Record Group/Collection:	George H.W. Bush Presidential Records
Collection/Office of Origin:	Science and Technology Policy, Office of (OSTP)
Series:	Bromley, D. Allan, Files
Subseries:	Correspondence Files

OA/ID Number:	62016
Folder ID Number:	62016-005

Folder Title:
Invitations: Speech (1) [5 of 11] [1991]

Stack:	Row:	Section:	Shelf:	Position:
	0	0	0	0

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION-SPEECH DOCUMENT NUMBER: 9121252

****

SPEECH: YES NO

FROM: GRAY, Paul E.: MIT

DATE OF EVENT: 05/31/91

LOCATION OF EVENT: MIT, CAMBRIDGE, MASSACHUSETTS

TIME OF EVENT: 04:30PM

SUBJECT: INVITATION TO GIVE THE CLOSING LECTURE AT A TWO-DAY SYMPOSIUM HONORING VANNEVAR BUSH.

****

RSVP: 05/13/91

CONTACT PERSON: PROF. HARVEY SAPOLSKY

CONTACT NUMBER:

****

INVITATION ACCEPTED? ~~YES~~ NO

****

COPIES TO:

REMARKS:

Marian,
Write I say will be out of country. Make this a nice one, since I think DAB knows Gray.
Thx

DATE OF LETTER: 04/23/91 DATE RECEIVED: 04/29/91

FILE: P- INVITATION - Speech

9121252

OFFICE OF
THE CHAIRMAN OF THE CORPORATION
ROOM 5-205, 77 MASSACHUSETTS AVENUE

CAMBRIDGE, MASSACHUSETTS 02139
TELEPHONE 617-253-4665

April 23, 1991

Dr. Allan Bromley
Special Assistant for Science and Technology
to the President
The White House
Washington, DC 20506

Dear Allan:

I would like to invite you to give the closing lecture at a two-day symposium honoring Vannevar Bush that MIT is holding May 30-31, 1991. The symposium which is part of the inaugural series for MIT's new president, Charles Vest, has as its theme "Remembering the Past and Shaping the Future of American Science Policy." The session you would give is scheduled for Friday, May 31, 1991, at 4:30 p.m. and will be open to the MIT community. It would be followed by a private reception and dinner if that is convenient for you.

Vannevar Bush did so much to establish the policies that have guided the development of American science and technology over the last 50 years. Inevitably though these policies will change. We are hoping that you will describe some of the changes the administration prefers.

Attached is a program outline for the symposium. Professor Harvey Sapolsky is coordinating the event. He will call your office in a few days to determine whether or not you can participate.

Sincerely yours,

Paul E. Gray

PEG:fg

Enclosure

President Charles M. Vest Inauguration Series

THE VANNEVAR BUSH CENTENNIAL SYMPOSIUM

Remembering the Past and
Shaping the Future of American Science Policy

Sponsored by
The MIT Defense and Arms Control Studies Program

Massachusetts Institute of Technology
Cambridge, Massachusetts

May 30-31, 1991

VANNEVAR BUSH SYMPOSIUM

As one of the activities marking the inauguration of Charles Vest as President of the Massachusetts Institute of Technology, the MIT Defense and Arms Control Studies Program is arranging a symposium on May 30-31, 1991, to commemorate the science policy contributions of Vannevar Bush. the symposium is entitled "Remembering the Past and Shaping the Future of American Science Policy" and is intended to describe the system of government-science relations that Bush helped establish and to chart the significant changes that system is currently undergoing.

The official leader of American science and engineering during the Second World War, Bush helped formulate the policies that have guided engineering education, the federal government's support of basic research, and the generation and utilization of technical knowledge for America's military and industry since then. In all of these fields, Bush sought to shape the future. The Bush Centennial Year, slightly elongated, provides opportunity to reflect on his initiatives and to consider what needs to be done today if the policy challenges of the future are to be met.

Bush had a life of considerable achievement. He invented or helped invent several precursors to modern computers, a justifying typewriter, a phototypesetting machine, submarine detection

devices, and anti-aircraft fire control mechanisms. As director of the Office of Scientific Research and Development during the Second World War, he supervised the atomic bomb project, the development of radar, and hundreds of other contributions of science and engineering to victory. Bush helped found the firm that evolved into the Raytheon Corporation and served on several corporate boards, including Merck and Company, where he became Chairman, and AT&T. At M.I.T. he was Professor of Electrical Engineering, the first Dean of Engineering, Vice President, Chairman and Honorary Chairman of the Corporation. His contribution to government in addition to his wartime service included chairmanship of the National Advisory Committee on Aeronautics and offering recommendations that led to the establishment of the National Science Foundation.

VANNEVAR BUSH SYMPOSIUM

May 30-31, 1991

Program

May 30

Introduction

9 a.m.	Charles M. Vest MIT President	Welcome
	Howard Johnson MIT	Bush and MIT
	David Hamburg President, Carnegie Corporation	Science Policy from Bush to Bush and Beyond

Session I: The Civilian Role in Military R & D

	Jack Ruina MIT	Chair
	Harold Sorenson Vice President, MITRE	
	Michael Dennis National Air and Space Museum	
	Alex Roland Duke University	
	Rod Nichols Carnegie Commission	

Lunch **MIT Faculty Club**

* Dennis J. Picard
Chairman and Chief Executive Officer, Raytheon

Walter Rosenblith
MIT

May 30

2-4 p.m.

Session II: **National Policy for Basic Research**

Carl Kaysen — Chair
MIT

Daniel J. Kevles
California Institute
of Technology

David Robinson
Carnegie Commission

Harvey M. Sapolsky
MIT

Bruce Smith
Brookings Institution

Dinner **MIT Museum**

Mitch Kapor — "As We May Think"
Formerly, Lotus

Charles M. Vest
MIT President

Jay Keyser
MIT

May 31 10 a.m. - Noon

Session III: Private and International Sponsorship of R & D

Michael Dertouzos — Chair
MIT

Michael Schrage
LA Times/Washington Post

Robert Reich
Kennedy School

Suzanne Berger
MIT

Eugene Skolnikoff
MIT

Lunch **MIT Faculty Club**

* P. Roy Vagelos
Chief Executive Officer,
Merck

Lester Thurow, Host
Dean, MIT School of Management

May 31 2-4 p.m.

Session IV: Designing Engineering Education for the Future

Joel Moses — Chair
Dean, MIT School
of Engineering

Gordon Brown
retired Dean, MIT

Paul Penfield
MIT

Granger Morgan
Carnegie Mellon

Kent Bowen
MIT

"CORRESPONDENCE TRACKING"

TYPE: INVITATION-SPEECH DOCUMENT NUMBER: 9121216

****

FROM: MARCHESE, Jim: UNIVERSITY OF WISCONSIN-EAU CLAIRE
715/832-0301

TO: DR. BROMLEY

July
Eau Claire, Wisc.

DATE OF CORRESPONDENCE: 04/17/91

SUBJECT: REQUEST FOR A KEYNOTE SPEAKER WITH A THEME OF SCIENCE, TECHNOLOGY AND EDUCATION TO EXCITE YOUNG PEOPLE TO PURSUE SCIENCE AS A CAREER.

****

ASSIGNED TO: D. Allan Bromley

ACTION REQUIRED:

****

SENDER'S DUE DATE: OSTP DUE DATE: 05/07/91

DATE COMPLETED: 5/3/91

****

COPIES TO: Thomas Ratchford

No

****

WHITE HOUSE TRACKING #: CONTACT PERSON:

REMARKS: 5/9/91 - Regretted to Mr. Marchese, mx

Marian,
Say that he will be too busy to do any additional traveling this summer. Jim

Tom cannot do.

DATE RECEIVED: 04/23/91 FILE: P-INVITATION-SPEECH

9121216

UNIVERSITY OF WISCONSIN-EAU CLAIRE
EAU CLAIRE, WI 54702-4004

Education Outreach
(715) 836-5843

SCIENCE SUMMER INSTITUTE
JULY 8-19, 1991

April 17,1991

Dr. Allen Bromley
The White House
Washington,D.C.
20500

Dear Dr. Bromley:

I am Jim Marchese, coordinator of guest speakers for the University of Wisconsin-Eau Claire Summer Science Institute for High Potential Students (note enclosed brochure). Our main goal is to excite young people to pursue science as a career.

My need is for a dynamic keynote speaker with a theme of science,technology, and education. If you or any of your colleagues have any time to speak with these kids for about 45 minutes between July 8 to July 19, please contact me at your earliest convenience.

Yours truly,

Jim Marchese

Jim Marchese
1220 Webster Ave.
Eau Claire,WI 54701
715-832-0301

TWELFTH ANNUAL

SCIENCE

SUMMER INSTITUTE

FOR HIGH-POTENTIAL STUDENTS

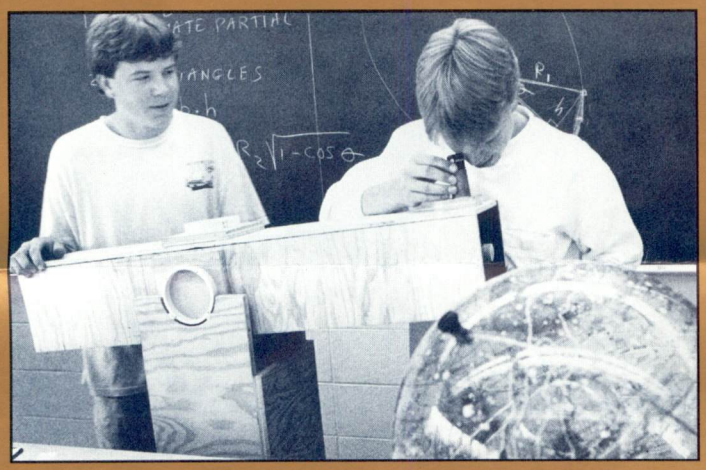
JULY 8-19, 1991
UNIVERSITY OF WISCONSIN-EAU CLAIRE

SPONSORED BY THE UNIVERSITY OF WISCONSIN-EAU CLAIRE EDUCATION OUTREACH AND UW-EXTENSION

Descriptions of the Science Summer Institute Courses

ASTRONOMY

The course will focus on three components: *classroom study* of sky motion, planets, stars, moons, nebulae, galaxies, etc., including laboratory work and planetarium use; *telescope-building* where students will assemble their own 6-inch, reflecting telescope at a cost of only $185 for the components (about 1/4 the cost of commercial units with comparable quality); *sky observing* sessions to learn telescope use and become familiar with sky objects, constellations, star charts, etc. In total, the course provides a comprehensive introduction to an exciting field of science. Telescope fee is $185.00.



AVIATION SCIENCE

"Aviator" enthusiasts are invited to experience the science-related challenges of general aviation pilots. Ground School topics include aerodynamics of flights, radio navigation, instrumentation, cross-country flight planning, instrument landing systems, private pilot license written exam practices, and meteorology for pilots. Also included are airplane ownership information, using personal computers for simulated flight, and careers in aviation. A short flight and field trip are offered at the Eau Claire County Airport fixed base operator.

MEDICAL BIOLOGY

This course provides an introduction to the anatomy and physiology of the human body through "hands on" activities, experiments and group problem-solving in the laboratory. Comparisons between healthy and diseased states for a number of selected body systems will be emphasized. Some of these might include: eating disorders, Lyme disease, heart disease, AIDS, osteoporosis and skeletal trauma and the process of aging. Field trips and visits by experts in these areas will be included.

ACTION ELECTRONICS

Build a robot and other electronic projects and study operating principles and theory related to the devices to be built. "Hands on" lab study of basic electric, electronic and digital circuits will complement construction of various breadboard projects including a seven-segment LED readout. An electronic multitester will be assembled as well as the robot. The student will have the robot, multitester and an electronic lab kit involving 30 different experimental circuits to take home. Special equipment fee is $120.00.

ADVANCED DIGITAL ELECTRONICS

This is a follow-up course to "Action Electronics," physics or other basic electronics courses. The students will construct basic logic gates, shift registers, digital counters, multiplexers, A to D converters, and interface TTL logic to discrete devices. Each student will also build a digital logic probe, a programmable microprocessor, and a digital clock to take home. Special equipment fee is $165.00.

PHYSICS

Students will be introduced to electronics and optics, especially lasers. Laboratory projects will be featured. Topics include relationships of voltage, current and resistance, energy forms, amplifiers and integrated circuits, meters and oscilloscopes, lenses, mirrors, lasers and laser projects. (Students should bring a calculator.)

STUDENT QUALIFICATIONS

☐ 12-16 years of age; minimum education, completion of sixth grade by June 1991 except for prerequisites for certain courses.

☐ recommended by two persons (e.g., science or sixth grade teacher and a coordinator for gifted/talented, counselor or other appropriate person) indicating that the student:

(1) scores at the 90th percentile or above in math and science on standardized tests
(2) can handle abstract concepts well and work 2 or more years above grade level in the topic selected for study
(3) can function successfully in a group for instruction and dorm living (if student is not living at home)
(4) can maintain high motivation and interest in topic selected for study.

☐ desire to study academic science and/or computers is the main reason for the student attending the Institute.

APPLICATION PROCEDURES

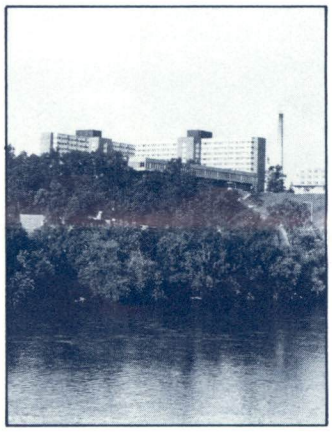
☐ Complete both sides of the application form and send it with a deposit of $50 ($25 non-refundable) directly to Education Outreach Office. Receipt date of application form establishes consideration priority.

☐ Ask two persons who know the applicant to write letters of recommendation *using the student qualification list*. Have the letters sent directly to: Education Outreach Office, Brewer 55, UW-Eau Claire, Eau Claire, WI 54702-4004; (715) 836-5843.

Applications will be considered on a first-come, first-served basis upon receipt of the application form. Teachers or coordinators should be asked to write their letters *as soon as possible* and should be provided with addressed stamped envelopes. It is the student's responsibility to be sure the letters are sent.

Applications will be reviewed by a committee of UW-Eau Claire faculty when the application form and two letters of recommendation are on file. Applicants will be notified of acceptance promptly.

Applications are accepted starting January 15, 1991; the application deadline is April 1, 1991.



Most classes are held in Phillips Science Hall on lower campus. Housing is in Towers Hall on upper campus.

APPLICATION FORM
SCIENCE SUMMER INSTITUTE — 1991

Name: _____ Sex: ☐ M ☐ F Birthdate: _____ Soc. Sec. # _____

Address: _____

City, State & Zip _____

Phone Numbers: Home ( )_____ Office: Father ( )_____ Mother ( )_____

Name(s) of Parent(s): _____

Course Name: First Choice _____ Second Choice _____ Grade In School (90-91) _____

School Attended: _____
Name Address City State Zip

Make $50 deposit check ($25 non-refundable) payable to UW-Eau Claire and return this application and check to: Education Outreach Office, Brewer 55, UW-Eau Claire, Eau Claire, WI 54702-4004; phone (715) 836-5843.

Application Deadline: *April 1, 1991*
Please complete other side of form before mailing.

Office Use Only

← *OVER*

DORM LIFE AND SCHEDULES

Students in the Science Institute may choose to commute or live in dormitories at UW-Eau Claire and eat in adjoining dining areas. The living fee includes 12 nights lodging and three meals daily; that is, the nights of July 7-18 and meals from dinner on July 7 through lunch on July 19. Eau Claire area students may live in the dorms or live at home and attend on a day basis.

Students will be supervised by an adult resident coordinator and resident college student counselors at meals, during sports and other activities and events and in the evenings. A typical weekday schedule follows:

Breakfast	8:00 a.m.
Class	9:00 a.m.-Noon
Lunch	Noon-1:00 p.m.
Class	1:00-3:00 p.m.
Recreation/Study	3:00-5:00 p.m.
Dinner	5:00-6:00 p.m.
Study/Recreation/Free	6:00-10:00 p.m.

Activities, which are arranged between 3 and 5 p.m. and after dinner for students who live in the dorms, will include sports, excursions, and cultural events such as plays and concerts. Facilities for swimming, bowling and exercise will be available in addition to outdoor activities. Students will have study time set aside for the after-class work related to their classes. They will also have access to University libraries and computers.

A special event will be planned for the weekend of July 13-14. There will also be picnics, competitions and other group activities.

Those students who find it difficult to return home on Friday afternoon may choose to remain in the dormitory Friday night for an additional fee. *Arrangements must be made before the start of the Institute.* Contact the Education Outreach Office for more details.

FEES

Costs for the two-week Institute are:

$230.00	Room (double occupancy) and 3 meals daily, supervision, recreational activities, sports
$250.00	Instruction, field trips, resource persons, instructional materials, and an Institute T-shirt. (Day students pay only this fee.)
$480.00	**Total Costs** (Telescope parts for the Astronomy course and equipment fees for the Electronics courses are **extra.)**

A deposit of $50 ($25 non-refundable) is due with registration. Payments may then be made at a schedule of your choice. **The total fees are due no later than May 31, 1991.**

Financial Aid: Some partial tuition grants are available through the Association for High-Potential Children, Inc. Tuition grants are based on need. To be considered, please request a form from the Education Outreach office. Deadline for tuition grant applications is April 1, 1991, and notification of grant distribution will be within two weeks. Should we be unable to award you the requested assistance, and you choose not to attend the Institute, your $50 deposit will be refunded.

Cancellations and Refunds: UW-Eau Claire reserves the right to cancel any program due to insufficient enrollment. In this event, registrants will be notified and offered full refund or the opportunity to enroll in an alternative class. In all other cases, a registrant who chooses to cancel will be charged a handling fee of $25.00 for cancellations prior to April 1 and $50.00 for cancellations between April 1 and June 21. These amounts will be subtracted from any refunds requested by registrants who cancel. After June 21, refunds will be granted only for medical reasons and must be accompanied by a doctor's signed statement of explanation.

TRANSPORTATION

Students must provide their own transportation to and from the Institute. There will be pick-up and delivery available to the Eau Claire bus station and the Eau Claire County airport.

Please provide the information requested below about the persons who are recommending the student for the Science Summer Institute.

Previous Student: Year _____ Class _____ No new letters needed.

Science Teacher/ Classroom Teacher:

Name _____ Title _____

Address _____ City _____ State & Zip _____

Phones: School ( ) _____ Home ( ) _____

Coordinator/Counselor:

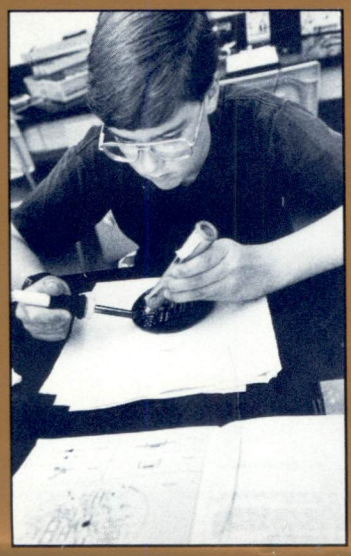
Name _____ Title _____

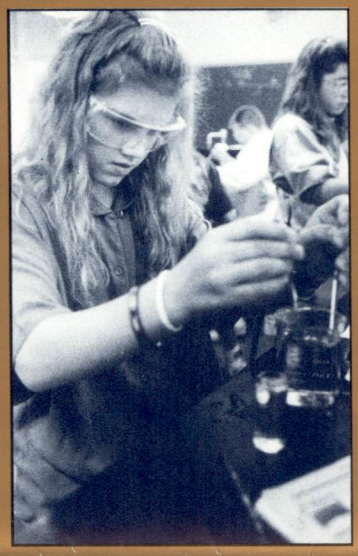
Address _____ City _____ State & Zip _____

Phone: School ( ) _____ Home ( ) _____

CHEMISTRY

This course allows students to investigate some of the basic concepts of chemistry and its applications in our environment and our lifestyles. Students will spend most of their time in the laboratory doing and learning from experiments. Subjects include basic atomic structure, chemical properties and reactions, methods of analysis, energy in reactions and practical applications in the chemistry of foods, medicinal products and plastics.





ADVANCED LOGO— COMPUTERS BEYOND THE TURTLE

Much like chess, the Logo programming language takes only minutes to learn, but a lifetime to master. This class will include some comparisons of procedural and non-procedural languages and compiled and interpretive languages. Students will use the Logo language to learn advanced programming techniques such as divide-and-conquer problem solving, modular programming, recursion and data structures. Challenges to use these techniques will be in areas of ''Visual Modeling,'' artificial intelligence, and graphic simulation. (Prerequisites: Formal programming experience in any language with some knowledge of a procedural language. Student must be familiar with procedures, functions, parameters, and return values.)

EXPERIMENTAL GEOLOGY

Through hands-on activities, model constructions and field trips, this course introduces methods for studying geological materials and processes. Students will explore the world of rocks, minerals and fossils and learn about earthquakes, planets, plate movements, evolution and earth processes. Projects include use of maps and compass, chemical and physical tests of minerals, identification of rocks and minerals, field trips to local outcrops, collection and extraction of fossil specimens, mapping planetary terrains, and studying an actual earthquake record. Participating students will also examine problems related to natural hazards, origins and limitations of our geological resources and impact of human activities on earth's environment.

EXPERIMENTAL PSYCHOLOGY

This course has two aims: 1) to help students learn to apply the scientific method to the analysis of human behavior; and 2) to teach students to think critically about what we do and do not know about human behavior. A strong emphasis on ''hands on'' laboratory experiences teaches the scientific method. Structured thinking exercises, discussion, and debate foster critical thinking about major topics such as learning, motivation, perception, personality, thinking, and social group behavior.

VETERINARY MEDICINE

The course is designed as an introduction to veterinary medicine and includes a combination of laboratory and discussion. Topics include reproduction and the genital-urinary system, hematology, parasitology, radiology, anaesthesiology and surgery. Students will have ''hands on'' experiences working in the veterinary laboratory and observing in surgery. Field trips will be a special part of the learning experience. Class will meet on the campus and at the Eau Claire Animal Hospital or other local animal hospitals. (Prerequisites: completion of eighth grade and a basic biology/life science course in junior/senior high school.)

SUPERCOMPUTER APPLICATIONS-TECHNOLOGY IN THE SCIENCES

Here is a special opportunity to work directly with a supercomputer. An overview of the Cray X-MP supercomputer will be shared through pictures, slides, and examination of the internal structure of this powerful machine. Questions about how it works and what makes it a supercomputer will be explored. Then national networking with Lawrence Livermore National Laboratory, California, will be explained and experienced. Students will then work on PC's to improve skills in problem-solving and creativity and, utilizing networking with the Cray X-MP, experience how technology can enhance their solutions. Applications will be in the subject areas of graphics and ray tracing, global warming, and particle physics. Students will experience being a ''scientist'' and learn how technology helps science.

General Information About the Institute

The twelfth annual *Science Summer Institute* for 12- to 16-year-olds is designed to provide opportunities for high-potential students to explore a science or science-related topic intensively for a two-week period. Also, students will have opportunities to interact with specialists in several fields of science, mathematics and computers.

The 1991 *Science Summer Institute* will offer a choice of 12 courses—astronomy, aviation science, medical biology, action electronics, advanced digital electronics, chemistry, physics, veterinary medicine, experimental psychology, experimental geology, advanced logo and supercomputer applications. Each course will include 50 hours of instruction and each participant will select one course for study. Class limit is 18 participants.

Objectives for each course include opportunities for students to learn about the knowledge base in their area of study, to learn the methodology of carrying out scientific investigation in the laboratory and field, to work with instruments and techniques and to apply the knowledge.

This Institute, in its twelfth year, has become a model for programs in Wisconsin and other areas. It offers students unusual and inspiring opportunities to develop their academic potential, to gain new knowledge and to make lasting friendships with others who have similar interests and aspirations. In addition, students have opportunities to use the facilities of a university campus and to interact with outstanding instructors from the University of Wisconsin-Eau Claire, area school faculties and the community.

Classes for the Institute will be held on the UW-Eau Claire campus. Resident students will live in the University dormitories under appropriate supervision. After-class activities will include sports, cultural events and trips. Both residential and day students are welcome.

Students can apply for the Institute by completing the application form in this brochure and arranging for two letters of recommendation. Letters are requested to help ensure a successful experience for each student. Parents, teachers and counselors are encouraged to call the Education Outreach Office if they have questions.

Course descriptions, living and instruction costs, student qualifications and application procedures are presented elsewhere in this brochure. In 1990, 209 students from 10 states attended the Institute. You are invited to apply in 1991!

Direct inquiries to: Education Outreach Office, Brewer 55, UW-Eau Claire, Eau Claire, WI 54702-4004
Telephone (715) 836-5843

Science Summer Institute
Education Outreach
Brewer Hall 55
University of Wisconsin-Eau Claire
Eau Claire, WI 54702-4004

Non-Profit Org.
U.S. Postage
PAID
Permit No. 219
Eau Claire, WI

TWELFTH ANNUAL
SCIENCE
SUMMER INSTITUTE
FOR HIGH-POTENTIAL STUDENTS

July 8-19, 1991

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION-SPEECH DOCUMENT NUMBER: 9121360

****

SPEECH: YES NO

FROM: NASH, Martin, Forrest Anthony, Frank Kung and Bruce Mackler: ASSOCIATION OF BIOTECHNOLOGY

DATE OF EVENT: 05/14/91

LOCATION OF EVENT: WASHINGTON, D.C.

TIME OF EVENT: 01:15PM

SUBJECT: INVITATION TO BE THE KEYNOTE LUNCHEON SPEAKER AT THEIR ANNUAL MEETING.

****

RSVP: 05/08/91

CONTACT PERSON: DR. BRUCE MACKLER

CONTACT NUMBER: 202/861-1539

****

INVITATION ACCEPTED? YES (NO)

****

COPIES TO: LIFE SCIENCES

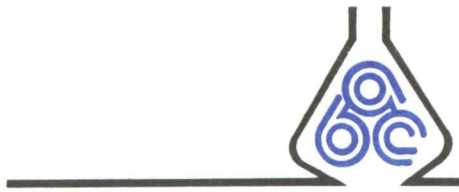
REMARKS:

Regrets conveyed to Bruce Mackler by Ken Yale.
Steve Osm (05/09/91)

DATE OF LETTER: 04/23/91 DATE RECEIVED: 05/08/91

FILE: P- INVITATION-SPEECH

9121360



Association of Biotechnology Companies

RECEIVED
91 MAY 8 A10 : 54
OFFICE OF THE DIRECTOR

April 23, 1991

The Honorable D. Allan Bromley
Assistant to the President for
Science and Technology
Executive Office of the President
Washington, D.C. 20500

Dear Dr. Bromley:

Thank you for your strong and ongoing support of the U.S. biotechnology industry. We appreciate the significant role you and your staff play in the oversight and administrative policy towards our industry. Science, particularly NIH and NSF funded research are critical to the continual innovation and growth of biotechnology.

For this reason, we would like to invite you, on behalf of the Association of Biotechnology Companies, to be a keynote luncheon speaker at our annual meeting which will be held in Washington, D.C., May 13-16, 1991. Your address is tentatively scheduled for 1:15 p.m. on Tuesday, May 14th, but we would, of course, be willing to work with you to accommodate your schedule.

By way of background, ABC is a not-for-profit trade association with over 250 members consisting of: biotechnology and pharmaceutical companies; academic and state biotechnology centers; not-for-profit and government-affiliated entities; and, other organizations interested in biotechnology. ABC was founded to represent the unique and diverse interests, both business and scientific, of small biotechnology companies. In addition to the areas mentioned above, other areas of interest to ABC are Federal research support for biotechnology, small business issues, Federal regulation of biotechnology, research and development tax credits, and the European Community 1992. We have attached a brochure on ABC for your information.

1666 Connecticut Avenue, NW, Suite 330 • Washington, DC 20009-1039 USA
(202) 234-3330 • Telefax (202) 234-3565

Based upon registration at previous meetings, attendance at the Annual Meeting is expected to number about 600. Registration is open to all in the biotechnology industry and will include ABC members, officials and staff of Federal agencies, the press (including the trade press), and members of other scientific associations.

If we can be of any assistance or answer any questions, please feel free to contact Dr. Bruce F. Mackler at 202-861-1539.

We hope that your schedule will permit you to join us. Thank you for your consideration of this matter and we look forward to hearing from you.

Sincerely,

Martin Nash
President, ABC and
President
Regentech, Inc.

Forrest H. Anthony, M.D., Ph.D.
President-Elect, ABC and
President
Quality Biotech Inc.

Frank F. C. Kung, Ph.D.
Vice President, ABC and
President & CEO
Genelabs, Inc.

Bruce F. Mackler, Ph.D., Esq.
General Counsel, ABC and
Partner
Baker & Hostetler

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION-SPEECH DOCUMENT NUMBER: 9121233

****

SPEECH: YES NO

FROM: Verrick French

DATE OF EVENT: 05/15/91

LOCATION OF EVENT: HOTEL WASHINGTON

TIME OF EVENT: 06:00PM

SUBJECT: Speak to the Board of Directors and membership ofthe International Electronics Manufacturers and Consumers of America

****

RSVP: 05/01/91

CONTACT PERSON: Verrick French

CONTACT NUMBER: 202 783-7276

****

INVITATION ACCEPTED? YES NO

****

COPIES TO:

In USSR

REMARKS:

Marian,
Call & say will be in USSR.
Thx

5/15/91 - Regretted to Tracy Gilman!
MM

DATE OF LETTER: 04/23/91 DATE RECEIVED:

FILE: P-Invitation-Speech

9121233

International Electronics Manufacturers and Consumers of America, Inc.

Suite 1260, The Willard, 1455 Pennsylvania Ave., N.W., Washington, D.C. 20004

Telephone
(202) 783-7276

Facsimile
(202) 783-4345

Keith H. Smith
Executive Director

April 23, 1991

Honorable D. Allan Bromley
Assistant to the President
for Science and Technology
Room 360
Old Executive Office Building
Seventeenth Street and Pennsylvania Avenue, N.W.
Washington, D.C. 20506

Dear Dr. Bromley:

I am writing to invite you to speak briefly and informally during the rescheduled annual meeting of the Board of Directors and membership of the International Electronics Manufacturers and Consumers of America (IEMCA), at any time between 6:00 and 8:00 p.m. on Wednesday, May 15, 1991, or 8:30 a.m. and 1:30 p.m. on Thursday, May 16, 1991, at the Hotel Washington, 15th Street and Pennsylvania Avenue, N.W., here in town.

IEMCA is an American trade association composed of the United States manufacturing subsidiaries of 18 major overseas electronics companies, including, for example, Fujitsu America, Hitachi America, the Matsushita Electric Corporation of America, Mitsubishi Electronics America, and the Sony Corporation of America, plus the National Office Machine Dealers Association, and the J.C. Penney Company. During the past decade, all of IEMCA's manufacturing members have established substantial and rapidly expanding plants in the United States which produce virtually every kind of commercial and consumer electronics product. Collectively their American investment exceeds an estimated $35 billion, their annual United States sales exceed $30 billion, and their current American employment is over 175,000 people. In addition, the organization includes a dozen well-known Washington law firms and consulting firms retained by IEMCA's members.

IEMCA's members are committed to freer international trade, in general, and committed, in particular, to an improved trading relationship between the United States, Japan, and Europe. Their specific concerns include, for example, the Section 301 process, the structural impediments initiative, foreign investment in the United States, intellectual property law and regulation, antidumping law and regulation, international tax policy, re-extension of "fast-track" authority, the GATT Uruguay Round, and the proposed North American Free Trade Agreement.

I will be happy to provide you with additional information about IEMCA, its officers and members, and the event on May 16.

Sincerely,

Verrick O. French
President,
French & Company, and
Consultant to IEMCA

"CORRESPONDENCE TRACKING"

TYPE: INFORMATION DOCUMENT NUMBER: 9121234

****

FROM: SCHRIESHEIM, A.

