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POSITION STATEMENTS



of the Industrial Research Institute, Inc., 1988-1994

Industrial Research Institute

1550 M Street, NW

Suite 1100

Washington, D.C. 20005-1708

Telephone 202/296-8811

FAX: 202/776-0756



IRI news

A monthly newsletter for members of the Industrial Research Institute, Inc. • 1550 M Street, NW, Washington, DC 20005-1712 • (202) 296-8811

Internet Address: <http://www.iriinc.org>

Autoresponder: iriinc_info@mailback.com

Ludita H. Vallarta, Editor

No. 199 -- July 1996

FALL MEETING -- NEW MEMBERS WELCOMED -- MEMBERSHIP OPTIONS -- IRI/CIMS ANNUAL R&D SURVEY -- CRMA CONFERENCE -- CALL FOR SPEAKERS -- TUTORIAL -- PAST PRESIDENT BRUCE HANNAY PASSES AWAY -- UPCOMING EVENTS

FALL MEETING OCTOBER 20-23 WASHINGTON, DC

What better backdrop than the Nation's Capital to complement our Fall Meeting, October 20-23 at the J. W. Marriott? With the theme, "*Managing Technology for Global Competitiveness*," sessions will focus on how to help IRI members and its foreign counterparts better understand the globalization process in order to compete more effectively in markets around the world, and to build more effective bridges between these organizations. Mark your calendars now and plan to attend! The Call to Meeting, registration, and room reservations forms will be mailed in early August.

NEW MEMBERS WELCOMED

The following are new member companies of the Institute. Give their Representatives a welcome call!

Asahi Chemical Industries

Rep: Haruro Tabata
Managing Dir., & Gen. Mgr.
813-3507-2277

Boehringer Ingelheim Pharmaceuticals, Inc.

Rep: Stephen K. Carter
Sr. Vice Pres., R&D
203-798-5635

Cargill, Inc.

Rep: Stephen McCurry
Vice Pres. & Gen. Mgr.
612-742-6462

The Earthgrains Company

Rep: John T. Reeves
Vice President, R&D
314-877-8601

Nissan Research & Development

Rep: Takao Noda
Research Operations Exec.
617-374-9660

No. American Chemical Co.

Rep: John F. Tancredi
President & CEO
913-344-9201

Trus Joist MacMillan

Rep: James H. Ware
Vice Pres., Tech. & CTO
208-364-1260

Uniroyal Chemical Company

Rep: William R. True
Director, Specialty Chem.
203-573-3301

U. S. Borax, Inc.

Rep: Edward L. Docks
Mgr., Valencia Lab.
805-287-6030

The Westlake Group

Rep: David C. Bonner
Vice President, Technology
713-960-9111

Comment on Annual Meeting Feedback form by a Member Prospect:

"Thank you for organizing such good support for new/prospective members. I have never had such an easy time "breaking in" to a new organization. Besides the formal organization of contacts and events by IRI staff and leaders, all IRI attendees have been very friendly and open. I'd suggest that you recognize the importance and effectiveness of this to the membership at large in some way -- it makes it a far more attractive proposition to join IRI when the current atmosphere appears so inviting."

MEMBERSHIP OPTIONS

It was noted at the Annual Meeting in Colorado Springs that some representatives were unaware that *a division or subsidiary of a member company could apply for independent membership with IRI*, if it meets the normal membership requirements. The *only restriction* is that *no member company and its affiliates can have more than three independent memberships*. If any Representative or Alternate would care to suggest an independent membership for one of their divisions or subsidiaries, call Madora Bianco at IRI headquarters (202-776-0759) to request an "information packet." Separate memberships can help enhance the innovation process within one's corporate enterprise.

IRI/CIMS ANNUAL R&D SURVEY

If you have not yet returned your completed survey forms to CIMS at Lehigh, please do so as soon as possible. We have *extended the original deadline to the end of July*. At that time, we must begin to analyze the data for publication in the January/February issue of RESEARCH•TECHNOLOGY MANAGEMENT. If you wish to participate and find you need this extra time, please let Roger Whiteley at CIMS know (tel. 610-758-3430, fax: 610-758-3655).

1996 CRMA CONFERENCE

IRI Rep/Alts are cordially invited to attend the 1996 Conference of the Canadian Research Management Association (CRMA), October 6-9 in Banff, Alberta, on "*The High-Performing Organization*." AXIA's Innovation Mentoring Unit, led by Dr. Don Simpson, has been engaged to facilitate the conference. This unit (formerly a part of the International Institute for Innovation) is engaged in a global effort to identify, apply, and disseminate best practices in organizational transformations for high performance. *Participants will explore the nature of high-performing organizations and learn about the leadership characteristics, change models, and other elements that form the basis of a high-performing company*. For more information or to request a Conference Registration Package, get in touch with Michelle L. Limoges, Alberta Research Council, P. O. Box 8330, Edmonton, Alberta T6H 5X2 (tel. 403-450-5146; fax: 403-436-4237).

CALL FOR SPEAKERS

The Society of Competitive Intelligence Professionals (SCIP) is seeking speakers for their second Competitive Technical Intelligence (CTI) Seminar, October 10-11, 1996 in Philadelphia, Pennsylvania, to address issues on *how to interact with senior management effectively, how to manage a human collection process ethically, and how to tailor advanced tools and techniques to firm requirements*. Of interest also are speakers from around the world to talk on how CTI is different in France, Germany, Japan, the United Kingdom, and other countries and how techniques from one culture can be applied to another. If interested in becoming a speaker or an attendee, please contact Patti Stephens at SCIP (tel. 703-739-0696, fax 703-739-2524, e-mail: scip@dc.infi.net.).

TUTORIAL ON MANAGING INDUSTRIAL RESEARCH FOR BUSINESS SUCCESS

A *third edition* of this tutorial will be offered October 18-20, prior to the Fall Meeting in Washington, DC, at the J. W. Marriott. See enclosed brochure for details.

PAST PRESIDENT BRUCE HANNAY PASSES AWAY

Dr. N. Bruce Hannay, formerly Vice President for Research and Patents at Bell Laboratories, and 1974-75 President of IRI, died on June 2 in Bremerton, Washington. The cause was pneumonia. Sympathies may be expressed to Joan Hannay at 201 Cordon Lane, Port Ludlow, WA 98365.

UPCOMING EVENTS

July

- | | |
|-------|--|
| 18 | Board of Directors, Spartanburg, SC |
| 23 | Advanced Programs, Washington, DC |
| 24 | Impact of Information Technologies on the Technology Function* |
| 24-25 | Metrics for Improving the Technological Innovation Process* |
| 30 | Global Management of Technology Workshop, Washington, DC |
| 31 | Doing R&D Globally* |

August

- | | |
|-----|---------------------------|
| 6-7 | R&D Portfolio Management* |
|-----|---------------------------|

*ROR Subcommittee meetings at IRI headquarters, Washington, DC. Call Margaret Grucza (202-776-0755) for further information.



IRI PRE-COLLEGE EDUCATION NEWS

*A quarterly bulletin to inform members of IRI about programs
to improve pre-college education*

Ludita H. Vallarta - Editor

July 1996 -- No. 20

PRE-COLLEGE EDUCATION SURVEY MAILED

In a campaign to build a stronger network for K-12 pre-college education outreach, the Pre-College Education Committee (PCE) mailed its PCE survey in mid-June to all company Representatives, with a request to identify those individuals in their companies having prime responsibility for pre-college education activities. The goal is to build a database of knowledge about member-company activities and to serve as a starting point for the formation of an electronic network for sharing of ideas and issues among these individuals. The committee needs to know not only if you currently sponsor PCE activities, but also if you do *not*. Some forms have already arrived, and the committee thanks those who have responded. If, however, you have not done so, please return the "fax-back" form to Ludita Vallarta at IRI headquarters (fax: 202-776-0756) with your response (or e-mail her at vallarta@iriinc.org).

WEBSITE ADDRESSES ON IRI'S HOME PAGE

Does the thought of having your Website linked to IRI's Home Page interest you? If so, here is good news. The *PCE Committee, on the recommendation of its External Affairs Subcommittee, has approved the posting of Website URLs of companies and associations that have pre-college science and education programs.* Deemed appropriate and timely, directly linking these sites with IRI on the Web reflects our commitment to pre-college education reform and outreach to other organizations as partners in that commitment. If interested in linking your Website, send e-mail to Ludita Vallarta (vallarta@iriinc.org) with your URL address.

BUSINESS/EDUCATION PARTNERSHIP BENEFITS ILLINOIS THIRD GRADERS

For the past six years, researchers at Nalco Chemical Company have been linking up with local elementary schools to spread an important message to third graders: from diapers to rockets to green slime, science is all around them and studying science is indeed fun! During the 1994-1995 school year, over 15,000 students at nearly 200 schools participated in Nalco's one hour SCIENCE IS FUN! program, which is led by two-person teams of Nalco employees. Through several chemistry and physics experiments, demonstrators challenge the students to be scientists: to observe, to hypothesize, and to experiment. This year's experiments include getting an egg into (and with some luck, out of) a flask, making a rocket out of potato, cleaning up dirty water both by filtration and flocculation, and figuring out what goes into black ink by using paper chromatography. The program is offered free to local schools in the surrounding communities of Naperville, Illinois. Nearly 200 Nalco employees volunteer their talents to this program. Schools in the Houston, Texas area also benefit from the SCIENCE IS FUN! program, which is run by Nalco/Exxon Energy Chemicals, L.P. For more information, contact Dr. John Sparapany, SCIENCE IS FUN! Coordinator, at 708-305-2370 (note: area code will change to 630 in August).

TEACHER PROFESSIONAL DEVELOPMENT

The U.S. Department of Education's Online Library recently acquired a new series of newsletters on *Teacher Professional Development*. Topics of interest include the *new roles for teachers that are supported by high-quality professional development; examples of teachers' writing "cases"* (descriptions of classroom experiences and students' work that become the basis for monthly two-hour discussions among teachers); and *highlights of teacher meetings year-round to discuss mathematics reform, learning how to teach new state-of-the-art curriculum units, and examining/improving their own teaching methods.* Also to be found are descriptions of the New York State School Quality Review Initiative, Vermont Portfolio Network, Philadelphia Education Fund, Foxfire Network, National and State Writing Projects, and other networks and partnerships; plus key elements of Professional Development Schools and an update on the National Board for Professional Teaching Standards. A sister issue in this series -- *Improving America's Schools: A Newsletter on Issues*

(over)

in *School Reform* -- zeroes in on standards & assessment. These documents are available on the Internet's World Wide Web, at <http://www.ed.gov/pubs/IASA/newsletters/>.

