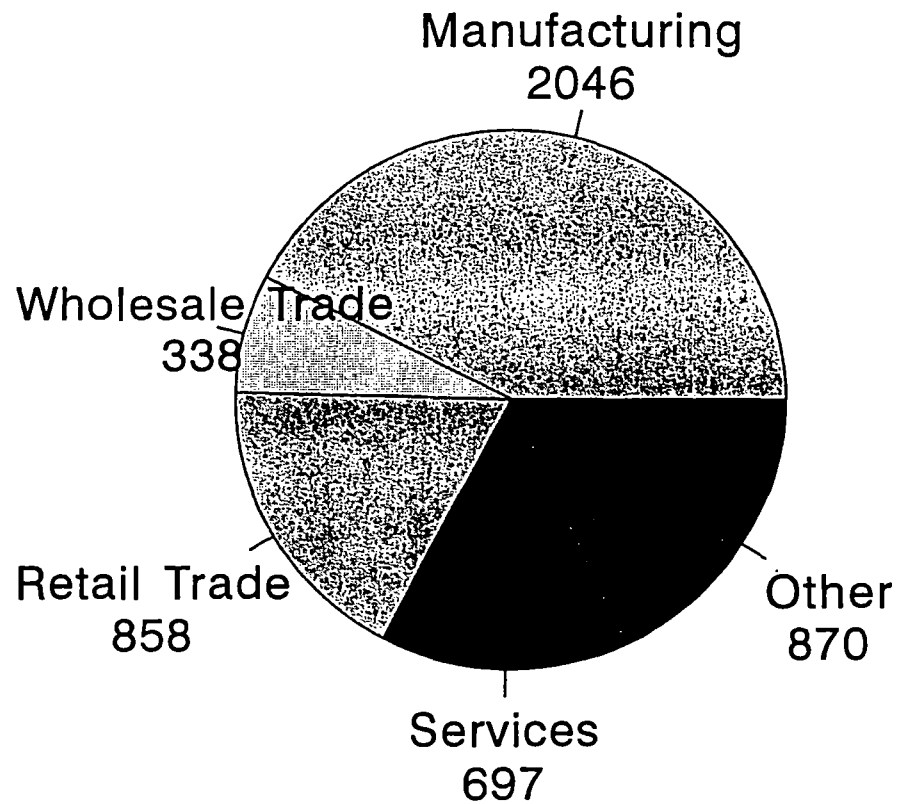
<sup>8</sup> Ibid 3.

<sup>9</sup> Bureau of Economic Analysis.

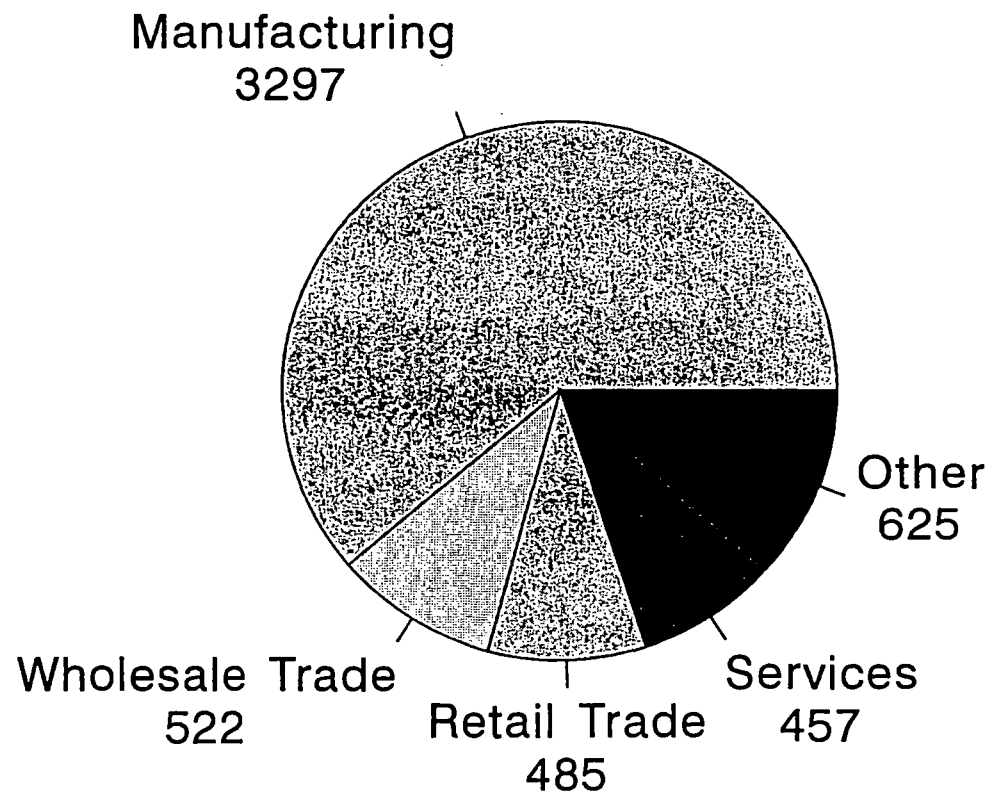
issue for the Subcouncil may be to recommend what the standards should be and what evidence is required to ensure that the standards are met.