TO: DR. BROMLEY

DATE OF CORRESPONDENCE: 04/22/91

SUBJECT: A THANK YOU FOR ACCEPTING TO SPEAK ON JUNE 20 AT THE DIRECTOR'S COLLOQUIUM AT ARGONNE NATIONAL LABORATORY

****

ASSIGNED TO: D. Allan Bromley

ACTION REQUIRED:

****

SENDER'S DUE DATE: OSTP DUE DATE:

DATE COMPLETED:

****

COPIES TO:

****

WHITE HOUSE TRACKING #: CONTACT PERSON:

REMARKS:

DATE RECEIVED: FILE: P INVITE-SPEECH ~~FOLLOW-UP~~

9121234

ARGONNE NATIONAL LABORATORY
9700 SOUTH CASS AVENUE, ARGONNE, ILLINOIS 60439
TELEPHONE 312/972-3872
FAX 312/972-3679

April 22, 1991

Dr. D. Allan Bromley
Assistant to the President for
Science and Technology
Executive Office of the President
Washington, DC 20506

Dear Allan,

I'm delighted that you will be able to visit Argonne on June 20th to speak at the Director's Colloquium. It will be a wonderful opportunity for our staff and a particular personal pleasure for me. Dr. Valentin, who chairs the Colloquium committee, has been in contact with your office and will coordinate the details of your visit.

I'm also looking forward to joining you on the upcoming visit to the Soviet Union and will be talking with you then.

Regards,

A. Schriesheim, Director

RAV/AS:sam

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION-SPEECH DOCUMENT NUMBER: 9121153

****

SPEECH: YES NO

FROM: WILLIAMS, Susan: BRACY WILLIAMS & COMPANY

DATE OF EVENT: 05/01/91

LOCATION OF EVENT: 1625 M STREET N.W., WASHINGTON

TIME OF EVENT: 10:00AM

SUBJECT: INVITATION TO BE THE FEATURED SPEAKER AT THE WESTERN FUELS ASSOCIATION'S ANNUAL BOARD OF DIRECTORS MEETING ON THE SUBJECT OF GLOBAL WARMING.

****

RSVP: 04/22/91

CONTACT PERSON:

CONTACT NUMBER:

****

INVITATION ACCEPTED? [redacted] NO

****

COPIES TO: Thomas Ratchford
Nancy Maynard

REMARKS: 4/30/91 - Regretted! mr

DATE OF LETTER: 04/17/91 DATE RECEIVED: 04/17/91

FILE: P- INVITATION-SPEECH

Bracy Williams & Company

Government & Public Affairs Consultants

April 17, 1991

Dr. Allan D. Bromley
Assistant to the President
for Science and Technology
Old Executive Office Building
17th St. and Pennsylvania Ave., N.W.
Washington, D.C. 20506

Dear Dr. Bromley:

I am writing on behalf of the Western Fuels Association to invite you to be the featured speaker at its annual Board of Directors meeting to be held in Washington on Wednesday, May 1, 1991.

The Western Fuels Association is a national fuel supply cooperative operating on a not-for-profit basis and providing fuel supply services to consumer-owned utilities in the Rocky Mountain West, the Great Plains, and the Southwest.

As both a coal producer and consumer, the Western Fuels Association has been deeply involved with the issue of global climate change. The Association has worked with members of the scientific community in an attempt to promote more balanced, broad-based and objective research on the issue.

To that end, the Association is extending this invitation for you to speak to its Board on the subject of global warming. The meeting will be held at 10 a.m., Wednesday, May 1, 1991, at the Western Fuels Association offices at 1625 M Street N.W., in Washington.

I understand that there are many demands for your time but we at the Western Fuels Association are hopeful that you can attend and give us your views of this increasingly important subject.

Sincerely,

Susan Williams

1000 Connecticut Ave., N.W. Suite 304 Washington, D.C. 20036 (202) 659-4805 FAX (202) 331-3247

TRANSMITTED FROM 2026 94805 i 04.17.91 15:54 P.01 *

Bracy Williams & Company

Government & Public Affairs Consultants

TELECOPY COVER SHEET

2 pages, including this page

TO: Allen Bromley

FR: Susan Williams

If you do not receive all pages, or if you have further questions, please call: (202) 659-4805.

1000 Connecticut Ave., N.W. Suite 304 Washington, D.C. 20036 (202) 659-4805 FAX (202) 331-3247

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION-SPEECH DOCUMENT NUMBER: 9121126

****

SPEECH: YES NO

FROM: TRULL, Frankie L.: NABR

DATE OF EVENT: 05/20/91

LOCATION OF EVENT: CAPITAL HILTON HOTEL, 16TH & K STREETS, N.W.

TIME OF EVENT: 09:00AM

SUBJECT: INVITATION TO OPEN THE NATIONAL ASSOCIATION FOR BIOMEDICAL RESEARCH'S 1991 ANNUAL CONFERENCE.

****

RSVP: 04/30/91

CONTACT PERSON:

CONTACT NUMBER:

****

INVITATION ACCEPTED? YES NO

****

COPIES TO: Dr. Henderson

REMARKS: Marian,
Write him that DAB cannot do it but "I understand that you have been in contact with O.A. Henderson's office to inquire about his availability. I hope he can meet with you."
Jane

DATE OF LETTER: 03/29/91 DATE RECEIVED: 04/16/91

FILE: P. INVITATION-SPEECH

9121126

NABR NATIONAL ASSOCIATION FOR BIOMEDICAL RESEARCH

RECEIVED

91 APR 16 A10 : 18

OFFICE OF THE DIRECTOR

March 29, 1991

D. Allan Bromley, Ph.D.
Special Assistant to the President and
Director, Office of Science and
Technology Policy
Old Executive Office Building
17th Street and Pennsylvania Avenue, N.W.
Washington, D. C. 20506

Dear Dr. Bromley:

Please accept the National Association for Biomedical Research's invitation to open its 1991 annual conference on Monday, May 20 at 9:00 a.m. in the Capital Hilton Hotel, 16th and K Streets, N.W., Washington, D.C.

The conference will be attended by representatives of Association member institutions which include 350 universities, medical and veterinary schools, academic and professional societies, and voluntary health organizations as well as pharmaceutical and other research intensive companies. The purpose of the conference is to discuss current legislative and regulatory activities affecting the use of laboratory animals in research, testing and education. Attendees will spend the second day of the conference visiting their Members of Congress. They would very much appreciate hearing your views on communicating with elected officials, federal agencies and the public concerning the process and needs of science.

We do hope your crowded schedule will allow you meet and briefly address the NABR membership. I know that they would welcome the opportunity to hear your remarks, and also to thank you in person for your activities on behalf of science. My office will be in touch with yours to learn whether you will be able to attend.

Thank you very much for considering our invitation; we hope to see you in May.

Sincerely,

Frankie L. Trull

Frankie L. Trull
President

818 Connecticut Avenue, N.W. • Suite 303 • Washington, D.C. 20006 • (202) 857-0540 • FAX (202) 659-1902

THE WHITE HOUSE

WASHINGTON

May 13, 1991

Dear Ms. Trull:

Thank you for your letter of March 29, 1991, inviting me to open the NABR annual conference on May 20, 1991. I apologize for the much belated response.

Unfortunately, due to scheduling difficulties, I will not be able to accept you kind invitation, as much as I would like to have done so. I understand that you have been in contact with Dr. D. A. Henderson's office to inquire about his availability. I hope he can meet with you.

I appreciate your thinking of me and would like to offer my best wishes for a successful conference.

Sincerely yours,

D. Allan Bromley
The Assistant to the President
for
Science and Technology

Ms. Frankie L. Trull
President
National Association for Biomedical Research
818 Connecticut Avenue, N.W., Suite 303
Washington, D.C. 20006

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION-SPEECH DOCUMENT NUMBER: 9121111

****

SPEECH: YES NO

FROM: LAWSON, Richard L.: NATIONAL COAL ASSOCIATION

DATE OF EVENT: 06/21/91

LOCATION OF EVENT: GREENBRIER HOTEL, WHITE SULPHUR SPRINGS, WV

TIME OF EVENT:

SUBJECT: REQUEST TO PARTICIPATE IN A MORNING BUSINESS SESSION TITLED, "ENERGY NEEDS & CLIMATE CHANGE POLICY OPTIONS FOR THE 90'S" OF THE NCA'A 74th ANNIVERSARY CONVENTION.

****

RSVP: 04/29/91

CONTACT PERSON: DAN GERKIN

CONTACT NUMBER: 202/463-2659

****

INVITATION ACCEPTED? [redacted] NO

****

COPIES TO: Thomas Ratchford
Nancy Maynard
Dr. Wong

REMARKS:

4/16/91 - Regretted to Shirley. mw

DATE OF LETTER: 04/11/91 DATE RECEIVED: 04/15/91

FILE: D. INVITATION-SPEECH

9121111

NATIONAL
COAL
ASSOCIATION

RICHARD L. LAWSON
President
(202) 463-2647

April 11, 1991

Mr. Allan Bromley
Assistant to the President for
Science and Technology
Office of Science and Technology Policy
Old Executive Office Building
17th Street & Pennsylvania Ave., N.W.
Washington, D.C. 20506

Dear Mr. Bromley:

The National Coal Association (NCA) is planning its 74th anniversary convention June 20-23, 1991, at the Greenbrier Hotel, White Sulphur Springs, WV. With the theme *Coal: Freedom's Foundation*, our program objective is to examine key energy and environmental policy issues, as well as the important link between coal and electricity.

It is my pleasure to invite you to participate in a morning business session on June 21 titled, *Energy Needs and Climate Change-Policy Options for the '90s*. Our members would be most interested in your perspectives regarding the Administration's position on global climate change issues, congressional climate change initiatives, a status of the Intergovernmental Panel on Climate Change activities and its potential impact on U.S. energy policy development. Your prepared remarks should last approximately 20 minutes.

As you know, NCA is the national trade organization for coal and represents the entire spectrum of the industry's producers--small, medium and large--as well as numerous major equipment manufacturers and suppliers, transporters, utilities and others interested in coal. Last year, NCA members produced approximately 65 percent of the nation's coal tonnage.

I hope your schedule will allow you to join us and enjoy the magnificent facilities at the Greenbrier. If you have any questions or need additional information, please call me or Dan Gerkin (202) 463-2659. I hope to hear from you soon.

Sincerely,

Richard L. Lawson

Richard L. Lawson

1130 Seventeenth Street, N.W.
Washington, D.C. 20036-4677

(202) 463-2625
FAX: (202) 463-6152

"CORRESPONDENCE TRACKING"

TYPE: INFORMATION DOCUMENT NUMBER: 9121115

****

FROM: VAN DOMELEN, John F.: WENTWORTH INSTITUTE OF TECHNOLOGY

TO: DR. BROMLEY

DATE OF CORRESPONDENCE: 04/09/91

SUBJECT: APPRECIATION FOR DR. BROMLEY'S PARTICIPATION IN THE ACADEMIC SYMPOSIUM.

****

ASSIGNED TO:

ACTION REQUIRED:

****

SENDER'S DUE DATE: OSTP DUE DATE:

DATE COMPLETED:

****

COPIES TO: D. Allan Bromley

****

WHITE HOUSE TRACKING #: CONTACT PERSON:

REMARKS:

DATE RECEIVED: 04/15/91 FILE: P-INVITATION SPEECH ~~FOLLOWUP~~

9121115

RECEIVED

Office of the President 91 APR 15 AM : 16

OFFICE OF THE DIRECTOR

Wentworth
Institute of Technology

April 9, 1991

Dr. D. Allan Bromley
Assistant to the President
The White House
Washington, D.C. 20506

Dear Dr. Bromley:

I want to express my deep appreciation for your participation in our Academic Symposium - a highlight of the inaugural events. Your remarks were timely, warmly received and continue to spark lively and thoughtful discussion on campus.

It is indeed a pleasure to welcome you to the Wentworth family. I will take advantage of your offer and will stay in touch. You deserve news about your alma mater and the progress it makes towards its goal of developing a new curriculum for the teaching of technology.

Warm regards,

John F. Van Domelen
President

JVD/rs
Mac#R16

xc: File
Chrono

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION-SPEECH DOCUMENT NUMBER: 9121084

****

SPEECH: YES NO

FROM: DAVIS, Irwin L.: UNIVERSITY HILL CORPORATION

DATE OF EVENT:

LOCATION OF EVENT: SYRACUSE, NEW YORK

TIME OF EVENT:

SUBJECT: REQUEST TO SPEAK AT THEIR ANNUAL MEETING (to be scheduled at your convenience in June).

****

RSVP: 04/26/91

CONTACT PERSON: DAVID MANKIEWICZ

CONTACT NUMBER: 315/475-7244

****

INVITATION ACCEPTED? YES NO

****

COPIES TO: Dr. Phillips

REMARKS:

DATE OF LETTER: 04/08/91 DATE RECEIVED: 04/12/91

FILE: P- INVITATION-SPEECH

THE WHITE HOUSE

WASHINGTON

April 18, 1991

Dear Mr. Davis:

Thank you for your letter of April 8, 1991, inviting me to speak at your Annual Meeting scheduled to be held in Syracuse in June.

However, the number of requests I have received for the month of June is overwhelming, so as much as I would like to join you, I must regretfully decline.

I appreciate your thinking of me and wish you a successful meeting.

Sincerely yours,

D. Allan Bromley
The Assistant to the President
for
Science and Technology

Mr. Irwin L. Davis
President
University Hill Corporation
736 Irving Avenue
Crouse Unit, East Wing, Room 252
Syracuse, New York 13210

9121084

University Hill Corporation

James W. Maher, Chairman
Irwin L. Davis, President
David A. Mankiewicz, Executive Vice President

April 8, 1991

Dr. Allan Bromley,
President's Science Advisor
Old Executive Office Building
Room 358
Washington, D.C. 20500

Dear Dr. Bromley:

The University Hill Corporation is a private, not for profit organization which seeks to encourage the growth and development of the University Hill area in Syracuse. The Corporation was created in 1963 and has among its members the major educational and medical institutions, businesses, religious organizations and others who are concerned with the future of University Hill. Our major institutional members include Syracuse University, the SUNY Health Science Center at Syracuse, the SUNY College of Environmental Science and Forestry, the Veterans Administration Medical Center and Crouse Irving Memorial Hospital.

On behalf of the membership of the University Hill Corporation, I am asking you to speak at our Annual Meeting which would be scheduled at your convenience in June. Given the location of the major research institutions of the community within our area, our membership is extremely interested in the subjects of technology development and technology transfer, and using the scientific expertise of the institutions to stimulate economic development.

We are now undertaking a cooperative effort with Cornell University, Syracuse University, and the business leadership of the Central New York area represented by the Metropolitan Development Association to create the "supercomputing corridor" between Cornell and Syracuse. This program seeks to take advantage of Cornell's supercomputing center (funded by NSF) and the parallel processing expertise at Syracuse (funded by DAPPA)

736 Irving Avenue - Crouse Unit - East Wing - Room 252 Syracuse, NY 13210 Tel: (315) 475-7244

to make Central New York one of the centers of the next generation of computer development.

I would appreciate it if you could let us know if you could attend our meeting as our guest. We will have approximately 200 guests including the public and private leadership of Central New York, and the luncheon will be held at Syracuse University.

If you or your staff have any questions, please feel free to contact David Mankiewicz or me at (315) 475-7244.

Thank you for your consideration.

Sincerely,

Irwin L. Davis
President

cc: Hon. James Walsh
Hon. Alfonse D'Amato
H. Douglas Barclay

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION-SPEECH DOCUMENT NUMBER: 9121197

****

SPEECH: YES NO

FROM: STENBAEK, Marianne: McGILL

DATE OF EVENT: 01/22/92

LOCATION OF EVENT: MONTREAL

TIME OF EVENT:

SUBJECT: INVITATION TO BE THE KEYNOTE SPEAKER AT THE OPENING PLENARY SESSION OF THE POLARTECH '92 CONFERENCE.

****

RSVP: 05/06/91

CONTACT PERSON:

CONTACT NUMBER:

****

INVITATION ACCEPTED? YES NO

****

COPIES TO: Dr. Phillips
Thomas Ratchford

REMARKS:

DATE OF LETTER: 04/11/91 DATE RECEIVED: 04/22/91

FILE: P- INVITATION-SPEECH

9121197

McGill

RECEIVED

Centre for Northern Studies and Research

McGill University
Burnside Hall
Room 720

805 Sherbrooke Street West
Montreal, Quebec, Canada
H3A 2K6

Tel.: (514) 398-6052
Fax: (514) 398-8364
Telex: 05 268510

91 APR 22 P 2:25

OFFICE OF THE DIRECTOR

April 11, 1991

Mr. D. Allan Bromley
Science Advisor to the President
and Director of the Office of S&T Policy
Room 358 - Old Executive Office Bldg.
White House Complex
17th & Pennsylvania NW
Washington, DC 20506

Dear Mr. Bromley,

On behalf of the executive organizing committee I want to take this opportunity to officially invite you to be a keynote speaker at the opening plenary session of the Polartech '92 conference. This very prestigious and multi-faceted event will take place in Montreal, January 22-25, 1992. Polartech '92 will involve some 400 to 500 participants from all the circumpolar countries as well as other countries interested in the development of polar technologies. There will be scholars, professionals, civil servants, entrepreneurs from these regions.

The general theme of Polartech '92 is the development and commercial utilization of technologies in polar regions. The sub-themes are:

a. Application of Polar Technology
b. Offshore and Onshore Hydrocarbon Technology
c. Hydropower and Mining Technology
d. Polar Environment and Technology
e. Small Businesses and Technology.
f. Polar Telecommunications

It will also be a multi-faceted event because it follows immediately upon the Fifth Winter Cities Biennale, staged by the City of Montreal and includes a Mayor's conference forum, a competition of ideas, an exhibition, as well as a "Business Rendez-Vous" organised by the Chamber of Commerce and business people, all of these events will be combined with a comprehensive cultural and social program. The whole focus of this week in Montreal will be 'northern regions'.

.../2

POLARTECH '92

We are inviting all the ministers of science and technology/ industry from the circumpolar countries. It is our expectation to make the first day a very high-powered and high profile introduction and discussion of the circumpolar countries' expertise and future development of polar technologies.

As one of our keynote speakers, we would ask of you to speak about development and application of polar technology in your country. We hope that our invitation will interest you and that you will find time in your busy schedule to make room to make this international event a truly successful one.

We look forward to hearing from you.

Sincerely Yours,

Marianne Stenbaek, Ph.D.
Director
Centre for Northern Studies and Research

encl.

THE WHITE HOUSE

WASHINGTON

June 4, 1991

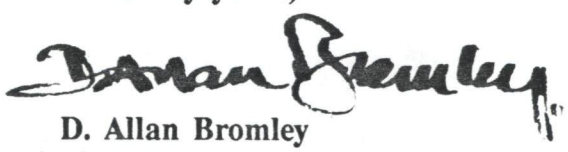
Dear Dr. Stenbaek:

Thank you for your letter of April 11, 1991, inviting me to be a keynote speaker at the opening session of the Polartech '92 conference scheduled for January 22-25, 1992.

I would very much like to attend the conference and would tentatively accept your invitation. However, because that particular time is during our budget season, I cannot make a firm commitment this far in advance. Please write to me later this fall, and by that time I should be able to give you a definite answer.

Thank you for thinking of me. I look forward to hearing from you later this year.

Sincerely yours,



D. Allan Bromley
The Assistant to the President
for
Science and Technology

Dr. Marianne Stenbaek
Director
Centre for Northern Studies and Research
McGill University
Burnside Hall - Room 720
805 Sherbrooke Street West
Montreal, Quebec, Canada
H3A 2K6

5e BIENNALE INTERNATIONALE DES VILLES D'HIVER

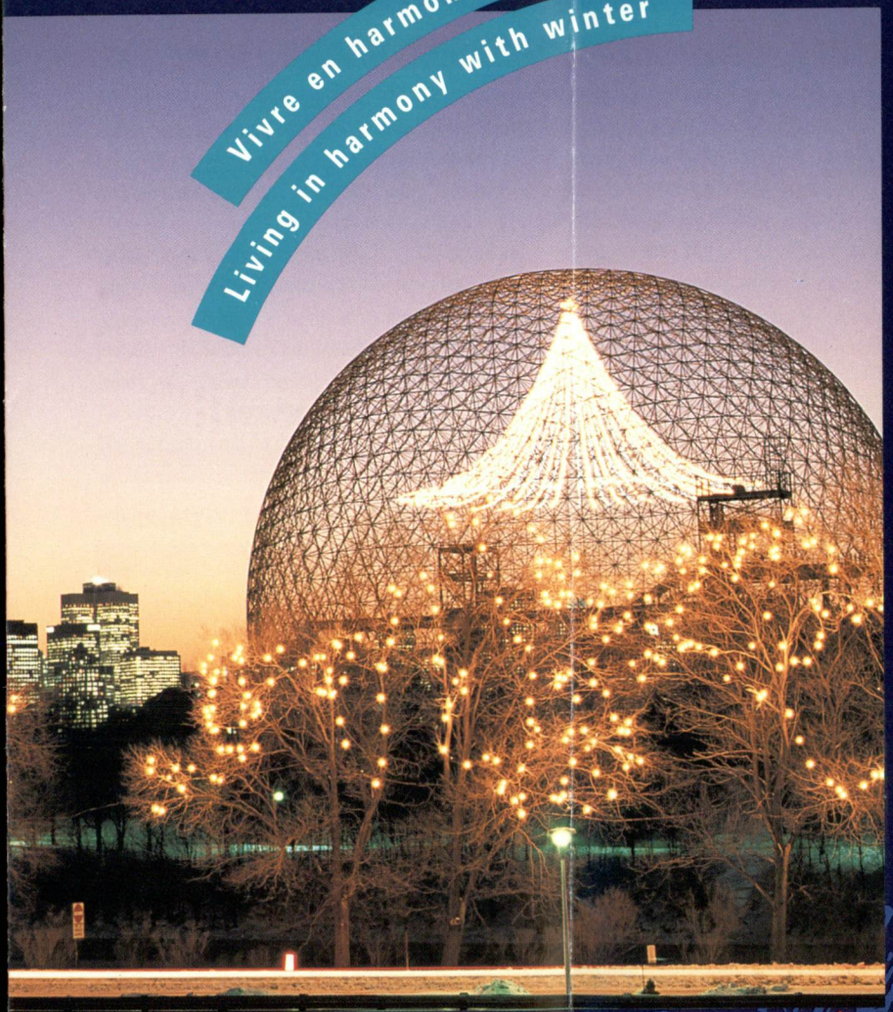
MONTRÉAL 1992

5th INTERNATIONAL WINTER CITIES BIENNIAL

MONTRÉAL 1992

Vivre en harmonie avec l'hiver

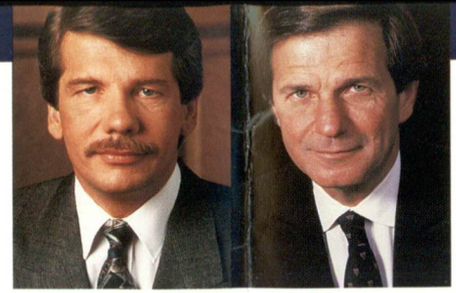
Living in harmony with winter



MONTRÉAL

17-21 janvier 1992

17-21 January 1992



Le 350e anniversaire de fondation de Montréal et la 5e Biennale internationale des villes d'hiver me donnent le privilège de vous inviter à une rencontre internationale d'envergure qui se déroulera dans notre métropole du 17 au 21 janvier 1992.

Montréal connaît un hiver froid et enneigé. Nous avons su l'apprivoiser en mettant au point différentes technologies et même, en faire une source de plaisir.

A l'occasion de la 5e Biennale internationale des villes d'hiver qui se déroulera sous le thème prometteur de "Vivre en harmonie avec l'hiver", nous pourrons mettre en commun nos expériences et voir ensemble comment faire de l'hiver l'un de nos meilleurs atouts dans le développement de nos communautés.

Vous serez, je l'espère, au rendez-vous. La population de Montréal vous accueillera avec l'hospitalité proverbiale qu'elle sait réserver à ses amis.

A bientôt à Montréal,

The 350th Anniversary of the founding of Montréal and the 5th International Winter Cities Biennial have afforded me the privilege of inviting you to a gathering of international scope which will take place in our City from January 17 to 21, 1992.

Winter in Montréal is cold and snowy. But we have managed to master winter by perfecting a variety of technologies, and have even turned winter into a source of pleasure.

The 5th International Winter Cities Biennial, which will unfold around the general theme of "Living in Harmony with Winter", will be an opportunity to share our experiences and look at how we can make winter a major asset in the development of our communities.

I hope you'll be there. The people of Montréal will greet you with the proverbial hospitality that it reserves for friends.

See you soon in Montréal,

Jean Doré
Le maire / *Mayor*

Nous sommes des citadins nordiques. L'hiver et la neige nous rassemblent et nous font partager une façon de vivre, de travailler, de nous distraire.

De l'environnement à l'aménagement urbain à toutes les formes de loisirs, les diverses activités de la 5e Biennale internationale des villes d'hiver nous permettront des échanges nombreux et variés sur notre mode de vie et sur notre condition de citoyens du froid.

A titre de Montréalais et de président du club de hockey Le Canadien de Montréal, c'est avec honneur que j'ai accepté la présidence du comité organisateur de cet événement et c'est avec beaucoup d'enthousiasme que Montréal vous attend.

We are urban dwellers of the north. Winter and snow bring us together, and as a result, we share a way of living, of working, of playing.

From the environment to urban development, to the many forms that leisure and recreation can take, the various activities of the Vth International Winter Cities Biennial will allow us to share, in a variety of different ways, both our lifestyle and our condition of citizens of colder climates.

As a Montrealer and President of the Montréal Le Canadien hockey club, I was honoured to accept the chairmanship of the organizing committee for this event and let me tell you that Montréal eagerly awaits.

Ronald Corey
Président / *President*

Vivre en harmonie avec l'hiver

Pour marquer de façon prestigieuse le début des célébrations de son 350e anniversaire de fondation, Montréal vous convie, du 17 au 21 janvier 1992, à la 5e Biennale internationale des Villes d'hiver.

Après Sapporo, Shenyang, Edmonton et Tromsø, la Ville de Montréal a obtenu le privilège d'organiser cette manifestation unique en son genre dans l'hémisphère nord.

En plein coeur de l'hiver, Montréal deviendra le théâtre d'un événement d'envergure à multiples facettes où les réalités hivernales feront l'objet pendant cinq (5) jours d'une conférence des maires des villes nordiques, d'un forum, d'une exposition, d'un concours international d'idées et d'un programme d'activités culturelles et sportives.

Il ne faut pas rater ce rendez-vous historique à Montréal, ville d'hiver par excellence.

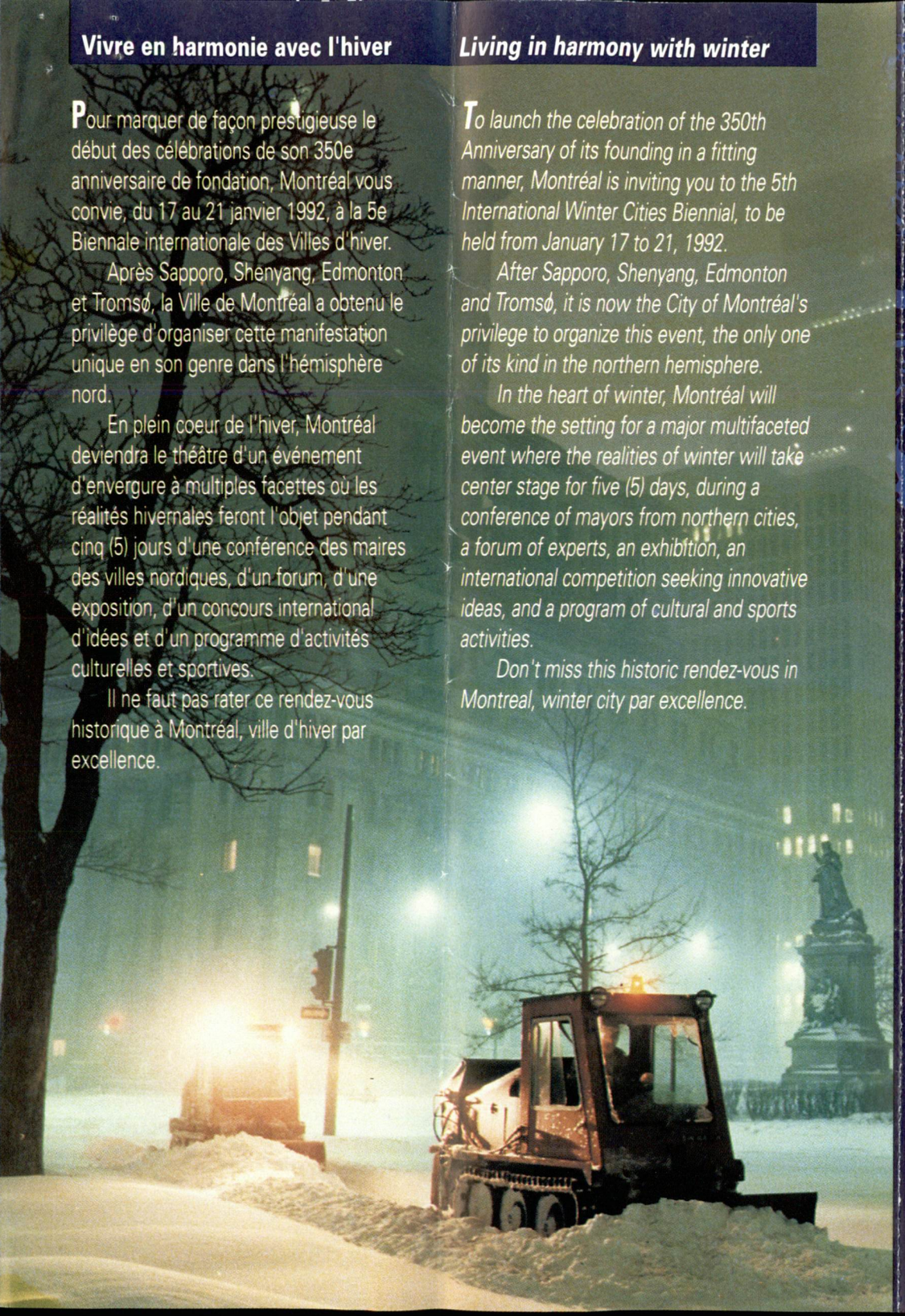
Living in harmony with winter

To launch the celebration of the 350th Anniversary of its founding in a fitting manner, Montréal is inviting you to the 5th International Winter Cities Biennial, to be held from January 17 to 21, 1992.

After Sapporo, Shenyang, Edmonton and Tromsø, it is now the City of Montréal's privilege to organize this event, the only one of its kind in the northern hemisphere.

In the heart of winter, Montréal will become the setting for a major multifaceted event where the realities of winter will take center stage for five (5) days, during a conference of mayors from northern cities, a forum of experts, an exhibition, an international competition seeking innovative ideas, and a program of cultural and sports activities.

Don't miss this historic rendez-vous in Montreal, winter city par excellence.



La 5e Biennale des Villes d'hiver

Un événement de prestige
Six volets uniques!

The 5th Winter Cities Biennial

A Prestige Event
A Unique Six-Part Program!

CÉLÉBRATIONS MONTRÉAL 1642-1992

Montréal

Québec

Canada

Bell

SNC

Air Canada
Transporteur officiel
Officiel Carrier

BOMBARDIER

La 5e Biennale des Villes d'hiver

Un événement de prestige
Six volets uniques!

The 5th Winter Cities Biennial

A Prestige Event
A Unique Six-Part Program!

Photo: Sylvain Mageau

La conférence des maires / *The Mayors Conference*

La rencontre des décideurs

A meeting of decision-makers

La conférence réunira au-delà de cinquante (50) maires des villes de toutes tailles d'Asie, d'Europe et d'Amérique qui relèvent ensemble un défi: créer un environnement urbain adapté aux réalités et aux plaisirs de l'hiver.

Cette rencontre leur permettra d'échanger leurs expériences et de partager un héritage commun, la gestion de l'hiver dans un contexte d'échanges directs et de contacts personnels.

The conference will bring together over fifty (50) mayors of cities of every size from Asia, Europe and North America who, together, will take up the challenge of creating an urban environment that is adapted to the pleasures and realities of winter.

The conference will allow them to talk about their experiences and share a common heritage, that of managing winter, in a context of frank discussion and personal contact.

Le Forum / *The Forum*

Pour une meilleure qualité de vie

Towards a better quality of life

L'activité du forum est centrée sur l'amélioration de la qualité de vie à travers les thèmes de l'environnement, de l'aménagement urbain et de la santé par l'activité physique en plein air.

Depuis plusieurs décennies les progrès de la science et les nouvelles technologies ont transformé l'art de vivre dans les régions froides. L'hiver n'est plus un frein à l'activité des citadins.

La présence de conférenciers de renommée internationale et l'organisation de visites techniques s'ajouteront aux discussions et échanges en ateliers.