EISENHOWER SCIENCE-MATH FUNDS ELIMINATED FOR F.Y. 97

The House of Representatives Appropriations Subcommittee on Labor, Health and Education voted to cut the President's F.Y. 97 education budget by \$2.8 billion. *What was targeted?* The *Eisenhower Professional Development* category, part of the U.S. Department of Education's budget that is essentially restricted to math and science teaching and which creates synergy with all the NSF science and math education programs. *What does this mean?* Should it stand, zeroing out of the Eisenhower Program means that the *Dept. of Education* will have almost no continuing formal obligation to science and math teaching. In a nation half of whose economic growth is the result of science and technology, the decision is deemed a bit shortsighted. Critics of the House action lament that "...while the U.S. may choose to stand still or even go backward, the major world economic competitors will not." Further, "...though our children may represent only 20% of the population, they are 100% of our future." The proposal to eliminate the Eisenhower Program now moves to full Committee approval. *Consider writing your legislators to let them know how Eisenhower-supported activities are valuable to your state and why they should continue its emphasis on mathematics and science.* The most senior members of the Appropriations Committee and their fax numbers are: MAJORITY -- Bob Livingston R-LA (202-225-0739); Joseph McDade, R-PA (202-225-9594); John Myers, R-IN (202-225-1649); C. "Bill" Young R-FL (202-225-9764); Ralph Regula, R-OH (202-225-3059); Jerry Lewis, R-Ca (202-225-6498); John E. Porter, R-IL (202-225-0157). MINORITY -- David Obey, D-WI (202-225-3240); Sidney Yates, D-IL (202-225-3493); Louis Stokes, D-OH (202-225-1339). An *alternative* would be to contact members of the *Senate* Appropriations Subcommittee on Labor, Health and Human Services, Education (phone 202-224-3471). They are: Arlen Specter, R-PA, Mark Hatfield, R-OR, Thad Cochran, R-MS, Connie Mack, R-FL, Christopher Bond, R-MO, Jim Jeffords, R-VT, Judd Gregg, R-NH, Robert Byrd, D-WV, Ernest Hollings, D-SC, Daniel Inouye, D-HI, Dale Bumpers, D-AR, Harry Reid, D-NV, Herbert Kohl, D-WI.

SCIENCE EDUCATION REFORM: HOW CAN WE HELP?

"*Scientists can make a vital contribution to K-12 classrooms, but their role is likely to be different from what they expect.*" So says James M. Bower in an article published in *Issues in Science and Technology* this spring. In it he lists the 10 myths of basic science education reform and refutes them. Some of the myths are: *Myth #1:* The problem with public science education is that a large percentage of teachers are incompetent and should be fired. *Myth #2:* Teachers are undermotivated to teach science because they do not understand how exciting it is. *Myth #3:* The primary reason teachers do not teach science well is a lack of knowledge of science content. *Myth #4:* Supplemental teacher training is necessary because too few teachers, especially in the early grades, have been required to take science classes in college. *Myth #5:* The key to scientist involvement in teacher training is to provide complex information in as digestible a form as possible. Bower warns that "...if public schools continue to be denied the resources needed, no reform effort will be sustainable and the downward cultural, educational, and political spiral we now find ourselves in will continue" and that "...it is becoming increasingly difficult to distinguish schools in Third World regions from our own public schools. It is hard to understand how the world's richest and most economically vital country got into this situation. But it is easy to predict what will happen if we don't do something about it, and soon." *What can scientists do to help?* They should be encouraged to get involved in science education reform. Funding for public education will be restored to necessary levels only when more of society's politically powerful members recognize the frightful state of U.S. schools. Scientists can play a critical role, even if that role is somewhat different from the one they initially imagined they should play. *The involvement of real working scientists can validate a science education program and it can have a profound effect on teacher optimism.* James Bower concludes his article with the thought that "...the most important consequence of my involvement with science education reform has been a growing awareness of how poorly we scientists teach science to our own students. The most significant consequence of scientists' involvement may be *fundamental reform* of the way we educate our own students and revision of the curriculum we control can therefore, in principle, change."

About the Newsletter

The PCE Newsletter is a quarterly publication of the IRI Pre-College Education Committee. It is intended to highlight what IRI Member Companies and others in industry are doing to improve pre-college education in the United States. *Suggested items for publication are encouraged. Member Companies are urged to encourage external educational organizations to submit information for publication.* Mail or fax articles to Ludita Vallarta, Editor, Industrial Research Institute (IRI), 1550 M Street, NW, Washington, DC 20005-1712; fax 202-776-0756, indicating the name, address, and telephone number of a contact for each item submitted so that interested readers can obtain additional information.

Wednesday, October 23, 1996

8:30 am - Noon

Session IV

Theme: **HOW TO INTERNALIZE AND APPLY
GLOBAL TECHNOLOGY**

The emphasis in this session will be on practical lessons learned by successful R&D managers of global technology. Each of the speakers, drawing on their corporate experiences in the United States, Canada, Brazil, and Sweden, will share their insights on the following topics: managing ideas for technical innovation, hiring and developing people, dealing with diversity, multisite program coordination, balancing global with national interests, and getting started.

Session Co-Chairs:

J. B. Bush (Gillette)
C. Taralli (ANPEI)

Speakers:

Per G. Hedström

Corporate Technical Director &
Senior Vice President
Electrolux Group

Geoffrey C. Nicholson (Invited)

Vice President
International Technical Operations
3M

Carmine Taralli

President
ANPEI

Diju Raha (Invited)

General Manager
International R&D Operations
Nortel Technology
Northern Telecom

Industrial Research Institute

Fall Meeting Theme

**"Managing Technology
for Global Competitiveness"**

Objectives: To help members of IRI and its foreign counterparts better understand how to use technology to enhance global competitiveness. A second objective is to build more effective bridges between our organizations and individuals in other countries. Session I will feature four CEOs/Senior Executives from a variety of regions and industries speaking on "Strategies for Globalization through Technology -- A View from the Top." Session II will explore "Global Aspects of Technology Management." "How to Protect Global Technology," the subject of Session III, will have expert speakers and short case studies dealing with intellectual-property protection. The wrap-up session will provide practical lessons learned by R&D Managers on "How to Internalize and Apply Global Technology."

Stanley V. Jaskolski
Chief Technology Officer
V. P. - Technical Management
Eaton Corporation
Chair, IRI Program Committee

IRI Tutorial
on

"Managing R&D for Business Success"

J. W. Marriott

October 18-20, 1996

(Will be conducted by
Innovation Resultants Incorporated)

Industrial Research Institute
Suite 1100, 1550 M Street, NW
Washington, DC 20005-1712
Phone: 202-296-8811

Industrial Research Institute

1996 Fall Meeting
and
International Conference
on

**Managing
Technology
for
Global
Competitiveness**

in cooperation with

ADIAT, AIRG, ANPEI, CRMA,
EIRMA, KITA, & JATES

Preliminary Program



October 20-23, 1996

J. W. Marriott
Washington, DC

Monday, October 21, 1996

8:30 am - Noon

Opening Session

Theme: **STRATEGIES FOR GLOBALIZATION
THROUGH TECHNOLOGY --
A VIEW FROM THE TOP**

This session will provide an overview of the role technology plays in globalization, drawing from the experiences of executive officers from around the world. Information will be shared on the vital link between technology and corporate strategies, how technology can best support these strategic goals, and what the future might hold for the continued global advancement of technology.

Session Co-Chairs:

S. M. Morris (Air Products)
S. Takayanagi (Toshiba)

Speakers:

J. Lawrence Wilson
Chairman & CEO
Rohm & Haas Company

Ernesto Heinzelmann
Director, Superintendent
EMBRACO

Sergio Barabaschi
Deputy General Manager
ANSALDO
(President of EIRMA)

Tsuneo Nakahara
Vice Chairman & Deputy CEO
Sumitomo Electric Ind., LTD

Monday, October 21, 1996

2:00 - 5:00 pm

Session II

Theme: **GLOBAL ASPECTS OF TECHNOLOGY
MANAGEMENT**

This session will focus on critical issues of managing a global technology operation identified in an IRI/MIT study. Following the main speaker, topic-related workshops will be convened and led by experienced R&D executives. Because of the importance of national policy to global technology development, two presentations on European and American policies have been included.

Session Co-Chairs:

P. Castillon (Elf Aquitaine)
T. J. Rudd (Dexter)

Speakers:

D. Eleanor Westney
Professor of Management
Massachusetts Institute of Technology

Sir Robert May
Chief Scientific Advisor
United Kingdom

Graham R. Mitchell
Assistant Secretary for Technology Policy
U. S. Department of Commerce

Topics/Discussion leaders for Afternoon Workshops

Globalizing R&D in an Era of Changing Strategies

T. Kaiser (ABB)
P. Kwant (Royal Dutch Shell)

Internationalizing the Home Base

P. Castillon (Elf Aquitaine)
M. Fitzpatrick (Rohm & Haas)

Asia - The Challenge in Global R&D Management

B. Kosa (Rogers Corporation)
H. Aotani (DuPont K. K.)

Government Policy and Global Technology

R. May (Chief Scientist, UK)
G. R. Mitchell (U.S. Dept. of Commerce)

Tuesday, October 22, 1996

8:30 am - 5:00 PM

Session III

Theme: **HOW TO PROTECT GLOBAL
TECHNOLOGY**

The speakers for this session will address the following topics: the legal and investment climate for ventures in Asia; managing intellectual property assets; trends in international trademark, copyright, and software protection; and new intellectual property legislation in Brazil.

Session Co-Chairs:

M. Arnold (W. H. Brady)
W. Lee (Tong Yang Central Laboratories)

Speakers:

**Preston Torbert and
Jia Zhao**
Partners
Baker & McKenzie

Emmett J. Murtha
Director of Business Development
Intellectual Property & Licensing Services
IBM Corporation

Leslie Bertagnolli
Partner
Baker & McKenzie

Rogério Cerqueira Leite
President
Ciatec

1:30 - 5:00 pm - **Optional Activities**

Hot-Topic Session

“Mastering the Dynamics of Innovation”
James M. Utterback
Professor of Management & Engineering
Massachusetts Institute of Technology

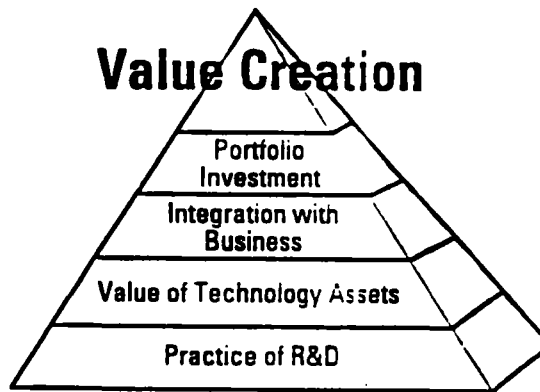
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IRI PUBLICATIONS

