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Record Group/Collection: George H.W. Bush Presidential Records
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Series: Boskin, Michael, Files
Subseries: Meeting Files

OA/ID Number: 08066
Folder ID Number: 08066-101

Folder Title:
December 1991: 12/3/91 (10:30 a.m.) Computer Systems Policy Project Meeting (CSPS) with Darman, Porter, Bromley [Attendance List, Report and Analysis of The Federal Budget by CSPP, Meeting Information] Roosevelt Room

Stack:	Row:	Section:	Shelf:	Position:
G	13	24	7	3

Allan Bramley

To MB
 Date 9-16-91 Time 3:05

WHILE YOU WERE OUT
 M Michelle Norman
 of Computer Systems Policy
 Phone 662-8407
 Area Code Number Extension

TELEPHONED	<input checked="" type="checkbox"/>	PLEASE CALL	<input checked="" type="checkbox"/>
CALLED TO SEE YOU	<input type="checkbox"/>	WILL CALL AGAIN	<input type="checkbox"/>
WANTS TO SEE YOU	<input type="checkbox"/>	URGENT	<input type="checkbox"/>

RETURNED YOUR CALL

Message: I'm calling to follow up on their letter of June 19 requesting a mtg approx 3 w/ your Norman & Peter
 Operator (11)

answer letter w/ them

AMPAD EFFICIENCY® 23-021 CARBONLESS
Meg & Nancy
 11:00 am on Wed a day by -- to come lunch

To AW
 Date 9/16 Time 2:15

WHILE YOU WERE OUT
 M Michelle Norman
 of Computer Systems Policy Project
 Phone 662-8407
 Area Code Number Extension

TELEPHONED	<input checked="" type="checkbox"/>	PLEASE CALL	<input checked="" type="checkbox"/>
CALLED TO SEE YOU	<input type="checkbox"/>	WILL CALL AGAIN	<input type="checkbox"/>
WANTS TO SEE YOU	<input type="checkbox"/>	URGENT	<input type="checkbox"/>

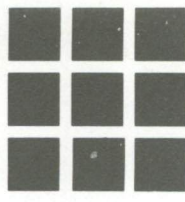
RETURNED YOUR CALL

Message: Re: their request to have MB meet w/12 CEO's on 12/3.
 Operator [Signature]

AMPAD EFFICIENCY® 23-023 CARBONLESS

Documents originally attached to following page.

*Norman
 do mtg w/ them 9-16-91
 Oct 18+ will determine
 @ that time whether
 or not they will meet
 on Dec. 3.
 Roger will join the
 mtg when it is scheduled.
 Setup Host a new
 11 to 12 informal
 lunch.*

 Computer
Systems
Policy
Project

June 19, 1991

John Sculley Apple

The Honorable Richard G. Darman
Director
Office of Management and Budget

Joseph R. Canion Compaq

The Honorable Roger B. Porter
Assistant to the President
for Economic and Domestic Policy

Lawrence Periman Control Data

The Honorable Michael Boskin
Chairman
Council of Economic Advisors

John A. Rollwagen Cray Research

Dear Gentlemen:

Kenneth H. Olsen Digital

As you will recall, representatives of our Executive Committee met with you in December 1990, to brief you on the results of the Computer Systems Policy Project (CSPP) analysis of the federal R&D investment. In our view, the meeting was extremely productive and has helped to shape CSPP's technology policy work since. As you know, we have focused our efforts on high performance computing and the federal labs.

John A. Young Hewlett-Packard

John F. Akers IBM

Your willingness to work with us on these important initiatives is extremely helpful and greatly appreciated. In an effort to continue the dialogue, I am writing to explore the possibility of our Executive Committee meeting with you again when we come to Washington for our next meeting on December 3, 1991.

Charles E. Exley, Jr. NCR

We believe that meeting in December, a year after our initial meeting at the White House, will provide a unique opportunity to assess our progress on the two projects and to determine the best way to continue working together. At this point, our schedule for December 3 is relatively free. We would be available to meet any time between 9:00 a.m. and 2:00 p.m.

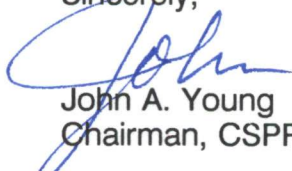
Scott G. McNealy Sun Microsystems

We look forward to hearing from you soon.

James G. Treybig Tandem

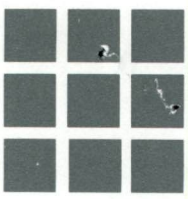
Sincerely,

James A. Unruh Unisys


John A. Young
Chairman, CSPP

cc: Harry Broadman

9-14-91
Michelle will call
back re luncheon
mtg. AHU



Computer
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John Sculley Apple

Joseph R. Canion Compaq

Lawrence Periman Control Data

John A. Rollwagen Cray Research

Kenneth H. Olsen Digital

John A. Young Hewlett-Packard

John F. Akers IBM

Charles E. Exley, Jr. NCR

Scott G. McNealy Sun Microsystems

James G. Treybig Tandem

James A. Unruh Unisys

June 19, 1991

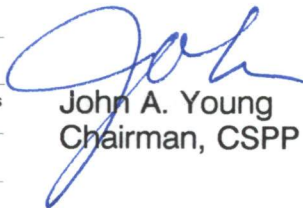
The Honorable Michael Boskin
Chairman
Council of Economic Advisors
Old Executive Office Building
17th & Pennsylvania Avenue, NW
Washington, DC 20500

Dear Mike:

I thought you might be interested to see a copy of the enclosed letter concerning computer exports to China which was forwarded on June 14, 1991, from the CEOs of the Computer Systems Policy Project (CSPP) to President Bush.


If you have any questions or need additional information, please feel free to call Ken Kay our executive director at (202) 662-8440.

Sincerely,



John A. Young
Chairman, CSPP

Enclosure



Computer
Systems
Policy
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John Sculley Apple

Joseph R. Canion Compaq

Lawrence Periman Control Data

John A. Rollwagen Cray Research

Kenneth H. Olsen Digital

John A. Young Hewlett-Packard

John F. Akers IBM

Charles E. Exley, Jr. NCR

Scott G. McNealy Sun Microsystems

James G. Treybig Tandem

James A. Unruh Unisys

June 14, 1991

The President
The White House
Washington, D.C. 20500

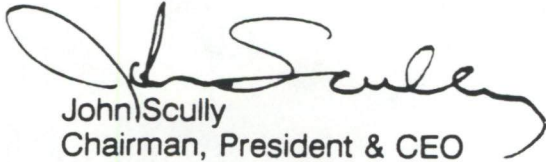
Dear Mr. President:

We congratulate you on the successful completion of your initiative to streamline export controls by reducing the size of the COCOM control list. The new "Core List" should significantly enhance the competitiveness of U.S. products in the international market without compromising our national security.

The Computer Systems Policy Project (CSPP), representing eleven major American computer companies that develop, build and market information processing systems, is concerned, however, by your decision to impose new unilateral restrictions on the export of U.S. computers to the Peoples Republic of China (PRC). While we fully support international export controls necessary to protect national security, we are concerned that unilateral controls could damage the marketing position of U.S. computer companies in China, many of whom have been encouraged to develop this market by the U.S. government. Our competitors in other COCOM countries, like Japan, would have no similar restrictions.

Therefore, we request that you defer implementing any change in export policy toward the PRC pending a thorough discussion between your Administration and the computer industry of the economic implications of your decision.

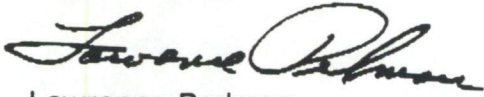
Sincerely,



John Scully
Chairman, President & CEO
Apple



Rod Canion
CEO
Compaq



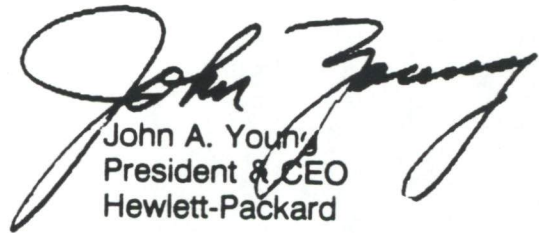
Lawrence Perlman
President & CEO
Control Data



John A. Rollwagen
Chairman & CEO
Cray Research



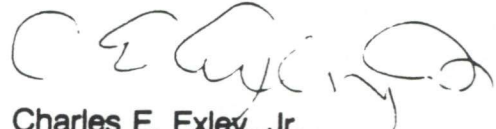
Kenneth H. Olsen
President
Digital



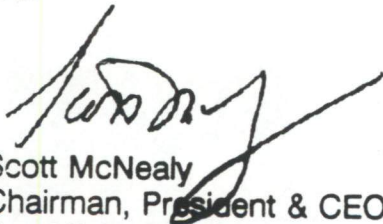
John A. Young
President & CEO
Hewlett-Packard