The focus of the Forum will be on improving quality of life through a variety of themes, including the environment, urban development, and health and fitness through outdoor activities.

For decades now, scientific progress and new technologies have continued to transform the art of living in cold climates. Winter no longer puts a dent in the lives of urban dwellers.

The workshops and panel discussions will be enriched by keynote speakers of international repute and by technical tours.

L'exposition / *The Exhibition*

Vivre l'hiver en ville

Winter in the City

L'exposition "Vivre l'hiver en ville" favorisera le développement et les échanges entre les industries d'hiver ainsi que la mise en valeur du potentiel touristique des villes présentes.

Les villes d'hiver des pays participants et les industries des secteurs de l'habitation, du transport, du vêtement, de l'énergie, de l'environnement, des loisirs et du tourisme présenteront leurs produits, leur savoir-faire et leurs attraits.

Le design de cette exposition s'inspirera d'une trame urbaine d'un quadrilatère très achalandé de Montréal.

The "Winter in the City" exhibition will encourage development and trade between winter industries, and enhance the potential for tourism of the cities that are represented.

The winter cities of participating countries and industries in the housing, transportation, clothing, energy, environment, leisure and tourism sectors will showcase their products, their know-how and their attractions.

The design of the exhibition will reflect the urban makeup of a busy city block in Montréal.

Le concours international d'idées / *The International Competition*

"A la recherche de l'excellence"

"In Search of Excellence"

Afin de promouvoir une meilleure qualité de vie en hiver, la 5e Biennale organise un concours d'idées novatrices dans les secteurs de l'environnement, de l'activité physique et de l'aménagement urbain.

Si vous oeuvrez dans ces secteurs et que vous résidez, travaillez ou étudiez dans une ville nordique, vous pouvez participer à ce concours régi par un jury international de sept personnes. Ce concours offre des prix totalisant 86 000$ (CAN) dont un grand prix de 20 000$ (CAN).

Toutes les personnes intéressées peuvent obtenir plus d'informations à l'aide de la carte réponse de ce dépliant.

In an effort to promote advances in the quality of life in winter, the 5th Biennial is organizing a competition seeking innovative ideas in the following categories: the environment, outdoor fitness activities and urban planning.

If you are engaged in any of these fields and reside, work or study in a northern city, you are eligible to participate in this competition which will be judged by a panel of seven internationally known individuals. Competition prizes will total $86,000 (CDN), including a grand prize of $20,000 (CDN).

For more information, please fill out and return the attached reply card.

Photo: Louis Michel Major

Activités populaires — *Community Activities*

La Fête des neiges

La Fête des Neiges

A la fin du 19e siècle, Montréal a organisé le premier festival d'hiver en Amérique. L'événement a eu tellement de succès que plusieurs autres villes ont imité Montréal et ont tenu des événements similaires.

La Fête des neiges d'aujourd'hui, une célébration moderne de l'hiver, attire plus de 550 000 participants et visiteurs pendant dix (10) jours à chaque année.

In the late 19th Century, Montréal organized the first winter festival in North America. The event was such a success that many other cities followed suit and held similar festivals.

Today, La Fête des neiges is a modern celebration of winter that annually attracts over 550,000 participants and visitors over a ten (10)-day period.

Les Internationaux du commerce — *Business worldwide*

Rendez-vous à Montréal

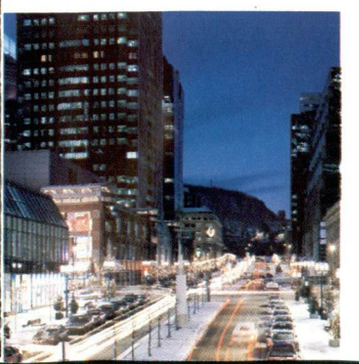
A Montréal Rendez-vous

Dans le cadre de la 5e Biennale, les deux principales associations de gens d'affaires de Montréal, La Chambre de commerce du Montréal métropolitain et le Bureau de commerce de Montréal, tiendront du 17 au 21 janvier 1992, la première édition des Internationaux du commerce de Montréal.

Les Internationaux du commerce de Montréal favoriseront les jumelages d'entreprises afin d'établir des liens d'affaires durables entre les gens d'affaires des villes participantes et ceux de Montréal.

As part of the 5th Biennial, Montréal's two principal business associations, La Chambre de Commerce du Montréal métropolitain and the Montréal Board of Trade, will be holding the first edition of Les Internationaux du Commerce de Montréal, from January 17 to 21, 1992.

Les Internationaux du Commerce de Montréal will encourage business twinnings, in order to establish lasting commercial ties between Montréal's Business Community and participating cities.



IWCC International Winter Cities Commitee

NICC NORTHERN INTERCITY CONFERENCE COMMITEE

5th INTERNATIONAL
WINTER CITIES
BIENNIAL

MONTRÉAL 1992

Last Name: _____

First Name: _____

Organization: _____

Mailing Address: _____

_____

Country: _____

Postal Code: _____

Telephone: _____

Fax: _____

Please send me more information on the following items:

- The Forum
- The Exhibition
- The Competition
- Les Internationaux du Commerce

Date: _____

Signature: _____

5th INTERNATIONAL
WINTER CITIES BIENNIAL
MONTRÉAL 1992
770, rue Sherbrooke Ouest
11 ième étage
Montréal (Québec) CANADA
H3A 1G1

Téléphone: (514) 872-0571
Télécopieur: (514) 872-9222

5e BIENNALE
INTERNATIONALE
DES VILLES D'HIVER

MONTRÉAL 1992

Nom: _____

Prénom: _____

Organisme: _____

Adresse postale: _____

_____

Pays: _____

Code postal: _____

Téléphone: _____

Télécopieur: _____

Veuillez me faire de plus amples informations sur:

- Le forum
- L'exposition
- Le concours
- Les Internationaux du commerce

Date: _____

Signature: _____

5e BIENNALE INTERNATIONALE
DES VILLES D'HIVER
MONTRÉAL 1992
770, rue Sherbrooke Ouest
11 ième étage
Montréal (Québec) CANADA
H3A 1G1

Téléphone: (514) 872-0571
Télécopieur: (514) 872-9222

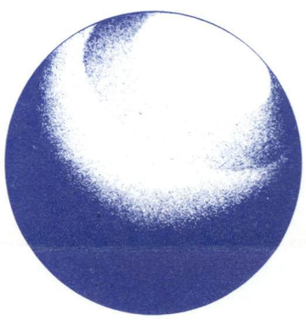
Conference announcement and call for papers

McGill

CENTRE FOR NORTHERN STUDIES AND RESEARCH
McGILL UNIVERSITY
MONTREAL, CANADA

POLARTECH '92

INTERNATIONAL CONFERENCE ON DEVELOPMENT
AND COMMERCIAL UTILIZATION
OF TECHNOLOGIES IN POLAR REGIONS
22-25 JANUARY 1992



POLARTECH The international POLARTECH Conferences were established by industrial organizations and governmental institutions from nordic countries.

The first POLARTECH conferences were held in Helsinki, Finland in 1986, in Trondheim, Norway in 1988, and in Copenhagen, Denmark in 1990. The POLARTECH '92 conference will be held in Montreal, Canada, in January 1992.

OBJECTIVE The objective of the POLARTECH conferences is to create an international forum for exchanging information and discussing experiences and ideas for technology to be applied in Arctic and Antarctic regions or for use under other extreme conditions.

The POLARTECH Conference focuses on the development and commercial application of polar technology with emphasis on onshore and offshore hydrocarbon technology, hydropower, and mining technology in polar regions. Logistics, interaction with local communities, and protection of the sensitive polar environment are highlighted.

The POLARTECH '92 Organising Committee hereby invites papers for presentation under the following headings:

THEME A **Application of Polar Technology**
- Infrastructure and urbanisation
- Logistics
- Transport and shipping
- Communication and navigation
- Ice management
- Man-technology interaction
- Community-project interaction
- Application of technology in other challenging environments (deserts, space, deep water, etc.)

THEME B **Offshore and Onshore Hydrocarbon Technology**
- Exploration and planning
- Engineering and construction
- Operation and maintenance
- Facilities, abandonment and environmental restoration

THEME C **Hydropower and Mining Technology**
- Exploration and Planning
- Construction and Production

THEME D **Polar Environment and Technology**
- Arctic and Antarctic experiences
- Environmental impact studies
- Regulation, control and evaluation
- Impact of technology on humans and society

THEME E **Small Businesses and Technology**

Please return this form to:

POLARTECH '92
Dr. Marianne Stenbaek
Centre for Northern Studies and Research
McGill University
Burnside Hall 720
805 Sherbrooke Street West
Montreal, Canada H3A 2K6

Tel.: (514) 398-6052
Fax: (514) 398-8364
Tlx: 05-268510

Surname _____ First name _____

Organization _____ Postal Address _____

_____ Country _____

Telephone _____ Telefax _____ Telex _____

☐ Please send me further information
☐ I plan to participate in the Conference and wish to receive further information
☐ I intend to present a paper related to:
Theme A ☐ Theme B ☐ Theme C ☐ Theme D ☐ Theme E ☐
April 30, 1991 - Due date for abstracts. **September 30, 1991** - Due date for papers
☐ I plan to attend both the Vth International Winter Cities Biennial and the POLARTECH '92 Conference and take advantage of their combined pre-registration fees rebate

☐ I would like information on participating in a trade show.

Signature _____ Date _____

WINTER CITIES
MONTREAL 1992

POLARTECH '92 follows the Vth International Winter Cities Biennial which will be held January 17-21, 1992 in Montreal.

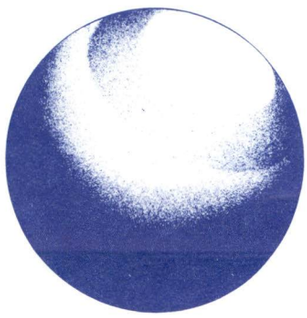
Avis de conférence et appel de communications

McGill

CENTRE D'ÉTUDES ET DE RECHERCHES NORDIQUES
DE L'UNIVERSITÉ McGILL
MONTRÉAL, CANADA

POLARTECH '92

CONFÉRENCE INTERNATIONALE SUR LE DÉVELOPPEMENT ET L'UTILISATION COMMERCIALE DES TECHNOLOGIES DANS LES RÉGIONS POLAIRES
22-25 JANVIER 1992



POLARTECH Les conférences internationales POLARTECH sont une initiative des industriels et des institutions gouvernementales des pays nordiques.

Les conférences POLARTECH se sont tenues précédemment à Helsinki en Finlande en 1986, à Trondheim en Norvège en 1988 et à Copenhague, au Danemark en 1990. La conférence POLARTECH '92 aura lieu à Montréal, au Canada en janvier 1992.

OBJECTIF L'objectif des conférences POLARTECH est de créer un forum international d'échanges, d'information et de discussions sur les technologies à appliquer en régions arctiques et antarctiques ou à utiliser dans des conditions climatiques extrêmes.

La Conférence POLARTECH porte sur le développement et les applications commerciales et technologiques polaires, notamment sur les techniques d'exploitation des hydrocarbones offshore et sur terre ferme, sur l'énergie hydraulique et la technologie minière dans les régions polaires. La logistique, l'interaction avec les collectivités locales et la protection de l'environnement polaire sont également à l'ordre du jour.

Le comité organisateur de POLARTECH '92 vous invite à venir présenter des communications sur les thèmes suivants:

THÈME A **Application de la technologie polaire**
- infrastructure et urbanisation
- logistique
- transport et expédition
- communication et navigation
- gestion des glaces
- interaction homme-technologie
- interaction communauté-projet
- application technologique dans d'autres environnements (déserts, espace, eaux profondes, etc.)

THÈME B **Technologie des hydrocarbones offshore et sur terre ferme**
- exploration et planification
- génie et construction
- exploitation et maintenance
- installations, cession et restauration de l'environnement

THÈME C **Énergie hydraulique et technologie minière**
- exploration et planification
- construction et production

THÈME D **Environnement polaire et technologie**
- expériences dans l'Arctique et l'Antarctique
- études d'impact environnemental
- réglementation, contrôle et évaluation
- impact de la technologie sur les êtres humains et la société

THÈME E **Petites entreprises et technologie**

Veuillez renvoyer ce formulaire à l'adresse suivante:

POLARTECH
Dr. Marianne Stenback
Centre d'études et de Recherches Nordiques
Université McGill
Pavillon Burnside 720
805, rue Sherbrooke Ouest
Montréal, Canada H3A 2K6

Téléphone (514) 398-6052
Télécopieur: (514) 398-8364
Télex: 05-268510

Nom _____ Prénom _____

Organisme _____ Adresse postale _____

_____ Pays _____

Téléphone _____ Télécopieur _____ Télex _____

☐ Veuillez me faire parvenir de plus amples renseignements
☐ Je pense participer à la conférence et souhaite obtenir de plus renseignements
☐ J'ai l'intention de présenter une communication:
thème A ☐ thème B ☐ thème C ☐ thème D ☐ thème E ☐
30 avril, 1991 faire parvenir le résumé de votre communication.
30 septembre, 1991 faire parvenir le texte de votre communication.
☐ J'ai l'intention de participer à la fois à la biennale des VILLES D'HIVER et à la Conférence POLARTECH '92 et de bénéficier d'un rabais sur les frais d'inscription.
☐ Je serais intéressé(e) à participer à une exposition. Veuillez me faire parvenir de plus amples renseignements.

Date _____ Signature _____

VILLES D'HIVER
MONTRÉAL 1992

POLARTECH '92 fait suite à la
Ve Biennale internationale des
VILLES D'HIVER qui aura lieu
du 17 au 21 janvier 1992 à Montréal

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION-SPEECH DOCUMENT NUMBER: 9121390

****

SPEECH: YES NO

FROM: CAREY, Ann E,: NATIONAL RESOURCE SOCIETY

DATE OF EVENT: 05/16/91

LOCATION OF EVENT: ARLINGTON, VA

TIME OF EVENT: 08:30AM

SUBJECT: INVITATION TO SPEECH AT THE OPENING SESSION OF THE 11TH ANNUAL SCIENCE DAY.

****

RSVP: 04/19/91

CONTACT PERSON:

CONTACT NUMBER:

****

INVITATION ACCEPTED? YES NO

****

COPIES TO:

REMARKS:

DATE OF LETTER: 04/10/91 DATE RECEIVED: 04/10/91

FILE: P- INVITATION-SPEECH

4/16

Sponsor:	**Natural Resource Societies**
Subject:	**Current environmental and natural resource issues**
Audience:	**300-400 natural resource scientists and administrators**
Date:	**May 16-Th**
Location:	**Arlington, Va.**
Contact:	**Ann Carey, USDA**
Conflicts:	**Your calendar says you will be in the Soviet Union.**

YES **NO**

4/19/91 Regretted to Ann Carey!
MW

9121390

NATURAL RESOURCE SOCIETIES
SCIENCE DAY

PRESENTED BY THE WASHINGTON AREA CHAPTERS
THE WILDLIFE SOCIETY
AMERICAN FISHERIES SOCIETY
SOCIETY OF AMERICAN FORESTERS
THE SOCIETY FOR RANGE MANAGEMENT
SOIL CONSERVATION SOCIETY OF AMERICA

April 10, 1991

Dr. D. Allen Bromley
Assistant to the President
for Science and Technology
Executive Office of the President
Fax: 202-395-3261

Dear Dr. Bromley:

This is to invite you to speak at the opening session of the 11th annual **SCIENCE DAY '91** on May 16, 1991, in Washington, D.C. SCIENCE DAY is an annual event at which 300 to 400 natural resource scientists and administrators from government and the private sector address current environmental and natural resource issues. It is jointly sponsored by the Washington, D.C. chapters of the American Fisheries Society, Wildlife Society, Society of American Foresters, Society for Range Management, and Soil and Water Conservation Society.

The theme for this year's event, to be held at the Key Bridge Marriott Hotel in Arlington, VA, is "NATURAL RESOURCES: Human Pressures, Changing Values". It will deal with the pressures of human populations on natural resources, and the different values that society places on natural resources as we approach the 21st century. The topic of the morning's first plenary session is "The Role of Science in Setting Public Policies for Natural Resources", and that is the general topic we would like you to address. You would have 30 minutes for your presentation; the keynote address is scheduled from 8:30 - 9:00 a.m., in a plenary session scheduled for 8:30 - 10:00 a.m.

If you have any questions about this request, please contact me at 245-5008 (Fax 202-447-7690). I hope that you can join us on May 16, and I look forward to your reply.

Sincerely,

Ann E. Carey

ANN E. CAREY
Special Assistant to the Chief
for Science and Technology
USDA Soil Conservation Service
and
Program Chair SCIENCE DAY '91

FACSIMILE TRANSMITTAL SHEET

DATE 4/10/91

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
P.O. Box 2890
Washington, D.C. 20013-2890

Number of Pages: Transmittal Sheet + 1

TO: Mr. D. Allen Bromley
Executive Office of the President

Telephone No.

FACS Machine Telephone No. 202-395-3261

FROM: Ann E. Carey
Special Asst. to the Chief, SCS
Telephone No. 202-245-5008

COMMENTS:

Transmission completed by: Date

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION-SPEECH DOCUMENT NUMBER: 9121125

****

SPEECH: YES NO

FROM: MILLER, Michael S.: PERFORMANCE MATERIALS

DATE OF EVENT: 10/14/91

LOCATION OF EVENT: WASHINGTON, D.C.

TIME OF EVENT:

SUBJECT: REQUEST TO SPEAK DURING THE BUSINESS CONFERENCE FOR EXECUTIVES IN THE ADVANCED MATERIALS INDUSTRY HELD BY MCGRAW-HILL'S PERFORMANCE MATERIALS PUBLICATION AND KLINE & COMPANY.

****

RSVP: 04/30/91

CONTACT PERSON: MICHAEL MILLER

CONTACT NUMBER: 202/822-4681

****

INVITATION ACCEPTED? OK or NO

****

COPIES TO: Perry Lindstrom
Dr. Phillips
Thomas Welch

REMARKS:

DATE OF LETTER: 04/04/91 DATE RECEIVED: 04/16/91

FILE: P- INVITATION-SPEECH

9121125

Performance Materials

McGraw-Hill Information Services Company

1156 15th Street, NW
Suite 600
Washington, DC 20005
Telephone 202/822-4600
FAX 202/293-7482

April 4, 1991

D. Allan Bromley
Chairman
National Critical Materials Council
730 Jackson Place
Washington, D.C. 20506

Dear Dr. Bromley,

McGraw-Hill's Performance Materials publication and the consulting firm Kline & Company, which concentrates on advanced materials, will hold a two-day business conference in Washington November 14-15, 1991 for executives in the advanced materials industry.

We would very much appreciate it if you would consider speaking during either of the two days.

The event's theme is "Advanced Composites—Beyond Aerospace in the 1990s" and the audience will be 50 to 100 of the top decision-makers in the advanced materials industry—from presidents of companies to directors of business development. No other event in the near future will bring together so many of this country's key leaders from the advanced materials industry.

Your topic would be fully up to you, though I would suggest it concern the Administration's doctrine for advanced materials and how the industry could play a role. Other possible areas could include the Critical Technologies Institute or critical technologies research in general.

I have worked with Perry Lindstrom and attended various PCAST meetings during the past year and have appreciated your elevation of advanced materials to the top of the Administration's technology agenda.

Performance Materials is the leading publication for business news on advanced materials and is read in more than 20 countries. Kline & Company is based in Fairfield, N.J., with offices in Brussels, Melbourne, Tokyo and Toronto, and is the top U.S. consulting firm on advanced materials.

Please consider this event and the captive audience of advanced materials leaders you would be addressing. My direct line is 202-822-4681.

Sincerely,

Michael S. Miller
Editor

9121125

Performance Materials

McGraw-Hill Information Services Company

1156 15th Street, NW
Suite 600
Washington, DC 20005
Telephone 202/822-4600
FAX 202/293-7482

April 4, 1991

D. Allan Bromley
Chairman
National Critical Materials Council
730 Jackson Place
Washington, D.C. 20506

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Please consider this event and the captive audience of advanced materials leaders you would be addressing. My direct line is 202-822-4681.

Sincerely,

Michael S. Miller
Editor

THE WHITE HOUSE

WASHINGTON

June 4, 1991

Dear Mr. Miller:

Thank you for your letter of April 4, 1991, inviting me to address your business conference scheduled to be held November 14-15, 1991 in Washington, D.C. I apologize for the much belated response.

As much as I would like to join you and your colleagues, I must regretfully decline. I will be chairing a two-day meeting that has been on my calendar for some time on those dates.

I appreciate your thinking of me and send my best wishes for a successful conference.

Sincerely yours,

D. Allan Bromley
The Assistant to the President
for
Science and Technology

Mr. Michael E. Miller
Editor
McGraw-Hill Performance Materials
1156 15th Street, Northwest
Suite 600
Washington, D.C. 20005

"CORRESPONDENCE TRACKING"

TYPE: INFORMATION DOCUMENT NUMBER: 9121579

****

FROM: STURGES, Claudia J.: AAAS

TO: Dr. D. Allan Bromley

DATE OF CORRESPONDENCE: 05/30/91

SUBJECT: THE SPEECH TO THE AAAS ENVIRONMENTAL SCIENCE & ENGINEERING FELLOWS; REQUEST TO DISCUSS OSTP'S ROLE IN FORMULATING ENVIRONMENTAL POLICY, HOW IT INTERACTS WITH AGENCIES & CEQ, AND ENVIRONMENTAL PRIORITIES.

****

DIRECTORATE ASSIGNED: STAFF ASSIGNED:

ACTION REQUIRED: STAFF ACTION:

****

SENDER'S DUE DATE: OSTP DUE DATE:

DATE COMPLETED: DATE COMPLETED/DEPT:

****

COPIES TO: D. Allan Bromley
Steve Olson
ENVIRONMENT

****

WHITE HOUSE TRACKING #: CONTACT PERSON:

REMARKS:

DATE RECEIVED: 05/31/91 FILE: P INVITATION-SPEECH [redacted]

9121579

American
Association
for the Advancement of
Science

Directorate for Science and Policy Programs
1333 H Street, NW, Washington, DC 20005
(202) 326-6600 FAX (202) 371-9526

May 30, 1991

Dr. D. Allan Bromley
Assistant to the President for Science and Technology
White House Office of Science and Technology Policy
Old Executive Office Building
Room 358
Washington, DC 20500

Dear Dr. Bromley:

On behalf of the 1991 AAAS Environmental Science and Engineering Fellows, I want to thank you for agreeing to speak to them as part of their orientation program.

Your remarks are scheduled Tuesday, June 4, from 11 - 12 a.m., in Room 180 of the Old Executive Office Building. In that hour I would ask you to discuss the role OSTP plays in formulating environmental policy, how the Office interacts with the agencies and CEQ, and perhaps some discussion of your environmental priorities. If you would talk for about 20 - 30 minutes, that would allow time for questions at the conclusion.

Enclosed is a list of the 1991 Fellows and a copy of the orientation schedule. I look forward to seeing you next week.

Sincerely,

Claudia J. Sturges

Claudia J. Sturges
Manager
AAAS Environmental Science and
Engineering Fellowship Program

CJS/hs
Enclosures

American
Association
for the Advancement of
Science

Directorate for Science and Policy Programs
1333 H Street, NW, Washington, DC 20005
(202) 326-6600 FAX (202) 371-9526

1991 AAAS/EPA ENVIRONMENTAL SCIENCE AND ENGINEERING FELLOWS

Name, Discipline/Institution,
Current Affiliation

Dr. Mary A. Bober
Physiology/Oklahoma State University
University of California, Santa Barbara

Dr. Vera Brankovan
Biological Structure, Engineering,Technology/Seattle City University
Bristol-Myers Squibb Pharm. Research Institute

Dr. Mark A. Brown
Environmental Agricultural Chemistry/Unversity of California, Berkeley
Hazardous Materials Laboratory

Dr. Charles A. Cole
Environmental Science/Rutgers University
Penn State University

Dr. Robert G. Croy
Toxicology/Massachusetts Institute of Technology
Cambridge Environmental Inc.

Dr. Marvin Fleischman
Chemical Engineering/Unversity of Cincinnati
Unversity of Louisville

Dr. Hilary I. Inyang
Civil Engineering/Iowa State University
University of Wisconsin, Dept. of Civil Engineering

Name, Discipline/Institution,
Current Affiliation

Mr. Keith A. Matthews
Law/Georgetown University
Dewey Ballantine

Dr. Eric A. Pani
Geosciences/Texas Tech University
Northeast Louisiana University

Ms. Christine A. Paszkiet
Materials Science and Engineering/Cornell University
Cornell University

5/7/91

American
Association
for the Advancement of
Science

Directorate for Science and Policy Programs
1333 H Street, NW, Washington, DC 20005
(202) 326-6600 FAX (202) 371-9526

ORIENTATION SCHEDULE

1991 AAAS EPA Environmental Science and Engineering Fellows

Monday, June 3

AAAS
1333 H Street, NW
10th Floor Board Room

9:00 a.m.	Continental Breakfast
9:30 a.m.	**Welcoming Remarks:**
	• Richard S. Nicholson Executive Officer, AAAS
9:45 a.m.	• Albert H. Teich Director AAAS Directorate for Science and Policy Programs
10:00 a.m.	• Roger Cortesi Director EPA Office of Exploratory Research
10:15 a.m.	• Claudia J. Sturges Manager, AAAS/EPA Environmental Science and Engineering Fellowship Program
10:30 a.m.	Break
10:45 a.m.	Introductions

Monday, June 3 continued

AAAS 10th Floor Board Room

12:00 Noon Luncheon

- William G. Wells, Jr.
  Consultant, Office of Science & Technology Policy
  Executive Office of the President
  "Perspectives on Washington"

1:30 p.m. Leave for Environmental Protection Agency
Take Orange or Blue Metro Line to L'Enfant Plaza
Station, take 7th & D/DOT Exit, walk to 4th St.,SW.

Environmental Protection Agency
401 M Street, SW
Meet Mary McCarthy-O'Reilly at
Waterside Mall West Tower (main entrance)

2:15 p.m. Get visitor passes

2:30 p.m. Get EPA Badges, Room 3307 Court Yard

3:00 p.m. Meet with Mentors

Gangplank Restaurant
Rear Deck
600 Water Street, SW

5:00 p.m. - 7:00 p.m. Reception

Invitees include Selection Committee Members, EPA Staff, other friends of the fellowship program and the 1990-91 AAAS Congressional, Diplomacy, and Arms Control Science and Engineering Fellows, and the summer 1991 AAAS Mass Media Fellows.

Tuesday, June 4

Old Executive Office Building
17th & Pennsylvania Avenue, NW
Pennsylvania Avenue Entrance - be there at 8:30 am, to allow
time for Security Clearance
Room 180

Environmental Policy in the Executive Branch

9:00 a.m. •Erich Bretthauer
Assistant Administrator for Research and Development
U.S. Environmental Protection Agency

10:00 a.m. • Michael R. Deland
Chairman
White House Council on Environmental Quality

11:00 a.m. • D. Allan Bromley
Assistant to the President for Science & Technology
White House Office of Science and Technology Policy

700 Water Street Restaurant
700 Water Street, SW
The Red Room

12:30 Luncheon

• Deanna Richards
Senior Program Officer
National Academy of Engineering
"Looking Back: Some Advice from an Ex-Fellow"

Environmental Protection Agency
Room 103, North East Mall
401 M Street, SW

Overview of EPA

2:00 p.m. • Mary McCarthy - O'Reilly
Program Manager
EPA Office of Research Program Management

2:30 p.m. Pollution Prevention:
•Gerald Kotas
Director, Pollution Prevention Division
Office of Pollution Prevention

Tuesday, June 4 continued

Environmental Protection Agency

3:00 p.m. Nonregulatory Programs:
- Eileen B. Claussen (invited)
  Director, Office of Atmospheric and Indoor Air Programs

3:30 p.m. Regulatory Programs:
- Joseph Cotruvo
  Director, Health and Environmental Review Division, Office of Toxic Substances

Wednesday, June 5

Congressional Research Service
The James Madison Building, LM 423
1st Street and Independence Avenue, SE
Science and Policy Division Conference Room

Legislative Branch and the Environment

9:00 a.m. Science and Policy Research Division Staff

10:30 a.m. Break

10:45 a.m. Environment and Natural Resources Division Staff

Congressional Research Service
Montpelier Room
6th Floor Madison Building

12:00 Noon Luncheon with Congressional Research Service Staff

AAAS 10th Floor Board Room

2:30 p.m.
- Stephen D. Nelson
  Director, AAAS Program on Science, Technology and Government
  "How the Budget Drives the Process"

Thursday, June 6
Office of Technology Assessment
600 Pennsylvania Avenue, SE
Conference Room D

Overview of OTA Activities

9:00 a.m. - 12:00 Noon

- Howard Levenson
  Project Director, Oceans and Environment Program
  "Welcome"

- Robert Niblock
  Program Manager, Oceans and Environment Program
  "Introduction to OTA"

- Robin Roy
  Senior Analyst, Energy and Materials Program
  "Energy Efficiency in the Federal Government"

- Daryl Chubin
  Senior Analyst, Science, Education
  and Transportation Program
  "Federally-funded Research; Decisions for a Decade"

- Emilia Govan
  Senior Analyst, Oceans and Environment Program
  "Complex Cleanup: The Environmental Legacy of Nuclear Weapons Production"

Hunan Dynasty
215 Pennsylvania Avenue, SE

12:30 p.m. Luncheon with OTA Staff

Office of Technology Assessment
600 Pennsylvania Avenue, SE
Conference Room D

Public Interest Groups and Environmental Policy

2:30 - 4:00 p.m. Moderator: Robert Rycroft
George Washington University
Program on Science and Technology and Public Policy

- Howard Geller
  Executive Director
  American Council for an Energy Efficient Economy

Thursday, June 6 continued
Office of Technology Assessment
600 Pennsylvania Avenue, SE
Conference Room D

- Kevin Fay
  Executive Director
  Alliance for Responsible CFC Policy

- Daniel Becker
  Lobbyist
  Sierra Club

- Henry Cole
  Science and Policy Director
  Clean Water Action Fund

Friday, June 7
AAAS 1st Floor Conference Room

10:00 a.m. **Law, the Courts and the Environment**

- Jonathan Turley
  Associate Professor of Law
  National Law Center
  George Washington University

Old Ebbitt Grill
675 15th Street, NW
Near 15th and G Streets

12:15 p.m. Luncheon

The National Science Foundation and Environmental Issues

- W. Franklin Harris
  Executive Officer, Biological, Behavioral, and
  Social Sciences, NSF

Friday, June 7 continued
National Academy of Sciences
National Research Council
2101 C Street, NW
Room 180

2:00 p.m. **Briefing by National Research Council Staff**

- James J. Reisa
  Director
  Board of Environmental Studies and Toxicology

- Richard Thomas
  Program Director
  Toxicology and Risk Management

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Invites applications for the

Summer 1991
AAAS Environmental Science and Engineering Fellowships

PROGRAM: Fellows will spend ten weeks (June 3 through August 9) working as special research consultants with the Office of Research and Development (ORD) of the U.S. Environmental Protection Agency (EPA) in Washington, DC. Fellows will undertake a detailed, future-oriented research project of mutual interest to the Fellow and one of EPA's research or program offices and prepare a report at the completion of the summer's work. The program includes a week-long orientation to EPA and relevant congressional and executive branch operations, as well as a weekly seminar program on environmental issues and science, technology and public policy.

PURPOSE: The purpose of the fellowship program is to assist ORD in identifying and assessing the significance of long-range environmental problems and opportunities. Broad areas of research interest within EPA include: environmental risk assessment; biological pesticides; acid deposition; mobile source air pollution; oxidants; gases and particles; global climate; stratospheric ozone depletion; municipal waste water and spills; drinking water; hazardous waste; chemical testing and assessment; pesticides; radiation; and energy. A brief description of EPA's priorities for 1991 is enclosed.

CRITERIA: Prospective Fellows must be postdoctoral to mid-career professionals, show exceptional competence in a relevant professional area, have a broad professional background, and have a strong interest and some experience in applying scientific or other professional knowledge toward the identification and assessment of future environmental problems. Fellows are expected to be critical thinkers, articulate, adaptable, and able to work with a variety of people from different professional backgrounds. Persons may apply from any physical, biological, or behavioral science field, any field of engineering, or any other relevant professional field. Applicants must be residents of the U.S.