Category and Title of Publication	Cost	Number	Total
<u>RESEARCH-TECHNOLOGY MANAGEMENT REPRINT BOOKLETS</u>			
THE ART OF TECHNOLOGY MANAGEMENT Selected Papers from RESEARCH-TECHNOLOGY MANAGEMENT's "Managers at Work" Department 1982-1993.	\$ 25.00	_____	_____
BUILDING MORE EFFECTIVE TECHNICAL TEAMS: Selected Papers from RESEARCH-TECHNOLOGY MANAGEMENT 1984-1993.	25.00	_____	_____
CREATIVITY AND IDEA MANAGEMENT Selected Papers from RESEARCH-TECHNOLOGY MANAGEMENT 1987-1995.	35.00	_____	_____
TI FINANCIAL MANAGEMENT OF R&D Selected Papers from RESEARCH-TECHNOLOGY MANAGEMENT 1985-1993.	25.00	_____	_____
GETTING THE MESSAGE: HOW TECHNICAL PEOPLE AND ORGANIZATIONS CAN COMMUNICATE BETTER. Selected Papers from RESEARCH-TECHNOLOGY MANAGEMENT 1988-95.	35.00	_____	_____
MEASURING AND IMPROVING THE PERFORMANCE AND RETURN ON R&D Selected Papers from RESEARCH-TECHNOLOGY MANAGEMENT 1985-1994.	35.00	_____	_____
MOTIVATING, APPRAISING AND REWARDING ENGINEERS AND SCIENTISTS Selected Papers from RESEARCH-TECHNOLOGY MANAGEMENT 1988-1994.	25.00	_____	_____
PEOPLE DILEMMAS FOR TECHNICAL LEADERS A Set of Management Problems in Motivation, Ethics, Communications, and Interpersonal Relations: Case Studies from RESEARCH-TECHNOLOGY MANAGEMENT 1986-1995.	35.00	_____	_____
PROJECT MANAGEMENT Selected Papers from RESEARCH-TECHNOLOGY MANAGEMENT 1988-1993.	25.00	_____	_____
QUALITY IN R&D Selected Papers from RESEARCH-TECHNOLOGY MANAGEMENT 1987-1992.	25.00	_____	_____
R&D MANAGERS AT WORK: Insights from IRI Study Groups 1984-1989.	25.00	_____	_____
D PRODUCTIVITY Selected Papers from RESEARCH-TECHNOLOGY MANAGEMENT 1985-1994.	25.00	_____	_____
SUCCEEDING AS A NEW MANAGER/LEADER Selected Papers from RESEARCH-TECHNOLOGY MANAGEMENT 1984-1994.	35.00	_____	_____
<u>R&D: CAREER</u>			
YOUR TECHNOLOGY CAREER: A Guide for Scientists and Engineers in Industry (1995) IRI Members: 1 copy, \$35.00; 10 or more copies, \$25.00 each; 50 or more copies, \$20.00 each. Non Members: 1 copy, \$45.00, 10-49 copies, \$35.00 each; 50 or more copies, \$25.00 each.		_____	_____
<u>R&D: MANAGEMENT</u>			
MANAGING RESEARCH AND DEVELOPMENT: What We've Learned in the Past 50 Years (1989).	35.00	_____	_____
<u>FUTURE TRENDS</u>			
INDUSTRY'S FUTURE: Changing Patterns of Industrial Research by Herbert I. Fushfeld (1994). Published by ACS.	25.00	_____	_____
<u>25 YEAR INDEX TO RESEARCH-TECHNOLOGY MANAGEMENT</u>			
Articles classified by topic for the period 1970-1994.	25.00 (Non Members)	_____	_____
	Free to IRI Members	_____	_____

IRI COMMITTEE AND PROJECT REPORTS

R&D ORGANIZATION AND FUNDING CHARTS Survey conducted by the Research-on-Research Committee (1995).

95.00(Non Members)

50.00(IRI Members)

INTEGRATING TECHNOLOGY AND BUSINESS PLANNING IN IRI COMPANIES IRI Video and Facilitator's Notebook from ROR Committee (1995).

495.00(Non Members)

95.00(IRI Members)

ING R&D LEADERSHIP AND CREDIBILITY Report from R&D Leadership and Credibility Steering Committee and Research-on-Research Committee (1991).

10.00

DEFINITIONS OF RESEARCH AND DEVELOPMENT Report of the Definitions of Research Ad Hoc Committee (1978-1979).

3.00

CONFERENCE PROCEEDINGS**GATT R&D ISSUES**

Summary Report of Roundtable Meeting (1992).

20.00

USTRY INTERACTION WITH THE FORMER SOVIET UNION (FSU) Summary Report of Roundtable Meeting, Part I (1992).

10.00

IN RY INTERACTION WITH THE FORMER SOVIET UNION (FSU) Summary Report of Roundtable Meeting, Part II (1992).

10.00

REDUCING R&D CYCLE TIMES

Summary Report of Roundtable Meeting (1992).

10.00

REDUCING R&D CYCLE TIMES - APPENDICES

10.00

STUDY MISSION TO JAPAN: Trip Report - Sept. 23 to Oct. 4, 1986. A report on eight major industrial companies in Japan and proceedings of a joint conference with the Japan Techno-Economics Society (1986).

20.00

Total Cost of Publications Ordered:

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1991-1	MANAGING RESEARCH QUALITY, by George W. Roberts; HOW GOOD IS OUR RESEARCH?, by Walter L. Robb.	_____
1991-2	A NEW MISSION FOR CORPORATE TECHNOLOGY, by Lawrence W. Linden, Jules Blake, and Donald E. Elson (Late-Afternoon Symposium).	_____
1991-3	ROLE OF THE INDUSTRIAL TECHNICAL REP IN WASHINGTON, DC, by Edwin H. Behrens, William A. Owczarski, and Patrick H. Windham (Late-Afternoon Symposium).	_____
1991-4	MANAGING THROUGH CYCLES OF TECHNOLOGICAL CHANGE, by Philip Anderson and Michael G. Tushman; IMPLEMENTING EXPERT SYSTEMS IN R&D, by John R. Pickett and Thomas L. Case.	_____
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1992-6	SHORTENING THE PRODUCT DEVELOPMENT CYCLE, by Preston G. Smith and Donald G. Reinertson; R&D BENCHMARKING AT AT&T, by Thomas J. Bean and Jacques G. Gros.	_____
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1993-4	THE ROLE OF CORE COMPETENCIES IN THE CORPORATION, by C. K. Prahalad; HOW A BAND OF TECHNICAL RENEGADES DESIGNED THE ALPHA CHIP, by Ralph Katz.	_____
1994-1	ALIGNING TECHNOLOGY WITH BUSINESS STRATEGY, by Arthur N. Chester; FINDING AND COMMERCIALIZING NEW BUSINESSES, by Robert E. Gee.	_____
1994-2	GATT R&D SUBSIDIES -- REVISITED, by J. Thomas Ratchford, Peter S. Watson, Eric I. Garfinkel, Lawrence C. Kravitz, and Deborah Wince-Smith (Late-Afternoon Symposium).	_____
1994-3	MEASURING R&D EFFECTIVENESS - Parts I and II, by Robert Szakonyi.	_____
1994-4	DEBUNKING THE MYTHS OF NEW PRODUCT DEVELOPMENT, by Robert G. Cooper; THE CHANGING ROLE OF U.S. CORPORATE RESEARCH LABS, by Elizabeth Corcoran.	_____
1994-5	DO'S AND DON'TS OF R&D BENCHMARKING, by Derek L. Ransley; WHITEWATER AHEAD: EASTMAN PREPARES FOR TURBULENT TIMES, by Jerry D. Holmes and Gary E. McGraw.	_____
1994-6	BUILDING AN INTEGRATED ENGINEERING ORGANIZATION, by Ronald K. Leonard, Robert D. Wismer, and Steve Bosserman; THE HIDDEN SIDE OF LEADERSHIP IN TECHNICAL TEAM MANAGEMENT, by Gary Gemmill and David Wilemon.	_____
1995-1	BENCHMARKING THE STRATEGIC MANAGEMENT OF TECHNOLOGY, Parts I and II, by Edward B. Roberts.	_____
1995-2	MEASUREMENTS AND INCENTIVES FOR CENTRAL RESEARCH, by Arthur N. Chester; HOW 26 COMPANIES MANAGE THEIR CENTRAL RESEARCH, by Charles E. Bottomsworth and Burton H. Sage, Jr.	_____
1995-3	MEASURING R&D PERFORMANCE, by Paul A. Shumann, D. L. Ransley, and Donna C. L. Prestwood; OVERCOMING RESISTANCE TO TQM, by Neal A. C. Braver.	_____
1995-4	DEVELOPING NEW PRODUCTS ON TIME, IN TIME, by Robert G. Cooper; A BROADER MISSION FOR R&D, by William A. Miller.	_____
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1996-2	YOUR PRODUCT DEVELOPMENT PROCESS DEMANDS ONGOING IMPROVEMENT, by Preston G. Smith; STRATEGIC PARTNERING FOR DEVELOPING NEW PRODUCTS, by Murray R. Millson, S. P. Raj, and David Wilemon.	_____

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June 28, 1996

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To: Member Company Representatives and Alternates

Subject: **NOMINATIONS FOR 1996 IRI MEDAL**

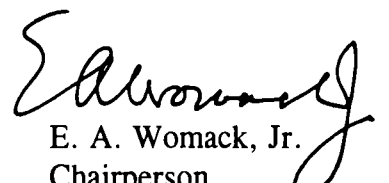
Enclosed you will find a nomination form for the Industrial Research Institute Medal. Your assistance is requested in choosing the 1997 recipient.

The Medal was first awarded in 1946 and is presented to "recognize and honor leaders of technology for their outstanding accomplishments in technological innovation, which contribute broadly to the development of industry and to the benefit of society."

Nominations must be received at IRI headquarters by August 31, 1996; please address them to my attention. The recipient will be selected this fall during the Washington, D.C. meeting. Presentation of the Medal will be made during our 1997 Annual Meeting in Boca Raton, Florida.

Note that the IRI Achievement Award, established in 1973, is presented to "honor outstanding accomplishment in individual innovation and creativity, which contributes broadly to the development of industry and to the benefit of society." There is a distinct difference between the two awards. Past recipients of each award are shown on the reverse side of this letter, to serve as a guide in making your nominations. The high standards that past Medalists have established are obvious.

Nominations must be submitted on the enclosed form. The Awards Committee makes its selection solely upon the information included on the form, so please ensure that it is filled in neatly, accurately, and completely. Supplemental material is not considered. Candidates previously nominated, but not selected, may be renominated.


E. A. Womack, Jr.
Chairperson
Awards Committee

EAW:krr

Enclosure

"To enhance the effectiveness of technological innovation in industry"

(over)

IRI MEDALISTS

1946	Willis R. Whitney (General Electric)	1972	Peter C. Goldmark (Goldmark Communications)
1947	Charles A. Thomas (Monsanto)	1973	William E. Shoupp (Westinghouse)
1948	Games Slayter (Owens-Corning)	1974	Robert W. Cairns (Hercules)
1949	Vannevar Bush (Office of Scientific R&D)	1975	James Hillier (RCA)
1950	Frank B. Jewett (Bell Labs)	1976	Hendrik B. G. Casimir (N.V. Philips)
1951	Randolph T. Major (Merck)	1977	John J. Burns (Hoffman-La Roche)
1952	Roy C. Newton (Swift & Co.)	1978	Malcolm E. Pruitt (Dow Chemical)
1953	Eger V. Murphree (Standard Oil of NJ)	1979	Arthur M. Bueche (General Electric)
1954	Mervin J. Kelly (Bell Labs)	1980	Lewis H. Sarett (Merck)
1955	Ernest H. Volwiler (Abbott)	1981	William H. Armistead (Corning)
1956	Victor Conquest (Armour)	1982	N. Bruce Hannay (Bell Labs)
1957	Clifford F. Rassweiler (Johns-Manville)	1983	Edward E. David, Jr. (Exxon R & E)
1958	Elmer W. Engstrom (RCA)	1984	Harry W. Coover (Eastman Chemical)
1959	Frank K. Schoenfeld (BFGoodrich)	1985	Ralph E. Gomory (IBM)
1960	Augustus B. Kinzel (Union Carbide)	1986	George E. Pake (Xerox)
1961	Max Tishler (Merck)	1987	Ian M. Ross (Bell Labs)
1962	Chauncey G. Suits (General Electric)	1988	Abraham B. Cohen (E.I. Du Pont)
1963	James B. Fisk (Bell Labs)	1989	Roland W. Schmitt (General Electric)
1964	Ray H. Boundy (Dow Chemical)	1990	Edward M. Scolnick (Merck)
1965	Edwin H. Land (Polaroid)	1991	Mary L. Good (AlliedSignal)
1966	Paul L. Salzberg (E.I. Du Pont)	1992	John S. Mayo (Bell Labs)
1967	Emanuel R. Piore (IBM)	1993	George H. Heilmeyer (Bellcore)
1968	John H. Dessauer (Xerox)	1994	Walter L. Robb (General Electric)
1969	Patrick E. Haggerty (Texas Instruments)	1995	John J. Wise (Mobil)
1970	William O. Baker (Bell Labs)	1996	Robert A. Frosch (General Motors)
1971	Henri Busignies (Int'l. Telephone & Telegraph)		