John F. Akers
Chairman
IBM



Charles E. Exley, Jr.
Chairman & CEO
NCR



Scott McNealy
Chairman, President & CEO
Sun Microsystems



James G. Treybig
President & CEO
Tandem Computers



James E. Unruh
Chairman & CEO
Unisys

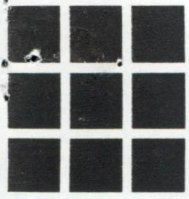
**MEETING WITH DARMAN, BOSKIN, PORTER, BROMLEY, MOORE
DECEMBER 3, 1991 - 10:30 A.M. MEETING
CSPP PARTICIPANTS**

CEOs -

John Sculley Apple Computer, Inc.	April 6, 1939	080-32-0711
Robert Allen AT&T	Jan. 25, 1935	317-30-0402
Eckhard Pfeiffer Compaq Computer Corporation	Aug. 20, 1941	449-53-6551
John Rollwagen Cray Research, Inc.	Nov. 20, 1940	470-42-6861
Ronald Skates Data General Corporation	Sept. 25, 1941	490-42-3121
Kenneth Olsen Digital Equipment Corporation	Feb. 20, 1926	045-20-8275
John A. Young Hewlett-Packard Company	April 24, 1932	543-32-2111
James G. Treybig Tandem Computers, Inc.	Sept. 28, 1940	467-58-8657
James Unruh Unisys Corporation	March 21, 1941	501-44-8617

Others -

Samuel H. Fuller Digital Equipment Corporation	June 1, 1946	382-50-1540
Jerry Brost Cray Research, Inc.	March 11, 1946	501-48-8977
Jim Johnson Apple Computer, Inc.	July 7, 1938	560-50-8091
Piper Cole Sun Microsystems, Inc.	Dec. 24, 1946	330-40-5614
Ken Kay CSPP	Nov. 16, 1951	117-36-4650
Fiona Branton CSPP	Dec. 23, 1958	209-50-2051



Computer
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Project

John Sculley Apple

Robert E. Allen AT&T

Eckhard Pfeiffer Compaq

Lawrence Periman Control Data

John A. Rollwagen Cray Research

Ronald L. Skates Data General

Kenneth H. Olsen Digital

John A. Young Hewlett-Packard

John F. Akers IBM

Scott G. McNealy Sun Microsystems

James G. Treybig Tandem

James A. Unruh Unisys

**THE FEDERAL HPCCI BUDGET
FOR FY '92:
ACHIEVING BETTER BALANCE**

**AN ANALYSIS BY THE
COMPUTER SYSTEMS POLICY PROJECT
DECEMBER 3, 1991**

THE FEDERAL HPCCI BUDGET FOR FY '92:
ACHIEVING BETTER BALANCE
AN ANALYSIS BY CSPP

The current Administration program is divided into four primary components: High Performance Computing Systems, Advanced Software Technology and Algorithms, National Research and Education Network, and Basic Research and Human Resources. In general, CSPP believes the research planned under the HPCCI will address fundamental technology areas important to providing the foundation for a world-class high performance computing and communications infrastructure in the United States. However, CSPP believes that by re-focusing some of the current priorities, the relevance of the program to the private sector can be maximized, thereby increasing the likelihood that its goals will be successfully achieved in the near future.

To analyze the Administration's current budget plan, CSPP formed four working groups -- one to correspond with each program component. During the last six months, each CSPP working group has had a series of internal discussions and meetings with agency representatives, and has reviewed more detailed agency program plans where available. The following summarizes CSPP's specific recommendations for shifting budget priorities to create a more balanced program for the future.

- A. **HIGH PERFORMANCE COMPUTING SYSTEMS (HPCS)** -- The goal of this component is to develop the underlying technology required for scalable parallel computing systems capable of sustaining trillions of operations per second. The Defense Advanced Research Agency (DARPA) is coordinating R&D under the component; additional major agency participants include NSF, DOE and NASA. The FY92 proposed budget is \$156.8 million, which is 25% of the total initiative amount. Generally speaking, the incremental funds for FY92 and beyond will be focused on research in and work on experimental and prototype massively parallel systems, not for purchase of production machines.

CSPP believes the focus should be broadened to include more than massively parallel systems. We recommend expanding the HPCS focus to include research and work on parallel vector, heterogeneous and other high performance computing architectures. This will ensure a broad range of computing platforms needed to solve a wider range of Grand Challenges.

- B. **ADVANCED SOFTWARE TECHNOLOGY AND ALGORITHMS (ASTA)** -- The goal for this group is to develop generic software technology and algorithms for research applications to realize the performance potential of high performance computing systems in a networked environment. The coordinating agency is NASA; other major players include DARPA, NSF, and DOE. The FY92 budget proposal is \$265.1 million, or 41% of the initiative. CSPP recommends the following to improve the effectiveness of the ASTA program:

1. In general, the ASTA program targets the research areas and technology challenges critical to enable successful implementation of the HPCCI.

DARPA, DOE, NASA, and NSF are focusing their research on advancing technology in compilers, tools, computing environments, languages, data management, operating systems, user interfaces, and visualization, with an emphasis on developing software systems and applications that will take advantage of massively parallel systems and databases. However, it appears that a disproportionately small amount of the budget allocated to the ASTA program will actually be expended on research in these areas. Instead, a relatively large percentage of the ASTA funding will go to purchasing new equipment and computers and to supporting computer centers. CSPP recommends that the government investigate whether some of these funds can be shifted toward urgently needed software research, perhaps by using or improving existing facilities. New facilities should be funded only if the other options are not possible.

2. The software library included in the NASA and DARPA programs is a potentially important and useful mechanism for sharing new software developments among the agencies and the private sector. CSPP urges the government to ensure that this program is given high priority, including ensuring the library is easily accessible to a large community of users and industry.
3. The government should ensure that private standards organizations, such as the American National Standards Institute (ANSI), continue to play a lead role in developing standards for parallel processing as well as the software library.
4. Research on both improving the technologies needed to recognize parallelization opportunities in existing programs and using those technologies for parallel applications, as well as recoding existing programs for parallel applications, are essential to success in high performance computing. It is not clear, based on our review, which strategies the agencies are pursuing in the ASTA program.
5. It appears that the ASTA program emphasizes massively parallel architectures to the extent that other architectures are not being explored adequately. The program should have a balanced emphasis on different types of technologies to meet a wide variety of computing needs, including both tightly coupled and loosely coupled parallel and heterogenous configurations, including networks of high performance workstations.
6. The mechanisms for transferring the technology developed under HPCCI, and especially for transferring advances in software and applications under ASTA, are not clear, and, at best, appear uncoordinated among agencies. The government should consider designating a lead agency for ensuring that the technology developed under the ASTA program is made available to the private sector in a coordinated manner and in a form that is useful to industry. CSPP recognizes that the most effective transfer of technology

occurs through direct interaction among researchers and technologists. Accordingly, we recommend allocating as large a proportion of the funding as practicable to collaborative efforts, such as joint research through Cooperative Research and Development Agreements (CRADAs), and ensuring that industry is aware of research opportunities in HPCCI. CSPP is willing to work with the government to develop appropriate mechanisms for working together.

- C. **NATIONAL RESEARCH AND EDUCATION NETWORK (NREN)** -- The goal is to develop a national high speed network to provide distributed computing capability to research and educational institutions and to further advanced research on very high speed networks and applications. The lead agency is NSF; funding proposed for FY92 is \$91.9 million, or 14% of the initiative. NSF's share of the total FY92 NREN funding will be used primarily to support the continued growth of a strong and flexible interim network. The primary activity under this effort will be the continuing upgrade of the existing internet, including the NSFnet backbone, the regional and midlevel networking structure, and various government agency networks. Gradually, funds will be shifted away from direct support by NSF of physical networks in favor of existing and developing commercial networks and services which compete according to natural market forces. NSF will focus on ensuring network architecture and protocol harmonization to guarantee pervasive end user and application connectivity and interoperability as part of their base programs. Additionally, NSF will use a percentage of its funding (less than 20%) to support new and important initiatives in the areas of network services (e.g. networked libraries), attachment of K-12 institutions, and network research and development including gigabit networking research. Finally, NSF has been designated as the lead agency for the NREN program and will soon have dedicated resources in place to coordinate and manage the program.

DARPA's focus will be on research and development projects in the area of multimedia gigabit networking technologies and systems. DARPA's primary goal will be to pursue these projects in the context of serving the research needs of the Department of Defense. DARPA appears reluctant to engage with industry in goal and priority setting but is open to active collaboration where DARPA and industry goals coincide.