AWARDS: In cooperation with EPA, AAAS will select ten Environmental Science and Engineering Fellows for the summer of 1991. The stipend is $850 per week plus nominal relocation and travel expenses. The deadline for receipt of applications is **March 1, 1991.**

Further information about the program and detailed application information are available from:

Environmental Science and Engineering Fellows Program
American Association for the Advancement of Science
1333 H Street, NW, Washington, DC 20005
202/326-6600

Minorities and persons with disabilities are especially encouraged to apply.
The continuation of this program, now in its eleventh year, is contingent upon the availability of funds.

"CORRESPONDENCE TRACKING"

TYPE: INFORMATION DOCUMENT NUMBER: 9121714
ORIGINATOR: 02 STATUS C DIRECTORATE STATUS

****

FROM: SPENCER, Jean E.: UNIVERSITY OF MARYLAND SYSTEM

TO: DR. D.A. BROMLEY

DATE OF
CORRESPONDENCE: 06/07/91

SUBJECT: INFORMATION REGARDING YOUR PARTICIPATION IN THE INAUGURATION OF CHANCELLOR LANGENBERG.

****

DIRECTORATE ASSIGNED: STAFF ASSIGNED:

ACTION REQUIRED: STAFF ACTION:

****

SENDER'S DUE DATE:

OSTP DUE DATE: STAFF DUE DATE
DATE COMPLETED: DATE COMPLETED/DEPT:

****

COPIES TO: D. Allan Bromley
Steve Olson

****

WHITE HOUSE TRACKING #: CONTACT PERSON:
PHONE: EXT:

REMARKS:

OSTP RECEIVED: 06/11/91 FILE: P INVITATION SPEECH ~~FOLLOW UP~~
DEPT RECEIVED:

912714

UNIVERSITY OF MARYLAND SYSTEM

OFFICE OF THE DEPUTY CHANCELLOR

RECEIVED
91 JUN 11 P5:25
OFFICE OF THE DIRECTOR

3300 Metzerott Road
Adelphi, Maryland 20783

(301) 853-3701
FAX (301) 853-4761

June 7, 1991

The Honorable D. Allan Bromley
Assistant to the President
for Science and Technology
Old Executive Office Building
17th and Pennsylvania Avenues, N.W.
Washington, D.C. 20506

Dear Dr. Bromley:

I am pleased that you will participate in the inauguration of Chancellor Langenberg on June 26, 1991. This letter includes information for members of the academic procession.

The inauguration will begin at 2:30 p.m.; members of the procession are asked to arrive at 1:45 p.m. for robing. Please enter by the rear entrance of the Lyric, 1404 Maryland Avenue, Baltimore, Maryland. An attendant will meet you at the door.

All members of the procession will wear academic robes, hoods, and caps, as appropriate. Please bring academic attire with you, unless your order was placed through the System Administration Office. Attire ordered by the System Administration for members of the Board of Regents and elected officials will be hanging in the outer room in the robing area. Marshals will assist in robing. Signs will indicate robing areas for platform guests and for other members of the procession. Lockers and restrooms are located in both robing areas. There will be security in the robing area throughout the ceremony and reception.

You may park in University of Baltimore lots 7A and 7B on Bolton Street. A map of the University is enclosed with this letter.

Also enclosed are 1) a copy of the program, 2) a copy of the order of procession, 3) a seating chart indicating the seating of platform guests, and 4) guidelines for speakers. Marshals will assist in guiding the procession and in seating members of the procession. There will be reserved seating for members of the procession who are not seated on the platform.

I appreciate your helping to make the inauguration a memorable ceremony. If you have questions about the program, please call me or Dr. Sheila Tolliver at 301 853-3701.

Sincerely yours,

Jean E. Spencer

Jean E. Spencer
Chair, Inauguration Committee

Dr. Robert E. Stevenson - 1925 — No
American Type Culture Collection
12301 Parklawn Drive
Rockville, MD 20852-1776

Mr. Allan W. Ostar, President - 1961 — No
American Association of State
College and Universities
Suite 700
One Dupont Circle
Washington, D.C. 20036

Dr. Jim Harrison - 1975 — No
Association of Urban Universities
1225 Connecticut Avenue, NW, Suite 306
Washington, DC 20036

Representatives of NASULGC, AASCU, AAU Institutions

Chancellor John J. Quinn - 1794 — Yes
University of Tennessee at Knoxville
Knoxville, Tennessee 37996

Dr. Donald A. MacPhee - 1826 — Yes
President
State University of New York
College at Fredonia
Fredonia, NY 14063

Dr. William W. Chmurny - 1866 — Yes
Chancellor
University of Wisconsin - Platteville
1 University Plaza
Platteville, WI 53818-3099

Dr. Robert J. Dillman - 1867 — Yes
President
Fairmont State College
Locust Avenue
Fairmont, WV 26554

Dr. Gordon H. Lamb - 1869 — Yes
President
Northeastern Illinois University
5500 N. Saint Louis Avenue
Chicago, IL 60625-4699

Dr. Paul LeClerc - 1870 Yes
President
City University of New York
Hunter College
695 Park Avenue
New York, NY 10021

President Walter Washington - 1871 Yes
Alcorn State University
Lorman, Mississippi 39096-9998

President James D. McComas - 1872 Yes
Virginia Polytechnic Institute and
State University
Blacksburg, Virginia 24061

Dr. Robert N. Aebersold - 1889 Yes
President
Slippery Rock University of Pennsylvania
Slippery Rock, PA 16057-9989

Dr. Thomas E. Everhart - 1891 Yes
President
California Institute of Technology
1201 East California Boulevard
Pasadena, CA 91125

Dr. Hazo W. Carter, Jr. - 1891 Yes
President
West Virginia State College
Institute, WV 25112

Dr. Robert A. Corrigan - 1899 Yes
President
San Francisco State University
1600 Holloway Avenue
San Francisco, CA 94132

Dr. G. Warren Smith -1925 Yes
President
Southeastern Louisiana University
100 West Dakota
Hammond, LA 70402

<u>Representatives of Other Regional Schools</u>

Dr. Martin Meyerson- 1740 Yes
President Emeritus
University of Pennsylvania
2016 Spruce Street
Philadelphia, Pennsylvania 19103

Rev. William J. Bryon - 1887 Yes
President
Catholic University of America
620 Michigan Avenue, NE
Washington, DC 20064

Representatives of Other Maryland Institutions

Dr. Charles H. Trout - 1782 Yes
President
Washington College
Chestertown, MD 21620

Rev. Joseph A. Sellinger, S.J. - 1852 Yes
President Loyola College
4051 North Charles Street
Baltimore, MD 21210-2699

Dr. Robert H. Chambers - 1867 Yes
President
Western Maryland College
Westminster, MD 21157

Dr. Rhoda M. Dorsey - 1885 Yes
President
Goucher College
1021 Dulaney Valley Road
Towson, MD 21204

Dr. G. William Troxler - 1932 Yes
President
Capitol College
11301 Springfield Road
Laurel, MD 20708

Dr. Robert E. Parilla - 1946 Yes
President
Montgomery College
Central Administration
900 Hungerford Drive
Rockville, Maryland 20850

Dr. James D. Tschechtelin - 1947 Yes
President
New Community College off Baltimore
2901 Liberty Heights Avenue
Baltimore, MD 21215

Dr. Lee J. Betts - 1957 — Yes
President
Frederick Community College
7923 Opposumtown Pike
Frederick, Maryland 21701

Dr. Thomas E. Florestano - 1961 — Yes
President
Anne Arundel Community College
101 College Parkway
Arnold, Maryland 21012

Dr. Dwight A. Burrill - 1966 — Yes
President
Howard Community College
Little Patuxent Parkway
Columbia, Maryland 21044

Dr. Charles W. Simmons - 1972 — Yes
President
Sojourner-Douglass College
500 North Caroline Street
Baltimore, MD 21205

Mr. Robert M. Duggan - 1980 — Yes
President
Traditional Acupuncture Institute, Inc.
American City Building, Suite 100
Columbia, MD 21044

REPRESENTATIVES OF UMS INSTITUTIONS

UMAB 1807

Dr. Errol Reese — Yes
President

Dr. Warren Morganstein — No
Dean

Dr. Michael Kelly — No
Dean

Dr. Richard Richards — No
Dean

Dr. Barbara Heller — No
Dean

Dr. David Knapp Dean			No
Dr. Howard Altstein Dean			No
Dr. Steven Max Dean			No
Dr. James P. Flynn Dean			No
Dr. Preston Shelton Faculty Senate			No
Ms. Cathleen Snelling Student Government			No
Dr. Morton Rapoport UMMS			No
UMCP	1856		
Dr. William Kirwan President			Yes
Dr. Kathryn Costello Vice President			No
Dr. Robert Dorfman Vice President			No
Dr. Charles Sturtz Vice President			No
Dr. William Thomas, Jr. Vice President			No
Dr. Bruce Fretz Campus Senate			No
Ms. Vicki Gruber Student Government			No
BSU	1865		
Dr. James Lyons President		Yes	Yes

Dr. Ida Brandon Vice President	No
Dr. Zola Boone Vice President	No
Mr. E.R. Golden Vice President	No
Dr. O.E. Jack Faculty Senate	No
Mr. Darren Swain Student Government	No

TSU 1866

Dr. Hoke Smith President	Yes
Dr. Robert Caret Vice President	No
Mr. Dan McCarthy Vice President	No
Dr. Donald McCulloh Vice President	No
Ms. Dorothy Siegel Vice President	No
Dr. Neil Gallagher Faculty Senate	No
Mr. David Cameron Student Government	No

UMES 1886

Dr. William Hytche President	Yes
Dr. Edward Ellis Vice President	No
Dr. Herman Franklin Vice President	No
Mr. Ronnie Holden	No

Vice President

Dr. Jean Moore — No
Vice President

Dr. Carolyn Brooks — No
Faculty Senate

Mr. Karl White — No
Student Government

FSU 1898

Dr. Harold Delaney — Yes
Acting President

Dr. Kenneth Stewart — No
Vice President

Mr. Richard Metz — No
Vice President

Dr. Alice Manicur — No
Vice President

Mr. Mark Atchison — No
Vice President

Dr. Karen Holbrook — No
Faculty Senate

Mr. Todd Hancock — No
Student Government

CSC 1900

Dr. Calvin Burnett — Yes
President

Dr. Carlton Molette — No
Vice President

Mr. Gregory Davis — No
Vice President

Mr. Charles Wright — No
Vice President

Dr. Clayton McNeill — No
Vice President

Ms. Myra Chichester Faculty Senate		No	
Mr. Kunle Fagbenle Student Government		No	
SSU	1925		
Dr. Thomas Bellavance President		Yes	
Dr. K. Nelson Butler Vice President		No	
Mr. Joseph Gilbert Vice President		No	
Dr. Frederick Kundell Faculty Senate		No	
Miss Lynn Maguire Student Government		No	
UB	1925		
Dr. H. Mebane Turner President		Yes	Yes
Dr. Catherine Gira Vice President		No	
Dr. Daniel Costello Vice President		No	
Dr. Wayne Markert Dean		No	
Ms. Rebecca Korzec Faculty Senate		No	
Ms. Kate Kppel Student Government		No	
Mr. Craig Frechette Student Government		No	

UMUC 1947	
Dr. Benjamin Massey President	Yes
Dr. David Montgomery Vice President	No
Mrs. Vida Bandis Vice President	No
Dr. Julian Jones Vice President	No
Dr. Julie Porosky Vice President	No
Ms. Adelaide Lagnese Faculty Senate	No
Mr. Larry Reynolds Student Government	No
UMBC 1966	
Dr. Michael Hooker President	Yes
Dr. Freeman Hrabowski Executive Vice President	No
Dr. Arthur O. Pittenger Vice President	No
Mrs. Constance Beims Vice President	No
Mr. Mark Behm Vice President	No
Dr. Susan Kitchen Vice President	No
Dr. Robert Rasera Faculty Senate	No
Mr. David Smith Student Government	No

MARYLAND INSTITUTE FOR AGRICULTURE AND NATURAL RESOURCES
1888/1914

Dr. Raymond J. Miller President	Yes
Dr. Robert Kennedy Director, AES	No
Dr. Craig Oliver Director, CES	No
Mr. Kenneth Stafford	No
Dr. J. Lee Majeski Faculty Senate	No

CEES 1973

Dr. Donald Boesch President	Yes
Dr. Wayne Bell Vice President	No
Mr. Steven Wilson Vice President	No
Dr. Robert E. Ulanowicz Faculty Senate	No
Ms. Joan McKearnan Student	No

MBI 1984

Dr. Rita Colwell President	Yes
Dr. Tom Poulos Director, CARB	No
Dr. Fred Singleton Director, COMB	No
Dr. Edmund Tramont Director, MBC	No
Dr. Antonio Moreira Director, CBM	No

Dr. William Weigand Director, CBM	No
Dr. Chris D'Elia Director, Sea Grant	No
Dr. Darrell Hueth Director, CPIB	No
Dr. Theodor Diener Director, CAB	No

Other Platform Guests

Dr. John S. Toll Chancellor Emeritus	Yes
Dr. Shaila Aery Secretary, Maryland Commission for Higher Education	Yes

SYSTEM REPRESENTATIVES

Dr. Jean Spencer Deputy Chancellor	Yes	
Mr. John Martin Acting Vice Chancellor	Yes	
Mr. Donald Myers Vice Chancellor	Yes	

BOARD OF REGENTS MEMBERS

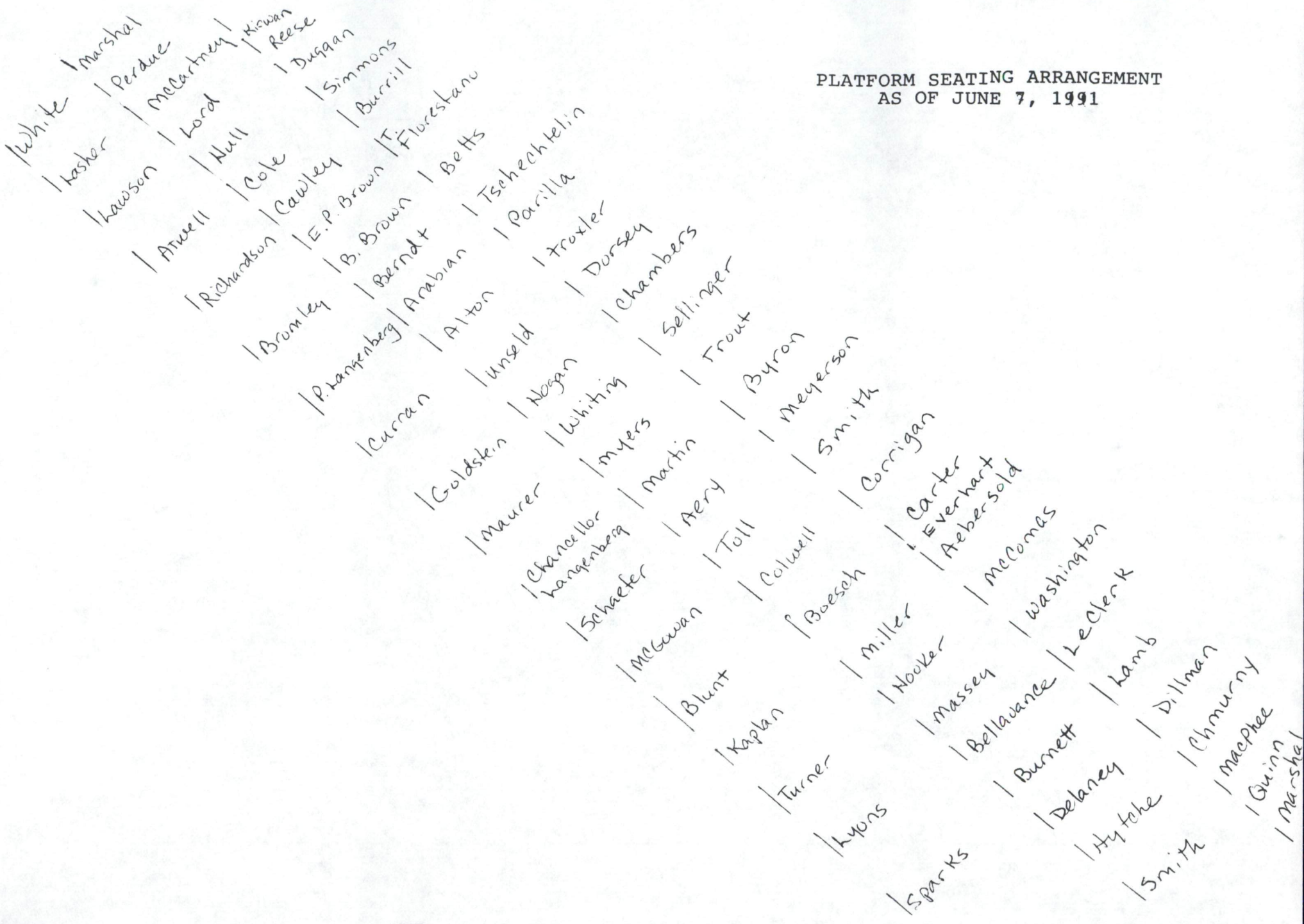
Dr. Albert Whiting Secretary	Yes	
Mrs. Ilona Hogan Treasurer	Yes	
Ms. Constance Unseld Assistant Secretary	Yes	
Mrs. Margaret Alton	Yes	
The Hon. Mary Arabian	Yes	
Mr. Richard Berndt	Yes	
Mr. Benjamin Brown	Yes	
Mr. Earle Palmer Brown	Yes	
Mr. Wayne A. Cawley, Jr.	Yes	
Mr. Charles W. Cole, Jr.	Yes	
Mrs. Ann Hull	Yes	
Mr. Harry Lord	Yes	
Ms. Joann M. McCartney	Yes	
Mr. Franklin P. Perdue	Yes	
Dr. Louis Kaplan UM Regent Emeritus	Yes	Yes
Mr. Roger Blunt Vice Chairman	Yes	Yes

Mr. George McGowan Chairman	Yes	Yes

OTHER PLATFORM GUESTS

The Hon. William D. Schaefer Governor	Yes	Yes
The Hon. Lucille Maurer State Treasurer	Yes	
The Hon. Louis Goldstein Comptroller of the Treasury	Yes	
The Hon. J. Joseph Curran Attorney General	Yes	
Dr. Patricia Langenberg	Yes	
Dr. D. Allan Bromley Asst. to the President for Science and Technology and Director, Office of Science and Technology Policy	Yes	Yes
Dr. William Richardson - 1876 President Johns Hopkins University Baltimore, Md.	Yes	Yes
Dr. Robert Atwell President, American Council on Education	Yes	Yes
Mr. Quentin Lawson Vice Chairman, Md. Higher Education Commission	Yes	Yes
Mr. David Lasher Chairman, Systemwide Student Council	Yes	Yes
Dr. Amos White Chairman, Systemwide Faculty Council	Yes	Yes
Dr. Donald Langenberg Chancellor	Yes	Yes

PLATFORM SEATING ARRANGEMENT
AS OF JUNE 7, 1991



GUIDELINES FOR GREETERS

INAUGURATION OF CHANCELLOR DONALD N. LANGENBERG
JUNE 26, 1991

We are delighted you will be bringing greetings at the *Inauguration of Chancellor Donald N. Langenberg* on June 26.

For your convenience, we offer the following guidelines to enable you to plan your remarks:

1. ***Please take your seat on the stage in the front row*** as you process to the platform (the red velvet chairs are reserved for your use).
2. ***You will be summoned to the podium*** and introduced by H. Mebane Turner, president of the University of Baltimore, when it is your turn to offer remarks.
3. ***Please be brief.*** You should prepare approximately two minutes of spoken text.
4. ***Please don't cite everyone seated on the stage.*** It will be sufficient to open your greetings by acknowledging Governor Schaefer, Chancellor Langenberg, and "honored guests."
5. ***Please be upbeat.***
6. ***Please personalize the content of your remarks.***
7. ***Please feel free to express your expectations of the University of Maryland System under the leadership of Chancellor Langenberg.***

For your information, the entire ceremony will be videotaped. Please forward a copy of your prepared remarks to us in advance of the ceremony to be bound for presentation to Chancellor Langenberg.

We hope you find these guidelines helpful. If you have questions, comments, or concerns, please call:

Dr. Jean E. Spencer
Deputy Chancellor
The University of Maryland System
3300 Metzerott Rd.
Adelphi, MD 20783
(301)853-3701

6/11 Please close out - DAB has been here + back!

"CORRESPONDENCE TRACKING"

TYPE: INVITATION-SPEECH DOCUMENT NUMBER: 9121659
ORIGINATOR: 02 STATUS I DIRECTORATE STATUS

****

FROM: OLLERHEAD, R.W.: UNIVERSITY OF GUELPH

TO: DR. D.A. BROMLEY

DATE OF CORRESPONDENCE: 05/29/91

SUBJECT: RE: DR. BROMLEY'S VISIT TO THE UNIVERSITY. REQUEST TO GIVE A 15/20 MINUTE OVERVIEW OF MAJOR ISSUES TO THE PHYSICS FACULTY MEMBERS.

****

DIRECTORATE ASSIGNED: D. Allan Bromley

STAFF ASSIGNED:

ACTION REQUIRED: AS NECESSARY

STAFF ACTION:

****

SENDER'S DUE DATE:

OSTP DUE DATE:

STAFF DUE DATE

DATE COMPLETED:

DATE COMPLETED/DEPT:

****

COPIES TO: Steve Olson

****

WHITE HOUSE TRACKING #:

CONTACT PERSON:

PHONE: EXT:

REMARKS:

OSTP RECEIVED: 06/07/91

FILE: P INVITATION-SPEECH ~~FOLLOW-UP~~

DEPT RECEIVED:

9121659

UNIVERSITY of GUELPH

RECEIVED
91 JUN 7 A8:43
OFFICE OF THE DIRECTOR

May 29, 1991

COLLEGE OF PHYSICAL AND ENGINEERING SCIENCE
Department of Physics
Office of the Chair

Dr. D. Allan Bromley
Executive Office of the President
Office of Science and Technology Policy
Old Executive Office Building
Washington, DC 20506
U.S.A.

Dear Dr. Bromley:

Thank you for your telephone call regarding your visit to Guelph. I am sorry I missed you.

As I understand it, you will be met at Toronto airport by a private limousine service ("Red Car") at the ground transportation booth, which will bring you to the College Inn, adjacent to the University of Guelph campus. If you would call me at the number given below when you are settled, I will meet you at the College Inn and bring you to the university.

Our physics faculty members would welcome the opportunity to hear your views on science policy, in the U.S.A. certainly, and also your perceptions as far as Canada is concerned. Perhaps you could give a fifteen or twenty minute overview of major issues, and we could have an open and informal discussion. We would plan to invite our graduate students, who clearly have a vested interest in these matters! Topics of interest would include "big science" versus "little science", industrial support (or lack of it) for science, the best strategies for granting agencies in times of limited budgets (e.g. a little bit for everyone, or major funding for a few "stars"), the future of SSC and/or the kaon factory, etc. This will be followed by a reception from 5:30 to 6:30.

Plans for dinner have been altered since I wrote to you previously. It turns out that the annual dinner for the University Senate and the Board of Governors is being held that night, and many of the people I would like you to meet will be there. The President has kindly extended an invitation to you to join us at the dinner. The Dean of our college (Iain Campbell) and the Vice-President Academic (Jack R. MacDonald) are both accelerator physicists, and former members of the Physics Department, and would be pleased to have the opportunity to chat with you. You will be seeing John Kuehner and Peter Egelstaff the next day at luncheon, following Convocation.

I trust these plans are satisfactory. I look forward to seeing you next week.

Yours sincerely,

Robin

R.W. Ollerhead, Chair,
Department of Physics.

RWO/bem

GUELPH • ONTARIO • CANADA • N1G 2W1 • (519) 824-4120 EXT 3771 • FAX (519) 836-9967 • ROBINO@VM.UOGUELPH.CA

"INVITATION FOR DR. BROMLEY"

TYPE: INVITATION-SPEECH DOCUMENT NUMBER: 9121513

****

SPEECH: YES NO

FROM: MAGAZINE, Alan H.: HIMA

DATE OF EVENT: 06/04/91

LOCATION OF EVENT: MADISON HOTEL, WASHINGTON, D.C.

TIME OF EVENT: 07:30PM

SUBJECT: INVITATION TO ADDRESS THE HIMA BOARD OF DIRECTORS AT THEIR BOARD DINNER.

****

RSVP: 05/28/91

CONTACT PERSON:

CONTACT NUMBER:

****

INVITATION ACCEPTED? YES NO

****

COPIES TO: LIFE SCIENCES

REMARKS: 5/30/91 - Regretted to Marilyn! mn

DATE OF LETTER: 05/22/91 DATE RECEIVED: 05/28/91

FILE: P INVITATION-SPEECH

HIMA
HEALTH INDUSTRY MANUFACTURERS ASSOCIATION

9121513

RECEIVED
91 MAY 28 A9:23
OFFICE OF THE DIRECTOR

ALAN H. MAGAZINE
PRESIDENT

May 22, 1991

D. Allen Bromley
Assistant to the President
Science and Technology
The White House
1600 Pennsylvania Avenue, N.W.
Washington, DC 20500

Dear Dr. Bromley:

You may recall that shortly after you were sworn in you accepted my invitation to address the Council on Competitiveness Board of Directors at a luncheon meeting. I have since become President of the Health Industry Manufacturers Association, an organization of approximately 300 companies that manufacture 95 percent of this country's medical devices, diagnostics and health information systems. It is a pleasure to extend an invitation to you to address the HIMA Board of Directors and guests at our upcoming Board Dinner at 7:30 p.m., June 4 at the Madison Hotel here in Washington. I am enclosing our recently released report, Competitiveness of the U.S. Health Care Technology Industry for your information.

I very much hope that you will be able to join us on the evening of June 4. If you have any questions, please don't hesitate to let me know. I look forward to hearing from you.

Best regards,

Alan H. Magazine

AHM:rll

Enclosure

1030 15TH STREET, N.W., SUITE 1100
WASHINGTON, D.C. 20005-1598
(202) 452-8240
FAX (202) 289-1978

HIMA

HEALTH INDUSTRY MANUFACTURERS ASSOCIATION

COMPETITIVENESS OF THE U.S. HEALTH CARE TECHNOLOGY INDUSTRY

Contribution to the U.S. Economy and Trade

World Leaders in Health Care Innovation

COMPETITIVENESS OF THE U.S. HEALTH CARE TECHNOLOGY INDUSTRY

Contribution to the U.S. Economy and Trade

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HIMA

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PREFACE

Health care technology can be awe-inspiring — the balloon catheter used to repair the fragile heart of an unborn baby as the infant rests in her mother's womb.

It can be high tech — the artificial lungs that help the 70-year-old librarian to breathe.

It can be small and simple — the suture that helps patch the Little Leaguer's leg.

And it can be preventive and practical — the immunization for the infant or the mammography screening that saves the life of the infant's 41-year-old mother.

The manufacturers of medical devices and diagnostic products who make up America's $31.2 billion health care technology industry produce a vast array of life-saving and life-enhancing equipment and supplies. These include surgical and medical instruments, electromedical apparatus, diagnostic imaging equipment, in vitro diagnostic products and much more. They also make health information systems — computer hardware and software designed to process everything from patient records to lab and blood bank data — an increasingly important segment of the health care technology industry.

The products of this industry are not only world-class in terms of quality and technological sophistication, but also world-class in terms of the contributions they make to the quality of human life. The more than 300 companies that belong to the Health Industry Manufacturers Association (HIMA) account for over 90 percent of the health care technology sales in the United States.

The U.S. health care technology industry has flourished during the trend of global competition that has stymied so many other American industries. In fact, over the past two decades, while import displacement has devastated communities that had relied for years on the local mill or factory, this industry has proven by example that American industry *can* compete — and *win* — in global markets.

During the past five years, for example, the exports of this industry have increased at a double-digit rate. In 1990, the industry rang up an estimated $6.5 billion in exports and a $3.2 billion trade surplus, while at the same time providing high-value jobs for more and more Americans — nearly a quarter of a million, in fact.

This deeply ingrained export mentality, which other industries are just now trying to develop, is one of two factors that more than any other explain why the medical products industry has succeeded while others have failed.

The second factor is a tradition of technological innovation and rapid, but careful, product commercialization. The health care technology industry invests an average of some 6 percent of sales in research and development — *twice* the average of all other American manufacturers.

Given these two strengths and the industry's history of success, it would be easy to become complacent, to expect the stream of life-sustaining innovations and the large trade surpluses to continue of their own accord. The fact is, however, that the industry's leaders — sensitized by the very nature of their business to global trends and to the fast pace of change — are alert to challenges ahead that, if not well met, could weaken the U.S. health care technology industry's vitality to the detriment of each and every American.

These challenges are arising both on the domestic U.S. scene and abroad. But, fortunately, there is much U.S. industry and policymakers can — and must — do to safeguard the nation's wealth and health in both arenas.

For instance, there can be no doubt that the global marketplace the industry will confront in the 1990s will be even more competitive than that of the 1980s. The unification of the European Community (EC) in 1992 will help forge larger and stronger firms in that 12-nation market. Already dominant German firms should continue to prosper in this environment. The liberation of the East Bloc and the trade liberalization of Mexico and other Latin American countries will spawn new business and investment opportunities that will help local and foreign companies compete against U.S. companies in world markets. The newly industrialized nations of the Pacific Rim will be larger and tougher competitors in the more advanced technology industries, including health care technology. And Japan will continue to improve its technological and manufacturing prowess while extending its global reach. With trade playing an increasingly important role in the prosperity of both the U.S. health care technology industry *and* our nation as a whole, it is vitally

important that American policymakers persevere in their efforts to establish and maintain a level playing field.

On the regulatory front, proposed changes in U.S. and EC regulations stand in startling contrast to trends in other parts of the world. As the economies of Eastern Europe and the Soviet Union struggle toward more open markets and a freer private sector, the U.S. and EC governments are contemplating policies that could produce more regulation and make innovation more difficult, especially during the next several years. The uncertainty that is being created by the new U.S. and EC medical device legislation will take its toll until the new legislation is implemented and tested in the marketplace. At that time, it is possible that industry will benefit from the new U.S. and EC regulatory schemes and from any resulting harmonization of regulation. Although it is important that we all continue to work to ensure that health care technology is safe, effective and provided at reasonable cost, it is also important that regulatory and cost-control measures not handicap, even temporarily, the innovativeness that is a major strength of the industry and its key to international competitiveness.

Contrary to common belief, medical products manufacturers are not all huge corporations. Two-thirds of HIMA's members are small businesses with annual revenues of $20 million or less. These companies, in particular, need a regulatory environment in which the product approval process is timely, predictable, consistent and not unduly burdensome. They need to know in advance what types of studies must be done, what types of applications need to be filed and how long the product approval process will take. If they cannot plan realistically for these factors, they cannot survive. If they cannot survive, the nation will lose their entrepreneurial skills, their technical innovation and their economic contributions for all time.

To understand how and why the changing national and international environment affects this industry and all those who depend on it, it is helpful to review major trends and the worldwide market position of U.S. medical products manufacturers. This report provides just such a review. A second volume of this report, which analyzes world markets and opportunities in greater depth, should be available in late 1991. HIMA plans to update and reissue both volumes periodically.

This first volume attempts to put the contribution that the health care technology industry makes to America's economy and international trade performance in perspective. It is designed to be used by both policymakers and executives as they address the complex business, regulatory and trade issues facing the industry. These issues are not only complex, they are vital — to the industry itself, of course, but also to the U.S. economy and to individual Americans.

We have seen strong industries falter before. We know how the impact ripples through the nation's economy for years to come and how it affects the lives of everyone who works in an industry, supplies an industry or depends on an industry for goods and services. The contribution the U.S. health care technology industry makes to America's balance sheet does not have to wane. However, cooperation between government and industry and within government itself is vital. Wise policymaking on behalf of government — coupled with continued enterprise and innovation on behalf of industry — can guarantee Americans the rising standard of living and the rising standard of health to which they are entitled.

Executive Summary

Like virtually every other industry in America, the health care technology industry has encountered the trend toward global markets and increased international competition. *Unlike* virtually every other industry in America, however, the health care technology industry has maintained and increased its positive trade balance throughout the last decade, despite the nation's recent overall trade deficits. The keys to the industry's high degree of international competitiveness are its abilities to innovate, to commercialize its innovations rapidly and to penetrate foreign markets.

The manufacturers of medical devices and diagnostic products who comprise the health care technology industry are a diverse group. Some date back to the pioneering days of modern medicine in the 19th century. Over the decades, some have evolved into multinational corporations with a variety of product lines and annual sales in the billions of dollars. Many other firms, however, are newcomers to the field who have less than $20 million in annual revenues. They thrive by being highly entrepreneurial, excelling at taking an innovation from the lab and speeding it to market. Together, these companies, old and new, large and small, create a stream of ever-improving products that lengthen the lives of Americans and people around the world — and make those lives more productive and pleasant.