# COMPOSITION OF EMPLOYMENT IN 1991

Thousands of Employees



Foreign Affiliates in the US



US Affiliates Abroad



S. HRG. 101-1281

**"WHO IS US?"—NATIONAL INTERESTS IN AN AGE  
OF GLOBAL INDUSTRY**

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**HEARINGS**

BEFORE THE

**JOINT ECONOMIC COMMITTEE  
CONGRESS OF THE UNITED STATES**

ONE HUNDRED FIRST CONGRESS

SECOND SESSION

SEPTEMBER 5 AND 13, 1990

Printed for the use of the Joint Economic Committee



U.S. GOVERNMENT PRINTING OFFICE

WASHINGTON : 1991

42-907

For sale by the Superintendent of Documents, Congressional Sales Office  
U.S. Government Printing Office, Washington, DC 20402

659-5147

**"WHO IS US?"—NATIONAL INTERESTS IN AN AGE  
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659-5147

## PREPARED STATEMENT OF ROBERT B. REICH

## Does Corporate Nationality Matter?

Mr. Chairman and Committee members:

My name is Robert B. Reich. I teach political economy at Harvard's Kennedy School of Government. Throughout most of the 1970s I was director of the Federal Trade Commission's Policy Planning staff, responsible for keeping tabs on the competitive structure of American industry; throughout the 1980s I have been researching and writing about the competitiveness of the United States.

American "competitiveness" is not the same as the profitability or world market share of American-owned corporations. A better definition of competitiveness is the capacity of Americans to maintain and enhance our standard of living, without going into debt to the rest of the world. This goal depends less on the competitiveness of American corporations than on the value that the American work force is able to add to the global economy, regardless of the nationality of the corporations that buy their labors. In other words, in the new global economy it is not what we own that counts; it is what we are able to do.

This conclusion is at odds with one of the most fundamental tenets of American competitiveness policy--a tenet perhaps best exemplified by a statement made thirty-seven years ago before another Senate committee, by Charles Erwin Wilson, then president of General Motors, who was to be confirmed as Eisenhower's Secretary of Defense. "Engine" Charlie, as he was known, opined that he would surely be able to make a decision in the interest of the United States that was adverse to the interest of GM, but that such a conflict would never arise because "what was good for our country was good for General Motors, and vice versa. The difference did not exist. Our company...goes with the welfare of the country."<sup>1</sup>

However dubious this statement might have appeared in 1953, its truth is even more doubtful today. What is good for the American corporation is no longer necessarily good for the American work force as it engages, increasingly, in international competition. American corporations are fast becoming global corporations that do a large share of their work abroad.

## The New Global American Corporation

The American multinational corporation has, of course, been with us for many decades. But the new global American corporation marks a major step in its evolution. A much larger proportion of its work force is foreign; and, increasingly, it does its most

sophisticated work--including research, development, engineering, and complex fabrication--outside the United States.

Some 40 percent of IBM's world employees are now foreign, and the percentage is growing. IBM Japan boasts more than 18,000 Japanese employees and annual sales of more than \$6 billion, making it one of Japan's major exporters of computers. Or consider Whirlpool. After cutting its American work force by 10 percent, shifting much of its production to Mexico, and buying Dutch-owned Philips's appliance business, Whirlpool now employs 43,000 people in 45 countries--most of them non-Americans. Or Seagate Technology--a California-based world leader in hard-disk drives--27,000 of whose 40,000 employees work in Southeast Asia.

American firms now employ 11 percent of the work force of Northern Ireland. On the other side of the world, 200 American firms employ more than 100,000 Singaporeans to fabricate and assemble electronic components. Singapore's largest employer is General Electric. Taiwan counts AT&T, RCA, and Texas Instruments among its largest exporters.