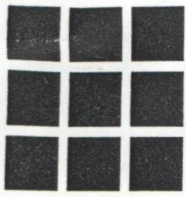
The projects and goals to be pursued with NREN funding in the remaining governmental agencies are not yet well defined. There will likely be some focus on establishing or upgrading the individual agencies' networks or network attachments. There will also be a drive toward developing various mission specific applications that can leverage high speed networks. It is extremely important that these activities be coordinated with NSF and DARPA to ensure that there is no unnecessary duplication of effort and an appropriate leveraging of projects and funds.

CSPP has the following recommendations for improving the effectiveness of the NREN program.

1. CSPP agrees with designating NSF as the lead agency for the NREN program.
2. The NREN program must be well coordinated and managed across the various government agencies to ensure there is no unnecessary duplication of effort, particularly in the R&D for gigabit networking technologies.
3. The records of proceedings and planning documents from meetings of the various NREN coordinating committees should be made generally available within both government and the private sector.
4. The government should work to ensure ubiquitous access to NREN by all government agencies at the federal, state, and local levels, by the American research and education communities, and by the library community.
5. A vehicle should be established for industry participation in the goal setting and prioritization of the various components of the NREN program. Several vehicles currently exist: NSF has named a full-time NREN coordinator to focus on the day-to-day coordination and management of the program; the Federal Networking Council (FNC) coordinates actions by government agencies; and the Federal Networking Advisory Committee (FNAC) is a forum for industry participation. In addition, the Internet Advisory Board (IAB) and the Internet Engineering Task Force (IETF) provide vehicles for technical coordination between governmental agencies, industry, and the scientific community. However, the existence of these organizations is just a first step. First, it is important that their existence, as well as records of their proceedings, be made generally known throughout the government and private sector. Second, it is critical that these organizations and individuals are held accountable to an overall HPCCI management body. Further, DARPA should be encouraged to actively participate in industry-government efforts to set NREN goals and priorities.
6. To ensure successful operation of a network that is now and will continue to be made up of many different networks and protocols, CSPP recommends that efforts under the NREN program focus on interoperability and harmonization of standards.
7. Significant administrative emphasis should be placed on acquiring services within the framework of this interconnected system and making all the services of each component of the system available to the broadest community possible.

8. R&D under the NREN component should promote strong interaction between the telecommunications and computing industries in pursuit of technologies needed to support an emerging high speed multimedia information and communications infrastructure, including the high performance computing systems that will use that infrastructure. The testbed programs currently funded by DARPA and NSF provide a first step toward these goals. Moreover, these projects cover R&D across a broad range of gigabit networking areas including wide area networks, metropolitan area networks, local area networks, and attachment of high performance computing systems. The Administration should work with interested private sector parties to insure that a balance is drawn between promising independent basic research, research focused on local implementations of gigabit systems, and "test-bed" systems.
9. CSPP endorses use of NREN funding to address issues surrounding privatization and commercialization of the NREN.

D. **BASIC RESEARCH AND HUMAN RESOURCES (BRHR)** -- This component provides support for individual investigators and multidisciplinary long term research; initiation of activity to significantly increase the pool of trained personnel; and support for efforts leading to accelerated technology transition. The FY92 budget proposal is \$124.5 million, 20% of the initiative; NSF and DARPA are the major contributors. The BRHR activities are crucial to the success of the HPCCI. Accordingly, OMB and the participating agencies should give these activities a high priority in making budget decisions. Further, the base programs in high performance computing and communications research and infrastructure must be maintained and built upon; the incremental funding proposed for FY92 must remain truly incremental to be effective. The overall funding levels and plans for accomplishing BRHR goals seem reasonable for FY92. The breakdown among subcomponents -- basic research, research participation and training, infrastructure, and education, training and curriculum - - also seems reasonable. However, the agencies have not yet articulated clear goals or objectives for the incremental funding in a form in which measures of success can be effectively developed. CSPP will work with the government to help articulate specific goals and success measures for this component based on the goals we would like the HPCCI achieve.



Computer
Systems
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Project

December 2, 1991

John Sculley Apple

BY HAND DELIVERY

Robert E. Allen AT&T

The Honorable Michael J. Boskin
Chairman
Council of Economic Advisors
Old Executive Office Building
17th Street and Pennsylvania Avenue, N.W.
Room 314
Washington, D.C. 20500

Eckhard Pfeiffer Compaq

Dear Chairman Boskin:

Lawrence Perlman Control Data

On behalf of the CEOs of the Computer Systems Policy Project (CSPP), I thank you in advance for taking the time to meet with us tomorrow, December 3. In preparation for our meeting, I have enclosed a copy of CSPP's report and video Expanding the Vision of High Performance Computing and Communications: Linking America for the Future.

John A. Rollwagen Cray Research

As you know, this report and video will be formally released to the Administration, Congress and the press tomorrow, December 3.

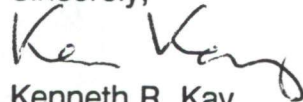
Ronald L. Skates Data General

I hope you find this material interesting and informative. We look forward to discussing it with you further at tomorrow's meeting.

Kenneth H. Olsen Digital

Sincerely,

John A. Young Hewlett-Packard


Kenneth R. Kay
Executive Director

John F. Akers IBM

Enclosure

Scott G. McNealy Sun Microsystems

cc: Harry Broadman

James G. Treybig Tandem

James A. Unruh Unisys



EXECUTIVE OFFICE OF THE PRESIDENT
COUNCIL OF ECONOMIC ADVISERS
WASHINGTON, D.C. 20500

THE CHAIRMAN

September 5, 1991

Dear Mr. Perlman:

Thank you very much for your letter of April 2, 1991, which responds to a request I made at the December 14, 1990 meeting with the Computer Systems Policy Project (CSPP). Unfortunately, the staff member whom I had assigned to develop the analysis here left in the middle of May, and Kenneth Kay's letter of July 23 arrived just as his replacement arrived. Let me assure you, however, that I read your letter carefully and have been thinking about the issues it raises and your proposals.

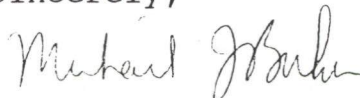
The question I posed to the CSPP at the December meeting was whether there are unnecessary rules or procedural barriers encountered by CSPP member companies that inhibit commercialization of new technologies that result from government-sponsored and/or funded research? Your letter identifies four potential problem areas, which I understand draw from CSPP members' experiences, as well as policy recommendations. While many of the policy recommendations you suggest are promising, more information is needed to develop the options in greater detail. To ensure the rules adopted are indeed solutions to the problems you have identified and do not have unsuspected effects we need to test out how they would work in particular situations. To that end, it would be extremely helpful to have for each of the generic barriers your survey has produced several specific examples (or case studies) based on experience. It is my hope that the CSPP would be willing to undertake this extension of the analysis.

I have asked the newly-arrived Member-Designate, David Bradford, to work on this issue with my Special Assistant, Harry Broadman, and have instructed them to place this topic on the fall agenda of the Science and Technology Working Group of the

Economic Policy Council. Dr. Bradford will make sure your original letter is distributed to the members of the Working Group. I am confident that the more detailed assessment I recommend above would prove enormously useful to the Working Group.

I look forward to hearing further from you.

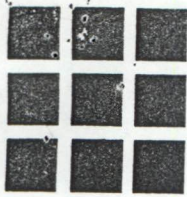
Sincerely,



Michael J. Boskin

Mr. Lawrence Perlman
President and Chief Executive Officer
Control Data
Box 0
8100 34th Avenue South
Minneapolis, Minnesota 55440

cc: Richard Darman, OMB
Allan Bromley, OSTP
John Akers, IBM
John A. Young, Hewlett Packard



Computer
Systems
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Project

BY HAND DELIVERY

John Sculley Apple

July 23, 1991

Joseph R. Canlon Compaq

Mr. Harry G. Broadman
Special Assistant to the Chairman and Senior Economist
Council of Economic Advisors
Old Executive Office Building
Room 314
Washington, D.C. 20500

Lawrence Perlman Control Data

Dear Harry:

John A. Rollwagen Cray Research

At the meeting between Michael Boskin, Richard Darman, Roger Porter and the CEOs of the Computer Systems Policy Project (CSPP), Chairman Boskin raised a question about the difficulties our member companies encounter when attempting to commercialize technology which has resulted from government sponsored and/or funded research. Lawrence Perlman, CEO of Control Data Corporation, responded to that question in a letter which was sent to Michael Boskin on April 2, 1991.

Kenneth H. Olsen Digital

Since that time, CSPP has not received any acknowledgement of that letter from Chairman Boskin's office. For your reference, I have enclosed a copy of the Perlman letter. I would appreciate it if you could make sure that the letter was in fact received. If there are any substantive reactions to the letter we would of course be interested in them.

John A. Young Hewlett-Packard

I thank you for your assistance. I look forward to hearing from you soon.