IRI ACHIEVEMENT AWARD RECIPIENTS

1973	William F. Gresham (E.I. Du Pont) <i>Polyolefins</i>	1985	John E. Franz (Monsanto) <i>Roundup</i>
1974	William G. Pfann (Bell Labs) <i>Ultra-High Purity Materials</i>	1986	Robert D. Maurer (Corning Glass) <i>Glass Fiber Wave Guides</i>
1975	Maurice R. Hilleman (Merck) <i>Vaccines</i>	1987	Howard G. Rogers (Polaroid) <i>Instant Color Film</i>
1976	LeGrand Van Uiter (Bell Labs) <i>Electronic Materials</i>	1988	Alfred Y. Cho (Bell Labs) <i>Molecular-Beam Epitaxy</i>
1977	Robert H. Wentorf, Jr. (General Electric) <i>Synthetic Diamonds</i>	1989	Robert H. Dennard (IBM) <i>One-Transistor Dynamic Memory Cell</i>
1978	Frank B. Colton (G.D. Searle) <i>Oral Contraceptives</i>	1990	Leonard S. Cutler (Hewlett-Packard) <i>Cesium Atomic Beam Clock</i>
1979	Stanley D. Stookey (Corning Glass) <i>Photochromic Glasses</i>	1991	Victor Mills (Procter & Gamble) <i>Soaps and Detergents</i>
1980	Andrew H. Bobeck (Bell Labs) <i>Bubble Memories</i>	1992	Richard H. Frenkiel (Bell Labs) <i>Cellular Telephones</i>
1981	Robert N. Noyce (Intel) <i>Silicon Integrated Circuits</i>	1993	Marvin M. Johnson (Phillips Petroleum) <i>Passivating Agents for Catalytic Cracking</i>
1982	Herbert W. Boyer (University of California) <i>Recombinant DNA</i>	1994	Marinus Los (American Cyanamid) <i>Imidazolinone Herbicides</i>
1983	John W. Backus (IBM) <i>FORTRAN</i>	1995	Andrezj M. Pawlak (General Motors) <i>Electromechanical Devices</i>
1984	Allan S. Hay (General Electric) <i>Polymerization by Oxidative Coupling</i>		

Other Data

3. What is nominee's current area of technology management?

4. Affiliation in other companies:

5. Awards (Give name of organization, date, and citation, if possible):

6. Degrees:

7. Date of birth:

8. Additional information:*

Send this form by August 31 to Chairperson,
Awards Committee, c/o IRI at address below
(1/96)

NOMINATION
for
INDUSTRIAL RESEARCH INSTITUTE MEDAL

PURPOSE OF THE AWARD

The purpose of the award shall be to recognize and honor leaders of technology for their outstanding accomplishments in technological innovation which contribute broadly to the development of industry and to the benefit of society.

QUALIFICATIONS OF THE RECIPIENT

ACHIEVEMENT ATTRIBUTED TO THE NOMINEE'S LEADERSHIP SHALL BE THE PRIMARY CONSIDERATION, AS EVIDENCED BY:

1. Leadership within his/her own organization.

a. Vision in the establishment, development, or operation of industrial R&D.
b. Integration of technology with the business of his/her company.
c. Successful nurturing of new products/processes that benefit his/her organization.
Specific instances with quantitative impact are particularly helpful.
2. Leadership in the promotion of technological innovation for the public interest or welfare. Instances in which the nominee has had quantifiable impact are particularly helpful.

The recipient shall be living at the time the award is approved by the Board of Directors and long enough thereafter to have significant willingness to accept the award. The actual presentation, however, may be made posthumously to a representative of the recipient.

I nominate as a qualified candidate for the Industrial Research Institute Medal:

(Full Name of Candidate)

(Present Position)

(Present Company)

(Company Address)

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(Position & Company)

(Address)

Your SignatureDate Submitted

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*Do not include secondary or other supporting letters and material with your nomination. The Awards Committee bases its consideration of candidates solely on data provided on the four pages of this nomination form.



QUALIFICATIONS OF THE CANDIDATE, in detail:

(Keep in mind that the Awards Committee makes its decision solely on the basis of the qualifications which are cited in this form. Consequently it is desirable that all pertinent information be included here.)

1. *Leadership within his/her organization.*

a. Vision in the establishment, development, or operation of industrial R&D.

- b. Integration of technology with the business of his/her company.

- c. Successful nurturing of new products/processes that benefit his/her organization.

2. *Leadership in the promotion of technological innovation for the public interest or welfare. (Public service in national or local government, or in civic or social groups, which serves to increase the impact of industrial technology in these areas.)*



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June 28, 1996

To: Member Company Representatives and Alternates

Subject: **MINUTES OF COLORADO SPRINGS MEETING**

Enclosed are the Minutes from our 1996 Annual Meeting, held at Colorado Springs, Colorado.

If we have not heard from you within 30 days from the date of this memo, these minutes will be considered approved by the membership.

Charles F. Larson
Executive Director

CFL:mjb
Enclosures

INDUSTRIAL RESEARCH INSTITUTE

Minutes of the One Hundred and Thirty-First General Meeting

May 22-25, 1996

Colorado Springs, Colorado

The one hundred and thirty-first general meeting of the Industrial Research Institute (106th since incorporation) was held at The Broadmoor, Colorado Springs, Colorado, on May 22-25, 1996.

Tuesday, May 21

The IRI registration desk was open during the late afternoon, an afternoon tour of The Broadmoor was offered, and a social hour was held for early arrivals.

Wednesday, May 22

The IRI registration desk opened in the morning and two optional tours were offered during the day. The Board of Directors, Pre-College Education Committee, and Research-on-Research Subcommittee on Information Technology met during the morning.

The following committees met in the afternoon: Awards, Board of Editors, Federal Science and Technology, International, Membership, Plans & Policies, Program, R&D Communications, Research-on-Research, Seminar, University Relations, and the Research-on-Research Subcommittee on R&D Portfolio Management. The Thursday afternoon workshop leaders also met during the afternoon.

The traditional reception for first-time attendees, hosted by the Board of Directors, was attended by approximately 60 Representatives, Alternates, companions and guests. Executive Director Charles Larson welcomed them to their first Institute meeting and introduced the Executive Committee and IRI staff members present. President Charles Bishop introduced the "IRI in Action" slide presentation. Following dinner, the group enjoyed a talk by Michael Moran, Director of Media Relations for the United States Olympic Committee.

Thursday Morning, May 23

The following groups met during breakfast: Emeriti, Federal Guests, Finance, Study Groups: New and Experienced Leaders, and the Thursday morning speakers.

President Bishop called the first general session to order at 8:30 a.m. (See Appendix A for a list of member companies represented.) After welcoming members, guests, speakers, past presidents, and emeritus representatives, Dr. Bishop emphasized highlights of the meeting and called on President-Elect and Program Committee Chair, Jerry Cogan, who introduced the overall meeting theme, "**Winning with Technology**," summarized the overall program content, and introduced the co-chairs for the morning session:

Andrea Sanders, Vice President, North American Chemicals, Rhone-Poulenc

Edwin B. Stear, Corporate Vice President, Technology Assessment, The Boeing Company

Ed Stear introduced the morning session's first two speakers:

Paul M. Romer, Professor of Economics, University of California, Berkeley
"S&T Policy for Nations and Firms"

Edward Barnholt, Senior Vice President & General Manager, Hewlett-Packard Test & Measurement Group
"The Value of Growth to the Firm"

Following a coffee break, Andrea Sanders introduced the next two speakers:

Craig Tedmon, Executive Vice President & Senior Corporate Officer, ABB Asea Brown Boveri Ltd
"Achieving Company Growth"

John Major, Senior Vice President & Chief Corporate Staff Officer, Motorola, Inc.
"Sustaining Company Growth"

After thanking the morning speakers, Dr. Sanders adjourned the session at noon.

Thursday Afternoon, May 23

The President's Luncheon was held at 12:15 p.m. Mr. Cogan introduced Dr. Bishop for the President's Address. Dr. Bishop introduced the Past Presidents in attendance and gave his President's Address. Following his remarks, Dr. Bishop introduced the newly elected Vice-President and Directors who took office after adjournment of the meeting.

Vice President:	Gary McGraw, Eastman Chemical Co.
Directors:	Cathy Ellis, Philip Morris, U.S.A. Paul Germeraad, Avery Dennison Mike Griffith, ARCO Chemical Co. Bill Miller, Steelcase Inc. John Tancredi, North American Chemical Co.

Dr. Bishop then thanked the Past President and Directors whose terms ended at the close of the Meeting on Saturday.

Past President:	Allen Womack, McDermott International
Directors:	Brian Burrows, USG Corporation Judy Giordan, Henkel Corporation Andy Pettifor, Rockwell Joe Raksis, W. R. Grace & Co.

Jerry Cogan opened the afternoon session at 2:00 p.m. and introduced the co-chairs:

Kenneth G. Migliorese, Corporate Director, Technology Development, Helene Curtis, Inc.

Mel Perel, Principal, Technology Management Group, Battelle (who was unable to be present)

Craig Chambers (covering for Mel), Vice President & Managing Director, Technology Management Group, Battelle

Ken Migliorese introduced the first speaker:

Clarence M. Eidt, Jr., President, Exxon Research & Engineering Company
“‘Reinventing’ Industrial Basic Research”

Craig Chambers then introduced the next two speakers:

Robert M. Rivett, Director, Advanced Materials Center, Emerson Electric Company
“An Approach to Technology Sourcing”

Richard Razgaitis, Vice President, Technology Commercialization, Bellcore
“A 30-minute Guide to Picking Intellectual Property Winners”

Dr. Migliorese thanked the afternoon speakers and noted that, after a short coffee break, participants should proceed to the Workshops on Research Planning, Technology Sourcing, and Intellectual Property.

After a social hour hosted by Adolph Coors, Schuller International and U S West, the group was free to enjoy dinner on their own at a restaurant of their choice. The Board of Directors hosted a dinner for Committee and Network Chairs to thank them for their service during the past year. At the same time, the Emeriti had a group dinner at a local restaurant.

Friday Morning, May 24

Breakfast meetings were held for the Advanced Program Committee, the Emeritus Activity Group, University Guests, and the Friday morning speakers.

Jerry Cogan began the morning session by thanking Adolph Coors, Schuller International, and U S West, for hosting the Thursday evening social hour, and then introduced the IRI Medalist for his address.