Even America's major utilities are going global. Bell South, the largest provider of basic telephone services in the U.S., now has operations in more than 20 countries--developing cellular telephone networks in Argentina and France, cable systems in France, management software in India, voice and data system designs in China, digital network technical services in Guatemala. Bell Atlantic just spent \$1.5 billion to acquire New Zealand's Telecom, that nation's largest telephone company.

All told, more than 20 percent of the output of American firms is now produced by foreign workers, outside the United States, and the percentage is rising quickly. At the present rate, overseas capital spending by American corporations will rise 14 percent this year, on top of 13 percent last year, and 13 percent the year before. That's compared to a rate of capital investment in the United States hovering at a bit over 6 percent a year.<sup>2</sup> American firms are now investing at a higher rate in Western Europe alone than they are in the United States. They've accounted for over half of the flurry of acquisitions of European companies in the last six months, and a hefty percentage of the new factories now going up.

Much of what the new global American corporation produces abroad is exported back to the United States. In fact, approximately one-quarter of America's trade imbalance is attributable to American firms which make or buy things abroad and then ship them back here. In these terms, American firms are no less competitive than they were in the 1960s; they

<sup>1</sup> United States Senate, Armed Services Committee, Confirmation Hearings of Charles E. Wilson as Secretary of Defense, February 18, 1953.

<sup>2</sup> Figures from Bureau of Economic Analysis, U.S. Department of Commerce, "Foreign Direct Investment by U.S. Companies," various issues. See also Translink's European Deal Review (June, 1990).

account for about the same share of global exports as they did 25 years ago--17 percent--even though exports from the United States have steadily declined.<sup>3</sup>

What's more, American firms are hiring skilled workers abroad, to do complex things. Texas Instruments maintains a software development facility in Bangalore, where fifty Indian programmers are linked by satellite with Texas Instrument's Dallas headquarters. Engineers in Singapore, meanwhile, are developing a new generation of laser printers for Hewlett Packard, and high-resolution video screens for Apple. In August, Hewlett Packard announced that it was moving its world headquarters for the production of personal computers to Grenoble, France. The list of American firms that have recently opened R&D labs in Japan reads like a "Who's Who" of corporate America: Eastman Kodak, W.R. Grace, DuPont, Merck, Procter & Gamble, Upjohn, and IBM, to name a few. And American firms are scrambling to set up labs in Europe.

Here again, the aggregate figures suggest the trend: According to the National Science Foundation, American firms increased their overseas spending on R&D by 33 percent between 1986 and 1988 (the last date for which such data are available), compared with a 6 percent increase in R&D in the United States.<sup>4</sup> For American firms, it is coming to be no longer the case that highest "value added" occurs in the United States.

#### The Global Foreign Corporation in America

Meanwhile, of course, foreign companies have been stepping up their investments in the United States. Foreign firms now account for more than 13 percent of America's manufacturing assets and employ more than 8 percent of America's manufacturing workers--or about 3 million Americans.<sup>5</sup> Even as some American firms have reduced their American work forces, foreign firms have expanded theirs: Between 1987 and 1990, the Big Three laid off 9,063 American autoworkers, while foreign firms hired more than 12,000 Americans. Since 1975, over 20,000 Americans have lost their jobs in American firms that once manufactured televisions in the United States, but over 15,000 Americans have been hired by foreign firms to manufacture televisions in the United States.

<sup>3</sup> Calculations from Robert E. Lipsey and Irving Kravis, "The Competitive and Comparative Advantage of U.S. Multinationals," 1983, Working Paper No. 2051, National Bureau of Economic Research, November, 1984.

<sup>4</sup> National Science Foundation, *Highlights*, March 9, 1990, Table 2.

<sup>5</sup> These and related figures from Bureau of Economic Analysis, U.S. Department of Commerce, "Foreign Direct Investment in the United States: Operations of U.S. Affiliates of Foreign Companies," various issues; also Bureau of the Census, and the Federal Trade Commission.

Foreign firms are also stepping up their research, development, engineering, and complex production in the United States. During the 1980s, foreign firms invested about the same amount of money in the U.S. on R&D per manufacturing worker than did American firms.<sup>6</sup> European multinationals, like their U.S. counterparts, place R&D activities in all of the major markets in which they participate; they show little if any tendency to concentrate R&D at home.<sup>7</sup>

Some nation's firms are, of course, more nationalistic than others, in that they tend to keep more of their high value added at home, and are more reluctant to promote foreign nationals to high positions of authority. Japanese firms, in particular, display such characteristics--although even here it is difficult to generalize because certain Japanese firms, like Sony, have made more progress toward becoming truly global corporations that have other Japanese firms.