John F. Akers IBM

Sincerely,

Charles E. Exley, Jr. NCR

Kenneth R. Kay
Executive Director

Scott G. McNealy Sun Microsystems

James G. Treybig Tandem

Enclosure

James A. Unruh Unisys

8100 34th Avenue South
Mailing Address/Box 0
Minneapolis, MN 55440,
612/853-5283
FAX 612/853-7272

Lawrence Perlman
President and Chief Executive Officer

April 2, 1991

The Honorable Michael J. Boskin
Chairman, Council of Economic Advisors
Old Executive Office Building
Washington, D.C. 20500

Dear Dr. Boskin:

During your December 14 meeting with the Computer Systems Policy Project (CSPP) you asked, among other things, whether our industry has difficulties in commercially applying technology developed with government funding or participation (particularly the Department of Defense). I have asked the CSPP members about their experiences in this area. This letter reflects those findings and recommends actions that the White House could take to encourage greater commercial application of government technology.

TECHNOLOGY TRANSFER

Over the last decade, Congress and the Executive branch have clearly recognized the benefits of closer cooperation in research and development between the private and public sectors. Passage of the 1986 Federal Technology Transfer Act (FTTA) codified the government's intent to encourage such cooperation. Moreover, President Reagan's Executive Order 12591 (1987), implementing and augmenting the FTTA with specific orders to federal agencies, set forth some very important directives. These include an order to develop a uniform federal policy to pass rights in federally developed technology to the private sector for commercialization, subject only to royalty-free use by or on behalf of the government.

While the Department of Commerce deserves special mention for its efforts to support the FTTA and the Executive Order, implementation by other federal agencies and laboratories has been uneven. Substantial cultural biases and practices both in industry and government agencies/laboratories have dampened enthusiasm for these important initiatives. Substantial work is required in both the public and private sectors to realize the objectives envisioned by the President and Congress in their actions.

We are committed to redoubling our efforts as demonstrated by our CSPP working group which is developing recommendations to foster cooperation between our industry and federal laboratories. We urge the White House to encourage a greater commitment by federal

agencies/laboratories to implement the spirit and the word of the FTTA and Executive Order 12591. This effort should include using the budget process to encourage federal laboratories to more aggressively pursue cooperative agreements with private industry. Progress toward achieving those agreements should be measured, and funding tied to its success. In addition, the White House should encourage expanded use of a merit system within federal laboratories to reward researchers and laboratory managers for successful implementation of industry cooperative programs which develop and transfer commercially beneficial technology. This might include a program for Presidential recognition of individuals who most successfully support commercialization of government technology.

PROCUREMENT

Our mutual efforts in the area of FTTA implementation will require supplemental action in areas of technology transfer and the treatment of intellectual property rights growing out of contractual relationships governed by federal procurement laws and regulations.

As you know, rules and practices governing technology transfer and treatment of intellectual property rights created in the execution of a federal contract vary substantially from agency to agency. In itself, such inconsistency poses great challenges for industry and leads to confusion. We recommend, therefore, action to achieve greater uniformity in those rules and practices within and across federal government agencies.

Generally, and again with some important agency exceptions, when a contractor makes a discovery in the performance of work on a federally-funded project the contractor holds title to that invention. However, the federal government retains unlimited rights to the technical data created under the contract in support of the invention, and limited rights in the contractor's proprietary background technical data used by the contractor in development of the invention. When the proprietary background data cannot be readily separated from the technical data produced in the project, the government obtains unlimited rights to the proprietary background data as well, and can provide that background data -- together with the technical data created in the project -- to anyone, including domestic or international competitors.

While the ability of the contractor to hold title to patent rights is critical, the inability of the contractor to protect associated technical data is a major inhibitor to any contractor who may wish to commercialize the invention. For competitive exploitation, the technical data is often much more valuable and useful than the patent per se. Knowing that any competitor may gain access to the contractor's proprietary background technical

data ensures against any substantial new investment required for commercialization.

Moreover, unless the contractor can either own or gain an exclusive license to such technical data for commercial use, the value of the incorporated background data is severely eroded once the new technical data is made available by the federal government. Such a policy clearly discourages companies from providing their most valuable -- and perhaps most useful -- technical data to federal projects.

Thus, we strongly recommend that, except in cases essential to protect national security, technical data rights developed under federal contracts or through federal funding in cooperative ventures be owned by the contractor subject to a grant of a non-exclusive, royalty free license to the government to use the technical data for public, non-commercial purposes. We also recommend that a prohibition be adopted to prevent granting of unlimited rights in background data.

Another issue requiring attention is sole ownership, or joint ownership, by the government of intellectual property rights resulting from inventions by federal employees in the course of contractual work with the private sector. When such rights are created, the government generally may -- to promote commercialization -- elect to transfer title of that intellectual property right to the private sector contractor. However, unless a mechanism is established to protect related technical data from dissemination to commercial competitors, the same exposures exist that are described above. We would be willing to work with the government to explore appropriate mechanisms that would afford such protection.

While commercialization of intellectual property rights created by either public or private sector employees is best achieved by the private sector, some federal agencies have demonstrated great reluctance to transfer title to those rights, opting rather to license rights in exchange for royalties. Few investors would devote substantial sums to a project where both the intellectual property rights and technical data needed to exploit them could be made available to anyone approaching the federal government, including foreign competitors.

We, therefore, recommend that the government -- as expeditiously as possible -- transfer the patent rights and technical data to the contractor who brought substantial knowledge and expertise into the federal project. A less optimal solution would be a mandate that any license for commercial purposes must be exclusive, and that associated technical data be guided by the same policy.

RECOUPMENT

In some cases, the federal government may seek recovery of its costs in a project, insisting on payment for transfer of title or through royalty payments for retained rights. Payment of royalties could subject the private sector contractor to extremely cumbersome record keeping requirements that could substantially detract from any commercial appeal the technology might offer.

Alternatively, payment for transfer of title would provide incentive to federal employees to focus their attention on commercially relevant discoveries. It could provide a reward to the government developer without subjecting the contractor to cumbersome tracking of commercial transactions.

We recommend, therefore, that to the extent direct recovery of costs is deemed necessary, OMB initiate an effort to develop recovery guidelines which:

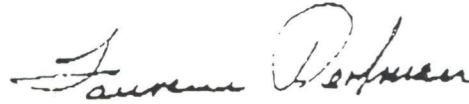
- Do not discourage commercial development of government funded technology.
- Limit recovery to no more than the amount of government funds actually expended to create the technology. The recovery amount should be equitable; it should not be so high or under such terms that commercialization is precluded; and it should reflect the benefits government received for its investment and for which it should legitimately pay.
- Require all federal agencies pursuing recovery to assert their rights early in the technology development phase.
- Reduce record keeping requirements. If a royalty formula is elected, record requirements should be no more burdensome than those normally imposed in private sector royalty licenses.

CLASSIFICATION

We also urge a renewed focus on preventing overclassification of information. It is important that the label of "sensitive information" only be applied to legitimately sensitive technology, rather than to technology that an agency simply is reluctant to transfer and therefore classifies as "sensitive." We recommend the White House consider mechanisms to ensure the proper classification of technological information and to explore processes for review of information which is believed to be misclassified.

Working together, we believe that information created in the course of federal contracts or through other cooperative arrangements such as those envisioned in FTTA can be extremely helpful in bolstering U.S. industrial competitiveness. Your questions have identified an area of great opportunity, and through a discrete set of administrative actions, President Bush can have a substantial, beneficial impact on strengthening U.S. industry. As we gather additional information through our on-going work, we look forward to a continued dialogue.

Sincerely,

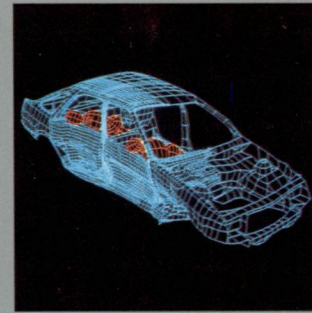
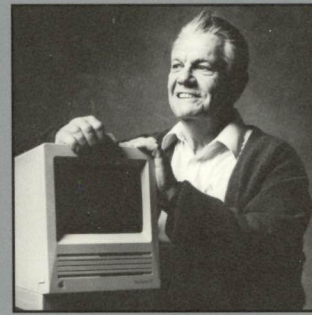
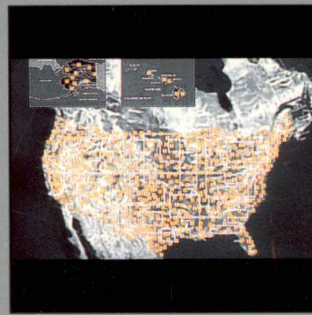


Lawrence Perlman

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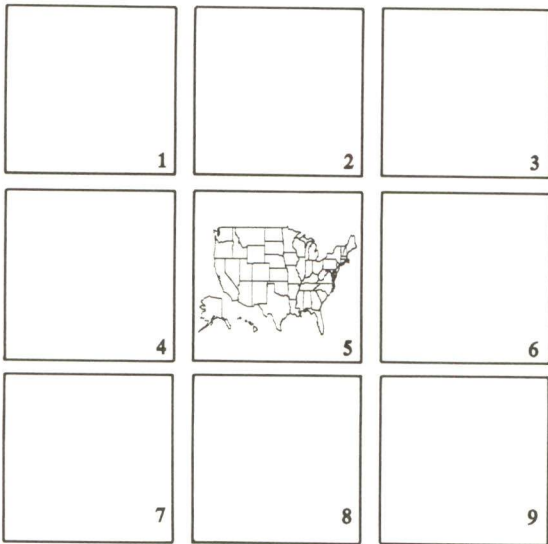
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Expanding the Vision of High Performance Computing and Communications: *Linking America for the Future*



*A Report by
The Computer Systems Policy Project*

December 3, 1991



The photos and images used in this report illustrate how high performance computing and communications could solve problems motivated by social and economic needs in areas of interest to the government and general public. This includes, for example, advances in the delivery of health care and services for senior citizens; improvements in education and opportunities for lifelong learning; enhanced industrial design and intelligent manufacturing technologies; and broad access to public and private databases, electronic mail and other unique resources.