Robert A. Frosch, Vice President (Retired), General Motors Research & Development Center
“R&D Management: Planting, Cultivating & Harvesting”

Kymus Ginwala, Consultant, Business Development (formerly President), Northern Research/Ingersoll Rand, opened the morning session, the theme of which was **“Key Drivers of the New Product Delivery Process,”** and introduced the first two speakers:

Robert G. Cooper, Lawson Mardon Chaired Professor of Industrial Marketing & Technology Management, McMaster University, and 1995 Holland Award Recipient
“Winning at New Products: Benchmarking Firms’ Practices & Performance”

Charles P. Holt, Corporate Vice President, Center for Research & Technology, Xerox Corporation
“Case Study: Technology Delivery at Xerox”

Following a coffee break, session co-chair Gerry Meiling, Senior Vice President and Director, Science & Technology Strategy, Corning, Inc., introduced the next two speakers:

William F. Powers, Vice President, Research, Ford Research Laboratory, Ford Motor Company
“The Role of the Research Laboratory in Ford 2000”

Sheldon A. Buckler, Chairman of the Board, Commonwealth Energy Systems (formerly Vice Chairman, Polaroid Corporation)
“The Spiritual Nature of Product Innovation”

Mr. Cogan thanked the speakers and introduced Stanley Jaskolski who gave a brief overview of the 1996 Fall Meeting which will be held in Washington, DC on October 20-23.

Friday Afternoon, May 24

A Networking Luncheon was held from 11:45 a.m. to 1:00 p.m. A Hot-Topic Session on “**Impact of Information Technologies in R&D**” followed from 1:00 to 5:00 p.m. The session leaders were:

Daryl Boudreaux, Director of Technology Transfer & Corporate Development, Stevens Institute of Technology

Philip D. Metz, Associate Director, Arthur D. Little

Optional activities offered during the afternoon included golf, tennis, Cog Rail Train to Pikes Peak, the Air Force Academy & Garden of the Gods, and NORAD.

Friday Evening, May 24

Following a Board of Directors' reception for the IRI Award Recipients, and a social hour for all participants, the Awards Dinner began at 8:00 p.m. Following dinner, President Bishop called on Dale F. Pollart, Director, Research, Texaco, Inc. to introduce the recipient of the Maurice Holland Award: Dr. Robert G. Cooper, Lawson Mardon Chaired Professor of Industrial Marketing & Technology Management, McMaster University. Dr. Bishop escorted Dr. Cooper to the lectern, read the citation, and presented the award. In brief acceptance remarks, Dr. Cooper expressed his appreciation for being honored by IRI. Dr. Bishop then called on Larry J. Howell, Executive Director, Body & Vehicle Integration, General Motors Research & Development Center, to introduce the recipient of the Industrial Research Institute Medal: Dr. Robert A. Frosch, Vice President (Retired), General Motors Research & Development Center. Dr. Bishop escorted Dr. Frosch to the lectern and presented him with the IRI Medal after reading the citation. Following acceptance remarks by Dr. Frosch, Dr. Bishop called Dr. W. Gale Cutler forward as IRI's third Honorary Fellow. Dr. Cutler's service to IRI was highlighted as a poem, and he was presented with a certificate recognizing his election as an Honorary Fellow. He thanked the membership and IRI staff for their contributions to his efforts over the past 20 years. Past President Brian Rushton then came to the lectern and presented the Past President's Certificate, Steuben Owl and IRI watches to Dr. Bishop, who in turn called Mr. Cogan to the lectern and transferred the gavel. Mr. Cogan accepted the gavel and adjourned dinner for dancing to the music of the Frank Finelli Orchestra.

Saturday, May 25

Breakfast meetings were held for the Newcomers' Spring '96 Network, speakers, and Past Presidents.

Dr. Bishop opened the session at 8:00 a.m. by urging everyone to complete their feedback forms for Colorado Springs and then calling on Charles F. Larson, Executive Director, who gave membership certificates to new IRI members.

Chuck Larson presented his Executive Director's Report (see Appendix B) and introduced the Committee/Network Activities Reports: **Federal Science & Technology Committee**, David C. Knowlen, Chair; **Research-on-Research Committee**, Donald S. Mueller, Vice-chair; **University Relations Committee**, J. Peter Bingham, Chair; and **Finance Directors' Network**, Stanley V. Jaskolski, Board Liaison. (See Appendix D.)

Chuck Larson thanked the Network/Committee Chairs for their reports and called on Kenneth G. Migliorese, Corporate Director, Technology Development, Helene Curtis, Inc. who gave a summary of the Thursday Workshops.

Jerry Cogan introduced the co-chairs of the Special Interest Sessions:

Lester R. Isbrandt, Vice President, Worldwide Consumer Healthcare Research & Development,
Warner-Lambert Company

Edward J. Nemeth, Director of Research, Aristech Chemical Corporation

Five Special Interest Sessions, summaries of which are presented in Appendix E, were held from 9:15 to 11:30 a.m. Titles of the sessions were:

- A. "Technology Value Program: New Users' Group"**
- B. "R&D Issues for Smaller Companies & Business Units"**
- C. "Management of Discontinuous Innovation"**
- D. "Information Tools for R&D Effectiveness"**
- E. "Third Generation R&D Users' Group"**

Following adjournment of the Special Interest Sessions, the Board of Directors held a luncheon meeting to review committee activities and organize for the coming year.

INDUSTRIAL RESEARCH INSTITUTE

May 22-25, 1996
Colorado Springs, Colorado

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Appendix B
to Minutes of May 1996 Meeting

Executive Director's Report—Chuck Larson

Our most important business is to recognize new member companies, three of whom are with us this morning. In the order that they became members, they are:

- **Grain Processing Corporation**, represented in IRI by Jim Crowder, Senior Vice President. They became a member on May 1, 1995. Jim is located in Muscatine, Iowa.
- **Westlake Group**, represented in IRI by Dave Bonner, Vice President, Technology. They became a member on May 3, 1996. Dave is located in Houston, Texas.
- **North American Chemical Company**, represented in IRI by their President, John Tancredi. They became a member just last week and John is located in Overland Park, Kansas.

We presented a membership certificate to John Major, the Representative of Motorola, on Thursday because he had to return early. Motorola became a member of IRI on August 21, 1995. On behalf of the entire membership, I want to welcome these new members and to congratulate James Rudd of Dexter, who has led our Membership Committee for the past two years, and Dave Trecker of Pfizer, the committee's vice chair. In the past two years they have helped to raise our membership to the current level of 271, up 5 from this time last year and 10 above the level two years ago. We are also approaching the old high mark of 278 members, set back in 1981 when the Board put a moratorium on acceptance of new members. It is encouraging that Daimler-Benz and Motorola, two of the major R&D spenders in the world, joined last year and that three former members, U. S. Borax, Cargill, and Boehringer Ingelheim, re-joined this year, in large part to access IRI professional development programs. I am pleased that we have also acquired several small members, which we will, of course, help grow through effective management of R&D, technology, and innovation. In addition, we were pleased to welcome eight member prospects at this meeting, more than have ever before attended a Semi-Annual Meeting.

Perhaps the major highlight of the past year was the release of the Technology Value Program as software, which you will hear more about from Don Mueller, incoming chair of the ROR Committee. You will recall that in 1994 the IRI Executive Committee charged ROR Committee with developing reliable techniques to measure R&D value, following feedback from the membership in the Mission Development Survey.

Two Roundtable meetings convened by the FST Committee last August and this February were another highlight. These sessions provided our membership with an opportunity to learn about, and to express an opinion on, cuts that Congress is considering in future funding of federal S&T programs, a situation that is still not resolved and which may not be until after the elections this fall.

A third major highlight was the successful move of our Management Seminar from the Boston area to Evanston, and utilizing faculty from the Kellogg School instead of Harvard Business School after 35 years. Other major milestones included publication of the fourth IRI Strategic Plan, covering 1996 to

2000, last July; implementation of a second round of the Los Alamos National Laboratory Industry Fellows program at four of our member companies; a highly productive workshop at Duke University to examine industry-university research collaborations; the creation of a new Network for Environmental, Health and Safety Directors; and the election of Gale Cutler as the third Honorary Fellow of IRI.

We have one matter to act on formally at this session, which is to vote on an amendment to the Constitution recommended by the Board at its meeting in Coronado last November. The amendment to Article V, Section 2 (b) would eliminate the size-based restriction on the number of Additional Alternate Representatives allowed a member company. If you concur with the proposed amendment, as shown on the sheet that you have, any member company could name up to four Additional Alternates regardless of the number of professionals it has in R&D. This change is intended to support a recent amendment to IRI's Constitution to include as Alternate Representatives technical leaders in business units who have responsibility for the innovation process. Could we, therefore, have a motion for acceptance by the membership? (A motion was offered, seconded, and unanimously approved by the official Representatives present or their proxies.)

Our last fiscal year saw revenue and expense both ahead of budget, by 8% for revenue, to \$3,082,000, but by only 3% for expense. That resulted in an operating surplus of \$139,286 and a net increase in our financial position of \$388,300 due to investment income and increase in the market value of investments. (Details are presented in Appendix C.)

For several years, we have recognized Study Group Discussion Leaders who have led three or more Study Groups. This year, we have certificates for the following persons, who should come forward to be recognized: Cathy Ellis of Philip Morris; Dick Fantazier of Armstrong; Dave Haid of Praxair; Bill Lever of Bausch & Lomb; George Kubanek of Noranda; Ken Migliorese of Helene Curtis (now part of Unilever); and Parvez Wadia of Union Carbide. We greatly appreciate their contributions and will add their names to the Study Group Discussion Leaders Hall of Fame list that hangs on the wall at IRI headquarters.

To conclude, I want to thank the Rep/Alts who have reached out to our Newcomers as hosts the first evening of our Semi-Annual Meetings ever since this mentoring was started here at The Broadmoor in 1985. We typically have 65 to 70 newcomers at a meeting. It is an interesting task to line them up with someone who has been coming to meetings for some time, so the newcomers will have a good contact and future mentor, as well as be introduced to others. We have recently been asking newcomer hosts from one meeting to get in touch with their newcomers at the next meeting, if they will both be present; to get the second-meeting newcomers together for dinner the first evening; to get the first-time newcomers together for breakfast the last morning of the meeting; and, as you could see at this meeting, to give the first-time newcomers a memento by which they can relate with one another in the future. Your help in making newcomers feel welcome at IRI is greatly appreciated. I would also urge our newcomers as well as "old-timers" to visit us at headquarters when you are coming to Washington. Many of you do, but we would always welcome more.