The point of my argument, however, is not that all foreign-owned firms automatically act in ways that are good for America; it is that one can no longer assume that *American* firms automatically function in ways that are good for America. To the extent that we want global firms of whatever nationality to meet certain standards of behavior within the United States, such standards should apply equally to foreign and American firms.

#### Ownership and Control Less Important Than Work Force Learning

American shareholders do, of course, benefit from the global successes of American corporations to the extent that such successes are reflected in higher share prices; and the entire U.S. economy benefits to the extent that the overseas profits of American companies are remitted to the United States. But note that American investors also benefit from the successes of non-American companies in which Americans own minority interests. (Cross-border equity investments by Americans, British, Japanese, and West Germans are increasing by about 20 percent a year.)

In today's global economy, the total return to Americans from their equity investments is not solely a matter of the success of particular companies in which Americans happen to have a controlling interest; it depends, rather, on the total amount of American savings.

<sup>6</sup> See E. Graham and P. Krugman, *Foreign Direct Investment in the United States* (Washington, D.C.: Institute for International Economics, 1990), pp. 58-59, Table 3-3.

<sup>7</sup> See, for example, John Cantwell, *Technological Innovation and Multinational Corporations* (London: Blackwell, 1989).

investment in global portfolios comprising both American and foreign-owned companies--and on the care and wisdom with which American investors select such portfolios.

That American citizens are in "control" of a certain global corporation as its top officers and directors is no guarantee that the corporation will act in the interests of America. The logic of global capitalism, in fact, requires that American firms allocate their production across many nations, wherever they can earn the highest return for their shareholders. Not even the most patriotic of American executives is authorized by shareholders to forego profitable opportunities abroad for the sake of improving the competitiveness of the American work force.

The new logic of global capitalism requires that American firms go to great lengths to show their foreign employees, suppliers, customers, and host governments that they are not "playing favorites" by biasing their decisions in favor of the United States. They must be "good corporate citizens" wherever they do business, as must any other global corporation. (The same principle applies to Japanese firms; if they continue to display nationalistic tendencies, they will encounter increasing resistance from their foreign constituencies. Not the least, they will have difficulty hiring highly talented non-Japanese executives.)

Even when it comes to national security, the fact of American nationality is less relevant than the location of production. Unlike foreign assets held by American firms that are subject to foreign political control and, occasionally, foreign expropriation, foreign-owned assets in the United States are secure against sudden changes in foreign governments' policies. The current crisis in Kuwait proves ample evidence. In World War Two, Ford's German subsidiary contributed to the war effort on the side of Germany.

#### Policy Implications

During the last few years, as American policy makers have become increasingly worried about America's declining competitiveness, a number of laws and policies have been invoked to stem the tide. But because they are premised on the incorrect notion that the competitiveness of the American corporation is roughly equivalent to the competitiveness of America, these measures may end up jeopardizing the real standard of living of Americans instead of enhancing it. Consider these examples:

**Publicly-supported research and development.** By law, American national laboratories may license their inventions to private firms, but only to American-owned private firms. Similarly, participation in research consortia funded in part by the federal government is limited to American-owned firms. Such policies make little sense. The goal of publicly-

supported research and development should be to enhance the skills and insights of American scientists, engineers, and technicians. But there is no reason to suppose that American firms that receive federal research support will necessarily utilize their research in the United States; they may just as easily apply it to engineering and development projects abroad. A more sensible policy, therefore, would require that any global firm that receives government research assistance--regardless of nationality--undertake in the United States a certain amount of the engineering and development that flows from that research.

**Trade policy.** For the same reason, we should be less interested in opening foreign markets to American-owned firms (which may in fact be doing or buying overseas much of what they sell abroad) than in opening those markets to companies that employ Americans--even if they happen to be foreign-owned. By this logic, for example, it makes little sense for the United States Trade Representative to its expend scarce bargaining "chits" trying to get Japan to open its market to retail firms like "Toys-R-Us" (most of whose inventory comes from Southeast Asia and Latin America). By the same token, a high priority should be to ensure that the European Community not erect barriers to the importation of American-based entertainment--television shows, videos, records, and so forth--even if the Americans who produce such entertainment happen to work for Sony.