1. Courtesy of Hewlett-Packard Company.
2. Joseph H. Baily©, National Geographic Society.
3. Courtesy of IBM Corporation. Photo by Ron Sherman.
4. Courtesy of Apple Computer, Inc.
5. The U.S. map suggests how a broad information and communications infrastructure could bring the benefits of high performance computing to all Americans. Image from CSPP video on high performance computing and communications. Image edited by Susan Davis.
6. William Farrand, SeniorNet™ member. Photo by Wesley Wong.
7. Courtesy of Sun Microsystems.
8. Courtesy of Hewlett-Packard Company.
9. Courtesy of Cray Research.

Expanding the Vision of High Performance
Computing and Communications:
Linking America for the Future

A Report by
the Computer Systems Policy Project

December 3, 1991

Executive Summary

Over the past year, the Computer Systems Policy Project (CSPP), an affiliation of major U.S. computer systems companies, has reviewed the Administration's High Performance Computing and Communications Initiative (HPCCI), as outlined in *Grand Challenges: High Performance Computing and Communications*. CSPP believes the HPCCI is a significant, critical and necessary undertaking by the government. As currently designed, the HPCCI will advance research in high performance computing and networking technologies as well as increase the use of high performance computers to solve a range of scientific and engineering "Grand Challenges" -- problems whose solutions are critical to national needs. CSPP believes, however, that the HPCCI can provide the foundation for something even more important: a new national infrastructure to promote America's growth in the 21st century and beyond.

Today, high performance computing and high speed networks are being used at an increasing rate in a wide variety of scientific, engineering, academic, and business settings. The potential benefits of these technologies, however, extend far beyond this country's laboratories, universities, businesses, and supercomputer centers. High performance computing, in conjunction with widely accessible high-speed networks, offers exciting new opportunities to improve the quality of life for all Americans.

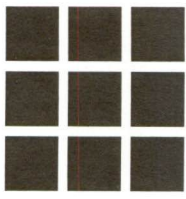
To make the most of federal and private research investments in the HPCCI, however, the software, hardware, and networking technologies being developed must be based on the broadest possible vision of what high performance computing and communications can make possible in the future. This requires expanding the current vision of the HPCCI to include Grand Challenges motivated by social and economic needs in areas of interest to the government and general public, such as advances in the delivery of health care and services for senior citizens; improvements in education and opportunities for lifelong learning; enhanced industrial design and intelligent manufacturing technologies; and broad access to public and private databases, electronic mail and other unique resources.

As a major user of computers, the government is appropriately investing in advanced computer technology research through the HPCCI. By leveraging these investments, the government can develop more broadly applicable generic, enabling technologies and stimulate the additional research by the private sector needed to solve the expanded Grand Challenges.

CSPP strongly believes the HPCCI program will have maximum benefit to the country only if the government collaborates more closely with industry and supports the broader vision of the HPCCI; advances the technologies to meet that vision; and implements a stronger management approach. To accomplish this, CSPP recommends the following changes to the current initiative:

- Expand the vision of the HPCCI and include research on generic, enabling technologies to support a wider range of applications;
- Establish a technology and policy foundation for an information and communications infrastructure for the future;
- Improve management and governance of the initiative and increase opportunities for industry participation; and
- Reorder HPCCI budget priorities to achieve a more balanced program.

Working together, the government, industry, and the broader science and technology community can construct an HPCCI program that will contribute to our nation's ability to meet many of the science, engineering, economic and social challenges we face. In addition, by cooperating, we can ensure a better return on the federal R&D investment; promote increased industry investment; and generate productive collaboration between industry, academia, and government.



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The Computer Systems Policy Project

The Computer Systems Policy Project (CSPP) is an affiliation of Chief Executive Officers of American computer companies that develop, build and market information processing systems and related software and services. CSPP was formed in 1989 to provide the CEOs of the industry with a forum to discuss, develop, and advocate public policy positions on trade and technology issues critical to the computer systems industry and country.

Additional copies of this report, along with a complementary video, are available for \$20. For more information, please contact:

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INTRODUCTION

Linking America for the Future

During the growth of the Industrial Age, America built national transportation links to move people, goods, and raw materials across increasingly greater distances. Just as these interstate highways were crucial to our post-war development, national data links are necessary for growth in the 21st century and beyond. As the United States enters the Information Age, a new national infrastructure is required.

Today, high performance computing is increasingly used in a wide variety of scientific, engineering, academic, and business settings. The potential benefits, however, extend far beyond these current uses. In conjunction with high-speed networks, high performance computing could be the new national infrastructure, offering virtually unlimited opportunities to solve challenges and improve efficiency in ways which directly affect the lives and well-being of all Americans. Among the opportunities are:

- better health care;
- lifelong learning;
- improved services for senior citizens, the disabled, and the housebound;
- enhanced industrial design and intelligent manufacturing technology; and
- broad access to public and private databases, electronic mail, and other unique resources.

Realizing these opportunities requires harnessing the collective energy, talents, and unique resources of industry, academia, the general public, and the federal government. By enhancing the ability of all Americans to better communicate, share resources and exchange information, the HPCCI can promote a new national infrastructure -- potentially the most powerful tool our nation has ever had to bolster its international economic position and long-term national well-being.

Over the last nine months, the Computer Systems Policy Project (CSPP), an affiliation of chief executives of twelve leading American computer companies, has begun to define this broader vision of high performance computing and communications. If followed, the recommendations offered in this report could help establish the new national infrastructure that would bring the benefits of high performance computing and communications to individual Americans.

Providing the Foundation

In February, 1991, as part of its budget submission to Congress, the Bush Administration released *Grand Challenges: High Performance Computing and Communications*, summarizing its High Performance Computing and Communications Initiative (HPCCI), a cross-agency research program on computing and networking technologies. The HPCCI is designed to advance research in high performance computing and networking technologies as well as increase the use of high performance computers to solve a range of scientific and engineering "Grand Challenges" -- problems whose solutions are critical to national needs.

CSPP fully supports the goals of the HPCCI and the Administration's program described in *Grand Challenges*, and commends the Administration for its leadership in designing this important initiative. Similarly, CSPP commends Congress for funding the initiative in Fiscal Year 1992, and for recent legislation that would establish a high performance computing program and National Research and Education Network.

In addition to helping the U.S. maintain its worldwide lead in high performance computing, the HPCCI will lead to specific critical developments in areas such as:

- improving the accuracy of weather forecasts;
- identifying and analyzing cancer-causing genes;
- finding new ways to reduce air pollution; and
- increasing the efficiency of internal combustion engines.

Just as important, however, the HPCCI has the potential to benefit the nation much more broadly by driving important advancements in technologies and policies that will make possible a wide range of future high performance computing and communications applications.

Expanding the Vision

CSPP believes expanding the vision of HPCCI to include a more comprehensive view of what HPCCI technologies can make possible in the future will increase the return on the research investments made in the program. This requires that the HPCCI program include additional Grand Challenges to supplement those already identified by the Administration. Basing federal and private research in software, hardware, and networking technologies on the broadest possible vision will make the most of the foundation provided by the current HPCCI.

CSPP firmly believes that the best means to advance the long-term goals of the HPCCI is for all America to become captivated by the possibilities. The following pages provide just a few examples of what an expanded HPCCI could make possible.

BETTER HEALTH CARE AND MEDICAL SERVICES



- Patients will be linked directly to computers that will not only monitor medical data, but will continuously transmit that information for rapid analysis and ongoing diagnosis by remote experts.
- Interactive video coupled with high capacity networks will deliver medical care, including consultations and diagnoses, to populations without easy access to state of the art medical care and equipment. Besides improving the accuracy of diagnoses, this could reduce the cost of providing medical care throughout the United States by permitting more efficient use of expensive equipment.
- Doctors, patients, and hospitals will be able to confer and consult with specialists in distant cities, sharing high definition video images, audio transmissions, and statistical data from several sources as needed.