The future of this industry is far from certain, however. This report provides a snapshot of where the health care technology industry stands today and how various factors could shape the industry tomorrow.

Production, Consumption and Employment

In 1989, the U.S. health care technology industry produced a total of $28.7 billion in equipment and products, up 10 percent over the year before. For 1990, the figure is estimated to have climbed another 9 percent to $31.2 billion (Figure 1).

Figure 1
U.S. HEALTH CARE TECHNOLOGY INDUSTRY PRODUCTION
1990

Medical devices		**$27.8 billion**
Surgical and medical instruments	$ 9.5 billion	
Surgical appliances and supplies	10.1 billion	
Dental equipment and supplies	1.3 billion	
X-ray apparatus and tubes	1.9 billion	
Electromedical equipment	5.0 billion	
Diagnostic products		**$ 3.4 billion**
1990 TOTAL U.S. PRODUCTION		**$31.2 billion**

Of the six industry sectors identified by the U.S. Department of Commerce as the fastest growing in 1991, three are health care technology industry sectors — surgical and medical instruments (forecast to grow 9 percent), surgical appliances and supplies (8 percent) and diagnostic substances (7 percent).

Consumption of health care technology products within the United States is growing, too, totalling $26.3 billion in 1989, up 7 percent from the 1988 figure. Recent estimates indicate that consumption reached $28.0 billion in 1990. In all, both production and consumption have grown nearly 200 percent during the 1980-1990 period.

This growth has contributed to strong industry employment figures. Since 1980, employment in the medical products industry has grown by more than 38 percent. In the past two years alone, the health care technology industry has increased the number of jobs it provides by an annual rate of 4 percent. During 1990, some 248,300 were employed in the industry.

International Trade

The health care technology industry is one of America's foremost exporters. It is, in fact, one of the few U.S. industries that did not run a trade deficit during the 1980s, even when the U.S. dollar was very strong. Today, the industry continues to generate a trade surplus averaging $1 billion or more. Not only does this strong international performance help the industry's bottom line, it also helps the nation's balance of trade. In 1989, the industry racked up a $2.3

billion surplus. In 1990, the industry's trade surplus reached an estimated $3.2 billion as exports grew by more than 18 percent to $6.5 billion.

This success has been achieved despite tough global competition. Germany has a particularly strong and broad-based health care technology industry. Japan is also extremely competitive in several product areas such as electromedical imaging equipment. These two countries alone account for nearly half of U.S. medical products imports. In 1990, Germany bought an estimated $691 million worth of U.S. medical products. Nevertheless, although the U.S. achieved a worldwide trade surplus in medical products that year, it ran a $127 million medical products deficit with Germany. In medical products trade with Japan, the U.S. trade surplus with that country grew to $115 million in 1990, after going into surplus in 1989 for the first time in many years. In all, two-thirds of the medical devices exported from the United States in 1990 were consumed by the European Community, Japan and Canada. The Pacific Rim nations and Mexico are also important rapidly growing markets for U.S. exports. In addition to exporting to these countries, many U.S. medical products companies have made overseas investments in local production to better serve these markets.

Industry import/export figures bear witness to the increasing internationalization of the health care technology market. Both the U.S. export intensity level and the import penetration ratio have risen gradually since 1975. In other words, America is both exporting more *and* importing more of these products. Today, being an American manufacturer carries no guarantee of holding a given share of the American market: the most innovative and effective manufacturers, regardless of home country, can readily capture a chunk of what is the world's largest market for health care technology products — the United States.

Innovation

The U.S. health care technology industry's international success stems in no small part from its commitment to innovation. In both 1988 and 1989, the industry invested 6.2 percent of sales in research and development. The average for U.S. industry as a whole was 3.4 percent. The medical products industry even out-invested other industries recognized for innovation — aerospace (4.1 percent of sales invested in R&D), chemicals (3.8 percent), and electrical and electronics (5.4 percent).

This major investment in innovation brought nearly 5,000 new health care technology products to market in fiscal 1990. Most of these products were reviewed under the Food and Drug Administration's (FDA's) premarket notification, or 510(k), process. The total review time for the 4,748 products approved this way averaged 98 days. (By comparison, the 47 products approved through the FDA's premarket approval [PMA] procedure averaged 415 days.)

Another measure of the industry's innovativeness and international competitiveness is patent activity. During the period 1980-1990, the number of medical device patents granted annually by the U.S. Patent and Trademark Office more than doubled, reaching 4,180 in 1990. Only 32 percent of the U.S. medical device patents granted in 1990 were foreign owned. The most frequent foreign owners of U.S. patents for health care technology products were Japanese (accounting for about 10 percent) and German (about 9 percent).

Meanwhile, 48 percent of *all* U.S. patents granted in 1990 went to foreign residents. In other words, U.S. health care technology companies dominate patent activity in their field far more than do U.S. companies as a whole.

Prospects

Conservative Health Industry Manufacturers Association (HIMA) forecasts predict that U.S. health care technology production will grow 7.4 percent each year between 1990 and 1995 (see Figure 2). American consumption is forecast to grow 5.1 percent annually during that period, while U.S. exports and the U.S. trade surplus are expected to grow at annual rates of 15.5 percent and 24.3 percent, respectively.

As conservative as these forecasts are, however, it remains possible that various policy-related decisions could be made in the United States and abroad that could significantly curtail the industry's annual growth.

Negative Scenario

Domestically, for instance, the FDA — upon which the industry must depend so heavily for efficient regulation — could be hampered by continued chronic under-funding and by recent legislation, such as the Safe Medical Devices Act of 1990, which adds a number of new requirements to the FDA's review process. It will take months and, in some instances, years before many of the new requirements are implemented by the government and understood by an industry that creates new products very rapidly. Even before the enactment of the new legislation, the

Figure 2

U.S. HEALTH CARE TECHNOLOGY INDUSTRY FACT SHEET 1990-1995

	1990 Subtotals	1990	1995 Projected
Production		**$31.2 billion**	**$43.9 billion**
- Medical devices	$27.8 billion		
- Diagnostic products	3.4 billion		
Market size (consumption)		**$28.0 billion**	**$35.5 billion**
- Medical devices	$25.3 billion		
- Diagnostic products	2.8 billion		
U.S. exports		**$ 6.5 billion**	**$13.1 billion**
U.S. imports		**3.3 billion**	**4.7 billion**
U.S. trade surplus		**3.2 billion**	**8.4 billion**
- with the EC	$1,017 million		
- with Japan	115 million		
- with Canada	841 million		
- with Germany	-127 million		
- with Mexico	43 million		
- with the U.K.	174 million		
U.S. industry employment		248,300	
Industry R&D expenditures as a percentage of sales		6.2%	
Annual U.S. industry growth (1990 & projected annual growth through 1995)			
- Market size		up 6.4%	up 5.1%
- Production		up 8.8%	up 7.4%
- Exports		up 18.4%	up 15.5%
- Imports		up 5.3%	up 6.9%
- Trade surplus		up 35.8%	up 24.3%
- Employment		up 2.8%	
Device approvals and favorable decisions			
PMAs: 47		down 16%	
PMA supplements: 700		up 35%	
510(k)s: 4,748		down 2%	
PMA review time (days)		up 19%	
510(k) review time (days)		up 20%	

Sources: U.S. Department of Commerce unpublished data; FDA data for fiscal year 1990; *Business Week*, "R&D Scoreboard 1990"; and HIMA projections based on historical trends.

number of PMAs approved and 510(k)s cleared by the FDA had already fallen in FY 1990, while average review and approval time increased.

If regulatory delays, uncertainty and a number of burdensome requirements sparked by the new legislation further inhibit the U.S. medical products industry from bringing its innovations to market, it will not be able to continue to invest so vigorously in R&D. Nor will the industry be able to improve already developed technologies by incorporating information learned from their manufacture and use. Furthermore, if user fees, seen by some as a solution to the FDA's funding problems, must be paid with each new product approval application, the small, entrepreneurial companies in the industry will be crippled. In addition, user fees could create a host of conflict-of-interest questions because companies would, in effect, be paying money to the FDA to approve their new products.

What's more, changes in Medicare coverage and payment regulations could reduce the amount of money available to be plowed back into the development of new technologies and products, as could certain proposed Medicare cost-control measures. Medicare coverage policies involve a large portion of the U.S. health care delivery system and directly affect the environment for technological innovation. Over the past decade, some Medicare coverage and payment regulations have been implemented that constrained the introduction and diffusion of new technologies. Furthermore, a recent study found that coverage decisions for new technologies took an average of nearly 2.4 years to complete, thus delaying the availability of critical technologies.

Another initiative that could harm this industry is the regulations being drafted to implement the Clinical Laboratory Improvement Amendments of 1988. These regulations could change laboratory testing in ways that add up to multimillion-dollar losses to the diagnostics sector of the health care technology industry. Also, a number of environmental and worker safety regulations are under consideration at both the state and federal level that could significantly affect certain segments of the health care technology industry. The revised Clean Air Act, for example, will pose a number of challenges to the industry and is expected to result in increased costs.

Internationally, how much access U.S. manufacturers have to key markets such as Japan and the 12-nation European Community (EC) and how foreign governments decide to treat their own health care technology industries at home will also have a significant impact. The EC's plans to completely overhaul and harmonize its approval process by 1992 will create uncertainty and possible chaos for manufacturers trying to access the European market. In Japan, the government is in the process of revising its health care requirements

and reimbursement system in an effort to control the cost of serving its rapidly aging population.

Can U.S. companies adapt as quickly and freely as local companies to the major changes taking place in the foreign regulatory environment? A recent U.S. Department of Commerce study warns that trends emerging overseas in product introduction and government support to industry are making foreign companies more vital global competitors than ever before. Given the increasingly favorable climate some foreign health care technology companies are enjoying at home, U.S. companies may begin to lag — especially if they do not have the same open access to their competitors' home markets as their competitors have to the vast U.S. market.

All told, the U.S. industry's future success is much more fragile than its strong historical performance suggests.

Positive Scenario

There are, of course, circumstances that could fuel the U.S. health care technology industry's growth beyond what HIMA's conservative forecasts predict. Domestically, Congress could end the FDA's chronic under-funding, giving it the resources to attract well-qualified scientists to develop guidance on regulatory requirements and to serve as medical reviewers. Furthermore, the FDA could implement the new Safe Medical Devices Act of 1990 in a manner that minimizes the potential negative impact and uncertainty caused by any major new legislation of this type. But some degree of uncertainty and disruption cannot be avoided.

Better coordination between the FDA and the Health Care Financing Administration could help ensure that FDA-approved products are covered for Medicare reimbursement purposes. A more efficient system of preparing export certificates also could help the industry strengthen its performance in overseas markets by reducing the delays that U.S. suppliers face in marketing their products in many countries.

Internationally, the possible harmonization of regulatory requirements that the unification of the European Community could bring to that 12-nation market, the restructuring of Japan's distribution system and improvements in international trade rules in the General Agreement on Tariffs and Trade (GATT) could all bolster the U.S. health care technology industry's export performance.

Finally, efforts to enhance America's overall international competitiveness, such as the reduction of the U.S. budget deficit, would increase growth prospects for U.S. industries in general, including the health care technology industry.

Conclusion

In recent years, the U.S. health care technology industry has performed extremely well in both domestic and international markets. Not only has the industry helped shore up America's balance of trade by running a large surplus in an era of widespread deficits, it has also created a wealth of innovative life-saving and life-enhancing products and provided jobs to nearly a quarter of a million workers. In coming years, the industry is expected to remain a major contributor to U.S. manufacturing growth and U.S. trade performance, with a projected trade surplus of $8.4 billion in 1995.

The commitment of America's medical products companies, both large and small, to R&D and to exporting sets the industry apart from many others. Its future rests on the ability of these companies to continue their commitment to developing and marketing innovative products at home and abroad. Furthermore, the industry must strive to meet this challenge in the face of increasingly strong foreign competition and increasingly tight government reimbursement and regulatory controls.

HIMA recognizes that the health care technology industry itself is responsible for continuing to meet its global competitors with the same vision, energy and innovativeness as it has in the past. The industry is also responsible for alerting U.S. policymakers to the priorities and pitfalls in the regulatory and legislative spheres that could boost or impair the industry's ability to buoy the nation's trade balance and — just as important — to safeguard the health and well-being of every American.

American legislators and regulators will decide how well funded and efficient the FDA is in coming years, how well attuned to new technologies Medicare is, how reasonable laboratory testing regulations are and how aggressive U.S. negotiations with trading partners are.

Greater coordination within U.S. government circles will be needed to shape and balance often competing national priorities — the need for U.S. competitiveness versus the need for adequate regulatory controls, for instance. The dismal trade performance of other U.S. industries throughout the 1980s should serve as a reminder that the competitiveness of this industry is as fragile as some of the patients it serves. Moreover,

it underscores the importance of policy coordination both within the government and between the government and the private sector.

By working together, the U.S. government and the U.S. health care technology industry can continue to meet these challenges and to fulfill these important national priorities.

INTRODUCTION

The trend toward global markets and increased international competition is a phenomenon that is affecting virtually every U.S. industry. The health care technology industry is no exception. But the industry's consistently strong growth and positive trade balance over the last several decades, including the recent period of high U.S. trade deficits, have made it an exceptionally bright spot on America's economic balance sheet. Thanks to the U.S. health care technology industry's ability to innovate and to commercialize its innovations rapidly, its competitiveness in world markets has been ensured, despite increased competition from overseas suppliers in recent years.

In 1990, U.S. production of medical devices and diagnostic products reached $31.2 billion, while the U.S. trade surplus in medical products rose to an estimated $3.2 billion, its highest level ever (Figure 3).[1] The industry provided jobs to nearly 250,000 and put nearly 5,000 new medical devices on the market to help Americans live longer and healthier lives.

A HISTORY OF GROWTH AND INNOVATION

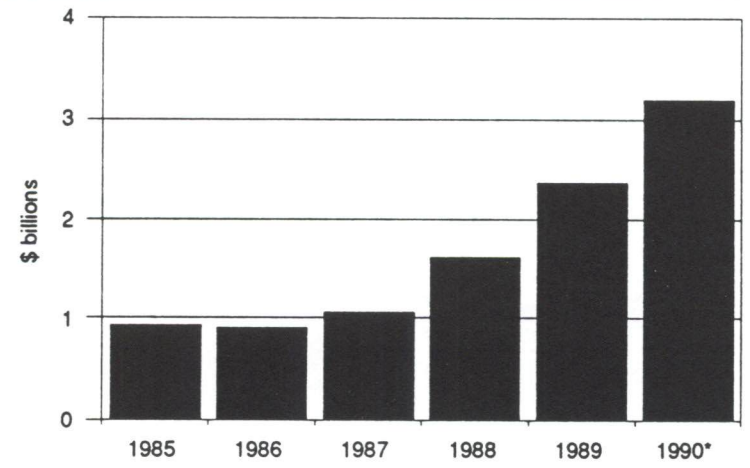
The beginnings of the modern health care technology industry can be traced back to the 1880s, when the use of anesthetics and antisepsis for surgical purposes was pioneered. These developments vastly changed the role hospitals played from that of caretaking to that of intervening in patients' health. The development of x-ray technology at the turn of the century added even greater impetus for establishing well-capitalized hospitals that could acquire such equipment and provide the lab-testing and other facilities needed for surgical procedures. Between 1880 and 1920, the number of hospitals in the United States grew from approximately 200 to 6,000.

Just as the development of health care technology encouraged the establishment of medical services and facilities that could use the new technologies to save lives, the proliferation of those services and facilities also encouraged the expansion of the fledgling health care technology industry. Other developments in that era reinforced this trend. The shift in physician training in the early 1900s to a stronger emphasis on the biological and chemical sciences, for instance, prepared doctors to better understand, develop and use technological advances. The creation of Blue Cross insurance in 1927 helped make those advances available to more Americans.

The inclusion of medical insurance as a standard part of employee benefits during the World War II era and the creation of Medicare/Medicaid in 1965 went even further in making health care technology widely available in this country and provided hospitals with a stable financial base on which to operate. In addition, the National Institutes of Health's large-scale funding of biomedical research after World War II made the development of more effective surgical techniques and technological advances possible. Together, these trends and developments have contributed greatly to the dramatic advances in health care that Americans — and people all around the world — have enjoyed in recent decades.

A number of today's major health care technology companies date back to those pioneering days of medicine

Figure 3
U.S. HEALTH CARE TECHNOLOGY INDUSTRY TRADE SURPLUS 1985-1990



* Estimate.

Source: U.S. Department of Commerce unpublished data.

Important Terms

In this report, the health care technology industry is also referred to as the medical products industry and the medical devices and diagnostic products industry. The industry is described as having two major segments:

- Medical devices — By far the largest industry segment, medical devices range from tongue depressors to surgical instruments, from implantable devices to magnetic resonance imaging (MRI) systems.
- Diagnostic products — A rapidly growing industry segment, diagnostics are products that allow patients to be tested for a variety of conditions. Examples include immunoassay kits, allergy measuring products and drug-abuse tests. As is explained below, there is an important distinction to be made between the two basic types of diagnostic products: in vitro and biological products, and in vivo diagnostic reagents.

A Third Segment

The Health Industry Manufacturers Association (HIMA) also recognizes a third important industry segment, health information systems — the computer hardware and software that do a number of health care-related tasks such as processing patient records, financial information, or lab and blood bank data. For the purposes of this report, however, health information system segment figures are included in the medical device totals and not shown as a separate industry segment.

This has been done because the U.S. Department of Commerce recently began including partial data on health information systems in its medical device Standard Industrial Classification (SIC) grouping for electromedical equipment. This is a step forward — in the past, neither government nor private data sources tended to classify computer hardware and software by their end use. The contribution health information systems manufacturers made to the health care technology industry's production, consumption and trade totals, therefore, was invisible in industry statistics. Although that contribution is now being at least partially recorded, adequate statistics are not yet available for this report to discuss the health information system segment with the same comprehensiveness as the medical devices and diagnostics product industry segments.

Diagnostic Products

As mentioned above, the diagnostic products segment is divided into two basic categories: (1) in vitro and biological diagnostic products and (2) in vivo reagents. In vitro products use chemical or biological reagents to test specimens (blood, urine, etc.) drawn from a patient. Examples include the immunoassay kits, allergy measuring products and drug-abuse tests mentioned above — products that are used *outside* the patient's body. This category is the larger of the two, and most manufacturers of these products are represented by HIMA.

Some in vitro diagnostic products such as HIV assays or blood bank reagents are regulated by the FDA as in vitro biologicals. As such, they are subject to regulatory oversight that differs slightly from the above mentioned groups. Makers of such products are also represented by HIMA.

In vivo reagents, on the other hand, are injected into or ingested by the patient. Examples include the various radiological substances that are administered to a patient to make x-ray or CAT scan images more revealing. These products are used *inside* the patient's body. The makers of these products are represented by pharmaceutical industry groups, not by HIMA.

When it comes to compiling statistics on diagnostic products, however, the distinction between in vitro and in vivo products is rarely made — both are grouped together. Fortunately, for the purposes of this report, inclusion of in vivo reagent products in the figures does not significantly distort health care technology industry totals.

For more detailed information on the data in this report, see Appendix A.

in the 1880s. Many of these companies began by producing what are today simple products, such as bandages, alkaloids and relatively crude medical instruments. Over the decades, they evolved into multinational corporations with diverse product lines and annual sales in the billions of dollars.

The commitment to innovation that is the hallmark of today's health care technology industry was present from the start. A turn-of-the-century ice-box manufacturer that began by exploring refrigeration technology, for instance, developed a niche in the health care field and, though still a relatively small company, is today one of the world's premier suppliers of blood bank refrigeration equipment and hospital coolers.

In contrast, however, many other health care technology companies are newcomers to the field. In fact, one distinguishing characteristic of the industry is the large role that newer, smaller companies — those with less than $20 million in annual revenues — play. Some of these companies are highly entrepreneurial and excel at taking a technological innovation from the lab, developing it into a marketable product and making it available to patients.

This corporate mix of old and new, large and small, has produced a vast number of innovative products in recent decades that save lives and greatly improve the *quality* of life. For example, in fewer than 20 years, diagnostic imaging equipment has progressed from x-ray to CAT scan to MRI. One of the benefits of this progression has been the dramatic increase in the survival rate of head-trauma victims. A decade ago, one in 10 survived; today, the survival rate approaches 9 in 10.

Another notable innovation, the implantable defibrillator — which delivers an electric shock to the heart to restore normal heartbeats — has greatly reduced the risk of death due to a fibrillating (or racing) heart. Artificial limbs and joints such as hip implants have improved the lives and productivity of countless people by increasing mobility and, often, by relieving pain. New instruments and techniques are also greatly reducing the risks and recovery times for a number of surgical procedures. For example, the laparoscopic technique, in which surgeons make small incisions through which they insert cameras and surgical tools, is currently being expanded to a number of applications — from the removal of gallbladders to intestinal and chest surgery. Other devices such as surgical lasers are being used to remove infected body tissue, including cancerous growths. Such procedures, and the medical devices used to carry them out, offer not only health advantages but also significant financial benefits.

It should also be noted that, although these innovations improve the quality of life in the United States and abroad, they also contribute to U.S. economic competitiveness by incorporating and otherwise broadening America's use of advanced technologies and materials. The defibrillator was made possible only through advances in sensor technology and electronic engineering. Artificial limbs and implants increasingly rely on advanced materials to improve their effectiveness. In the area of x-ray imaging, many believe that a major part of the next leap forward will come from high-definition imaging, which will store and display images electronically and result in vastly sharper pictures. It is expected that the work done on digital imaging technology for medical purposes will spin off benefits to a number of industries, including telecommunications and computers.

By broadening U.S. research and manufacturing in emerging technology areas, medical products clearly contribute to the stream of developments that fuel other American high-tech industries. Many of these industries, along with the health care technology industry, will play key roles in America's future prosperity.

Looking to the Future

The health care technology industry is expected to experience strong growth as the U.S. economy enters the 1990s. Both increased consumption of medical products and stronger foreign demand are expected to contribute to this growth.

The consumption of health care technology products in the United States is expected to grow for several reasons. One factor is the aging of the U.S. population. The proportion of the population 65 years old and older, for example, is projected to rise from 9.8 percent in 1970 to 13.0 percent by the year 2000.[2] The increased availability of various treatments on an outpatient basis, as well as shortened recovery periods associated with many new treatments, encourages individuals to take advantage of these services and products. In addition, the increase in the incidence of infectious diseases such as AIDS will also stimulate demand for certain medical products.

Stronger foreign demand will also play a major role in this industry's growth prospects. U.S. medical products manufacturers maintain a worldwide reputation as suppliers of high-quality, very competitive products. Overseas sales are expected to increase not only in the fast-growing developed country

markets of Canada, Japan and the European Community (EC), but also in less traditional developing country markets. The high-growth Pacific Rim economies, in particular, have strong sales potential for American medical products firms.

Trade in medical products is also expected to grow strongly as a result of companies' continued efforts to respond to global competitive pressures. Medical technology companies, given the heavy investment they must make in technology and R&D, must work to achieve economies of scale, lower their costs and leverage their technology investments beyond the U.S. market.

In addition to their commitment to innovation, another distinguishing characteristic of health care technology companies, both large and small, is their commitment to exporting. Although the United States is the largest market in the world for medical products, many companies in this industry operate with the stated objective of doing at least 50 percent of their business outside the United States.

In a recent survey of 222 of its smaller company members, HIMA found that more than 77 percent were active in exporting their products. One of these companies recently won the Presidential "E Award" for excellence in exporting from the U.S. Department of Commerce. This company, a maker of monitors and respiratory care products based in California, exports well over 50 percent of its products.

A third distinguishing characteristic of health care technology companies is the degree of regulation they face. In fact, the health care technology industry is one of the most highly regulated manufacturing industries in America, with regulations at the state and federal level affecting virtually all segments of the industry. In addition, numerous efforts underway to contain health care costs are creating another form of regulatory complications and uncertainty for the industry.

The U.S. health care technology industry achieved its highest trade surplus ever in 1990. Clearly, this industry represents one of the competitive industries the United States will have to rely upon as it grows out of its trade deficits. However, as is discussed extensively in a later section, the industry's growth prospects and its future contribution to U.S. trade performance could be greatly diminished by changes in the regulatory and international environment.

I. Production, Consumption and Employment

The U.S. health care technology industry comprises manufacturers of medical devices and diagnostic products. In 1990, the United States produced an estimated total of $31.2 billion in medical devices and diagnostic products (Figure 4). Of this total, medical device production amounted to $27.8 billion in 1990, while production of diagnostic products reached $3.4 billion (see Table 1 in Appendix C).

The $31.2 billion in U.S. production of health care technology products represents a 9 percent increase over 1989 levels. This increase helped to supply the U.S. market, which expanded by 6 percent, and the export market, which grew by 18 percent in 1990. During the three-year period, 1988-1990, medical device and diagnostics production in the United States experienced average annual growth of nearly 9 percent, with medical device production experiencing average annual growth of 8.9 percent and diagnostic products 8.2 percent (Table 1).

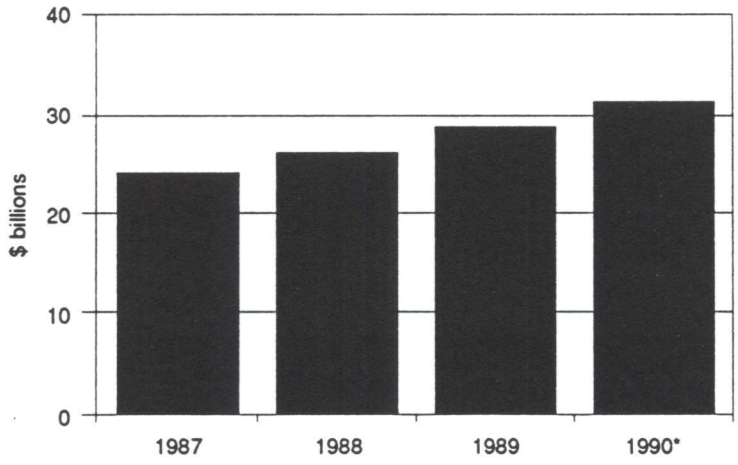
The size of the U.S. market for health care technology products, in terms of consumption, amounted to $28.0 billion in 1990, approximately 6.3 percent higher than 1989 levels.[3] Over the three-year period 1988-1990, U.S. consumption of medical products grew annually by an average of approximately 7 percent, with medical device consumption growing by an average 6.6 percent and diagnostic products averaging annual growth of 7.0 percent.

The two medical device product categories with the strongest growth in production during the period 1988-1990 were surgical appliances and supplies, and surgical and medical instruments, both of which experienced average annual growth of approximately 11 percent. Growth in these product areas has been fueled primarily by health concerns over the spread of AIDS and other infectious diseases. Shipments of electromedical equipment experienced a similarly strong annual growth rate of 9.2 percent during this period, as purchases of MRI equipment and ultrasound devices have remained at high levels. Table 2 contains a breakdown of medical device production by SIC code.[4]

Most important, as Table 1 indicates, the increase in medical device and diagnostics production in recent years has, to a large degree, been driven by export growth. U.S. production in the past three years has risen at an average annual rate of almost 9 percent, while consumption has risen less than 7 percent annually. At the same time, U.S. exports averaged annual growth of more than 21 percent.

Table 1 also provides a longer term perspective on U.S. production and consumption of medical devices and diagnostic products. Since 1975, the U.S. health care technology industry has grown from a $5 billion industry to one of over $31 billion. During the same period, the U.S. market has grown from under $5 billion to more than $28 billion. In the past 10 years alone, both production and consumption of health care technology products in the United States have increased nearly 200 percent (Figure 5).

Figure 4
U.S. PRODUCTION OF MEDICAL DEVICES AND DIAGNOSTIC PRODUCTS 1987-1990



* Estimate.

Source: U.S. Department of Commerce unpublished data.

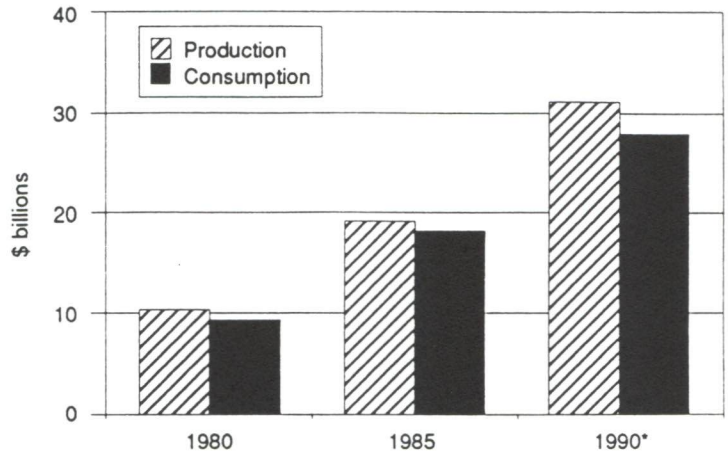
A Major Contributor to U.S. Manufacturing Growth

The U.S. Department of Commerce has forecast that the health care technology industry will be a major source of U.S. manufacturing growth over the near term. In fact, the health care technology and other high-tech industries are expected to dominate U.S. manufacturing growth over the next few years.

Table 3 lists the 10 industries — identified by the U.S. Department of Commerce on a four-digit SIC code basis — that are expected to experience the strongest growth in 1991 (in terms of industry shipments, on a constant dollar basis). Medical devices and diagnostic products account for three of the six industry sectors identified as the highest-growth industries.

Surgical and medical instruments, and surgical appliances and supplies rank near the top of the list of fastest growing U.S. industries, with projected growth rates of 8.6 percent and 7.6 percent, respectively, for 1991. Shipments by firms producing diagnostic substances are expected to grow by 6.9 percent in 1991. Overall, the U.S. Department of Commerce estimates that shipments by companies producing medical devices will grow 7.3 percent in 1991, in constant dollar terms (Table 4).

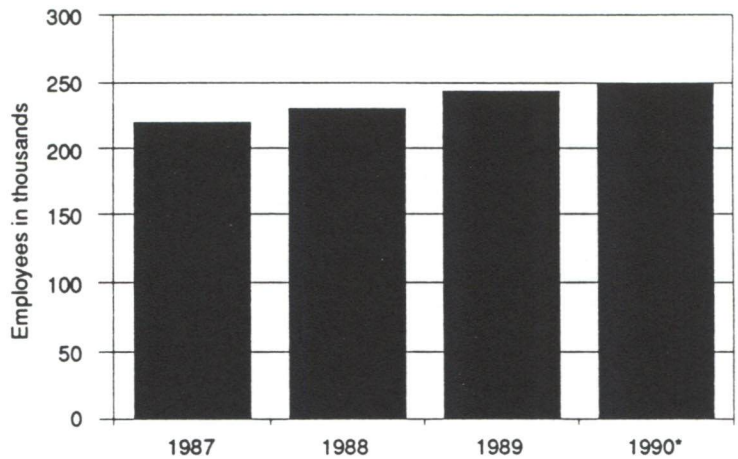
Figure 5
U.S. PRODUCTION AND CONSUMPTION OF HEALTH CARE TECHNOLOGY PRODUCTS, 1980-1990



* Estimate.

Source: U.S. Department of Commerce unpublished data.

Figure 6
EMPLOYMENT IN THE HEALTH CARE TECHNOLOGY INDUSTRY 1987-1990



* Estimate.

Source: U.S. Department of Commerce unpublished data and HIMA estimates.

Employment in the Health Care Technology Industry

The growth in U.S. production and consumption of health care technology products over the past decade has contributed to strong employment growth in the industry — more than 38 percent. Over the past three years, health care technology industry employment has averaged annual growth of approximately 4.3 percent, reaching 248,300 in 1990 (Figure 6 and Table 5). This employment growth has occurred as existing companies have expanded their activities to respond to increased demand in both the U.S. and overseas markets, and as new entrants in the industry have commercialized new technologies.

The major portion of employment in the health care technology industry can be attributed to medical device production. Employment in the medical device area totalled 231,100 in 1990, up approximately 3 percent

from 1989 levels. Over the period 1980-1990, employment in the medical device area has grown by more than 37 percent. The major portion of medical device employment growth over this 10-year period can be attributed to surgical and medical instruments, and surgical appliances and supplies.