**Antitrust policy.** The Justice Department is about to relax antitrust policy to permit certain joint production agreements, and has signaled that the relaxed policy would apply only to American-owned firms; the House of Representatives already has moved to deny foreign-owned companies relaxed antitrust rules on joint production ventures. But corporate nationality has little bearing upon whether a joint production agreement potentially enhances the competitiveness of the American work force by generating significant economies of scale within the United States. A decision whether to allow such an agreement should turn, rather, on whether participating firms could gain such efficiencies on their own, simply by enlarging their investment in the United States; whether such a combination of companies would allow higher levels of productivity within the United States; and whether the combination would substantially diminish global competition. National origin should have nothing to do with it.

**Foreign direct investment.** Under the Lixon-Florio Amendment to the Omnibus Trade and Competitiveness Act of 1988, a high-level Committee on Foreign Investments in the United States can block a proposed foreign acquisition of an American firm. Other proposed legislation would make it even more difficult for foreign firms to acquire American companies. These policies, too, make little sense. In general, foreign-owned companies displace American-owned firms in just those industries where the foreign businesses are simply more productive. Thus it is not surprising that America's governors spend a great deal of time and energy promoting their states to foreign investors and offer big subsidies to

foreign companies to locate in their states, even if they compete head-on with existing American-owned businesses.

If there is reason to believe that a proposed acquisition of an American firm by a foreign firm will give the foreign firm--or a group of foreign firms--the capacity to monopolize an industry, America's antitrust laws are sufficient to block the acquisition. Thus, to the extent that Japanese semiconductor firms are behaving like a cartel, and the purchase of an American semiconductor supplier like Perkin-Elmer would enhance their market power, the Justice Department or the FTC should prevent the acquisition. But note that the decision does not turn on corporate nationality *per se*, but on corporate behavior. Precisely the same stricture should be applied to American firms operating in the same monopolistic manner.

**Tax evasion.** Responding to Internal Revenue Service figures showing that foreign-owned firms in the U.S. in 1986 reported \$550 billion in gross receipts but showed \$1.5 billion in tax losses, several bills have been introduced in Congress to give IRS agents new powers to monitor U.S. units of foreign multinationals and impose a capital gains tax on the sale of the holdings of some foreigners. But to the extent that global firms have been evading U.S. taxes by transferring profits from their American to their foreign units, the problem is hardly limited to foreign-owned firms. Using many of the same techniques (many of which, after all, were devised by American tax lawyers in the first place), global American corporations have for years been using "transfer pricing" to allocate their profits in ways that reduce their income taxes. Here again, corporate nationality is irrelevant; if a federal response is warranted, it should apply broadly to all global corporations.

**Political activities.** Bills are being readied to bar American subsidiaries of foreign corporations from forming political action committees, or hiring former federal officials from lobbying on their behalf. While concerns about foreign interference in the American political process are understandable, we should nonetheless remind ourselves that--as in the other policy areas enumerated above--the underlying issue has less to do with corporate nationality than with corporate behavior, regardless of nationality. To the extent that it is appropriate for American corporations to have access to Washington policy makers, it is just as appropriate for foreign firms operating in the United States to have such access. (Restrictions on the political activities of such foreign companies necessarily reduce the access of Americans working within such companies to the American political process; American employees of such firms as Pillsbury, First Boston, and Marine Midland Bank would thus be denied the sort of representation accorded to their compatriots who happen to work for American-owned firms.) On the other hand, to the extent that such access is misused--with the result that the firm is helped but the nation's interests are jeopardized--the problem is the same whether it is caused by a foreign or an American firm. Restrictions on PACs, and on the lobbying

activities of former federal officials, in order to guard against such misuse, would seem appropriate regardless of the nationality of the firms that utilize them.

### A National Competitive Strategy

Nothing I have said is inconsistent with a bold national strategy to improve American competitiveness. Indeed, I have long advocated just such an initiative. At its heart would be public investments in education, training, and infrastructure designed to improve the capacities of Americans to identify and solve new problems, and link those capacities to the world economy. A skilled work force, coupled with superb infrastructure, will attract global capital to create good jobs. Such a strategy would also feature agreements with global corporations to undertake high value added development and production in the United States, and thus give Americans on-the-job training in the technologies of the future.

My point today is simply to suggest that, however we design our industrial policy, the nationality of corporate ownership should not play a significant role. In today's new global economy, every factor of production is highly mobile, save one. Money, technology, and state-of-the-art factories and equipment move almost effortlessly across borders. Corporations are becoming global entities that are only loosely linked to nations, if at all. Our competitive future depends on the least mobile factor of production, which is rooted at home: our work force.