LIFELONG LEARNING



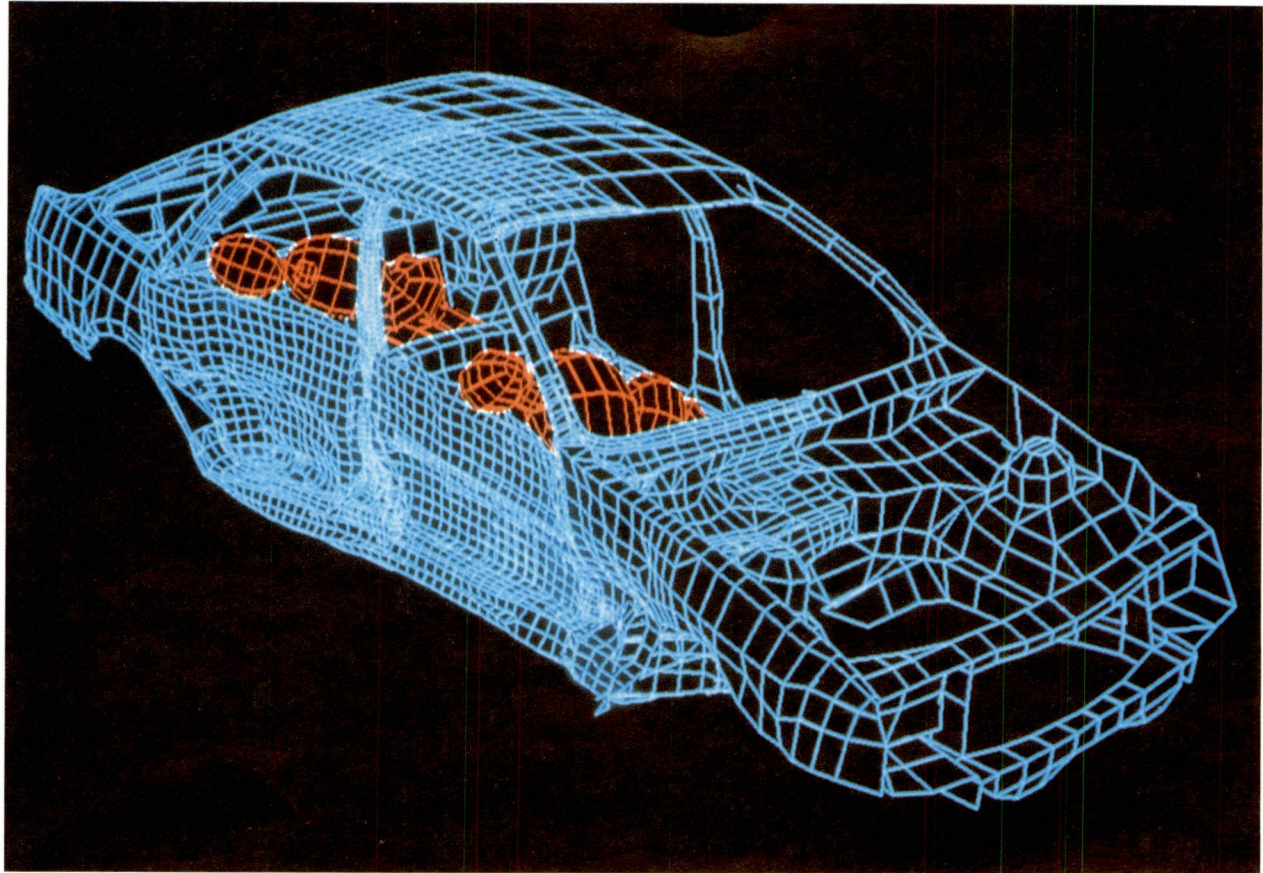
- Students will have easy access comprehensive remote databases providing information such as historical and forecasted weather data for their localities. They will be able to compare it with data they collect themselves, analyze the accuracy of predictions, and compare it with data collected by students in other parts of the country through interactive video conferences.
- At home or at school, a student doing research for a homework assignment on Shakespeare will be able to access the Folger Shakespeare Library in Washington, D.C. and consult with experts at the Library of Congress. Portions of plays will be available in video through multimedia information resources.
- Students will take realistic “video field-trips” to Amazon rain forests and Saharan deserts without leaving their classrooms.
- “Lifelong learning” will be a reality through high resolution interactive video. Schools and businesses will design adult education and training classes tailored to each individual’s needs which will be available regardless of a person’s schedule.

IMPROVED SERVICES FOR SENIOR CITIZENS, THE DISABLED, AND HOUSEBOUND



- Through advances in speech recognition and other remote control mechanisms, senior citizens, the disabled, and housebound, will become more independent by having access to services and activities that are currently not available to them.
- Enhanced multimedia technology, in conjunction with high performance computers and communications, will enable personal and direct interaction with friends and family in distant places, as well as with health care professionals and social service providers.
- More direct access to critical government services will also be available, as will health monitoring systems enabling help to be sent quickly and automatically in the event of an emergency.

ENHANCED INDUSTRIAL DESIGN AND INTELLIGENT MANUFACTURING TECHNOLOGY



- Industries will use high performance computing for advanced design, simulation, and testing. This will be particularly beneficial in manufacturing, including sheet-metal forming, rolling, welding, and casting; emissions control technologies; engine design; light materials design; and pharmaceutical design.
- High performance computers and networks will enhance capabilities in distributed manufacturing, including just-in-time manufacturing, automated inventory control and resupply, and scheduling; concurrent design, engineering, and manufacturing.
- The availability of high performance computing and communications in conjunction with sophisticated databases of important government information, will enable small and large manufacturing companies to quickly conduct automated patent searches and apply for patents electronically, significantly speeding the current process.

*BROAD ACCESS TO PUBLIC AND PRIVATE DATABASES,
ELECTRONIC MAIL, AND OTHER UNIQUE RESOURCES*



- A farmer in South Dakota will be able to easily access the latest crop predictions and satellite soil analyses from the Department of Agriculture, and long-range weather forecasts from the Department of Commerce, enabling adjustment of planting and harvesting plans.
- A small business owner will be able to respond electronically to a government request for proposal on a contract, receive more rapid feedback on the proposal, and track the award of contracts, enabling instant identification of subcontracting opportunities.
- Individuals will have immediate access to legislative proposals and will be able to provide their legislators with instant electronic feedback on specific bills.
- With government information available and easily accessible on line, individuals who live near waste dump sites will be able to conduct searches of Environmental Protection Agency data to find out whether the waste is toxic and what actions are being taken to clean it up.

RECOMMENDATION #1

Expand the Vision of the HPCCI and Include Research on Generic, Enabling Technologies To Solve a Wider Range of Grand Challenges

To expand the vision of the HPCCI, federal agencies, such as the Departments of Education, Health and Human Services, and Commerce, should work with industry to identify additional Grand Challenges in social and economic areas of direct interest to the government, such as those described on the previous pages.

To make the new vision a reality, the HPCCI must include research on the generic, enabling technologies and the computing and communications architectures needed to enable a wide variety of applications. These include technologies needed for development of open, scalable platforms and systems, from high performance workstations to parallel vector, heterogeneous and massively parallel systems. The current HPCCI will address a range of technologies, including, for example, the following:

- new computer architectures that will permit high-capacity information processing;
- advanced microelectronic technologies, including packaging;
- compression and decompression techniques;
- broadband networks and protocols;
- improved techniques for mass data storage and retrieval to permit storage of complex images;
- improved technologies and algorithms for accessing large databases;
- innovative user interface technologies;
- new algorithms for massively parallel machines, heterogeneous computers and workstations, and other platforms and applications;
- advanced database technology, including tools and services to tie together the users, the applications, the systems technology and the operating systems; and
- enhanced multimedia technologies and capabilities.

These technologies, while useful in solving the science and engineering Grand Challenges, can help to do more. The national investment in the HPCCI research program can be enhanced by designing it in such a way that the technologies also support solving the additional social and economic Grand Challenges.

CSPP companies are already pursuing these and other necessary technologies individually. Moreover, we are prepared to invest in collaborative work with the government. In fact, we are developing a computer industry model Cooperative Research and Development Agreement (CRADA) with the Department of Energy designed to increase industry/laboratory interaction.

Throughout implementation of the program, it is critical that the government collaborate with both the user and computer systems industries to be sure the HPCCI research and

development priorities will support the development of the hardware, software and networking tools needed to solve the expanded Grand Challenges. It is equally critical that new insights, knowledge, and technology developments generated by the HPCCI be quickly transferred to the private sector for actual development, production, and deployment.