INDUSTRIAL RESEARCH INSTITUTE, INC.
COMBINED BALANCE SHEET

For Fiscal Years ended February 29, 1996 and February 28, 1995

ASSETS	1996	1995
Cash/Money Market	\$ 724,405	\$ 322,097
Investments	1,112,256	1,374,148
Other current assets	<u>20,558</u>	<u>10,267</u>
	\$ 1,857,219	\$ 1,706,512
 Reserve Funds		
Security Deposit	\$ 15,728	\$ 15,728
Investments	<u>1,485,004</u>	<u>1,366,219</u>
	\$ 1,500,732	\$ 1,381,947
 TOTAL ASSETS	 <u>\$ 3,357,951</u>	 <u>\$ 3,088,459</u>
 LIABILITIES		
Accounts Payable	\$ 60,888	\$ 52,712
Deferred Revenue	<u>1,073,573</u>	<u>1,200,557</u>
	\$ 1,134,461	\$ 1,253,269
 Reserve Fund	\$ 1,919,269	\$ 1,439,327
Operating Fund	<u>304,221</u>	<u>395,863</u>
	\$ 2,223,490	\$ 1,835,190
 TOTAL LIABILITIES AND COMBINED FUND BALANCE	 <u>\$ 3,357,951</u>	 <u>\$ 3,088,459</u>

Operating Results
Fiscal Years 1996 and 1995

	1996	1995
REVENUE		
Membership Dues	\$1,036,690	\$ 961,604
Investment Income	103,118	89,119
Meetings, Semi-Annual	498,347	507,541
Meetings, Special	130,078	61,979
SG: New Leaders	125,425	115,629
SG: Experienced Leaders	175,500	199,232
Management Seminar	555,120	455,280
Tutorials	71,338	63,026
Journal	311,190	297,773
Miscellaneous	<u>74,902</u>	<u>66,266</u>
 Total Revenue	 \$3,081,708	 \$2,817,449
 EXPENSES		
Information Services	\$ 443,784	\$ 329,729
Committee & Awards	784,079	742,127
Meetings, Semi-Annual	564,720	639,645
Meetings, Special	134,673	49,759
SG: New Leaders	87,560	92,185
SG: Experienced leaders	90,582	117,532
Management Seminar	415,038	271,797
Tutorials	89,138	73,867
Journal	281,293	248,133
Miscellaneous	<u>51,555</u>	<u>20,803</u>
 Total Expense	 \$2,942,422	 \$2,585,577
 NET REVENUE	 <u>\$ 139,286</u>	 <u>\$ 231,872</u>

Federal Science & Technology Committee Report
David C. Knowlen, Chair

The Washington Post has emphasized that 1996 will be a most interesting year for science and technology policy in this country. Election of a Republican Congress in 1994 has brought about major challenges to President Clinton's technology policy, and has raised concern within the academic community regarding the future for science funding.

Our FST Committee members have learned that they were "politically challenged" in Washington when communicating a necessary and vital science and technology agenda for the future, one in which industry, government, and universities work cooperatively to ensure the future competitiveness and vigor of our technological enterprise. In response to this climate, the committee convened two roundtable meetings, last August and this February, to provide the IRI membership with some excellent insights on gridlock politics and an opportunity to express their opinions on government S&T policies to key decision-makers in our nation's capital. The roundtables were well attended, active, and enlightening, and I want to thank Chuck Larson and Margaret Grucza for their work in making them a valuable opportunity for our membership to learn about , as well as influence, S&T policy. If there was any lesson learned from the sessions, it was that small companies seem to have been more effective in communicating with Congress than large companies. Therefore, the FST Committee has been aggressive and proactive in expressing an opinion on the unsettled question of government funding for S&T. We have also expressed IRI's opinion on the value of technology partnerships between industry and government. As you know, many of these programs are threatened under the guise of "corporate welfare" rather than sound technology policy.

The FST Committee has reviewed the draft of a new IRI Position Statement on U. S. Economic and Technology Policy, which will go to the Board today for comment and approval. This statement is a message to the Presidential and Congressional candidates that action is required to forge stronger technical alliances and partnerships for economic competitiveness and innovation. We encourage your involvement with our FST agenda. What we are doing is more important than ever.

Research-on-Research Committee Report
Donald S. Mueller, Vice-Chair

This past year, the ROR Committee developed a Vision Statement, as well as a list of ongoing objectives, both of which complement the Mission Statement previously provided by the IRI Board to the ROR Committee. The two statements are provided as follows:

ROR VISION

- ROR will be the North American Leadership body for R&D improvement.
- IRI member companies at large will derive benefit from the knowledge, experiences, and understanding of ROR members.
- ROR members are capable and willing to actively support the ROR mission.

ROR OBJECTIVES

- ROR member companies will lead in continuously improving their R&D processes.
- ROR member companies will seek, audit, and embrace best-of-class processes determined to be relevant by the membership.
- ROR member companies will use best methodology to proactively determine what future best-of-class processes may improve R&D organizations, and actively experiment with member companies to determine the effectiveness and efficiency of new ideas.
- ROR members will ensure our knowledge is disseminated to IRI members.

These statements further support the concept of the ROR Committee serving as the Research and Development Division of the IRI.

The committee was involved with fourteen different projects during the past year, three of which have been recently completed and nine of which were initiated during the course of the year. The listing of each of these projects and their relative progress are provided on the attached graph in a stage-gate system format. As can readily be seen, the completed projects include the ROR Notebook, Measuring Effectiveness Subcommittee, and Environmental Initiatives Subcommittee. The Notebook provides summarized information to new members regarding ROR history, membership, and project selection. The Measuring Effectiveness Subcommittee and Environmental Initiatives Subcommittee will both have their work published in RESEARCH•TECHNOLOGY MANAGEMENT. Additionally, the Measuring Effectiveness Subcommittee developed the Technology Value Pyramid (TVP) software package to facilitate the identification and use of over 50 metrics that can be selected by the user. A complimentary copy was given to Chuck Bishop as the presiding President of the IRI during the past year.

The goals for the upcoming year for the ROR Committee are as follows:

- Support and promote sales and use of the TVP software package.
- Build upon R&D Data Base project - transition to ongoing program.
- Establish timelines for all ongoing projects and monitor progress.
- Develop as many of nine recently-initiated projects to full project status as feasible. Terminate others.
- Initiate project on Technology Management for the year 2000 and beyond.

University Relations Committee Report

J. Peter Bingham, Chair

The mission of the University Relations Committee is to foster interactions between member companies and the academic community. Founded in 1964 as the Education Liaison Committee, the name was changed to Education Committee and later to the current title, which was designed to reflect a major thrust for IRI: to be a conduit between industrial research and universities, as well as to keep abreast of changes in educational policies and climates which might affect industrial R&D. Another purpose of the committee is to initiate, consider, and recommend, to the Board of Directors, actions designed to improve communications between educational and industrial representatives.

Our Visiting Industrial Scientist/Engineer Program exposes students and faculty at small colleges and universities in the U.S. and Canada to the challenges and culture of the industrial R&D environment. The mechanism to achieve this is a campus visit by a practicing researcher from an IRI member company. During the past year, 117 schools requested visitors, a significant decrease from recent years. Only 44 companies indicated an interest in participating, compared with 52 during the previous period. It should be noted that several large member companies choose not to participate because they support their own in-house university relations programs. Participating colleges continue to express a high degree of satisfaction; hence the committee, at its fall '95 meeting, decided to continue the program in spite of the drop in participants.

A pamphlet, titled "Enhancing Industry-University Cooperative Agreements," prepared by Dr. Harry Morrison (former member of AAC and Dean, School of Science, Purdue University) with the help of committee members, was issued by IRI in 1995. The document outlines major drivers for effective interactions between industry and academia, and the special perspective brought to agreements between the two communities by the respective partners.

A workshop on "Industry-University Research Collaborations" was held at Duke University on November 28-30, 1995. The workshop was organized by a subcommittee chaired by Jean Bonney, with the participation of the GUIRR (Government-University-Industry Research Roundtable) and the COC (Council on Competitiveness). The 90 participants addressed issues critical to the industrial research and academic communities, and to the national research agenda. Efforts are currently under way to issue a document reflecting the deliberations at the Workshop.

Future activities include continuation of the Visiting Industrial Scientist/Engineer Program, and development of new approaches to increase member participation. We will also issue the document summarizing deliberations of the November 1995 Workshop and determine new directions for the committee and the AAC, to reflect current and expected changes in industrial research organizations and in research universities.

Finance Directors' Network Report
Stanley V. Jaskolski, Board Liaison

The Finance Directors' Network (FDN) seeks to contribute to the effectiveness of technological innovation by sharing experiences, seeking best practices, evaluating new trends and techniques, and assisting with financial aspects of IRI initiatives. Phil Howe (Air Products) served as chair during 1995-96.

Twenty-eight members attended the Fall Meeting of the FDN in Boston. There were several good discussions on what is happening in various financial areas. In particular, discussion focused on the use of systems to drive down finance costs and a presentation and workshop session focused on the implementation of SAP.

A record 38 members attended the Spring Meeting in Naples, Florida, with new member participation playing a large part in establishing that record. The opening around-the-room introductions were very informative and proved to be especially useful for new attendees. An additional day was added to the Spring Meeting in response to members' requests and was required to cover a wide range of topics.

John Schneider from United Technologies discussed full implementation of SAP at the research center in Connecticut and his experience with the software since implementation. George Morneau from Elf Atochem N.A. presented results from the third annual Facilities Cost Survey. Al Bean and Roger Whiteley from Lehigh University's Center for Innovation Management Studies led a discussion on the annual IRI/CIMS R&D survey. They also sought advice on certain aspects of the survey.

Special Interest Sessions

A. "Technology Value Program: New Users' Group"

Discussion Leader: Trueman D. Parish, Director, Special Projects, Eastman Chemical Company

After a short introduction on the purpose of the program, a live demonstration in local (not connected to the Internet) mode was given. Using example cases provided by Alan Fوسفeld, President, Fوسفeld Associates, the group was led through the logic of the program and shown a large number of the highly rated metrics. Following the demonstration, a general discussion of user needs brought out the following points:

- The need to develop a process for making and issuing revisions to the program.
- Users desire the ability to download revised versions of the program to their computers in a way which would allow them to be run without linking to the Internet at run time.
- The need to develop a standard definition of a "new product" in order to benchmark such metrics as New Products as a Percent of Sales. It was suggested that a future Special Interest Session be devoted to this topic.
- The need for additional metrics for the "fuzzy front end." These might include: number of ideas or customer needs.
- As part of the proposed bulletin board, users should be asked what metrics they are using and what literature references they have found useful for these metrics.

The Subcommittee on Metrics for Improving the Technological Innovation Process will meet at IRI headquarters in Washington, DC on July 24 and 25, 1996.

B. "R&D Issues for Smaller Companies and Business Units"

Discussion Leaders: David W. Abbott, Director, Process Development & Engineering, Grain Processing Corporation
Eugene L. Jarrett, Vice President, Research & Development, OSi Specialties/Witco Corporation

A special interest session on Small-Unit R&D issues was attended by 11 representatives interested in the subject. Nearly all the attendees had once worked for relatively large, integrated R&D organizations and most are now associated with smaller R&D units, either small companies or non-integrated R&D units within larger companies.

The session reviewed the several activities undertaken during 1994-96 which have been oriented toward small-unit R&D issues and the actions proposed at the Naples Research-on-Research meeting. After extensive discussion, the group decided to proceed with establishing an ongoing forum for small-unit issues within IRI -- formation of an IRI Network will be explored. This ongoing organization can conduct projects useful to small R&D units and can represent the positive values of smaller-units to the IRI as a whole.

C. "Management of Discontinuous Innovation"

Discussion Leaders: Miles P. Drake, Director, Corporate Science Center, Air Products & Chemicals, Inc.
Alfred C. Schmidt, Jr., Executive Director, Pitney Bowes, Inc.
Robert S. Wood, Manager, Research Planning, Rohm and Haas Company Research Labs.

Panelist: Joseph G. Morone, Dean, Lally School of Management, Anderson Consulting
Professor of Management, Rensselaer Polytechnic Institute

The Discontinuous Innovation project (95-2) of the ROR Committee sponsored this Special Interest Session which was attended by about 60 people. The topic matter of this session dovetailed well with the plenary sessions of this IRI meeting which focused on the need to go beyond optimization of products and processes to major innovations.