## PREPARED STATEMENT OF STEPHEN S. COHEN

## Topic of Hearings:

*Who is US? -- Does Corporate Nationality Matter?"*

## Title of Testimony:

*A Dozen Proofs of the Existence of US and an Equal Number of Observations on Why The Age of the Global Corporation is Not Yet Upon US."*

1. If we must promulgate a formal, general rule that is simple in form, universal in scope and automatic in its application, we must reject the assertion that corporate nationality does not matter. If it bears at least some relationship to influence and control, of course corporate nationality matters to U.S. policy. Simple, even trivial examples make this point: imagine Iraqi Corporations, or Soviet, Libyan, South African, Cuban, (and, depending upon how things work out, Kuwaiti) corporations controlling American television stations, newspapers, airlines, oil transport companies, or any of a broad set of militarily important technologies.

2. Similarly, as my emphasis on control indicates, ownership itself is not, and should not be, the unique, defining consideration. Control, or even influence, is what matters. But the two are related. Any assertion that they are not is an effort to update and internationalize the old Berle-Means argument of the total divorce between control and ownership. The consequences of the takeover binge on Wall St. these past years should provide sufficient evidence to disprove such an assertion.

3. This raises a more general question. Should we equip ourselves with a capability to analyze the meaning, for American national objectives, of critical direct foreign investments and to act flexibly to encourage (or discourage or harmonize) them with our national objectives? Or should we instead feel compelled to promulgate such a simple, universal and automatic rule? I think the automatic approach of deliberate ignorance and impotence is not in the interests of our nation. Other nations, such as Japan and the European states, do not think that such an approach is in their interests and they have instead created a capacity to monitor, analyze and influence international investments that shape the structure of their economies. We should do the same.

4. There are many reasons for not blindfolding ourselves and trusting the shaping of our wealth and power to a simple, absolute and universal rule. In this testimony I will try to list several of them. The first one is rather simple: The problem is not universal in its scope and invariable in its form. It is narrow in scope and depends upon very particular circumstances for its meaning. In substantive terms we are concerned not with all investments coming from all nations into all industries, but with direct investment into the U.S. by companies of Japanese and Western European nationality. A universal rule is not the best way to deal with just two places, especially as they differ so much one from the other. Our concerns focus far more on the Japanese than the Europeans. Furthermore, they focus even more narrowly on a small set of Japanese Kiretsu

companies rather than companies of Japanese nationality in general. Finally, those concerns narrow to a reasonably small set of sectors and technologies: we are more concerned with silicon chips than potato chips, with real time control than with real estate, with flat panel rather than fashion displays. Legislating absolute and universal rules to deal with a situation that is so far from universal and absolute seems to me to be the wrong approach.

5. We do not yet live in the age of the "global corporation" nor, in its logical concomitant, a world of politically undifferentiated economic spaces. Perhaps one day, perhaps soon, we will. But for the moment there are very few "global corporations" and there are relatively few economic spaces unconstrained by political considerations. For the present, we should continue to assume a real relationship between ownership and control. We should assume that all MNC's are not the same; all Home countries do not treat their MNC's the same; and all Host countries do not de facto set the same conditions for behavior on all MNCs.

a) Companies are not global: American MNC's are the most mature and the closest to global. Yet Commerce Department studies indicate that about 3/4's of the total assets of American MNCs are still accounted for by the parent operations in the U.S., with similarly high proportions for sales and employment. Despite much outbound investment these past years, that proportion has not changed much. For Japanese based MNCs, I would estimate the proportion of assets at the parent operation to be well over 90%. Even by these crude numbers, there is a long way to go before companies become global.

b) The weight and role of foreign based MNC's varies dramatically from Host country to Host country. In Germany and most of Europe foreign based MNC's occupy a big place in the economy and are able to behave a lot like nationals; in Japan they do neither. Substantial reciprocity is needed here before we can entertain the notion of global companies. In this particular debate Japan is not a trivial exception to an otherwise solid general rule. It is half the game.

6. As already indicated, ownership is not the defining consideration; behavior is. But behind behavior and shaping it lie influence and control. Corporate behavior -- what companies do and don't do within a country and with that country's people -- directly determines the wealth and power of that country. Ownership, we have learned in this era of takeovers, has a non-trivial relation to influencing corporate behavior. Also, when circumstances get exceptional, even the most global of Multinationals take orders from their home governments. The example of major U.S. computer companies in France in the 1960's is instructive. Their home government (our government) informally indicated to them to withdraw critical cooperation from President de Gaulle's Force de Frappe project. The consequences were substantial. France depended upon those good international citizens for critical inputs. The project failed. De Gaulle was furious and that reaction was part of his reason for withdrawing French forces from direct NATO command. The reaction of American based MNCs to the proposed Soviet-European gas pipeline a few years ago is another instructive example. Finally, the story of Mineba, the Japanese ball bearing company, purchasing and then systematically closing down U.S. capability in miniature ball bearings for what was presumably, its own strategic reasons -- despite assurances to the contrary (to the U.S. government in general and the Pentagon in particular) -- is another example that should give pause. Ownership and nationality often can matter.