CSPP also urges that the Library of Congress and the many government agencies that generate and maintain large amounts of useful information be included in the HPCCI to help lay the research foundation for a National Digital Library. The participation of agencies such as the departments of Agriculture, Transportation, Interior, and the Environmental Protection Agency, for example, is necessary to most efficiently develop the technologies needed to make databases easily accessible over a network.

RECOMMENDATION #2

Establish a Technology and Policy Foundation for an Information and Communications Infrastructure for the Future

Developing the most efficient, effective and broad-reaching communications and information infrastructure for the future requires that near-term research and policy decisions be made with an eye toward the long-term. As it is described in *Grand Challenges*, the National Research and Education Network (NREN) will provide a basic infrastructure for research and education. However, the NREN offers the foundation for something broader and more exciting.

Through an expanded HPCCI research agenda, there is an opportunity to lay the technology and policy foundation to support a much more comprehensive electronic communications and information infrastructure. Such an infrastructure, to be developed and deployed by the private sector, will consist of a number of interconnected networks that will not only connect research hubs across the country, but will bring educational, health, social, business, and entertainment services to households, schools, hospitals, and offices across the United States. This "network of networks" will provide all Americans with access to unique resources, public and private databases, and other individuals throughout the country.

To make this possible, government and industry must work together to address the following.

1. *NETWORK POLICY CONSIDERATIONS* -- As a broad communications and information infrastructure develops, many important policy and network management issues will need to be addressed, including, for example:
 - how to ensure security and privacy of widely accessible networks and the communications transmitted over them, including methods for ensuring privacy of data and files identifiable to individuals;
 - protection of copyright licensing and royalty rights;
 - allocation of radio and broadcast spectrum for networking purposes;
 - the role of the FCC with respect to networks; and
 - how to develop and implement flexible and fair standards applicable to high-capacity networks.

CSPP urges the Administration to ensure the HPCCI serves as a stepping stone to a broader future information infrastructure by beginning to address these and other network-related issues now. This will require expanding the activities under the NREN component of the HPCCI to include research and development on the technologies needed to support broadly accessible and affordable networks.

2. *ENSURING NETWORK INTEROPERABILITY* -- The future information infrastructure is expected to be a network of today's many separate regional, local, private, and public networks. To be able to send information around such a network of networks, each must connect physically and logically with the others, a concept known as interoperability.

To ensure interoperability, the multitude of commercial and research networks in the U.S. and around the world must be built on a harmonized set of coding schemes and protocols. Because government policies and programs will have a significant effect on the protocols used in future networks, they must be coordinated to meet the goal of network interoperability.

3. *ENSURING BROADEST POSSIBLE ACCESS* -- In the past, the federal government has been the sole convener and principal funding source for research and education networks. Today and into the future, however, more and more of the funding for these and other networks, even experimental networks, will come from the private sector.

While market forces must be allowed to operate to assure full competition in the provision of networks and services, an expanded HPCCI must include a plan for ensuring the widest possible access to the infrastructure as existing networks are upgraded and broadened. The federal government should also work with foreign governments to ensure equitable access and use of foreign networks, as well as the ability of U.S. information providers to compete abroad.

RECOMMENDATION #3

Improve Management and Governance of the Initiative and Increase Opportunities for Industry Participation

CSPP is concerned that the current HPCCI management approach is not strong enough to guarantee effective results. In particular, it does not take sufficient advantage of existing industry expertise in implementing similar systems.

The HPCCI is a complex project which is being undertaken by at least eight federal agencies, each with separate needs for high performance computing and networking activities. With the exception of the National Science Foundation, the agencies are focused primarily on pursuing agency missions and objectives. At this time, there is no unified vision of the HPCCI or any ultimate point of responsibility for ensuring the overall program goals are met.

If the HPCCI is to move forward effectively and efficiently, CSPP believes there must be explicit coordination and accountability, as well as a clear mechanism, which draws on industry expertise, to coordinate, manage and govern the implementation of the initiative. CSPP is willing to work with the government to help identify an appropriate lead body within the Executive Branch that would:

- develop and support a national vision for the HPCCI;
- develop a coordinated research and public policy agenda designed to make the national vision for HPCCI a reality;
- identify the government's role in accomplishing and overseeing the vision and the necessary computing and communications architecture;
- develop a set of measures and checkpoints against which progress toward the ultimate goals of the initiative can be measured;
- develop a mechanism to ensure that industry, academia, and other parties with expertise to offer can interact with the government and directly contribute to the design and implementation of the HPCCI; and
- develop a system to ensure the efficient transfer of government-developed technology under the HPCCI to the private sector for product development and application.

CSPP is particularly interested in working with the government to ensure close and continuing involvement with user industries and the computer and telecommunications industries.

RECOMMENDATION #4

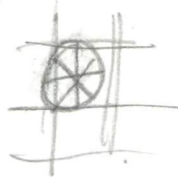
Reorder HPCCI Budget Priorities to Achieve a More Balanced Program

Following a series of meetings and interviews with the relevant agencies, CSPP has concluded that in general, the research planned under the HPCCI will address the technology areas needed to lay the foundation for a world-class high performance computing and communications infrastructure. However, CSPP believes, in addition to broadening the vision for the HPCCI as described on the previous pages, the following shifts in current priorities will maximize the relevance of the program to both the government and the private sector, thereby increasing the likelihood that the program's overall goals will be successfully achieved in the near future.

- First, the focus of the HPCCI research should include research on multiple high performance hardware and software configurations, across a broad performance range. In other words, the program should balance research on massively parallel architectures with development and application of other high performance computing tools including open, scalable platforms and systems, from high performance workstations to parallel vector, heterogeneous and massively parallel systems.
- Second, the proposed budget, especially the Advanced Software Technology and Algorithms subcomponent, includes relatively large expenditures on equipment and facilities in addition to software research activities. CSPP recommends that the Administration investigate whether the proportion of funds allocated to software research can be reduced, perhaps by using or improving existing facilities.
- Third, CSPP considers the activities planned under the Basic Research and Human Resources (BRHR) component crucial to the success of the HPCCI. OMB and the participating agencies must ensure these activities are also given high priority. Without trained personnel and a basic research infrastructure, none of the advances made in the other three program components can be successfully implemented or used.
- Finally, successfully achieving the goals of the HPCCI will require a balance between advancing key technologies and applying those technologies to solve complex problems affecting our society. These problems cannot be solved, nor the benefits distributed, without leaps in a broad range of technologies. However, planned HPCCI activities seem to focus on advancing key computer technologies, while applying and disseminating the technologies to solve critical problems is given a secondary role. CSPP recommends balancing these two goals to ensure both are adequately addressed.

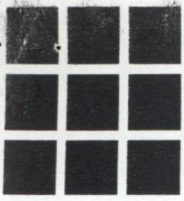
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announcements of implementation
promise



① public support of KAP,
technology

George Fisher



Computer
Systems
Policy
Project

John Sculley Apple

Robert E. Allen AT&T

Eckhard Pfeiffer Compaq

Lawrence Perlman Control Data

John A. Rollwagen Cray Research

Ronald L. Skates Data General

Kenneth H. Olsen Digital

John A. Young Hewlett-Packard

John F. Akers IBM

Scott G. McNealy Sun Microsystems

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THE FEDERAL HPCCI BUDGET FOR FY '92: ACHIEVING BETTER BALANCE

→ Darman, Bakken, Porter, Moore

→ 8 CEOs

→ CSPP will mention your letter back to them on Fed Lab technology transfer and report on their progress in responding to our request

→ CSPP will announce the establishment of a Cooperative R+D Agreement (CRADA)

AN ANALYSIS BY THE COMPUTER SYSTEMS POLICY PROJECT
DECEMBER 3, 1991 *Industry and DOE's*

labs, which will enhance tech. transfer. This CRADA will serve as a model for other agencies/labs

→ CSPP will present specific suggestions for improving the Administration-led High Performance Computing Initiative, which will be signed soon by the President

THE FEDERAL HPCCI BUDGET FOR FY '92:
ACHIEVING BETTER BALANCE
AN ANALYSIS BY CSPP

The current Administration program is divided into four primary components: High Performance Computing Systems, Advanced Software Technology and Algorithms, National Research and Education Network, and Basic Research and Human Resources. In general, CSPP believes the research planned under the HPCCI will address fundamental technology areas important to providing the foundation for a world-class high performance computing and communications infrastructure in the United States. However, CSPP believes that by re-focusing some of the current priorities, the relevance of the program to the private sector can be maximized, thereby increasing the likelihood that its goals will be successfully achieved in the near future.

To analyze the Administration's current budget plan, CSPP formed four working groups -- one to correspond with each program component. During the last six months, each CSPP working group has had a series of internal discussions and meetings with agency representatives, and has reviewed more detailed agency program plans where available. The following summarizes CSPP's specific recommendations for shifting budget priorities to create a more balanced program for the future.