Employment in the diagnostic products sector, which reached 17,200 in 1990, has shown even more impressive growth over the past 10 years. During the period 1980-1990, employment in the diagnostic products area grew by more than 68 percent. Over the past three years, employment in this sector has experienced average annual growth of 3.8 percent (Table 5).

II. International Trade

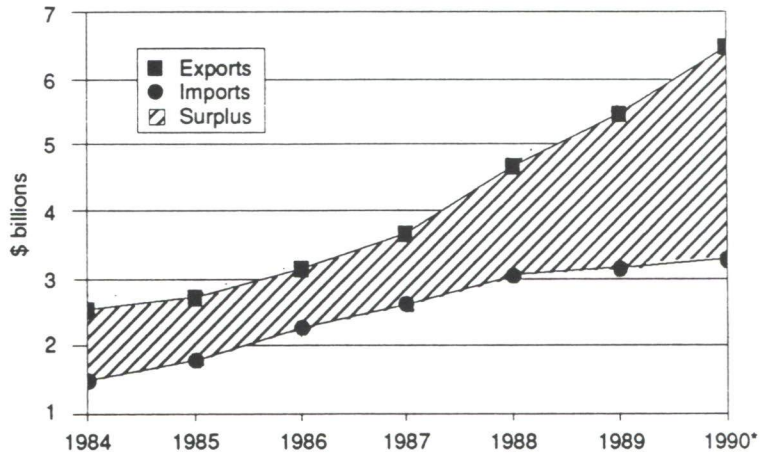
The strong growth in the U.S. trade surplus in medical products in recent years makes the health care technology industry one of the few U.S. industries to consistently generate a trade surplus averaging $1 billion or more.[5] The trade surplus for the medical products industry over the past 10 years has ranged from a high of $2.3 billion in 1989 to a low of $890 million in 1986 (Figure 7). Preliminary information from the U.S. Department of Commerce indicates that the export-driven growth in the medical products trade surplus continued in 1990, with the surplus reaching an estimated $3.2 billion (Table 6).

The major factor contributing to the consistent surplus is the strength of U.S. medical products exports (Figure 8). Annual medical products exports increased from $1.9 billion in 1980 to $6.5 billion in 1990, an increase of more than 242 percent (Table 6). In the past three years, exports of health care technology products have experienced an average annual growth of more than 21 percent. The significant growth in exports, cushioned by recent slower growth in imports, has reversed the five-year deterioration of the trade surplus that occurred during the mid-1980s.

The recent slowdown in medical products imports is due, in part, to the weakening of the U.S. dollar in relation to the currencies of the countries that host major suppliers of medical products (i.e., Germany and Japan). It also reflects the overall competitiveness of the U.S. industry across the range of medical devices and diagnostic products. U.S. imports of medical products remained flat in 1988 and 1989 and are estimated to have increased only marginally in 1990 (Figure 9).

Medical products imports, however, did rise strongly in the early 1980s, with the overall effect that imports climbed from $650 million in 1980 to $3.3 billion in 1990. This strong growth can be attributed to a number of factors. The United States

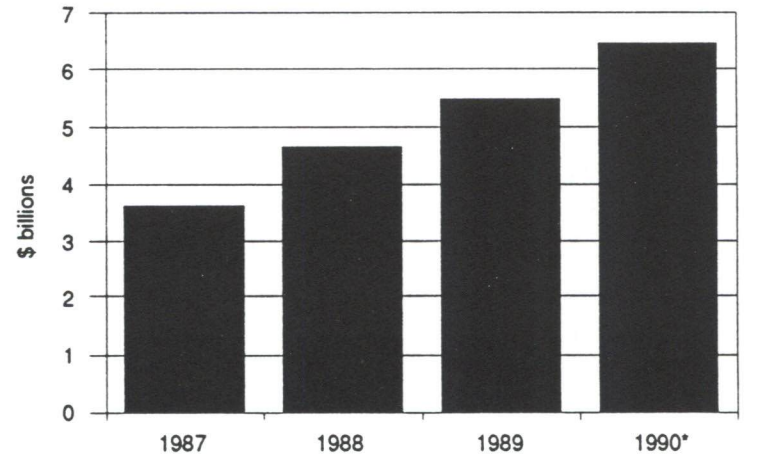
Figure 7
U.S. EXPORTS AND IMPORTS OF HEALTH CARE TECHNOLOGY PRODUCTS 1984-1990



* Estimate.

Source: U.S. Department of Commerce unpublished data.

Figure 8
U.S. MEDICAL PRODUCTS EXPORTS 1987-1990



* Estimate.

Source: U.S. Department of Commerce unpublished data.

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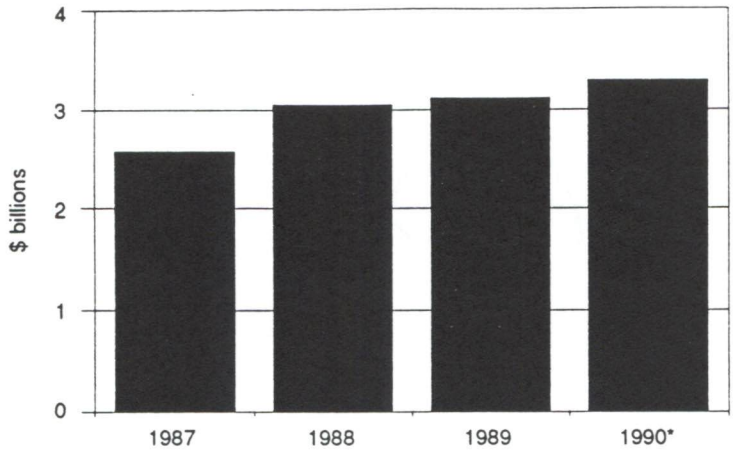
Figure 9
U.S. MEDICAL PRODUCTS IMPORTS 1987-1990



* Estimate.

Source: U.S. Department of Commerce unpublished data.

is the largest market for medical products, and U.S. demand has grown substantially. Compared to other major countries, the U.S. market provides for relatively rapid acceptance of new medical technology. The relative strength of the U.S. economy and limited growth opportunities in high-debt developing countries also contributed to strong competition in the U.S. market. This rise in imports — as well as exports — is also further evidence of the increasing globalization of the health care technology industry.

Bilateral Trade Flows

During much of the 1980s, the U.S. health care technology industry experienced chronic trade deficits with Germany and Japan. However, the big rise in the U.S. medical products trade surplus in the last three years has reversed the industry's trade deficit with Japan, and substantially reduced the trade deficit with Germany.

The only nation with which the United States currently runs a significant medical products deficit is Germany. As can be seen from Table 7, that deficit expanded during the period 1980-1990, despite the fact that U.S. exports to Germany also increased significantly during the period. After peaking at $265 million in 1987, the U.S. trade deficit for medical products with Germany has decreased to $127 million in 1990 (Table 8). Similarly, the bilateral trade balance with the European Community (EC), which had been a surplus of only $225 million in 1987, has grown to a surplus of $1.017 billion in 1990.

At the beginning of the decade, the United States had a bilateral trade surplus in medical products of $92 million with Japan, the second largest bilateral trade surplus that year in fact (Table 7). However, by the mid-1980s the United States had developed a medical products trade deficit with Japan that peaked at $95 million in 1987. The U.S. industry's inability to keep up with exports from Japan during the period 1980-1987 occurred despite the industry's increased sales efforts in Japan, strong growth in U.S. exports to that market and modest market liberalization by the Japanese government, some of which occurred at the behest of the U.S. government. In 1988, these efforts, in combination with increased competitiveness as result of the lower value of the dollar, began to pay off in terms of the industry's trade performance. In 1990, the U.S. trade surplus with Japan in medical products reached an estimated $115 million.

U.S. trade with its North American neighbors also increased significantly in recent years. U.S. medical device and diagnostics exports to Canada are estimated to have grown over 60 percent in 1990, to $934 million, contributing to a medical products trade surplus with that country of $841 million (Table 8). With regard to Mexico, both exports and imports have nearly doubled in the last three years, reaching $297 million and $254 million, respectively, in 1990. Medical products trade with Mexico is now nearly as large as U.S. medical products trade with France and the United Kingdom. Trade with Mexico is expected to grow in future years with the negotiation of a Free Trade Agreement, which will further enhance economic ties between the United States and Mexico.

Major Purchasers of U.S. Exports

Table 9 provides a comparison of the major purchasing countries of U.S. medical products in 1980 and 1990. The percentages attributable to purchasing countries have remained surprisingly stable during the decade. The 10 largest purchasers of U.S. health care technology products in 1980 continued to be the 10 largest purchasers in 1990, although for some the rankings have changed.

Canada (15 percent), Japan (14 percent) and Germany (11 percent) remain the three largest single-country markets for U.S. medical products exports and purchased the lion's share of U.S. exports in 1990.

As illustrated in Figure 10, the EC, Japan and Canada account for two-thirds of total U.S. medical products exports. The EC itself took 39 percent of the United States' medical products exports in 1990. It should also be noted that the EC and Japan accounted for an even greater percentage of U.S. exports in 1990 than they did in 1980, reflecting the importance of these markets to U.S. medical products manufacturers.

U.S. exports to Asian markets other than Japan (e.g., South Korea and Taiwan) have grown strongly in recent years as a result of increased demand for medical equipment in these expanding economies. These markets now account for 9.3 percent of U.S. medical products exports.

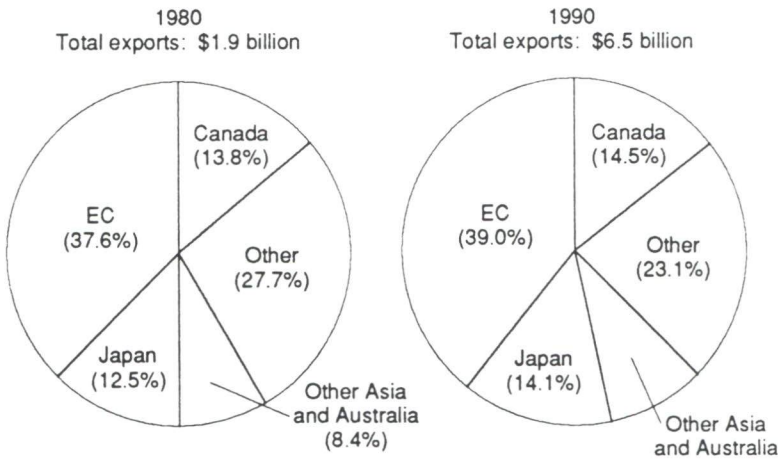
Mexico's share of U.S. medical products exports increased from 3.2 percent in 1980 to 4.6 percent in 1990. It is likely that increased exports to Mexico can, in part, be attributed to import liberalization in that country and some alleviation of the country's debt situation. However, these numbers, rather than reflecting only an increase in the Mexican market for medical products, may also reflect the fact that U.S. companies are increasingly locating there for production and assembly purposes. This results in increased exports to Mexico of partially assembled products, which are then finished and re-exported to the U.S. market.

Major Suppliers of U.S. Imports

In contrast to export patterns, the data reveal that import patterns have changed substantially since 1980 (Figure 11 and Table 10). Imports from Japan as a percent of total U.S. imports increased from 18 percent to 24 percent during the period 1980-1990. In contrast, the German share of U.S. medical products imports fell from 35 percent to 25 percent. In 1990, imports from Germany and Japan totalled $818 million and $794 million, respectively, which together accounted for nearly half of total U.S. imports of medical products.

Imports from Mexico rose so dramatically during the period 1980-1990 that Mexico is now the third largest supplier to the U.S. market. Imports from Mexico rose from $11 million in 1980 to $254 million 1990.

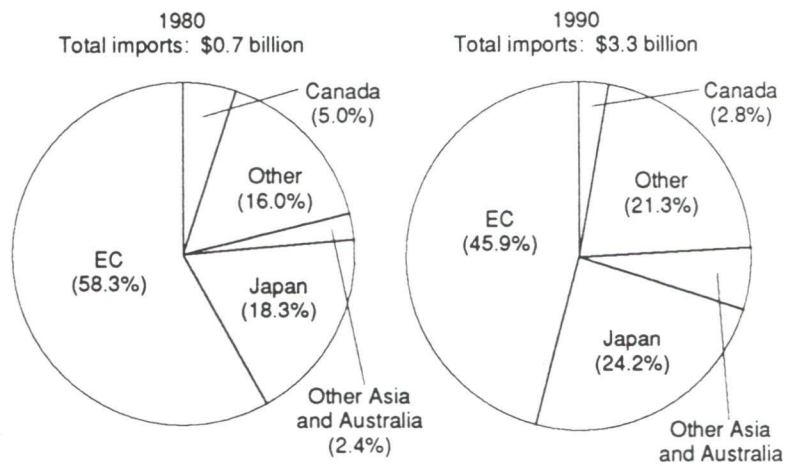
Figure 10
MAJOR PURCHASERS OF U.S. MEDICAL PRODUCTS EXPORTS 1980 AND 1990



Note: 1980 figures exclude diagnostic products.

Source: U.S. Department of Commerce unpublished data.

Figure 11
MAJOR SUPPLIERS OF U.S. MEDICAL PRODUCTS IMPORTS 1980 AND 1990



Note: 1980 figures exclude diagnostic products.

Source: U.S. Department of Commerce unpublished data.

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Again, however, it is not clear to what extent these figures reflect actual sales to end users or border transactions between producers and assemblers.

Composition of Medical Products Trade Flows

Table 11 provides a breakdown of health care technology products trade flows by major product groups. Surgical and medical instruments have been the major contributor to the surge in the U.S. medical products trade surplus in recent years. Exports of these products have grown by an average annual rate of more than 35 percent in the past three years, reaching an estimated $1.9 billion in 1990. At the same time, U.S. imports of surgical and medical instruments have remained relatively flat. As can be seen in Table 12, with the surge in exports of these instruments, this category now accounts for nearly 29 percent of total U.S. exports of health care technology products.

The major factor contributing to the growth in exports of surgical and medical instruments is probably the spread of AIDS and other infectious diseases. Exports of medical equipment used for infectious control purposes (e.g., syringes, needles and various transfusion equipment) have grown significantly in recent years. In addition, U.S. suppliers are particularly competitive (i.e., have a large percentage of world market share) in the more technologically advanced medical instruments such as microsurgical equipment. Although U.S. suppliers are also strong in the hand-held instrument area, they face tough competition from suppliers in Europe and Japan in this product area.

Surgical appliances and supplies also contributed strongly to recent growth in the medical products trade surplus, as exports have grown by more than 25 percent during the period 1988-1990, and imports have remained stagnant (Table 11). This category includes implantable medical devices, a product area in which U.S. suppliers are particularly competitive and have a large world market share. For example, U.S. suppliers hold over 90 percent of the Japanese market in heart valves and artificial joints. Intra-ocular lenses is another implantable product area in which the U.S. suppliers are strong. However, although U.S. suppliers are competitive in the implantable products area, they are by no means dominant and face tough competition from European suppliers, particularly from German suppliers. With the growth in exports of these products, surgical appliances and supplies now account for 17 percent of total health care technology products exports, compared with 11 percent of exports in 1980.

Electromedical equipment has continued to be a strong contributor to the U.S. medical device trade surplus in recent years, despite the fact that exports of these products have not grown as rapidly as other medical product categories (Table 11). The U.S. trade surplus in electromedical equipment reached an estimated $811 million in 1990. Key products in this category — in which U.S. suppliers have strong market share — are pacemakers and magnetic resonance imaging (MRI) equipment. Pacemakers represent another example of implantable devices where the major foreign competition for U.S. suppliers comes from Germany. The percentage of total medical products exports accounted for by electromedical equipment stood at approximately 28 percent in 1990, down from approximately 35 percent in 1987 and 1988 (Table 12).

MRI equipment, along with x-ray equipment, makes up the diagnostic imaging product area. As Table 11 shows, the U.S. trade deficit in x-ray and irradiation equipment decreased to $312 million in 1990, as U.S. exports of x-ray equipment rose and imports remained static.

The competition has become particularly fierce in the x-ray technology area as suppliers in Japan, Germany, the Netherlands and the United Kingdom have grown from being predominantly "national suppliers" to global players. In addition, with the U.S. market for x-ray equipment being primarily a replacement market with relatively slow growth prospects, U.S. suppliers must increasingly fight for market share elsewhere, such as in Japan and the EC.

Diagnostic products in recent years have become a key product group contributing to the U.S. trade surplus in medical products. In 1990, the trade surplus in diagnostic products reached $649 million. Relative to their foreign competitors, U.S. diagnostics manufacturers are very competitive in terms of market sales. While a number of foreign competitors have developed strong positions in certain product niches, U.S. diagnostics suppliers have captured the largest percentage of world sales, followed closely by European manufacturers and more distantly by Japanese suppliers. With the populations aging in the key markets of the EC and Japan, as well as in the United States, it is likely that U.S. production and exports of diagnostic products will remain strong over the medium term.

With regard to the composition of U.S. imports (Table 13), electromedical equipment and x-ray apparatus together accounted for nearly 57 percent of total U.S. medical products imports in 1990, compared with approximately 50 percent in 1980. The percentage of imports accounted for by surgical and medical instruments, and surgical appliances and supplies has dropped since 1980, to 23 percent and 12 percent, respectively, in 1990.

Export Intensity and Import Penetration Ratios

As a result of the health care technology industry's historical commitment to exporting, as well as the competitive dividends of investment in research and development, the industry has had a strong and relatively consistent export intensity ratio since 1975.[6]

Although gradually increasing, exports as a percentage of production have tended to range between 15 and 20 percent during the period 1975-1990 (Table 14). In 1990, the U.S. health care technology industry exported approximately 21 percent of its production, the highest level ever. The export intensity of the industry had stood at 18 percent in 1980, dropped slightly during the mid-1980s, and has increased in recent years as the export performance of a number of product categories has improved.

Electromedical equipment is clearly the most export-intensive of the medical products categories. Exports accounted for approximately 36 percent of U.S. shipments of electromedical equipment in 1990, down from 42 percent in 1988. X-ray apparatus and irradiation equipment also has a high export intensity, with 30 percent of industry shipments devoted to exports in 1990. Given their heavy dependence on export markets, as well as the strong competition suppliers of these products face worldwide, the electromedical and x-ray industry sectors are especially sensitive to foreign exchange rate fluctuations and other external factors influencing trade.[7]

Dental equipment and surgical and medical instruments also have relatively strong export intensities. In 1990, exports as a percentage of shipments stood at approximately 27 percent for dental equipment, while the percentage for surgical and medical instruments grew to over 19 percent. Diagnostic products also have a relatively strong export intensity, with nearly 23 percent of product shipments going to foreign markets in 1990.

On the import side, foreign products accounted for less than 12 percent of total U.S. consumption of health care technology products in 1990 (Table 14). Similar to this industry's export intensity ratio, the import penetration ratio has steadily increased over the past 15 years from the 7 percent level experienced in 1975.

Import penetration ratios vary widely across the categories of health care technology products. Import penetration in the surgical and medical instruments, and surgical appliances and supplies categories stood at 9 percent and 4 percent, respectively, in 1990. However, in the x-ray apparatus and electromedical equipment sectors — the sectors that account for the major portion of medical device imports — the penetration levels are much higher. In 1990, imports accounted for more than 40 percent of x-ray apparatus and equipment bought in America and nearly 24 percent of electromedical equipment consumption.

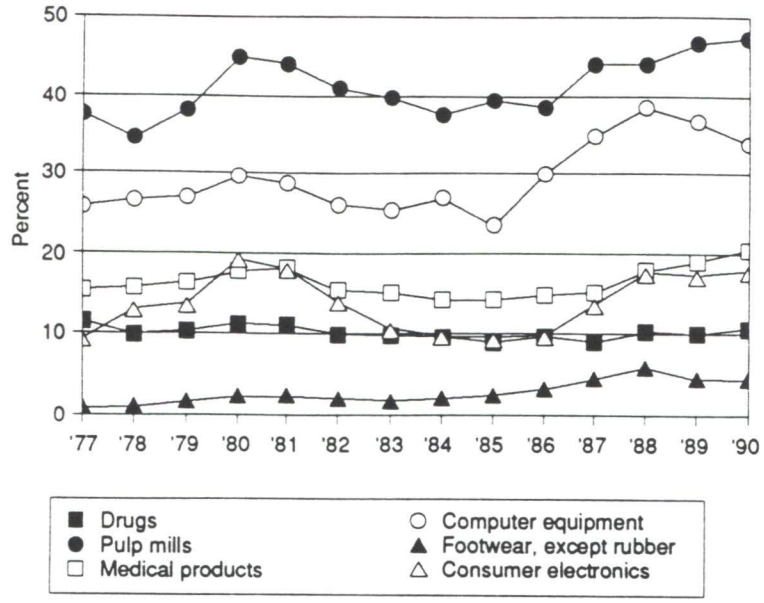
On the whole, Table 14 provides further evidence of the increasing importance of internationalization in the health care technology industry. Both the export intensity level and the import penetration ratio for the industry have exhibited a gradual rise since 1975.

The industry's consistently favorable trade intensity, especially relative to other U.S. industries, is indicative of its strength in the face of growing international competition. Figures 12 and 13 compare the import and export intensities of the U.S. medical products industry with those of several other U.S. industries. The other industries shown are a sample of some of America's highest and lowest exporting and importing industries.

The export intensity of the health care technology industry now stands at approximately 21 percent, which is significantly higher than the relatively low export intensities experienced by the U.S. footwear and drug industries. The U.S. pulp mill industry has a very strong export intensity of more than 40 percent; however, it should be noted that that industry's import intensity also exceeds 40 percent. Although the export intensity for the medical products industry is lower than that for the computer industry, both of these high-tech industries have experienced a similar increase in the percentage of their production that is shipped to foreign markets.

On the import penetration side, imports as a percentage of new supply for the health care technology industry remain relatively low in relation to such import-intensive

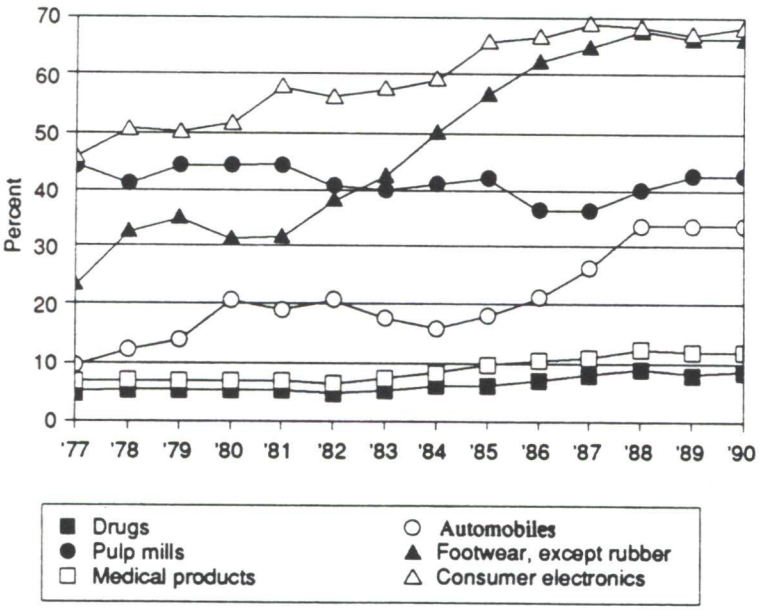
Figure 12
EXPORT INTENSITY RATIOS FOR SELECTED U.S. INDUSTRIES 1977-1990



Note: Export intensity ratio = export/shipments.

Source: U.S. Department of Commerce, *U.S. Industrial Outlook*, 1988 and 1990.

Figure 13
IMPORT PENETRATION RATIOS FOR SELECTED U.S. INDUSTRIES 1977-1990



Note: Import ratio = import/(shipments + imports).

Source: U.S. Department of Commerce, *U.S. Industrial Outlook*, 1988 and 1990.

industries as consumer electronics and footwear. This is despite the fact that the U.S. market, as for so many industries, represents the world's largest medical device market and is the one that foreign suppliers target with their products.

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III. Innovation

The rapid introduction of new products and the refinement of existing products are hallmarks of the U.S. health care technology industry. Innovation and new product introduction, in fact, are the key to the industry's international competitiveness. Firms that can successfully develop new products and satisfy consumer demand remain competitive in both the domestic and world health care technology markets.

Innovation is also a key factor in financial performance, a very important business consideration. According to one Wall Street analyst, the health care technology companies whose stocks perform the best are those that have made new product development a part of their operations strategy.[8]

But technology and innovation have little intrinsic value until they are used to benefit people. The true benefits of health care technology are found in the lives saved and the improved quality of lives lived by people around the world; the economic considerations of competitiveness and stock performance pale in comparison.

All too often, technological innovation is blamed for increased health care costs. However, this assumption does not accurately reflect the relationship between health care technology and costs. Newer technologies can actually reduce the costs associated with health care by allowing for care in lower-cost settings and by replacing more invasive procedures. Thanks to technological innovations, doctors can use sophisticated diagnostic equipment such as positron emission tomography (PET scans) and magnetic resonance imaging (MRI) instead of exploratory surgery. And when surgery is still necessary, technological innovations such as angioplasty devices (small hollow catheters) and the microsurgical tools used in laproscopy provide for less invasive procedures. By reducing risks and recovery times, these health care technologies can reduce costs over the long term.

Where medical technology does lead to increased costs, it is often because these advances allow doctors to do more for more people. When used effectively, medical technology helps keep people alive, get them back to work sooner and improve their quality of life.

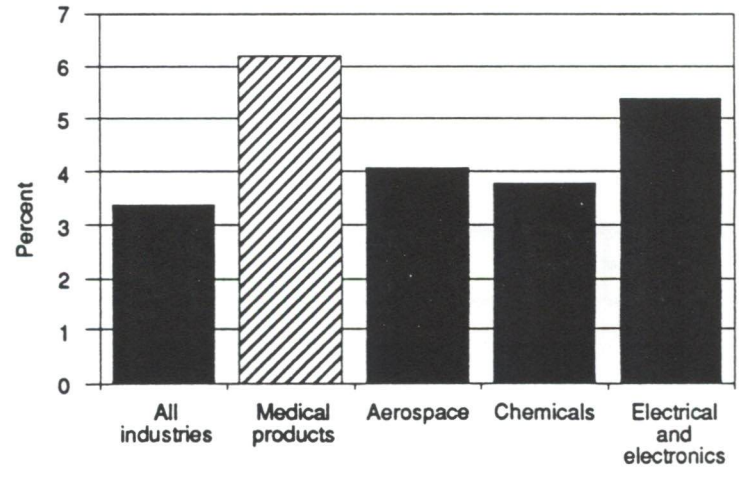
More than most industries, the health care technology industry has been receptive to technological innovation. This is related in no small part to the fact that the U.S. market is, in general, receptive to advancing health care technology. American consumers demand high-quality, innovative health care products, and the FDA's 510(k) process, under which the majority of products are reviewed before going on the market, allows for relatively rapid product introduction.

The industry's innovativeness can be measured in a number of ways. One measure is the percentage of sales that health care technology companies invest in research and development. Another is the number of new medical products approved by the FDA for use in the United States. Patents are also a useful indicator of the industry's innovativeness.

Research and Development Spending

Better health care is based on constant change, constant invention. To retain their international competitiveness in the coming decade and into the 21st century, U.S. health care

Figure 14
R&D AS A PERCENTAGE OF SALES IN 1989



Source: "Innovation 1990, R&D Scoreboard," *Business Week*

technology manufacturers must be able to continue to market new and more effective products.

The U.S. health care technology industry has demonstrated its commitment to innovation by investing heavily in research and development. In both 1988 and 1989, the industry spent 6.2 percent of sales on R&D, compared to an average for all U.S. industry of 3.4 percent in those years (Table 15). Figure 14 shows the health care technology industry's R&D expenditures relative to other innovative U.S. industries such as the electrical and electronics industry, which spent 5.4 percent of sales on R&D in 1989.

Table 16 shows the magnitude of U.S. health care-related R&D. The American public and private sectors spent an estimated $141.8 billion on research and development in all areas in 1989. Of that total, health care R&D accounted for an estimated $20.8 billion, or 14.7 percent.[9] During the period 1985-1989, U.S. health-related R&D grew at an average annual rate of 11.4 percent.

FDA Medical Device Approvals

In fiscal year 1990, the FDA cleared 4,795 new medical devices for sale in the United States. The overwhelming majority of these clearances were processed under the FDA's premarket notification, or 510(k), process. Forty-seven of these approvals were granted under the FDA's premarket approval (PMA) procedures.

The FDA's 510(k) process is uniquely suited for technology that is improved through incremental refinement and allows the FDA to scrutinize a product to a degree commensurate with its sophistication and complexity. Under the 510(k) process, a manufacturer must file a premarket notification with FDA before placing into commercial distribution a medical device that is substantially equivalent to devices already on the market. These procedures suffice, in the overwhelming majority of cases, to ensure that products entering the marketplace can be used by patients with minimal risk.

As can be seen in Table 17, in FY 1990 the FDA decided in 4,748 cases — out of a total of 5,831 510(k) submissions received — that devices being marketed for the first time were substantially equivalent to devices already on the market. The total review time averaged 98 days for these cases. The 4,748 cases that were cleared under the 510(k) process in FY 1990 represent about a 2 percent drop from the number of cases cleared in FY 1989 under these procedures.

In the case of products that are breakthrough devices, manufacturers are required to submit a PMA application for FDA review and approval. PMAs must provide assurance that the device is safe and effective for its intended use and that it will be manufactured in accordance with good manufacturing practices (GMPs). During FY 1990, a total of 79 original PMAs were submitted. The 47 approved represent a 16 percent drop from the number of PMAs approved in FY 1989 (Table 18). The total average review time on these cases was 415 days — considerably longer than for the 510(k) cases. However, the law stipulates that PMAs should be approved within six months (i.e., 180 days). PMA supplements, which represent modifications to existing PMAs, rose from 510 to 700, or 35 percent, in FY 1990.

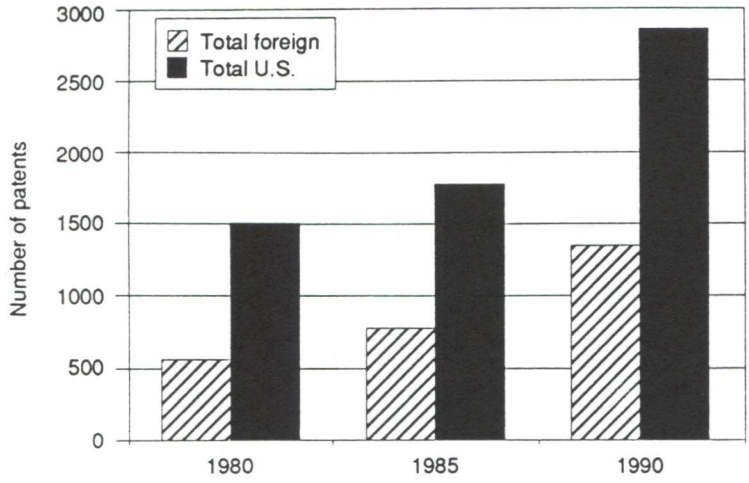
Although it is important that the United States work to ensure that medical products entering the market are safe and effective, it is also important that the regulatory approval process not handicap industry's ability to develop innovations and new products and to make them available to patients. In the majority of cases, the 510(k) process provides both the FDA and the health care technology industry with effective regulatory procedures that do not constrain the application of relatively recent innovations and new technologies. The 510(k) process is well-suited for an engineering-based industry that relies on incremental product improvements in most cases.

Medical Products Patents

The rapid rate of innovation in the health care technology industry makes many medical devices technologically obsolete within a few short years or months. For this reason, patent protection is typically less important in the medical products area than in related fields such as pharmaceuticals. However, patent protection in many instances can help medical products manufacturers protect important rights and, by encouraging the disclosure of information concerning new technologies, stimulate further innovations in a number of high-tech medical product areas.

A recent HIMA study estimated that approximately 4 percent of the total number of patents approved by the U.S. Patent and Trademark Office in 1990 were granted to medical products.[10] Of the approximately 4,180 medical products patents granted that year, 32 percent were foreign owned (Table 19). Figure 15 shows the increasing number of U.S. medical patents granted on an annual

Figure 15
OWNERSHIP OF U.S. MEDICAL DEVICE PATENTS 1980-1990



Source: U.S. Department of Commerce, Patent & Trademark Office, 1991.

basis. The 4,180 total medical device patents granted in 1990 represent more than a 100 percent increase over the number granted in 1980. During this same 10-year period, the ownership share of U.S. medical device patents granted to foreign entities grew from 27 percent to 32 percent. Japanese entities generally receive the largest foreign share of U.S. medical products patents granted to foreign owners, accounting for approximately 10 percent of the U.S. medical products patents granted in 1990. German concerns also receive a substantial number of U.S. medical device patents. Other countries with a significant number of medical device patents include the United Kingdom, France and Canada.