7. Market structure will shape the meaning of a major foreign investment into the U.S. and should, therefore, shape America's response to that investment. The US

response to implantation by a major foreign based MNC -- whether through the purchase of an American competitor or through a greenfield investment -- should be one thing in a case where a small number of firms, all located in one country, dominate the world industry. It should be quite different in a situation where the industry is structured by a large number of companies, located in a large number of countries.

8. Similarly, some countries seem to permit a "market in companies" while others don't. The U.S. and U.K. figure most prominently in this list. In others -- most prominently Japan -- it is an extremely rare event for a foreign company to purchase a substantial Japanese company. Reciprocity in many such areas should be a pre-condition to a laissez-faire US policy for foreign investment. We could set percentage targets for foreign owned manufacturing assets in that country. The ability of American based companies to purchase companies in particular foreign countries has little to do with rates of domestic savings. After all, US based MNCs are investing very heavily abroad. It has to do with what is covered by open market arrangements and what is not in which countries. An automatic yes to Japanese companies buying U.S. companies is an automatic acquiescence to this asymmetry that belies the assumptions of global corporations operating in politically unconstrained markets.

9. Many MNC's behave very well in the U.S. They do real research, real development, real production. They develop the next generation of product and even process. They not only create jobs, they improve the skill base of the U.S. economy. Because it is a good list, we can name some: Philips, Siemens, Thompson, Kawasaki Steel, to take only a very few, but non-trivial, examples. Why do they? In part, they find that it makes good business sense, etc. But unless they can point to some potential imperatives from the U.S. side for investing in R&D here and not at home, they will come under great pressure from their home governments not to "export jobs and R&D activities". The no-policy option for U.S. policy deprives our best friends of both the incentives to behave well, and the ammunition to deal with protectionist forces at home.

10. Why are we the object of so much DFI? Despite classical theories of comparative advantage, which in a world of politically unconstrained economic spaces should determine locational decisions for MNCs, most MNC's invest strategically. Their first consideration in foreign investment in rich countries is market access. The realities of limitations to access, and often more important the prospect of further limitations, have been a major cause in the recent wave of new foreign direct investment in U.S. manufacturing. The prospect of behavioral norms -- abolition of "screwdriver" plants -- has been the most important incentive for upgrading the value added and the skill content of foreign activities in the U.S. This is equally true in Europe: witness the behavior of U.S. semiconductor makers these past two years in Europe. This is far from an ideal situation. But absent an international agreement abolishing all constraints on trade and investment -- one that actually works in behavioral terms -- we should not ignore this reality.

11. Technology -- spillovers, linkages and predation. These are more complicated issues, and there is inadequate time in this presentation to develop these ideas properly. In sketch form we can say:

In the modern world a nation's wealth and power is due much less to its natural endowment of minerals and soils than to its ability to diffuse new technology, both product and process, throughout its industrial system and to

diffuse new skills and methods throughout its population quicker and more extensively than competing nations, and to hold that relative advantage as long as possible. Then to do it again. And again.

Direct foreign investment can help or hinder that process. There is no a priori way to know which way it will cut. Everything depends upon the particular circumstances of the particular investment.

Some industries and technologies are particularly important carriers of innovation. New materials, biotechnology, optoelectronics, micro-manufacturing, semiconductors are some well known and important examples. In these cases, as in cases of world industrial structure, careful attention should be paid to major foreign investments, especially those that might either reduce potential competition in that technology or in its upstream or downstream uses, or that might short circuit the U.S. domestic diffusion process. Here, there is no substitute for well informed judgement. A universal rule will not do. For example, a strong foreign company that is nationally independent from a national grouping that threatens to dominate the industry might be an excellent solution. Examples would include fostering cooperation with major European producers in our threatened advanced electronics sector. Similarly we may well wish to encourage Japanese investments into the U.S. where U.S. partners and/or U.S. nationals would benefit from a transfer of Japanese production technology.