Al Schmidt reviewed the project outline and goals. He described how we are collaborating with RPI Lally School of Management to uncover good practices for the development of "game changing" innovations based on technological advances. At the Florida ROR meeting, we framed the process for Discontinuous Innovation in terms of a high-level stage model - opportunity identification, opportunity selection, development, and commercialization. A survey to capture critical factors in management, culture, process and people for each phase of development is being developed by the subcommittee. The majority of the session was spent in lively discussion as Joe Morone presented the RPI findings which focused on a set of high-level themes such as the vital role of corporate development organizations. Through participation of academic members at this meeting, we recorded the need to consider the university connection at the front end of the innovation process. We obtained commitment for a wide base of company representatives to participate in the survey.

D. "Information Tools for R&D Effectiveness"

Discussion Leaders: Ralph W. Jenko, Manager, Technology Information Systems, Kennametal, Inc.
Jean G. Mayhew, Director, Information Services, United Technologies Research Center

The Information Services Directors Network (ISDN) hosted a poster session that focused on the development of an intranet at Babcock & Wilcox, lessons learned in deploying a project management system at Kennametal, and implementation of the SAP/R3 client/server business system at United Technologies Research Center. Approximately 20 people participated in a lively discussion on the changing role of the Information Services organization. The value of the ISDN as a forum for benchmarking and idea sharing was re-affirmed by the participants.

E. "Third Generation R&D Users' Group"

Discussion Leaders: William L. Miller, Director, Research & Development, Steelcase, Inc.
Stephen E. Rudolph, Vice President & Managing Director, Arthur D. Little, Inc.

After introductory remarks from the two discussion leaders there were formal presentations from three other people. The first was by Eric Scriven (Reilly Industries) who represented the ROR Portfolio Management Subcommittee. Eric conducted a brief benchmarking survey on five levels of portfolio management processes. Next, Derek Ransley (Chevron) presented an alignment to partnership assessment process and matrix that enabled a gap analysis for organizations wishing to implement 3rd Generation R&D. Finally Langdon Morris, a guest and consultant, presented a case study and a hypothesis that real innovation requires significant organizational innovation and change. There were other user presentations on technology management practices used in their respective companies, including one by Cathy Ellis of Philip Morris. The issues discussed included the following:

- A process and framework for technology planning.
- Assessment methods and tools for classifying technology planning.
- Change management.
- Specific places or war rooms that facilitate technology management.
- Reclassification of the IRI/CIMS budget pie chart from basic/applied research, product development process development and technical services into a newer set of categories more closely aligned with 3rd Generation R&D.

At the end of the session Eric provided feedback to the participants on the survey and how they compared with previous groups. Steve polled the group regarding another future SIS on this topic and received a yes vote. In summary, this SIS had more formal user presentations and the hottest topic was the discussion of necessary organizational change to achieve more effective technology planning.

APPLICATION AND REGISTRATION

Participation is limited to 30 Rep/Alts or close associates in R&D who have strategic leadership responsibility in their organizations. Only one person per company will be accommodated unless the Tutorial has not reached capacity by September 20, at which time additional persons from a prior registrant's company will be confirmed. The registration fee is \$995 per person, which covers tuition, notebooks, reference and workshop materials, and group meals. A room will be reserved, in your name, at the J W Marriott Hotel for the nights of Friday, October 18, and Saturday, October 19, unless you indicate otherwise. If a companion will be with you for the receptions and group meals, please check the appropriate space on the application form and add the additional amount (\$99) to the registration fee. Cancellation within two (2) weeks of the start of the Tutorial will result in a \$200 cancellation fee. There is no refund for withdrawal after a session has begun. There is a full refund for cancellation prior to October 4. Fax (202-776-0756 or 202-785-7376) us a copy of the completed application form or call Missy Speights (202-776-0760) to reserve a space. Please send the application and payment to:

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- Bob Burkart, Director
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NAME (Dr.) (Mr.) (Ms.) _____

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PHONE _____ FAX _____

EMAIL _____

BADGE NAME _____ COMPANION BADGE NAME _____

_____ Registration fee \$995 _____ Companion fee \$99

☐ Check Enclosed ☐ Sending Payment ☐ Invoice Me ☐ Mastercard ☐ VISA ☐ AMEX

Credit Card # _____ Expiration Date _____

Signature _____

_____ Please make my hotel room reservation for the nights of October 18 and 19 only.

Circle one: \$172 for a single occupancy room; \$187 for a double occupancy room. (Either rate is plus tax.)

Extend my hotel stay to include the following nights: _____

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_____ Check if you require special accommodations and attach a written description of needs.



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October 18 - 20, 1996

Immediately preceding IRI's Fall Meeting, October 20-23
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Managing Industrial Research for Business Success

Friday, October 18

6:00 p.m. **RECEPTION AND DINNER** Following dinner, the Tutorial leaders will present an overview of the program and the participants will introduce themselves and their own expectations for the Tutorial. (Note: methodology includes ample presentations, discussions, and focused breakouts.)

Saturday, October 19

7:00 a.m. **CONTINENTAL BREAKFAST**

7:30 **INTRODUCTION**

I - The Business Roles of Industrial R&D

The Tutorial begins with a review of the expectations of industrial research that are held by business leaders. This discussion sets a business context for the Tutorial and provides a framework for the topics that follow. New product innovation is described as the engine that drives revenue growth in the enterprise. The ability of R&D to add value in the form of new and useful technologies in a timely fashion is seen as essential to long-term business success. The cost of time is demonstrated and the need for urgency in R&D is established. Productivity in industrial research can be thought of as the product of **Doing the Right Things** times **Doing Things Right**. This product relationship implies that a research operation must be good at both--failing to do either one will effectively nullify its contribution. The first session of the Tutorial is invested in examining the first set of elements of this critical productivity equation.

II - Doing the Right Things

Selecting Technology Investments - The industrial research operation is described as a portfolio of investments in project activities that hopefully have future value to the business enterprise. Placing those investments in the best possible way is a key concern of research managers. The processes of opportunity scanning and product definition are discussed with emphasis on R&D roles and industry best practices. A clear understanding within R&D of business division perspectives on market forces and customer needs is shown to be critical to good R&D investment decisions.

Linking R&D Activities to Business Division Needs - Effective communication and relationships between R&D and the business operations are essential. This section outlines key objectives for both formal and informal links and describes best practices drawn from experience. The impact of research funding alternatives on working relationships with business operations are outlined.

Contributing to Business Strategies - Industrial R&D can make a critical contribution to business success by guiding the enterprise into the most fruitful long-term business directions from a technology perspective. Techniques and organizational structures for doing this are discussed in this segment.

Group Discussion - Participants will translate and apply the presented concepts to their own companies and consider responses to the following questions. Who are the customers of their work? What do these customers expect? What are the unique benefits that participants can provide the internal customers in their corporations? How can they achieve an imaginative understanding to the needs of their internal customers? How do they determine which new technology investments will create the greatest business success?

Noon **NETWORKING LUNCH**

1:30 p.m. **III - Doing Things Right**

Improving the Quality of R&D Processes - Industrial R&D research is described here as a process of adding value to information in ways that are worthwhile to an end-user. The idea of process maturity is introduced and strategies for improving the information processes common to research activities are outlined. The transfer of information on new technology to users in the business operations is explored and useful methods and alternatives are described.

The Cost of Time - Business success is dramatically affected by how quickly new technology can be brought to market. The relationship between time-to-market and financial return is explored and common causes of project delay are discussed. Project delays in R&D are often associated with unanticipated or poorly managed risks. A unique view of R&D risk is presented and best practices in risk management are discussed.

Measuring R&D Effectiveness - Once a conceptual framework for the ideal industrial research operation is understood, methods for evaluating your own current performance are needed. This section explains proven methods for designing and applying metrics in process improvement efforts. A capability maturity model applicable to research operations is discussed and effective benchmarking practices are described.

Group Discussion - Participants will relate these concepts to their own work and discuss their responses to the following questions. What are the critical deliverables that their organizations provide to users? What are the important parameters that determine the quality of their output? What does a one-month delay in new product delivery cost their business enterprise? What obstacles prevent timely delivery of a quality output? What could and should they do to improve the contribution of their organization to competitive business performance?

IV - Case Study: Improvement Efforts in an Industrial Research Operation

Chip Holt, Vice President and General Manager of the Xerox Wilson Center for Research & Technology, will describe efforts that define, measure and improve key work processes at Xerox. He will also discuss key success parameters that provide for the assessment of current levels of performance. Chip will offer insights into the framework that has been instrumental in establishing the vision of excellence at the Wilson Center and in setting the strategic direction for improvement activities.

6:00 p.m. **RECEPTION** followed by dinner on your own or in small groups

Sunday, October 20

7:00 a.m. **CONTINENTAL BREAKFAST**

7:30 **V - Improving the R&D Organization**

Managing Change - Techniques for establishing successful process improvement efforts, proven effective at Hewlett-Packard Company and in other industrial settings, are presented next. Obstacles that impede acceptance of new practices are described and principles of change management are offered that can overcome these barriers. The critical roles played by top level managers in launching and sustaining improvement efforts are underscored with anecdotes drawn from experience.

Organizing R&D for Success - In *Leadership and the New Science*, Margaret Wheatly points out that chaos theory describes the behavior of organizations better than do the old laws of deterministic physics. How then can an R&D operation be successfully organized to achieve needed outcomes? This session describes the elements of an effective organizational vision for R&D: customer focus, purpose and mission, core competencies, and supportive organizational structure. Once in place and infused throughout the operation, this vision serves as the so-called "strange attractor" that both keeps your research operation focused on delivering business value and motivates each individual to contribute their best efforts.

VI - Bringing It On Home

Participants will separate into teams and highlight the three or four top ideas from this two-day tutorial that might create the greatest impact on real-life issues "back home" in the lab. Break-out teams will report their conclusions to the group for discussion. Results of both the group discussions and the efforts of each break-out team will be compiled and distributed to participants during the following two weeks.

11:30 a.m. **CONCLUSIONS AND SUMMARY** (Adjournment at Noon)

TUTORIAL PRESENTERS

Marvin L. Patterson (Tutorial Co-Leader) is an internationally recognized expert in new product development processes. He is author of the highly regarded book, **Accelerating Innovation: Improving the Process of Product Development** (Van Nostrand Reinhold, New York, 1993), as well as many technical papers. Marv left the position of Director of R&D Operations at Hewlett-Packard to create Innovation Resultants International, a firm dedicated to helping client companies achieve greater business success through more effective new product development processes.

John A. Fenoglio (Tutorial Co-Leader), is a recognized expert in new product development processes. Before joining Innovation Resultant International, John was a principal contributor to Hewlett-Packard's product development process improvement effort, specializing in the areas of R&D management practices and metrics.

In addition to their process improvement work, both Marv and John have years of experience in commercializing new technology to satisfy customer needs.

Charles P. (Chip) Holt (Guest Speaker) is Corporate Vice President of the Joseph C. Wilson Center for Research & Technology for Xerox Corporation. In this position, he is responsible for capturing the value of leading-edge research and technology pertinent to Xerox's document output terminal businesses. Chip has been a Corporate Officer since May, 1990. He has held a number of management positions, including Vice President and Chief Engineer of Future Product Programs (responsible for the development and launch of the successful DocuTech product line) and Vice President of Advanced Technology and Competence Development.

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1:30 p.m. **III - Doing Things Right**

Improving the Quality of R&D Processes - Industrial R&D research is described here as a process of adding value to information in ways that are worthwhile to an end-user. The idea of process maturity is introduced and strategies for improving the information processes common to research activities are outlined. The transfer of information on new technology to users in the business operations is explored and useful methods and alternatives are described.