Although the number of medical device patents going to foreign residents has been increasing, patent data still reflect the U.S. health care technology industry's strong international competitiveness. While 32 percent of the medical products patents granted in 1990 did go to foreign residents, 48 percent of all patents for inventions granted in 1990 went to foreign residents. In other words, U.S. health care technology companies are far more dominant in terms of patent activity than are U.S. companies as a whole.[11]

IV. Prospects

The focus of the paper to this point has been to review the growth and development of the health care technology industry. The data clearly identify and establish the industry's positive, substantial and unique contribution to the U.S. economy and to the quality of American life and health. In coming years, the industry has the potential to continue to be a major source of economic growth and technological advances. If that potential is to be realized, however, policymakers — both American and foreign — must refrain from disrupting the regulatory environment in which the industry operates.

Growth Projections

U.S. Department of Commerce estimates rank the health care technology industry as the fastest growing U.S. industry in 1991, with an expected growth rate of 7.3 percent (on a constant dollar basis) for the year. Figure 16 provides comparable projections for selected U.S. high-growth industries. The health care technology industry is expected to grow significantly faster than some of the fastest growing U.S. industries and much faster than the U.S. economy in general.

Since the mid-1980s, production in the health care technology industry has grown an average of 9 percent annually. Based on U.S. Department of Commerce historical data and 1990 projections, HIMA estimates that U.S. production and consumption will maintain exceptionally strong growth for the next five years. HIMA also estimates that the industry's trade surplus will expand 39 percent in 1990 and will record average annual growth of 24 percent for the years 1990-1995.

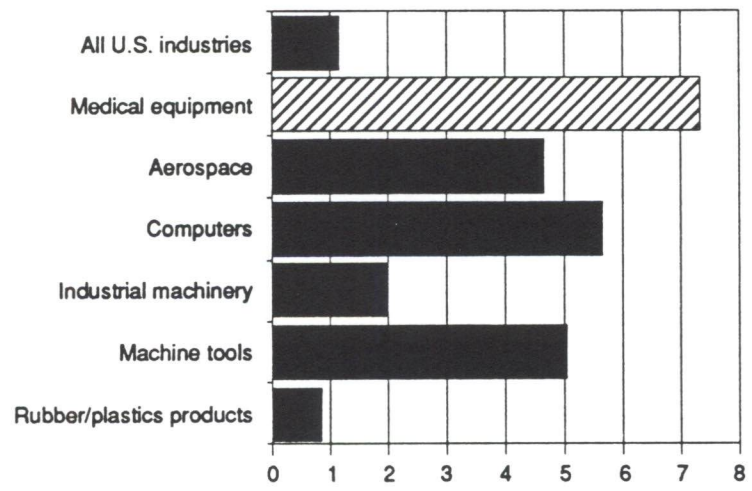
HIMA's projections represent a conservative estimate of the industry's future prospects, given recent historical trends. Specifically, projections for 1990 were reduced by 10 percent and projections for the period 1991-1995 were reduced by 20 percent in anticipation of a sluggish U.S. economy over the next several years (Figure 17 and Table 20). Figure 18 provides a year-by-year picture of the industry's size for the period 1985-1995 based on historical data and current industry projections.

Despite the conservative projections, export growth is still forecast to be a major contributor to the continued growth in U.S. production, as it has been in the past. Both U.S. government and industry sources expect U.S. medical products exports to continue to grow at a double-digit pace over the next five years. At the HIMA-forecasted annual growth rates of approximately 19.0 percent for 1990 and 15.5 percent for 1990-1995, U.S. exports would reach $13.1 billion in 1995. Imports, however, are expected to grow much more modestly over the next several years, with annual growth forecast to be about 7.6 percent in 1990 and 6.9 percent in 1990-1995, which would place U.S. imports of medical devices at $4.7 billion in 1995.

Based on these projections, the U.S. trade surplus in medical products would reach $8.4 billion in 1995 (Figure 19). Under HIMA's conservative projections, the size of the U.S. market for health care technology products, in terms of consumption, would be $35.5 billion in 1995, reflecting average annual growth of 5 percent during 1990-1995.

It is important to note that these projections assume no major changes in the regulatory or competitive

Figure 16
GROWTH RATE PROJECTIONS FOR SELECTED U.S. INDUSTRIES 1991



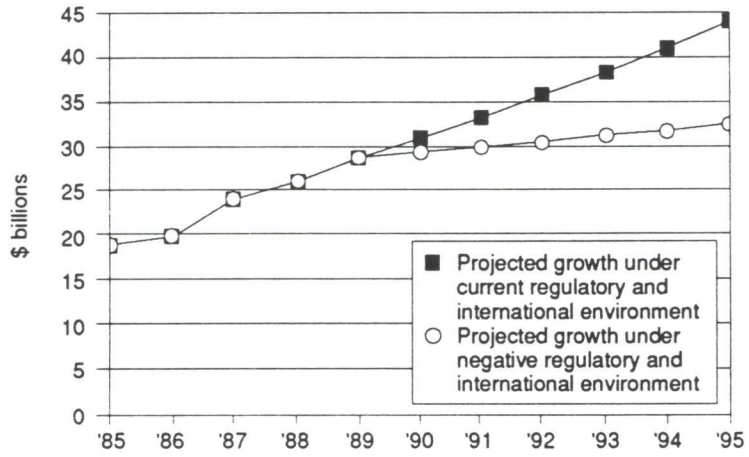
Source: U.S. Department of Commerce, *U.S. Industrial Outlook*, 1991.

Figure 17
U.S. HEALTH CARE TECHNOLOGY INDUSTRY GROWTH 1990-1995

Category	Amounts (in $ billions) 1990	1995	Annual growth (in percentages) 1990	1990-1995
U.S. production	31.0	43.9	8.1	7.4
Exports	6.5	13.1	19.0	15.5
Imports	3.3	4.7	7.6	6.9
U.S. trade surplus	3.2	8.4	39.1	24.3
U.S. market size (consumption)	27.8	35.5	5.7	5.1

Source: HIMA projections.

Figure 18
U.S. PRODUCTION OF HEALTH CARE TECHNOLOGY PRODUCTS 1985-1995



Source: U.S. Department of Commerce and industry sources.

environment in which the industry operates. There are, however, a number of potential changes facing the industry that could substantially alter the industry's future performance.

Negative Scenario

Nearly all of the factors that could dim the U.S. health care technology industry's growth prospects are in the hands of policymakers. Ironically, the policy options that could have the most negative effects on the industry from a competitiveness standpoint are those designed to improve the current system for medical products from a regulatory standpoint. The impact of these options could be great, however, reducing the industry's 1990-1995 growth potential from the currently projected annual rate of 7.4 percent to only about 2 percent (Figure 18). The competitive edge the U.S. health care technology industry currently holds in world markets could substantially deteriorate and, ultimately, the health and wealth of the nation could suffer. These potentially negative factors can be divided into two categories — domestic and international (Figure 20).

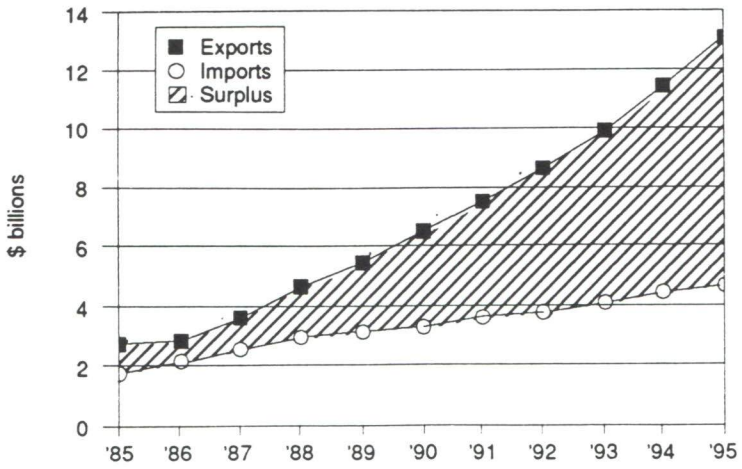
Domestic Factors

How the FDA implements the Safe Medical Devices Act of 1990 could have a tremendous impact on the strength of the U.S. health care technology industry's future performance. All of the innovations that flow from the industry must pass through the FDA's approval process before they can benefit American patients. If that approval process is slowed or disrupted, the flow of innovations will also be slowed and disrupted.

The most apparent losers in that instance would be the Americans who would have lived longer or had better lives if they had had access to the latest technology. At the same time, the health care technology industry itself would be weakened because it could not bring its products to market. Thus, sources of revenue would be cut off as would opportunities to continue developing the stalled technologies. Meanwhile, companies in nations without regulatory bottlenecks would be able to forge ahead with their innovation processes in their home markets and make themselves increasingly competitive in the global market, while American companies lag. An efficient FDA, therefore, is a vital ingredient in preserving the U.S. industry's international preeminence.

Three policy areas are particularly important here: protecting the FDA's review procedures, providing

Figure 19
PROJECTED TRADE SURPLUS FOR MEDICAL PRODUCTS UNDER CURRENT ENVIRONMENT, 1985-1995



Source: 1990-1995 figures are HIMA projections based on historical data from the U.S. Department of Commerce.

Figure 20
POTENTIAL NEGATIVE DEVELOPMENTS

U.S. Legislative and Regulatory Factors

- Adding requirements to the FDA's review process
- A lack of resources at FDA
- Imposition of user fees
- Reductions in reimbursement levels/coverage
- Cost-control measures discouraging innovation
- Ill-conceived clinical laboratory regulations

Foreign Regulatory Factors

- Imposition of price controls on most medical products in Japan
- Regulatory gridlock and chaos as a result of EC 1992
- Cost-control measures discouraging innovation

Source: HIMA.

sufficient resources to the FDA and avoiding the imposition of user fees.

The new requirements to the FDA's review process called for by recent legislation, including the Safe Medical Devices Act of 1990, could significantly impair the competitiveness of the U.S. health care technology industry, if only because of the uncertainty caused by the new legislation and its implementation. As discussed in the previous chapter, the number of PMAs approved and 510(k)s favorably reviewed had already fallen in FY 1990, while at the same time the average number of days required for reviews and approvals had increased.

The Safe Medical Devices Act of 1990 adds a number of requirements to the FDA's review procedures that are likely to complicate further the 510(k) process upon which the U.S. health care technology industry must so heavily depend to get improved products to market. Requirements contained in the new legislation include changes in premarket review requirements, including the preparation of a summary of safety and effectiveness data for most products and the certification that a search of adverse incidents for certain products has been conducted. Additional requirements include tracking certain high-risk devices, reporting removals and corrective actions taken by manufacturers, postmarket surveillance and reporting by health care providers of certain incidents involving devices. The new law also adds design validation of quality systems to the FDA's good manufacturing practices (GMPs) requirements, which will increase the regulatory burden on the industry, but may also facilitate agreement between the United States and the EC on a common GMP standard. The legislation also provides the FDA with the authority to assess civil penalties, to issue emergency recalls and to suspend PMAs temporarily.

Although it is unclear how these new requirements initially will affect the efficiency of the FDA's review processes, the legislation is expected to create some degree of regulatory uncertainty in the marketplace. The uncertainty is likely to remain until the new requirements have been implemented by the government and understood by an industry that innovates very rapidly. Lacking any additional resources for the FDA, the legislation is also likely to increase the FDA's paperwork load, further slowing down product review times.

The second important policy area, FDA resources, has long been a

problem for the agency and the industry. In fiscal 1989, for example, the FDA's Device Center had only 3.2 percent more staff-years at its disposal than it did in 1980, even though the device submissions it must handle had grown by more than 155 percent during that period. In an era of high federal budget deficits, such problems may only grow worse. Continued, chronic under-funding will prevent the agency from attracting and retaining enough qualified reviewers and scientists to handle the flow of applications for FDA product approvals.

Stalling the movement of innovations from the labs to the marketplace is just as detrimental for the industry and the Americans in need of the new products whether it occurs because the FDA review process is made more burdensome or because the FDA lacks the resources to do its job efficiently. Under-funding the FDA can also lead to inconsistent compliance enforcement, which further discourages the industry from making new, more effective products available while encouraging poor-quality products that, ultimately, will harm the reputation of better-quality products. Lack of resources can also limit the FDA's ability to inspect imported products and manufacturing facilities overseas, which in turn can result in delays or inadequate inspection of foreign products.

The third important policy area, user fees, is sometimes suggested as the panacea for the FDA's funding problems. Such fees, however, have the effect of taxing innovation and represent a special hardship for the small, entrepreneurial companies that are an especially vital part of the health care technology industry. The cost of a single premarket approval for a new device would be an estimated $90,000 under the user fee scheme contained in the President's FY 1991 budget proposal. The President's budget proposal called for companies to pay some $157 million in FDA user fees in FY 1991 even though they already contribute millions of dollars each year to the support of the federal government in the form of corporate income taxes. What's more, only a portion of the revenues from user fees would actually go toward FDA program improvements. Beyond that, industry funding of FDA activities raises a host of conflict-of-interest questions and undermines the concept of public funding for federal activities that benefit the public at large.

In addition to policy considerations related to the FDA, the U.S. health care technology industry's growth prospects could be harmed by changes in other federal regulations, such as those pertaining to the Medicare program, to laboratory testing requirements and to environmental safety issues.

The Medicare payment program is an issue that is likely to be of increasing importance in coming years. Medicare coverage policies involve a large portion of the U.S. health care delivery system and directly affect the environment for technological innovation. Over the past decade, Medicare coverage and payment regulations were implemented that constrained the introduction and diffusion of some new technologies.

A case that exemplifies the effects of these regulations is the cochlear implant, a device designed to aid patients with hearing disabilities. A recent study found that Medicare payment for the cochlear implant remains well below its cost, with the result that hospitals restrict the availability of the implant to Medicare beneficiaries.[12] This is despite the fact that cochlear implants remain the only hope for restoring limited hearing to a significant number of profoundly hard-of-hearing people. In addition, because of the Medicare restriction, one manufacturer of the device has discontinued production.

The Medicare coverage decision process is another area of concern. The process for determining whether a new product should be paid for, and at what level of reimbursement, has become increasingly difficult as government health agencies have intensified their efforts to evaluate new technology before paying for its use.

A recent study found that Medicare coverage decisions for new products took an average of nearly 2.4 years to complete. For one product, the review and approval time took 5.5 years.[13] In the case of magnetic resonance imaging (MRI), the coverage decision process took 3.5 years. Delays in the decision process are particularly common for implantables and other high-technology products. While the evaluations take place, many products that could save lives or otherwise improve patient care are denied to patients.

Future changes, such as the recently passed Medicare physician payment reform legislation, pose similar challenges to the health care technology industry. If reimbursement levels are reduced significantly, the amount of money available to be plowed back into the development of new technologies and products will also be reduced. The same effect could be caused by instituting certain Medicare cost-control measures that preclude the use of leading-edge technology. By discouraging innovation, certain cost-control measures may, in fact, actually serve to keep costs *up*, because developments that might reduce the cost of

patient treatment will simply never occur. According to one expert panel, technology will save more than $200 million in Medicare hospital costs this fiscal year alone.[14]

In terms of the laboratory testing issue, the regulations being drafted to implement the Clinical Laboratory Improvement Amendments of 1988 may severely impact the health care technology industry by substantially reducing the diagnostic testing done in physicians' offices and in facilities other than traditional laboratories. The changes in laboratory testing that could result from these regulations may add up to a multimillion-dollar loss to the diagnostics sector of the industry — while at the same time increasing the costs of testing and making testing services less accessible in rural and inner-city areas.

A number of environmental and worker safety regulations are currently under consideration at both the state and federal level that will significantly affect certain segments of the health care technology industry. These regulations cover issues ranging from industrial emissions to disposal of medical wastes to increased penalties for workplace safety and health violations. Under the recently revised Clean Air Act, the Environmental Protection Agency is expected to propose new federal emission standards for a number of chemicals used in the health care technology industry, including ethylene oxide. The revised Act is expected to increase the costs of doing business in the health care technology industry and, together with the other regulatory and legislative factors discussed above, could have a significant impact on the future performance of the industry.

International Factors

Because the U.S. health care technology industry is such a strong exporter, negative changes in the international context in which the industry operates could have a major impact on the industry's performance in coming years. Such changes include developments in the international regulatory environment and in the overall competitiveness of foreign suppliers.

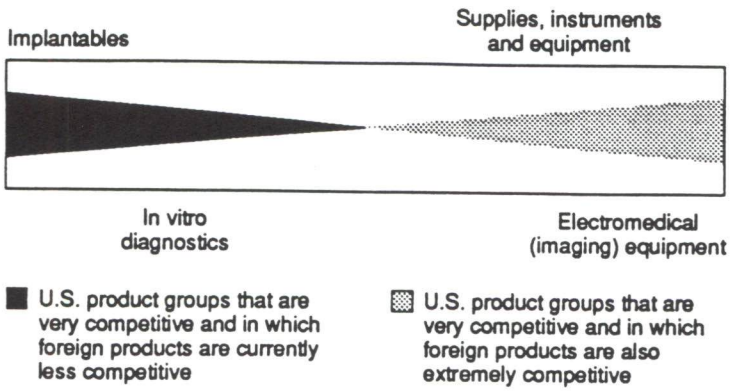
The European Community (EC) and Japan represent major markets for health care technology products. In 1990, the EC market for medical devices and diagnostic products amounted to $18.1 billion, while the Japanese market stood at $10.5 billion. U.S. medical products companies, given their overseas investments in local production as well as their trade interests in these markets, could be significantly affected by negative developments in either the regulatory environments of these countries or the degree of access they have to these markets.

The EC is currently developing legislation for the regulation of medical devices in the unified European marketplace. The EC's plans to completely overhaul and harmonize its approval process by 1992 will create uncertainty and possible chaos for manufacturers trying to access the European market. It is not yet clear what level of regulation the industry will face there after 1992. Nor is it clear whether U.S. companies will have nondiscriminatory access to the EC marketplace. The U.S. industry could be seriously disadvantaged if European testing and certification procedures do not provide the flexibility for tests and inspections to be carried out by non-European bodies or outside the EC's geographical boundaries. If the limited number of European certification bodies is not allowed to rely on information from U.S. test and inspection facilities, then U.S. manufacturers could face long delays and de facto discrimination in entering the EC 1992 market.

In Japan, the government is also in the process of revising its health care requirements and reimbursement system in order to control the cost of serving its rapidly aging population. As part of these efforts, the Japanese recently proposed establishing price controls in the three areas of implantables in which U.S. industry is most competitive and dominates the Japanese market. Thus far, the Japanese government has agreed to consult with the U.S. government and industry regarding this issue, but the possibility remains that some form of price controls may be implemented and, in fact, may be imposed across a broad range of medical products in Japan.

As the chapter on international trade showed, the U.S. health care technology industry excels at exporting its products around the world. However, significant changes in the level and quality of foreign competition could also have a great effect on the future performance of the industry in the United States. European and Japanese health care technology companies are extremely competitive on a global basis. Japanese companies are particularly competitive in the areas of x-ray and imaging equipment. With the next step forward in x-ray technology likely to come from high-definition imaging, the Japanese are expected to remain strong in this area. With regard to European companies, German suppliers are particularly competitive across the broad range of medical products, including imaging equipment. Figure 21 illustrates the relative competitiveness of U.S.

Figure 21
RELATIVE COMPETITIVENESS OF U.S. INDUSTRY



■ U.S. product groups that are very competitive and in which foreign products are currently less competitive

▩ U.S. product groups that are very competitive and in which foreign products are also extremely competitive

Note: "Relative competitiveness" is based on market sales rather than on technological superiority.

Source: HIMA.

industry across the range of health care technology products. ("Relative competitiveness" is based on market sales rather than on technological superiority.)

One factor that could affect the level of competition that the U.S. health care technology industry faces from overseas is the support that foreign governments provide their own industries. A recent U.S. Department of Commerce study warns that trends emerging overseas in product introduction and government support to industry are making foreign companies more vital competitors than ever before.[15] Given the increasingly favorable climate some foreign health care technology companies are enjoying in their home countries, the U.S. industry may begin to lag behind both Japanese and EC companies in certain advanced medical technology areas, particularly imaging equipment and diagnostics, the report found.

The U.S. industry's future success, therefore, is much more fragile than its strong historical performance suggests. For example, the Japanese medical device market — like the U.S. market — has grown rapidly in recent years. Although U.S. medical device exports to Japan have been rising significantly, there are indications that the actual U.S. share of the Japanese market has remained constant.

Similarly, Germany — like the United States — has a sizable global trade surplus in health care technology trade. In fact, Germany is the *only* country to run a trade surplus in medical products with both the United States and Japan. The global strength of the German industry and America's chronic medical products trade deficit with Germany point to the danger inherent in allowing the U.S. health care technology industry to falter. Although the U.S. health care technology industry stacks up incredibly well when compared to other U.S. industrial sectors, its continued competitiveness hinges on not yielding any advantage to its aggressive and able foreign counterparts. Here, then, the domestic U.S. policy considerations outlined at the beginning of this chapter come into play. If, as foreign governments strengthen and nurture their health care technology companies, the United States makes it more difficult for American companies to innovate and market their products, U.S. industry's global competitiveness may erode quickly.

In fact, HIMA calculates that if unfavorable U.S. and foreign regulatory measures are enacted or if foreign competitors grow in strength, the industry's current annual growth projections of 7.4 percent could be reduced to a much weaker 2 percent or so. In addition, other non-regulatory factors such as procurement practices can adversely affect future growth prospects. Many of the negative factors that could so debilitate an industry with such promise are in the hands of American policymakers, however. Wise decisionmaking at home and wise foreign trade policies can help offset whatever competitive advantages foreign governments try to bestow upon health care companies based in their countries. Therefore, the fate of the U.S. health care technology industry, the people it employs and the people it benefits with life-saving and life-enhancing products is to no small degree a matter for America's leaders to decide.

Positive Scenario

There are, of course, circumstances that could fuel the U.S. health care technology industry's growth beyond what HIMA's conservative forecasts predict. These circumstances are, generally speaking, the mirror image of those outlined in the negative scenario above and include potential changes in the U.S. regulatory and legislative environment and in the international marketplace.

To avoid complicating its current

review procedures, the FDA could implement the new Safe Medical Devices Act of 1990 in a manner that minimizes the potential negative impact and uncertainty caused by any major new legislation of this type. But some degree of uncertainty and anxiety cannot be avoided. HIMA will work with the FDA to lessen this concern. Furthermore, Congress could end the chronic under-funding of the agency, providing the FDA with the resources to attract well-qualified scientists to develop guidance on regulatory requirements and to serve as medical reviewers.

Other domestic factors that would aid the U.S. health care technology industry's growth include increased coordination between the FDA and the Health Care Financing Administration to ensure FDA-approved products are covered for Medicare reimbursement purposes. A more efficient system of preparing export certificates could also aid the industry by reducing the delays that U.S. suppliers face in marketing their products overseas.

A number of international factors could also fuel the U.S. health care technology industry's growth. The unification of the EC in 1992 could lead to the harmonization of regulatory requirements in the 12-nation market and contribute to increased sales prospects there for U.S. companies — if the level of regulation in the EC 1992 market is not unduly burdensome and if U.S. suppliers get equal access to the market. U.S. companies' concern over access to the European market will be greatly reduced if European certification bodies have the ability to subcontract outside the EC for product testing and quality assurance inspections. In the Japanese market, U.S. companies could benefit from a restructuring of Japan's distribution system (and associated regulatory mechanisms) that reduces the many inefficiencies that contribute to higher prices there.

The U.S. health care technology industry could also benefit from improvements in international trade rules in the General Agreements on Tariffs and Trade (GATT) as a result of the Uruguay Round of negotiations. These negotiations may lead to significantly reduced tariff and non-tariff barriers in the major medical products markets. In addition, economic growth in non-traditional markets such as Asia and Eastern Europe, as well as a U.S.-Mexico Free Trade Agreement, could lead to expanded trade opportunities for U.S. companies.

International harmonization of regulatory requirements, a long-term goal of the U.S. health care technology industry, would bring significant benefits to the quality of health care in the United States and to the U.S. industry. Harmonization of requirements (such as those for quality assurance) with those of other countries would enable manufacturers to meet major requirements for all markets and help eliminate many of the trade barriers U.S. companies face overseas. Finally, efforts to enhance overall U.S. competitiveness, such as reduction of the U.S. budget deficit and continued focus on regulatory reform, are positive factors that would contribute to increased growth prospects for U.S. industries in general.

In sum, if some of the above positive changes were implemented by policymakers, in the U.S. or abroad, the U.S. industry could easily continue the near double-digit growth that it experienced during the 1980s.

V. Conclusion

In recent years, the U.S. health care technology industry has performed extremely well during a turbulent period for the United States in international trade. The consistency of the industry's performance has been built on a tradition of product excellence, technological innovation and rapid, but careful, product commercialization. Recent dramatic increases in export performance and the overall trade surplus of the industry are the dividends of the industry's investment in research and development. In coming years, the industry is expected to remain a major contributor to U.S. manufacturing growth and trade performance, with a projected trade surplus of $8.4 billion in 1995.

The commitment of America's health care technology companies, both large and small, to R&D and to exporting sets the industry apart from many others. Its future rests on the ability of these companies to continue their commitment to developing and marketing innovative products at home and abroad. Moreover, the industry must strive to meet this challenge in the face of stronger and stronger foreign competition and tighter and tighter government reimbursement and regulatory controls.

HIMA recognizes that the health care technology industry itself is responsible for continuing to meet its global competitors with the same vision, energy and innovativeness as it has in the past. The industry is also responsible for alerting U.S. policymakers to the priorities and pitfalls in the regulatory and legislative spheres that could boost or impair the industry's ability to buoy the nation's trade balance and — just as importantly — to safeguard the health and well-being of every American.

Some of the factors that will determine the industry's fate are also in the hands of U.S. policymakers. American legislators and regulators will determine how efficient the FDA is in coming years, how well attuned to new technologies Medicare is, how reasonable laboratory testing regulations are and how aggressive U.S. negotiations with trading partners are in matters such as assuring U.S. access to the post-EC 1992 marketplace.

Greater coordination within U.S. government circles will be needed to shape and balance often competing national priorities — the need for U.S. competitiveness versus the need for adequate regulatory controls, for instance. The poor trade performance of other U.S. industries throughout the 1980s should serve as a reminder that this industry's competitiveness is as fragile as the patients it serves. Moreover, it serves to underscore the importance of policy coordination both within the government and between the government and the private sector.

In his recent book, George Lodge points out that coordination of government policies — both those that promote and those that constrain industry — is a critical factor for achieving competitive success in the high-tech industries of tomorrow. To this end, industry needs to work with policymakers in all areas of the government to promote awareness of the importance of industrial competitiveness.[16] With regard to the health care technology industry, it is important that there be cooperation between industry and government, as well as within government itself, to achieve a more coordinated approach in dealing with health care issues affecting the industry's competitiveness. This includes more consistent regulatory and reimbursement climates and a continued focus on opening global markets.

By working together, the U.S government and the U.S. health care technology industry can continue to meet these challenges and to fulfill these important national priorities.

VI. Appendices

Appendix A

Notes on Data

1. The data utilized in this study, with the exception of U.S. patent data, are based on the U.S. government's Standard Industrial Classification (SIC) codes.

2. The Department of Commerce defines the medical device industry using a total of five SIC codes:

   Surgical and Medical Instruments (SIC 3841)
   Surgical Appliances and Supplies (SIC 3842)
   Dental Equipment and Supplies (SIC 3843)
   X-Ray Apparatus and Tubes (SIC 3844)
   Electromedical and Electrotherapeutic Apparatus (SIC 3845)

   Appendix B lists the products that are included in these SIC medical device categories. Prior to 1987 changes in the SIC system, x-ray apparatus and electromedical equipment were grouped under the same four-digit SIC category.

3. In addition, HIMA has utilized, where available, data collected on diagnostic substances under SIC category 2835. This category was also created as a result of recent changes in the SIC system.

4. It should also be noted that due to the recent changes in the SIC system, as well as U.S. adoption of the Harmonized Tariff System (HS) in 1989, trade data for periods prior to 1989 are not directly comparable to data for 1989-1990. However, the data are reflective of overall trends and are useful for comparison purposes.

5. The U.S. Patent and Trademark Office does not provide a specific category that encompasses all medical devices. For its analysis of U.S. patents granted to medical devices, HIMA evaluated those categories that should be considered medical devices.

Appendix B

U.S. Department of Commerce SIC Classifications

SIC Code 3841: Surgical & Medical Instruments

Anesthesia apparatus
Biopsy instruments and equipment
Blood pressure apparatus
Blood transfusion equipment
Bone drills
Bone plates and screws
Bone rongeurs
Bronchoscopes, except electromedical
Cannulae
Catheters
Clamps, surgical
Corneal microscopes
Cystoscopes, except electromedical
Diagnostic apparatus, physicians'
Eye examining instruments and apparatus
Fixation appliances, internal
Forceps, surgical
Gastroscopes, except electromedical
Hemodialysis apparatus
Holders, surgical needle
Hypodermic needles and syringes
IV transfusion apparatus
Inhalation therapy equipment
Inhalators, surgical and medical
Instruments and apparatus, except electromedical: medical, surgical, ophthalmic and veterinary
Instruments, microsurgical: except electromedical
Knives, surgical
Metabolism apparatus
Muscle exercise apparatus, ophthalmic
Needle holders, surgical
Needles, suture
Operating tables
Ophthalmic instruments and apparatus
Ophthalmometers and ophthalmoscopes
Optometers
Optoscopes, except electromedical
Oxygen tents
Pelvimeters
Physiotherapy equipment, electrical
Probes, surgical
Retinoscopes, except electromedical
Retractors
Rifles for propelling hypodermics into animals
Saws, surgical
Skin grafting equipment
Slit lamps (ophthalmic goods)
Speculums
Sphygmomanometers
Stethoscopes and stethographs
Suction therapy apparatus
Surgical instruments and apparatus, except electromedical
Surgical knife blades and handles
Surgical stapling devices
Tonometers, medical
Trocars
Ultrasonic medical cleaning equipment
Veterinarians' instruments and apparatus

SIC Code 3842: Orthopedic, Prosthetic and Surgical Appliances and Supplies

Abdominal supporters, braces and trusses
Absorbent cotton, sterilized
Adhesive tape and plasters, medicated or nonmedicated
Applicators, cotton tipped
Atomizers, medical
Autoclaves, hospital and surgical
Bandages and dressings, surgical and orthopedic
Bandages: plastics, muslin, plaster of paris
Belts: sanitary, surgical and corrective
Braces, elastic
Braces, orthopedic
Bullet proof vests
Canes, orthopedic
Cervical collars
Clothing, fire resistant and protective
Colostomy appliances
Corn remover and bunion pads
Corsets, surgical
Cosmetic restorations
Cotton, absorbent: sterilized
Cotton, including cotton balls
Crutches and walkers
Drapes, surgical: cotton
Dressings, surgical
Ear stoppers
Elastic hosiery, orthopedic
Extension shoes, orthopedic
First aid, snake bite and burn kits
Foot appliances, orthopedic
Fracture appliances, surgical
Gas masks
Gauze, surgical: not made in weaving mills
Grafts, artificial: for surgery—made of braided or mesh artificial fibers
Gynecological supplies and appliances
Hearing aids
Helmets, space
Hosiery, support
Hydrotherapy equipment
Implants, surgical
Infant incubators
Intrauterine devices
Iron lungs
Life preservers, except cork and inflatable
Ligatures, medical
Limbs, artificial
Linemen's safety belts
Models, anatomical
Noise protectors, personal
Orthopedic devices and materials
Pads, incontinent and bed
Personal safety appliances and equipment
Plugs, ear and nose
Prosthetic appliances and supplies
Radiation shielding aprons, gloves and sheeting
Respirators
Respiratory protection equipment, personal
Restraints, patient
Safety appliances and equipment, personal
Safety gloves, all materials
Socks, stump
Space suits
Splints, pneumatic and wood
Sponges, surgical
Sterilizers, hospital and surgical
Stockinette, original
Stretchers
Suits, firefighting: asbestos
Supports: abdominal, ankle, arch and kneecap
Surgical appliances and supplies except medical instruments
Suspensories
Sutures
Swabs, sanitary cotton
Tongue depressors
Traction apparatus
Trusses: orthopedic and surgical
Welders' hoods
Wheel chairs
Whirlpool baths, hydrotherapy equipment

SIC Code 3843: Dental Equipment and Supplies

Abrasive points, wheels and disks: dental
Autoclaves, dental
Broaches, dental
Burs, dental
Cabinets, dental
Cement, dental
Chairs, dentists'
Compounds, dental
Cutting instruments, dental
Dental alloys for amalgams
Dental engines
Dental equipment and supplies
Dental hand instruments, including forceps
Denture materials
Drills, dental
Enamels, dentists'
Forceps, dental
Furnaces, laboratory dental
Glue, dental
Gold, dental
Hand pieces and parts, dental
Ultrasonic dental equipment
Dental laboratory equipment
Dental metal
Impression material, dental
Investment material, dental
Orthodontic appliances
Plaster, dental
Pliers, dental
Sterilizers, dental
Teeth, artificial not made in dental laboratories
Tools, dentists'
Wax, dental

SIC Code 3844: X-Ray Apparatus and Tubes and Related Irradiation Apparatus

Beta-ray irradiation equipment
Fluoroscopes
Fluoroscopic x-ray apparatus and tubes
Gamma-ray irradiation equipment
Irradiation equipment
Lamps, x-ray
Nuclear irradiation equipment
Radiographic x-ray apparatus and tubes: medical, industrial, research
Radium equipment
Therapeutic x-ray apparatus and tubes: medical, industrial and research
X-ray apparatus and tubes: medical, industrial, research and control
X-ray generators

SIC Code 3845: Electromedical and Electrotherapeutic Apparatus

Arc lamp units, electrotherapeutic: except infrared and ultraviolet
Audiological equipment, electromedical
Automated blood and body fluid analyzers, except laboratory
Bronchoscopes, electromedical
Cardiographs
Colonscopes, electromedical
Computerized axial tomography (CT/CAT scanner) apparatus
Cystoscopes, electromedical
Defibrillators
Dialyzers, electromedical
Diathermy apparatus, electromedical
Electrocardiographs
Electroencephalographs
Electromedical apparatus
Electromyographs
Endoscopic equipment, electromedical: e.g., bronchoscopes, cyctoscopes and colonoscopes
Gastroscopes, electromedical
Laser systems and equipment, medical
Lithotripters
Magnetic resonance imaging device (diagnostic), nuclear
Otoscopes, electromedical
Pacemakers
Patient monitoring equipment: intensive care/coronary unit
Phonocardiographs
Positron emission tomography
Respiratory analysis equipment, electromedical
Retinoscopes, electromedical
Surgical support systems: heart-lung machines, except iron lungs and blood flow systems
Transcutaneous electrical nerve stimulators (TENS)
Ultrasonic medical equipment, except cleaning
Ultrasonic scanning devices, medical

SIC Code 2835: In Vitro and In Vivo Diagnostic Substances

Angionrographic diagnostic agents*
Barium diagnostic agents*
Blood derivative diagnostic reagents
Clinical chemistry reagents (including toxicology)
Clinical chemistry standards and controls (including toxicology)
Coagulation diagnostic reagents
Cold kits for labeling with technetium*
Contrast media diagnostic products* (e.g., iodine and barium)
Cytology and histology diagnostic products
Diagnostic agents, biological
Electrolyte diagnostic reagents
Enzyme and isoenzyme diagnostic reagents
Hematology diagnostic reagents
In vitro diagnostics
In vivo diagnostics*
In vivo radioactive reagents*
Iodinated diagnostic agents
Metabolite diagnostic reagents
Microbiology, virology and serology diagnostic products
Pregnancy test kits
Radioactive diagnostic substances
Technetium products*
Viral test diagnostic reagents

*These represent in vivo diagnostic products, the manufacturers of which are represented by pharmaceutical groups.