If all technologies diffused through scientific literature and through commercial markets, and those markets worked well, than national boundaries would have no impact on where technology diffuses and at what pace. But they do not diffuse that way. Technology diffuses through communities, through hierarchies, through organizations as well as through markets and formal professional literatures. In different countries this all-important diffusion process takes different forms and operates through different channels. In Silicon valley, technology diffuses as people change jobs; one can hire the technology. A good deal of what is interesting in commercial technology in the U.S. is developed in small and medium sized companies; one can buy them. In American universities the latest in technology is provided to all comers. None of these channels is particularly important in Japan, where technology tends to stay in large corporate groups until it comes out as product. Most European nations are closer to the U.S. than the Japanese model.

These fundamental differences in the institutional structures of the two countries do not represent differences of "goodness and badness"; furthermore, neither side seems willing to change such fundamental structures. But the asymmetry has enormous consequences. It is into this critical asymmetry that foreign investment enters and must be judged.

12. Defense and Information Media: There is a large consensus that national defense has its own special concerns. There is also substantial agreement extending back many years that control of national information media such as TV stations and newspapers should also be subject to special concerns and restrictions.

There is also an excellent literature on the defense issue. The most recent piece that I have seen is the Report of the Defense Science Board Task Force on Foreign Ownership and Control of U.S. Industry of June 1990. It covers these questions, from a national defense viewpoint quite well.



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**BACKGROUND MATERIAL**

**DECEMBER 7, 1993**

**Eighth Floor - Conference Center  
11 Dupont Circle, NW  
Washington, DC  
10:00 a.m. - 2:30 p.m.**

November 23, 1993

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Dear Mr. Johns:

I would like to invite you to join the Competitiveness Policy Council's Subcouncil on Critical Technology. The Subcouncil is chaired by Erich Bloch, former Director of the National Science Foundation and currently Distinguished Fellow at the Council on Competitiveness. Erich joins me in extending this invitation to you.

As you may know, the Competitiveness Policy Council was created by the Omnibus Trade and Competitiveness Act of 1988. It is charged with making recommendations to the President and the Congress concerning ways to improve our nation's competitiveness. The Council is comprised of 12 members--4 each appointed by the President, Senate and House--representing business, labor, the public interest and academia, and the government.

Enclosed are copies of the Council's Second Annual Report to the President and the Congress, which presents a comprehensive national competitiveness strategy, and our recently released Progress Report. Also enclosed is a sampling of the Council's media coverage. The Second Report was based on the work of eight Subcouncils established in 1992 in the areas of Capital Formation, Training, Education, Manufacturing, Critical Technologies, Corporate Governance and Financial Markets, International Trade, and Public Infrastructure.

The Competitiveness Policy Council's objectives, as outlined in its legislation, are:

- (1) to report to the President and Congress on recommendations for long-range national strategies and specific policies intended to enhance the productivity of the US economy;
- (2) to create a national forum to identify problems, analyze information and monitor changes in savings and investment, education, trade and technology and evaluate Federal, State and local policies with respect to their impact on US competitiveness;
- (3) to establish Subcouncils of public and private leaders to develop long-range strategies on specific competitiveness issues, and to review any policy recommendations which derive from these Subcouncils.

The Critical Technology Subcouncil is a unique coalition of representatives from business, labor, university and government dedicated to improving the contribution of technology to the nation's standard of living. The group's first report, issued in March 1993, presents a comprehensive set of recommendations to that end. Their second report, issued in August 1993, reviews the progress to date in implementing these original recommendations. The Subcouncil continues to work to update and speed the implementation of the recommendations made in these reports (both enclosed). David Cheney serves as the group's Staff Director.

The Subcouncil holds periodic meetings, reporting its findings and recommendations to the full Council. The Subcouncil's next meeting will be on December 7th from 10:00 a.m. to 2:30 p.m., and will be held in the Eighth Floor Conference Center at 11 Dupont Circle, N.W. At this meeting we will review the progress to date and develop recommendations in the following areas:

- o technology legislation;
- o the R&D Budget; and
- o private sector input to decisionmaking on technology policy.

The Subcouncil will develop its next report to the full Council based on the discussions at this meeting. This report will also serve as input to the full Council's third annual report, to be released in March 1994. Background material for the December 7 meeting will be sent to you in the next few weeks.

Technology policy is obviously a central issue for enhancing the nation's competitiveness. I join Erich Bloch in hoping that you will agree to contribute to our work in developing effective strategies in this area. I look forward to your response.

Sincerely,

  
C. Fred Bergsten  
Chairman

Enclosures