- A. **HIGH PERFORMANCE COMPUTING SYSTEMS (HPCS)** -- The goal of this component is to develop the underlying technology required for scalable parallel computing systems capable of sustaining trillions of operations per second. The Defense Advanced Research Agency (DARPA) is coordinating R&D under the component; additional major agency participants include NSF, DOE and NASA. The FY92 proposed budget is \$156.8 million, which is 25% of the total initiative amount. Generally speaking, the incremental funds for FY92 and beyond will be focused on research in and work on experimental and prototype massively parallel systems, not for purchase of production machines.

CSPP believes the focus should be broadened to include more than massively parallel systems. We recommend expanding the HPCS focus to include research and work on parallel vector, heterogeneous and other high performance computing architectures. This will ensure a broad range of computing platforms needed to solve a wider range of Grand Challenges.

- B. **ADVANCED SOFTWARE TECHNOLOGY AND ALGORITHMS (ASTA)** -- The goal for this group is to develop generic software technology and algorithms for research applications to realize the performance potential of high performance computing systems in a networked environment. The coordinating agency is NASA; other major players include DARPA, NSF, and DOE. The FY92 budget proposal is \$265.1 million, or 41% of the initiative. CSPP recommends the following to improve the effectiveness of the ASTA program:

1. In general, the ASTA program targets the research areas and technology challenges critical to enable successful implementation of the HPCCI.

DARPA, DOE, NASA, and NSF are focusing their research on advancing technology in compilers, tools, computing environments, languages, data management, operating systems, user interfaces, and visualization, with an emphasis on developing software systems and applications that will take advantage of massively parallel systems and databases. However, it appears that a disproportionately small amount of the budget allocated to the ASTA program will actually be expended on research in these areas. Instead, a relatively large percentage of the ASTA funding will go to purchasing new equipment and computers and to supporting computer centers. CSPP recommends that the government investigate whether some of these funds can be shifted toward urgently needed software research, perhaps by using or improving existing facilities. New facilities should be funded only if the other options are not possible.

2. The software library included in the NASA and DARPA programs is a potentially important and useful mechanism for sharing new software developments among the agencies and the private sector. CSPP urges the government to ensure that this program is given high priority, including ensuring the library is easily accessible to a large community of users and industry.
3. The government should ensure that private standards organizations, such as the American National Standards Institute (ANSI), continue to play a lead role in developing standards for parallel processing as well as the software library.
4. Research on both improving the technologies needed to recognize parallelization opportunities in existing programs and using those technologies for parallel applications, as well as recoding existing programs for parallel applications, are essential to success in high performance computing. It is not clear, based on our review, which strategies the agencies are pursuing in the ASTA program.
5. It appears that the ASTA program emphasizes massively parallel architectures to the extent that other architectures are not being explored adequately. The program should have a balanced emphasis on different types of technologies to meet a wide variety of computing needs, including both tightly coupled and loosely coupled parallel and heterogenous configurations, including networks of high performance workstations.
6. The mechanisms for transferring the technology developed under HPCCI, and especially for transferring advances in software and applications under ASTA, are not clear, and, at best, appear uncoordinated among agencies. The government should consider designating a lead agency for ensuring that the technology developed under the ASTA program is made available to the private sector in a coordinated manner and in a form that is useful to industry. CSPP recognizes that the most effective transfer of technology

occurs through direct interaction among researchers and technologists. Accordingly, we recommend allocating as large a proportion of the funding as practicable to collaborative efforts, such as joint research through Cooperative Research and Development Agreements (CRADAs), and ensuring that industry is aware of research opportunities in HPCCL. CSPP is willing to work with the government to develop appropriate mechanisms for working together.

- C. **NATIONAL RESEARCH AND EDUCATION NETWORK (NREN)** -- The goal is to develop a national high speed network to provide distributed computing capability to research and educational institutions and to further advanced research on very high speed networks and applications. The lead agency is NSF; funding proposed for FY92 is \$91.9 million, or 14% of the initiative. NSF's share of the total FY92 NREN funding will be used primarily to support the continued growth of a strong and flexible interim network. The primary activity under this effort will be the continuing upgrade of the existing internet, including the NSFnet backbone, the regional and midlevel networking structure, and various government agency networks. Gradually, funds will be shifted away from direct support by NSF of physical networks in favor of existing and developing commercial networks and services which compete according to natural market forces. NSF will focus on ensuring network architecture and protocol harmonization to guarantee pervasive end user and application connectivity and interoperability as part of their base programs. Additionally, NSF will use a percentage of its funding (less than 20%) to support new and important initiatives in the areas of network services (e.g. networked libraries), attachment of K-12 institutions, and network research and development including gigabit networking research. Finally, NSF has been designated as the lead agency for the NREN program and will soon have dedicated resources in place to coordinate and manage the program.

DARPA's focus will be on research and development projects in the area of multimedia gigabit networking technologies and systems. DARPA's primary goal will be to pursue these projects in the context of serving the research needs of the Department of Defense. DARPA appears reluctant to engage with industry in goal and priority setting but is open to active collaboration where DARPA and industry goals coincide.

The projects and goals to be pursued with NREN funding in the remaining governmental agencies are not yet well defined. There will likely be some focus on establishing or upgrading the individual agencies' networks or network attachments. There will also be a drive toward developing various mission specific applications that can leverage high speed networks. It is extremely important that these activities be coordinated with NSF and DARPA to ensure that there is no unnecessary duplication of effort and an appropriate leveraging of projects and funds.

CSPP has the following recommendations for improving the effectiveness of the NREN program.

1. CSPP agrees with designating NSF as the lead agency for the NREN program.
2. The NREN program must be well coordinated and managed across the various government agencies to ensure there is no unnecessary duplication of effort, particularly in the R&D for gigabit networking technologies.
3. The records of proceedings and planning documents from meetings of the various NREN coordinating committees should be made generally available within both government and the private sector.
4. The government should work to ensure ubiquitous access to NREN by all government agencies at the federal, state, and local levels, by the American research and education communities, and by the library community.
5. A vehicle should be established for industry participation in the goal setting and prioritization of the various components of the NREN program. Several vehicles currently exist: NSF has named a full-time NREN coordinator to focus on the day-to-day coordination and management of the program; the Federal Networking Council (FNC) coordinates actions by government agencies; and the Federal Networking Advisory Committee (FNAC) is a forum for industry participation. In addition, the Internet Advisory Board (IAB) and the Internet Engineering Task Force (IETF) provide vehicles for technical coordination between governmental agencies, industry, and the scientific community. However, the existence of these organizations is just a first step. First, it is important that their existence, as well as records of their proceedings, be made generally known throughout the government and private sector. Second, it is critical that these organizations and individuals are held accountable to an overall HPCCI management body. Further, DARPA should be encouraged to actively participate in industry-government efforts to set NREN goals and priorities.
6. To ensure successful operation of a network that is now and will continue to be made up of many different networks and protocols, CSPP recommends that efforts under the NREN program focus on interoperability and harmonization of standards.
7. Significant administrative emphasis should be placed on acquiring services within the framework of this interconnected system and making all the services of each component of the system available to the broadest community possible.

8. R&D under the NREN component should promote strong interaction between the telecommunications and computing industries in pursuit of technologies needed to support an emerging high speed multimedia information and communications infrastructure, including the high performance computing systems that will use that infrastructure. The testbed programs currently funded by DARPA and NSF provide a first step toward these goals. Moreover, these projects cover R&D across a broad range of gigabit networking areas including wide area networks, metropolitan area networks, local area networks, and attachment of high performance computing systems. The Administration should work with interested private sector parties to insure that a balance is drawn between promising independent basic research, research focused on local implementations of gigabit systems, and "test-bed" systems.
9. CSPP endorses use of NREN funding to address issues surrounding privatization and commercialization of the NREN.

D. **BASIC RESEARCH AND HUMAN RESOURCES (BRHR)** -- This component provides support for individual investigators and multidisciplinary long term research; initiation of activity to significantly increase the pool of trained personnel; and support for efforts leading to accelerated technology transition. The FY92 budget proposal is \$124.5 million, 20% of the initiative; NSF and DARPA are the major contributors. The BRHR activities are crucial to the success of the HPCCI. Accordingly, OMB and the participating agencies should give these activities a high priority in making budget decisions. Further, the base programs in high performance computing and communications research and infrastructure must be maintained and built upon; the incremental funding proposed for FY92 must remain truly incremental to be effective. The overall funding levels and plans for accomplishing BRHR goals seem reasonable for FY92. The breakdown among subcomponents -- basic research, research participation and training, infrastructure, and education, training and curriculum - - also seems reasonable. However, the agencies have not yet articulated clear goals or objectives for the incremental funding in a form in which measures of success can be effectively developed. CSPP will work with the government to help articulate specific goals and success measures for this component based on the goals we would like the HPCCI achieve.