APPENDIX C

TABLES

Table 1
U.S. MARKET FOR HEALTH CARE TECHNOLOGY PRODUCTS
1975-1990
($ billions)

	1975	1980	1985	1986	1987	1988	1989	1990*	Average Annual Growth 1988-1990 (percent)
Medical Devices									
Production	4.6	9.7	17.5	18.0	21.5	23.2	25.6	27.8	8.9
Exports	0.7	1.7	2.4	2.8	3.2	4.0	4.8	5.7	21.6
Imports	0.3	0.6	1.7	2.2	2.6	3.0	3.0	3.2	7.5
Consumption	4.2	8.7	16.8	17.5	20.9	22.2	23.8	25.3	6.6
Diagnostic Products									
Production	0.3	0.9	1.7	2.0	2.7	2.9	3.1	3.4	8.2
Exports	-	0.2	0.3	0.4	0.5	0.6	0.7	0.8	18.4
Imports	-	-	-	-	-	-	0.1	0.1	60.3
Consumption	0.3	0.6	1.4	1.7	2.2	2.3	2.6	2.8	7.0
TOTAL PRODUCTION	**4.9**	**10.5**	**19.2**	**20.1**	**24.2**	**26.1**	**28.7**	**31.2**	**8.9**
TOTAL CONSUMPTION	**4.5**	**9.3**	**18.3**	**19.2**	**23.1**	**24.5**	**26.3**	**28.0**	**6.6**

* Estimate.

Source: U.S. Department of Commerce unpublished data.

Table 2
U.S. PRODUCTION OF HEALTH CARE TECHNOLOGY PRODUCTS
1987-1990

	Production ($ billions)				Average Annual Growth 1988-1990 (percent)
	1987	1988	1989	1990*	
Medical device production	**21.50**	**23.25**	**25.55**	**27.79**	**8.9**
Surgical and medical instruments	7.23	7.98	8.70	9.53	10.8
Surgical appliances and supplies	7.98	8.52	9.29	10.09	11.1
Dental equipment and supplies	1.22	1.22	1.26	1.34	5.4
X-ray apparatus and tubes	1.56	1.52	1.71	1.86	4.7
Electromedical equipment	3.51	4.00	4.59	4.96	9.2
Diagnostic products	**2.68**	**2.88**	**3.13**	**3.40**	**8.2**
TOTAL PRODUCTION	**24.18**	**26.13**	**28.68**	**31.19**	**8.9**

* Estimate.

Source: U.S. Department of Commerce unpublished data.

Table 3
10 FASTEST GROWING FOUR-DIGIT (SIC) INDUSTRIES IN THE U.S.
1991
(based on constant dollar shipments)

SIC Code	Industry	Percent Change
3111	Leather tanning and finishing	9.4
3674	Semiconductors and related devices	8.9
3841	**Surgical and medical instruments**	**8.6**
3842	**Surgical appliances and supplies**	**7.6**
2833	Medicinals and botanicals	7.1
2835	**Diagnostic substances**	**6.9**
2015	Poultry slaughtering and processing	6.8
2836	Biological products except diagnostics	6.2
3721	Aircraft	6.0
3843	Dental equipment and supplies	5.9

Source: *U.S. Industrial Outlook*, 1991.

Table 4
GROWTH RATE PROJECTIONS FOR SELECTED INDUSTRY GROUPS
1990-1991
(based on constant dollar shipments)

Industry Group	1990	1991
Medical devices*	**9.1**	**7.3**
Aircraft and parts	17.9	4.6
Steel mill products	-1.0	-4.8
Chemicals	1.6	1.0
Rubber and plastic products	1.0	0.8
Industrial machinery	2.5	1.9
Machine tools	5.3	5.0
Computers	4.4	5.6
Electronic components	1.8	6.2
Motor vehicles	-2.6	-1.4
Construction materials	-0.8	-3.2
Paper and allied products	1.6	2.2
Telephone and communication equipment	1.9	1.9
All industries	1.4	1.1

* Medical devices component of larger category labelled "scientific and medical equipment."

Source: *U.S. Industrial Outlook*, 1991.

Table 5
EMPLOYMENT IN THE HEALTH CARE TECHNOLOGY INDUSTRY
1975-1990

	Employment (000)						
	1975	1980	1985	1987	1988	1989	1990
Medical devices	**126.8**	**168.6**	**198.4**	**203.8**	**213.7**	**225.0**	**231.1**
Surgical and medical instruments	40.1	51.3	61.4	73.1	76.0	82.1	85.0
Surgical appliances and supplies	54.3	61.8	76.3	78.5	81.2	84.9	87.2
Dental equipment and supplies	14.6	16.7	14.4	14.3	15.0	15.2	15.3
X-ray apparatus and electromedical	17.8	38.8	46.3	-	-	-	-
X-ray apparatus and tubes	-	-	-	8.7	10.2	11.2	12.0
Electromedical equipment	-	-	-	29.2	31.3	31.5	31.6
Diagnostic substances	**5.6**	**10.2**	**13.7**	**15.4**	**15.7**	**16.6**	**17.2**
TOTAL EMPLOYMENT	**132.4**	**178.8**	**212.1**	**219.2**	**229.4**	**241.6**	**248.3**

	Percent Change	
	1980-1990	Average Annual Growth 1988-1990
Medical and dental equipment	**37.1**	**4.3**
Surgical and medical instruments	65.7	5.2
Surgical appliances and supplies	41.1	5.1
Dental equipment and supplies	-9.2	2.3
X-ray apparatus and electromedical	12.4	-
X-ray apparatus and tubes	-	11.4
Electromedical equipment	-	2.7
Diagnostic substances	**68.6**	**3.8**
TOTAL: MEDICAL EQUIPMENT AND DIAGNOSTICS	**38.9**	**4.3**

Note: Prior to recent changes in the SIC system, x-ray apparatus and electromedical equipment were grouped together under the same classification (SIC 3693). These products are now broken out separately under SIC 3844 for x-ray apparatus and SIC 3845 for electromedical equipment. The 1987 changes in the SIC also resulted in a new SIC category for diagnostic substances, SIC 2835. Employment data on diagnostic products are HIMA estimates.

Sources: U.S. Department of Commerce unpublished data and HIMA estimates.

Table 6
U.S. TRADE BALANCE FOR HEALTH CARE TECHNOLOGY PRODUCTS
1975-1990
($ billions)

	1975	1980	1985	1986	1987	1988	1989	1990*
Medical devices								
Exports	0.71	1.66	2.42	2.76	3.17	4.05	4.79	5.69
Imports	0.30	0.64	1.74	2.21	2.56	3.00	3.01	3.20
Trade balance	0.41	1.03	0.68	0.55	0.61	1.05	1.78	2.53
Diagnostic products								
Exports	0.04	0.22	0.29	0.37	0.47	0.61	0.67	0.77
Imports	-	0.01	0.03	0.03	0.03	0.05	0.11	0.12
Trade balance	0.04	0.21	0.26	0.34	0.44	0.56	0.57	0.65
TOTAL EXPORTS	**0.75**	**1.88**	**2.71**	**3.13**	**3.64**	**4.65**	**5.46**	**6.46**
TOTAL IMPORTS	**0.30**	**0.65**	**1.77**	**2.24**	**2.59**	**3.04**	**3.12**	**3.28**
TOTAL TRADE BALANCE	**0.45**	**1.24**	**0.93**	**0.89**	**1.05**	**1.61**	**2.34**	**3.18**

* Estimate.

Source: U.S. Department of Commerce unpublished data.

Table 7
HEALTH CARE TECHNOLOGY PRODUCTS
TRADE BALANCE WITH THE U.S. BY COUNTRY
1980 and 1990
($ millions)

	1980				1990		
	Exports	Imports	Balance		Exports	Imports	Balance
Canada	229	32	197	Canada	934	93	841
Japan	208	117	92	Italy	355	51	304
Netherlands	104	32	72	France	409	166	243
France	85	24	61	Netherlands	376	141	235
Italy	60	8	53	Belg. & Lux.	203	10	193
U.K.	87	38	49	Australia	199	8	191
Belg. & Lux.	57	8	48	U.K.	388	214	174
Australia	52	6	46	Japan	909	794	115
Mexico	54	11	42	S. Korea	106	16	90
Brazil	26	5	21	Brazil	81	3	78
Taiwan	21	2	19	Taiwan	98	39	59
S. Korea	20	1	19	Switzerland	131	74	57
Switzerland	43	29	14	Mexico	297	254	43
China	6	-	6	Ireland	75	66	9
Ireland	16	11	5	China	37	28	9
Sweden	25	25	0	Sweden	94	111	-17
West Germany	164	225	-61	West Germany	691	818	-127

Note: Figures for 1980 exclude diagnostic products, whereas 1990 figures are estimates based on preliminary data.

Source: U.S. Department of Commerce unpublished data.

Table 8
TRADE BALANCE WITH THE U.S. BY COUNTRY
1987-1990
($ millions)

	1987			1988			1989			1990		
	Exports	Imports	Balance	Exports	Imports	Balance	Exports	Imports	Balance	Exports	Imports	Balance
Canada	483	86	397	530	108	422	573	87	486	934	93	841
Japan	532	627	-95	680	716	-36	842	735	107	909	794	115
EC	1,529	1,304	225	1,956	1,457	499	2,326	1,485	841	2,522	1,505	1,017
Belg. & Lux.	141	12	129	147	12	135	181	9	172	200	138	62
France	221	123	98	309	150	159	356	144	212	409	166	243
Germany	429	692	-265	527	765	-238	642	835	-194	691	818	-127
Ireland	47	53	-6	73	57	16	69	59	10	75	66	9
Italy	155	39	116	225	44	181	268	43	225	355	51	304
Netherlands	200	125	75	253	154	99	315	139	176	376	141	235
U.K.	243	179	64	294	203	91	331	196	135	388	214	174
Western Europe (EC & EFTA)	1,714	1,496	218	2,223	1,683	540	2,642	1,703	939	2,879	1,748	1,131
Mexico	139	129	10	189	178	11	228	214	14	297	254	43
Australia	132	13	119	161	20	141	193	13	180	199	8	191
Sweden	51	83	-32	87	91	-4	96	90	6	94	111	-17
Switzerland	74	69	5	93	82	11	119	72	47	131	74	57
Taiwan	46	34	12	71	41	30	77	43	34	98	39	59
S. Korea	51	10	41	78	20	58	96	18	78	106	16	90
Brazil	23	4	19	34	4	30	91	3	88	81	3	78
China	31	4	27	41	15	26	39	28	11	37	28	9
WORLD	3,639	2,591	1,048	4,650	3,042	1,609	5,456	3,115	2,341	6,459	3,279	3,179

Source: U.S. Department of Commerce unpublished data.

Table 9
U.S. MEDICAL PRODUCTS EXPORTS BY SELECTED COUNTRIES
1980 and 1990
($ millions)

	1980 U.S. Exports	As Percent of Total		1990 U.S. Exports	As Percent of Total
1. Canada	229	13.8	1. Canada	934	14.5
2. Japan	208	12.5	2. Japan	909	14.1
3. West Germany	164	9.8	3. West Germany	691	10.7
4. Netherlands	104	6.3	4. France	409	6.3
5. U.K.	87	5.3	5. U.K.	388	6.0
6. France	85	5.1	6. Netherlands	376	5.8
7. Italy	60	3.6	7. Italy	355	5.5
8. Belg. & Lux.	57	3.4	8. Mexico	297	4.6
9. Mexico	54	3.2	9. Belg. & Lux.	203	3.1
10. Australia	52	3.1	10. Australia	199	3.1
11. Switzerland	43	2.6	11. Switzerland	131	2.0
12. Brazil	26	1.6	12. S. Korea	106	1.6
13. Sweden	25	1.5	13. Taiwan	98	1.5
14. Taiwan	21	1.3	14. Sweden	94	1.5
15. S. Korea	20	1.2	15. Brazil	81	1.3
16. Ireland	16	0.9	16. Ireland	75	1.2
17. China	6	0.3	17. China	37	0.6

Note: Figures for 1980 exclude diagnostic products, whereas 1990 figures are estimates based on preliminary data.

Source: U.S. Department of Commerce unpublished data.

Table 10
U.S. MEDICAL PRODUCTS IMPORTS BY SELECTED COUNTRIES
1980 and 1990
($ millions)

	1980 U.S. Imports	As Percent of Total		1990 U.S. Imports	As Percent of Total
1. West Germany	225	35.4	1. West Germany	818	24.9
2. Japan	117	18.3	2. Japan	794	24.2
3. U.K.	38	6.0	3. Mexico	254	7.7
4. Netherlands	32	5.1	4. U.K.	214	6.5
5. Canada	32	5.0	5. France	166	5.1
6. Switzerland	29	4.5	6. Netherlands	141	4.3
7. Sweden	25	3.9	7. Sweden	111	3.4
8. France	24	3.7	8. Canada	93	2.8
9. Ireland	11	1.7	9. Switzerland	74	2.3
10. Mexico	11	1.7	10. Ireland	66	2.0
11. Belg. & Lux.	8	1.3	11. Italy	51	1.6
12. Italy	8	1.2	12. Taiwan	39	1.2
13. Australia	6	0.9	13. China	28	0.9
14. Brazil	5	0.8	14. S. Korea	16	0.5
15. Taiwan	2	0.3	15. Belg. & Lux.	10	0.3
16. S. Korea	1	0.2	16. Australia	8	0.2
17. China	-	0.1	17. Brazil	3	0.1

Note: Figures for 1980 exclude diagnostic products, whereas 1990 figures are estimates based on preliminary data.

Source: U.S. Department of Commerce unpublished data.

Table 11
HEALTH CARE TECHNOLOGY PRODUCTS
TRADE BALANCE BY MAJOR PRODUCT GROUPS
1980 -1990
($ millions)

Exports	1980	1987	1988	1989	1990*	Average Annual Growth 1988-1990
Medical devices	**1,663**	**3,170**	**4,045**	**4,785**	**5,686**	**21.6**
Surgical/medical instru.	485	765	963	1,497	1,853	35.0
Surgical supplies	213	521	668	899	1,116	25.3
Dental equipment	129	272	322	281	358	10.9
X-ray & electromedical	839	-	-	-	-	-
X-ray apparatus	-	338	410	505	566	18.9
Electromedical	-	1,274	1,682	1,603	1,793	13.0
Diagnostic products	**219**	**469**	**606**	**671**	**773**	**18.4**
TOTAL EXPORTS	**1,882**	**3,639**	**4,651**	**5,456**	**6,459**	**21.2**

Imports	1980	1987	1988	1989	1990*	Average Annual Growth 1988-1990
Medical devices	**636**	**2,557**	**2,995**	**3,009**	**3,156**	**7.5**
Surgical/medical instru.	180	676	792	671	744	10.0
Surgical supplies	96	338	393	372	391	5.2
Dental equipment	42	104	112	141	161	15.9
X-ray & electromedical	319	-	-	-	-	-
X-ray apparatus	-	763	860	873	878	4.9
Electromedical	-	676	838	951	982	13.6
Diagnostic products	**9**	**34**	**47**	**106**	**124**	**60.3**
TOTAL IMPORTS	**645**	**2,591**	**3,042**	**3,115**	**3,280**	**8.4**

Balance	1980	1987	1988	1989	1990*
Medical devices	**1,027**	**613**	**1,050**	**1,776**	**2,530**
Surgical/medical instru.	305	89	172	826	1,109
Surgical supplies	117	184	275	527	725
Dental equipment	84	168	210	140	197
X-ray & electromedical	520	-	-	-	-
X-ray apparatus	-	-425	-450	-369	-312
Electromedical	-	598	844	652	811
Diagnostic products	**210**	**435**	**559**	**565**	**649**
TOTAL BALANCE	**1,237**	**1,048**	**1,609**	**2,341**	**3,179**

* Estimate.

Source: U.S. Department of Commerce unpublished data.

Table 12
COMPOSITION OF U.S. MEDICAL PRODUCTS EXPORTS
1980 -1990
($ millions)

Exports	1980	1987	1988	1989	1990*	Average Annual Growth 1988-1990
Medical devices	**1,663**	**3,170**	**4,045**	**4,785**	**5,686**	**21.6**
Surgical/medical instru.	485	765	963	1,497	1,853	35.0
Surgical supplies	213	521	668	899	1,116	25.3
Dental equipment	129	272	322	281	358	10.9
X-ray & electromedical	839	-	-	-	-	-
X-ray apparatus	-	338	410	505	566	18.9
Electromedical	-	1,274	1,682	1,603	1,793	13.0
Diagnostic products	**219**	**469**	**606**	**671**	**773**	**18.4**
TOTAL EXPORTS	**1,882**	**3,639**	**4,651**	**5,456**	**6,459**	**21.2**

	Percentage of Total Exports				
	1980	1987	1988	1989	1990*
Medical devices	**88.4**	**87.1**	**87.0**	**87.7**	**88.0**
Surgical/medical instru.	25.8	21.0	20.7	27.4	28.7
Surgical supplies	11.3	14.3	14.4	16.5	17.3
Dental equipment	6.7	7.5	6.9	5.2	5.5
X-ray & electromedical	44.6	-	-	-	-
X-ray apparatus	-	9.3	8.8	9.3	8.8
Electromedical	-	35.0	36.2	29.4	27.8
Diagnostic products	**11.6**	**12.9**	**13.0**	**12.3**	**12.0**

* Estimate.

Source: U.S. Department of Commerce unpublished data.

Table 13
COMPOSITION OF U.S. MEDICAL PRODUCTS IMPORTS
1980-1990
($ millions)

Imports	1980	1987	1988	1989	1990*	Average Annual Growth 1988-1990
Medical devices	**636**	**2,557**	**2,995**	**3,009**	**3,156**	**7.5**
Surgical/medical instru.	180	676	792	671	744	10.0
Surgical supplies	96	338	393	372	391	5.2
Dental equipment	42	104	112	141	161	15.9
X-ray & electromedical	319	-	-	-	-	-
X-ray apparatus	-	763	860	873	878	4.9
Electromedical	-	676	838	951	982	13.6
Diagnostic products	**9**	**34**	**47**	**106**	**124**	**60.3**
TOTAL IMPORTS	**645**	**2,591**	**3,042**	**3,115**	**3,280**	**8.4**

	Percentage of Total Imports				
	1980	1987	1988	1989	1990*
Medical devices	**98.6**	**98.7**	**98.4**	**96.6**	**96.2**
Surgical/medical instru.	27.8	26.1	26.0	21.5	22.7
Surgical supplies	14.8	13.0	12.9	11.9	11.9
Dental equipment	6.5	4.0	3.7	4.5	4.9
X-ray & electromedical	49.4	-	-	-	-
X-ray apparatus	-	29.5	28.3	28.0	26.8
Electromedical	-	26.1	27.6	30.5	29.9
Diagnostic products	**1.4**	**1.3**	**1.6**	**3.4**	**3.8**

* Estimate.

Source: U.S. Department of Commerce unpublished data.

Table 14
EXPORT INTENSITY AND IMPORT PENETRATION RATIOS
1975-1990

	Exports as a Percentage of Shipments						
	1975	1980	1985	1987	1988	1989	1990*
Medical devices	**15.5**	**17.2**	**13.8**	**14.7**	**17.4**	**18.7**	**20.5**
Surgical/medical instru.	19.4	17.5	13.0	10.6	12.1	17.2	19.4
Surgical supplies	7.5	6.2	6.9	6.5	7.8	9.7	11.1
Dental equipment	15.0	11.6	12.7	22.4	26.3	22.4	26.6
X-ray & electromedical	26.5	34.7	25.3	-	-	-	-
X-ray apparatus	-	-	-	21.7	26.9	29.5	30.4
Electromedical	-	-	-	36.3	42.1	34.9	36.1
Diagnostic products	**11.1**	**25.5**	**17.2**	**17.5**	**21.0**	**21.5**	**22.7**
ALL MEDICAL PRODUCTS	**15.4**	**17.8**	**14.1**	**15.0**	**17.8**	**19.0**	**20.7**

	Imports as a Percentage of Consumption						
	1975	1980	1985	1987	1988	1989	1990*
Medical devices	**7.2**	**7.4**	**10.3**	**12.2**	**13.5**	**12.7**	**12.5**
Surgical/medical instru.	5.8	7.3	8.7	9.5	10.1	8.5	8.8
Surgical supplies	1.8	2.9	2.5	4.3	4.8	4.2	4.0
Dental equipment	4.1	4.2	7.9	9.9	11.0	12.6	14.0
X-ray & electromedical	24.1	16.8	24.0	-	-	-	-
X-ray apparatus	-	-	-	38.5	43.6	42.0	40.4
Electromedical	-	-	-	23.2	26.6	24.1	23.6
Diagnostic products	**1.1**	**1.4**	**2.3**	**1.5**	**2.0**	**4.1**	**4.5**
ALL MEDICAL PRODUCTS	**7.0**	**6.9**	**9.7**	**11.2**	**12.4**	**11.8**	**11.7**

* Estimate.

Source: U.S. Department of Commerce unpublished data, 1990.

Table 15
R&D AS A PERCENTAGE OF SALES IN MEDICAL PRODUCTS AND OTHER INDUSTRIES
1988 and 1989

Industry	1988	1989
All-industry composite	3.4	3.4
Health care	8.2	8.6
Medical products and services	6.2	6.2
Drugs and research	10.0	10.1
Aerospace	4.1	4.1
Automotive	3.2	3.4
Chemicals	3.6	3.8
Electrical and electronics	5.3	5.4

Source: *Business Week*, "R&D Scoreboard," 1989-1990.

Table 16
U.S. HEALTH R&D COMPARED TO TOTAL U.S. R&D
1978-1989
($ billions, current $)

Year	Health R&D	Total R&D	Health R&D as a Percentage of Total R&D
1978	6.3	48.1	13.1
1980	7.9	62.6	12.6
1985	13.5	113.6	11.8
1986	14.8	119.6	12.4
1987	16.8	127.5	13.2
1988	18.8	134.2	14.0
1989	20.8	141.8	14.7
	Average Annual Percent Growth		
1985-89	11.4	7.0	

Source: National Institutes of Health, *National Institutes of Health Data Book*, 1988 and 1990.

Table 17
FDA PREMARKET NOTIFICATIONS, 510(K)S
FY 1985-FY 1990

Action	FY 85	FY 86	FY 87	FY 88	FY 89	FY 90
Number received	5,254	5,063	5,265	5,536	7,022	5,831
Number of decisions:						
Substantially equivalent	4,491	4,388	4,105	4,432	4,867	4,748
Not substantially equivalent	132	98	103	82	92	117
Other[1]	472	873	784	999	1,177	1,332
Total	5,095	5,359	4,992	5,513	6,136	6,197
Percent not substantially equivalent[2]	2.8	2.2	2.1	1.8	1.9	2.4
Average review time (days):						
Total time	76	72	69	78	82	98
FDA	N/A[3]	66	56	64	66	78

[1] Includes withdrawals, deletions and other administrative actions.
[2] Based on "substantially equivalent" and "not substantially equivalent" decisions only.
[3] Not available.

Sources: FDA Center for Devices and Radiological Health, Office of Device Evaluation, *Annual Report, Fiscal Year 1990*, p. 57.

Table 18
FDA ORIGINAL PREMARKET APPROVAL (PMA) APPLICATIONS FY 1985-FY 1990

Action	FY 85	FY 86	FY 87	FY 88	FY 89	FY 90
Number received	97	69	81	96	84	79
Number of final approvals	37	72	46	46	56	47
Average review time (days) for final approvals:*						
FDA	347	395	337 (257)	262 (142)	247 (145)	302 (228)
Non-FDA	43	44	81 (27)	75 (17)	101 (42)	113 (55)
Total	390	439	418 (284)	337 (159)	348 (187)	415 (283)

* Average review times in parentheses are calculated under the Premarket Approval of Medical Devices Regulation (21 CFR Part 814).

Sources: FDA Center for Devices and Radiological Health, Office of Device Evaluation, *Annual Report, Fiscal Year 1990*, p. 52.

Table 19
OWNERSHIP OF U.S. MEDICAL DEVICE PATENTS
1980-1990

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990*
Total U.S.	1,494	1,438	1,272	1,242	1,554	1,775	2,040	2,406	2,203	2,886	2,858
Foreign											
Japan	122	155	154	148	186	218	230	338	322	453	398
Germany	152	186	122	122	147	157	186	229	174	286	236
United Kingdom	49	57	53	56	56	73	80	101	78	124	132
France	44	42	35	33	54	59	62	91	89	133	106
Canada	39	39	27	20	43	40	34	53	50	64	62
Other	154	177	143	144	178	213	276	317	285	340	388
Total foreign	560	656	534	523	664	760	868	1,129	998	1,400	1,322
Total patents	2,054	2,094	1,806	1,765	2,218	2,535	2,908	3,535	3,201	4,286	4,180
Percent foreign	27.3	31.3	29.6	29.6	29.9	30.0	29.8	31.9	31.2	32.7	31.6

* Estimate.

Source: U.S. Department of Commerce/Patent and Trademark Office unpublished data, 1991.

Table 20
PROJECTED INDUSTRY PERFORMANCE
1989-1995
($ billions)

	1989[1]	1990[2]	1991	1992	1993	1994	1995	Average Annual Growth 1990-1995
Production	28.7	31.0	33.3	35.7	38.2	41.0	43.9	7.4%
Exports	5.5	6.5	7.5	8.6	9.9	11.4	13.1	15.5%
Imports	3.1	3.3	3.6	3.8	4.1	4.4	4.7	6.9%
Trade surplus	2.3	3.2	3.9	4.8	5.8	7.0	8.4	24.3%
Market size	26.3	27.8	29.4	30.9	32.4	34.2	35.5	5.1%
Production (under the negative scenario)	28.7	29.3	29.9	30.5	31.1	31.7	32.3	2.0%

[1] Figures for 1989 represent actual production and trade levels.

[2] HIMA projections for 1990-1995 based on U.S. Department of Commerce historical data and projections, with a 10 percent reduction for 1990 and a 20 percent reduction for 1991-1995 to reflect an expected sluggish U.S. economy.

Sources: U.S. Department of Commerce unpublished data; industry sources.

VII. NOTES

1. All trade data and forecast assumptions are based on U.S. Department of Commerce trade statistics and forecasts unless otherwise noted. Due to changes in the Standard Industrial Classification (SIC) system and the recent U.S. conversion to the Harmonized Tariff System (HS), trade data for periods prior to 1989 are not directly comparable to data for 1989-1990. However, they are reflective of overall trends and are useful for comparison purposes. All data are on a current dollar basis unless otherwise noted.

2. Prospective Payment Assessment Commission, *Medicare Prospective Payment and the American Health Care System: Report to the Congress*, June 1990, p. 12.

3. Consumption is calculated by taking overall annual production in the U.S., adding import flows into the U.S. during the year and subtracting exports shipped to overseas markets.

4. A listing of the products contained in these SIC groupings is contained in Appendix B.

5. Some of the few U.S. industries running consistently large trade surpluses include aerospace products, coal mining, plastics materials and resins, chemicals and allied products, and computers.

6. Export intensity measures the percentage of total domestic production that is exported. Import penetration measures the percentage of consumption that is supplied by imports.

7. *U.S. Industrial Outlook*, 1990, p. 51-7.

8. "Wall Street's View of the Health Industry Manufacturing Companies," John Balkoski, Medical Venture Holdings, presentation to HIMA's First Global Medical Device Conference, October 1990.

9. National Institutes of Health, *National Institutes of Health Data Book*, 1990, p. 1.

10. The U.S. Patent and Trademark Office does not provide a specific category that encompasses medical devices. HIMA evaluated those categories that should be considered medical devices for its analysis of these patents.

11. U.S. Department of Commerce, Patent and Trademark Office, unpublished data, 1991.

12. "The Effect of the Medicare Prospective Payment System on the Adoption of New Technology," *New England Journal of Medicine*, Vol. 321, November 16, 1989, pp. 1,378-1,383.

13. National Advisory Council on Health Care Technology Assessment, *The Medicare Coverage Process*, September 14, 1988.

14. Prospective Payment Assessment Commission, *Report and Recommendations to the Secretary*, U.S. Department of Health and Human Services, March 1, 1990, p. 59.

15. U.S. Department of Commerce, Technology Administration, *Emerging Technologies: A Survey of Technical and Economic Opportunities*, Spring 1990.

16. George C. Lodge, *Perestroika for America: Restructuring Business-Government Relations for World Competitiveness*, Harvard Business School Press, Boston, MA, 1991, pp. 146-147.

ABOUT THE HEALTH INDUSTRY MANUFACTURERS ASSOCIATION

The Health Industry Manufacturers Association (HIMA) is a national trade association representing more than 300 manufacturers of medical devices, diagnostics, and health care information systems. HIMA is the principal voice of the industry, and actively describes the benefits of innovative medical technologies to national, local and international legislative and regulatory agencies, and to the health care and business communities. The Association is dedicated to representing the long-term interests, concerns, and needs of the health care technology industry through education programs that encourage high quality, cost-effective health care.

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