The Cost of Time - Business success is dramatically affected by how quickly new technology can be brought to market. The relationship between time-to-market and financial return is explored and common causes of project delay are discussed. Project delays in R&D are often associated with unanticipated or poorly managed risks. A unique view of R&D risk is presented and best practices in risk management are discussed.

Measuring R&D Effectiveness - Once a conceptual framework for the ideal industrial research operation is understood, methods for evaluating your own current performance are needed. This section explains proven methods for designing and applying metrics in process improvement efforts. A capability maturity model applicable to research operations is discussed and effective benchmarking practices are described.

Group Discussion - Participants will relate these concepts to their own work and discuss their responses to the following questions. What are the critical deliverables that their organizations provide to users? What are the important parameters that determine the quality of their output? What does a one-month delay in new product delivery cost their business enterprise? What obstacles prevent timely delivery of a quality output? What could and should they do to improve the contribution of their organization to competitive business performance?

IV - Case Study: Improvement Efforts in an Industrial Research Operation

Chip Holt, Vice President and General Manager of the Xerox Wilson Center for Research & Technology, will describe efforts that define, measure and improve key work processes at Xerox. He will also discuss key success parameters that provide for the assessment of current levels of performance. Chip will offer insights into the framework that has been instrumental in establishing the vision of excellence at the Wilson Center and in setting the strategic direction for improvement activities.

6:00 p.m. **RECEPTION** followed by dinner on your own or in small groups

Sunday, October 20

7:00 a.m. **CONTINENTAL BREAKFAST**

7:30 **V - Improving the R&D Organization**

Managing Change - Techniques for establishing successful process improvement efforts, proven effective at Hewlett-Packard Company and in other industrial settings, are presented next. Obstacles that impede acceptance of new practices are described and principles of change management are offered that can overcome these barriers. The critical roles played by top level managers in launching and sustaining improvement efforts are underscored with anecdotes drawn from experience.

Organizing R&D for Success - In *Leadership and the New Science*, Margaret Wheatly points out that chaos theory describes the behavior of organizations better than do the old laws of deterministic physics. How then can an R&D operation be successfully organized to achieve needed outcomes? This session describes the elements of an effective organizational vision for R&D: customer focus, purpose and mission, core competencies, and supportive organizational structure. Once in place and infused throughout the operation, this vision serves as the so-called "strange attractor" that both keeps your research operation focused on delivering business value and motivates each individual to contribute their best efforts.

VI - Bringing It On Home

Participants will separate into teams and highlight the three or four top ideas from this two-day tutorial that might create the greatest impact on real-life issues "back home" in the lab. Break-out teams will report their conclusions to the group for discussion. Results of both the group discussions and the efforts of each break-out team will be compiled and distributed to participants during the following two weeks.

11:30 a.m. **CONCLUSIONS AND SUMMARY** (Adjournment at Noon)

TUTORIAL PRESENTERS

Marvin L. Patterson (Tutorial Co-Leader) is an internationally recognized expert in new product development processes. He is author of the highly regarded book, **Accelerating Innovation: Improving the Process of Product Development** (Van Nostrand Reinhold, New York, 1993), as well as many technical papers. Marv left the position of Director of R&D Operations at Hewlett-Packard to create Innovation Resultants International, a firm dedicated to helping client companies achieve greater business success through more effective new product development processes.

John A. Fenoglio (Tutorial Co-Leader), is a recognized expert in new product development processes. Before joining Innovation Resultant International, John was a principal contributor to Hewlett-Packard's product development process improvement effort, specializing in the areas of R&D management practices and metrics.

In addition to their process improvement work, both Marv and John have years of experience in commercializing new technology to satisfy customer needs.

Charles P. (Chip) Holt (Guest Speaker) is Corporate Vice President of the Joseph C. Wilson Center for Research & Technology for Xerox Corporation. In this position, he is responsible for capturing the value of leading-edge research and technology pertinent to Xerox's document output terminal businesses. Chip has been a Corporate Officer since May, 1990. He has held a number of management positions, including Vice President and Chief Engineer of Future Product Programs (responsible for the development and launch of the successful DocuTech product line) and Vice President of Advanced Technology and Competence Development.

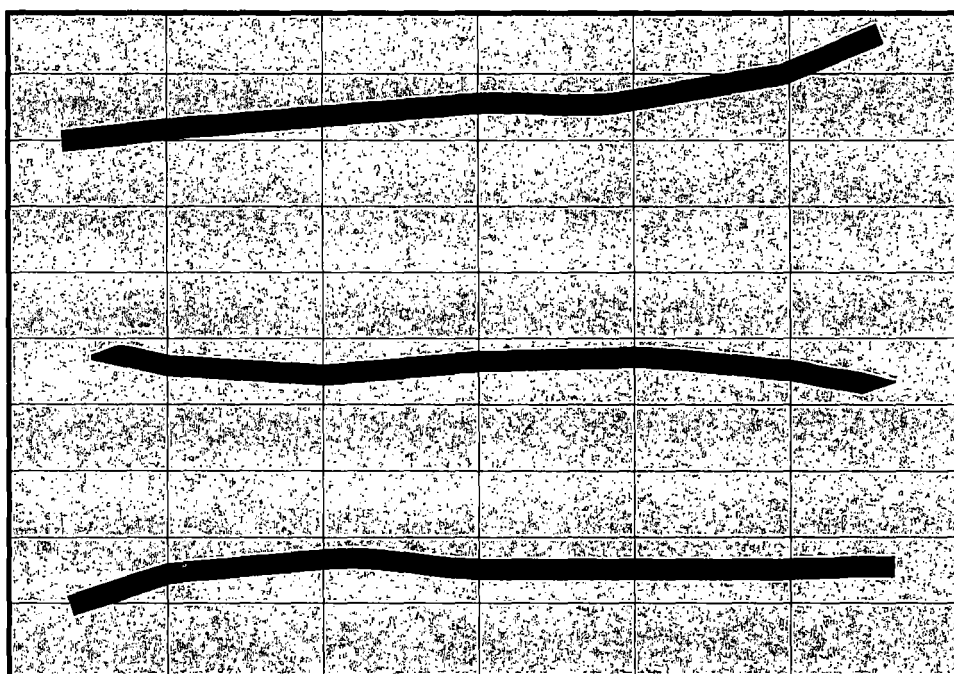
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JULY 1996



Industrial Research and Development *Facts*



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1995





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August 9, 1995

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EXECUTIVE DIRECTOR

To: Jim Decker, DOE
Mary Good, DOC
Skip Johns, OSTP
Pete Lyons, LANL
Ann Petersen, NSF

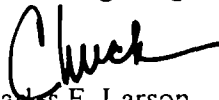
**Subject: AUGUST 23 IRI ROUNDTABLE ON GOVERNMENT
S&T POLICIES**

It would be appreciated if each of you would be prepared to talk for a few minutes at the beginning of the roundtable about the R&D funding cuts in your respective areas of oversight. We are also asking the members of our Academic Advisory Council who will be present to follow with comments on cuts in academic research.

We will then open discussion on the overall impact of these cuts on industry's future competitiveness, with input from each of the industry representatives.

A summary of the discussion will be provided to all participants and sent to the IRI membership. Others will, of course, also be interested.

We look forward to seeing you here Wednesday morning, August 23, at 9:00 a.m.


Charles F. Larson
Executive Director

CFL:ps
Copies to J. C. Bonney and D. C. Knowlen



Industrial Research Institute, Inc.

June 23, 1995

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EXECUTIVE DIRECTOR

To Members: Academic Advisory Council (AAC)
External Research Directors' Network (ERDN)
Federal Government Liaison Council (FST)
University Relations Committee (URC)

Subject: **IRI ROUNDTABLE ON GOVERNMENT S&T POLICIES**

As a member of one of the IRI groups listed above, **you are cordially invited to participate in a special IRI "policy roundtable" on Wednesday, August 23, from 9:00 a.m. to 3:30 p.m. at IRI headquarters in Washington, DC.** The purpose of this meeting will be to review and discuss the **changes in federal funding of science and technology**, the impact of these changes on research in university and federal labs, and the **long-range implications for technological innovation in industry.**

This meeting will provide an opportunity for members of the Academic Advisory Council to interact with our FST Committee, its FGLC, and ERDN. It will also help to develop an "IRI opinion" on the changes taking place in federal funding of R&D, which should be of value to members of AAC as well as FGLC.

Discussion will be facilitated by Dave Knowlen, chair of FST Committee, and Jean Bonney, Board representative to URC. Following brief comments by members of FGLC or their representatives, and by AAC members, committee members should be prepared to say **a few words about the impact, if any, of the proposed changes on their long-term R&D strategies, including interaction with university researchers and federal labs.** Others from IRI are being invited, via our July IRI News, to attend as observers.

Please notify me whether or not you will plan to attend by filling in and returning the enclosed form by fax not later than July 21. An agenda and expected attendance list with background materials will be sent to those who will plan to attend. Thanks!

Charles F. Larson
Executive Director

CFL:pt
Enclosure

"To enhance the effectiveness of technological innovation in industry"



**Industrial
Research
Institute, Inc.**

Suite 1100, 1550 M Street, NW
Washington, DC 20005-1708



Date: 6/28/95

To: Chuck Larson

Fax: 202-776-0756

REPLY FORM

Return by July 21

IRI ROUNDTABLE ON GOVERNMENT S&T POLICIES

Thursday, August 23, 1995

IRI Headquarters

Washington, DC

- ☒ Yes, I plan to attend the Roundtable
- ☐ I am unable to attend the Roundtable
- ☐ I will be represented by _____

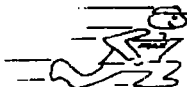
White House Office of
Affiliation Science and
Technology Policy

The Honorable Lionel S. ("Skip") Johns
Name



Industrial
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Suite 1100, 1550 M Street, NW
Washington, DC 20005-1708



Date: 6/28/95

To: Chuck Larson
Fax: 202-776-0756

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Return by July 21

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Thursday, August 23, 1995
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Washington, DC

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CHARLES F. LARSON
EXECUTIVE DIRECTOR

To Members: Academic Advisory Council (URC)
Federal Government Liaison Council (FST)

Subject: **IRI POSITION STATEMENTS 1988-1994**

Enclosed for your information is a copy of my June 9 memo on the above subject along with a copy of our booklet of position statements issued by IRI during 1988-1994. Extra copies of the booklet are available from headquarters at no charge.

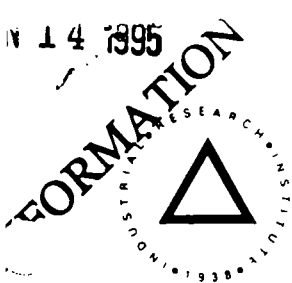
Also enclosed is the new IRI "Strategic Planning Process for 1996-2000."

Best regards.

Charles F. Larson
Executive Director

CFL:pt
Enclosures

Copies to G. R. Mitchell (DOC), J. P. Bingham, and D. C. Knowlen



Industrial Research Institute, Inc.

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June 9, 1995

TO: Member Company Representatives and Alternates

Subject: IRI POSITION STATEMENTS 1988-1994

As many of you are aware, IRI began speaking out on significant issues related to science and technology in 1978. These "opinions of industrial R&D leaders" were based largely on surveys of the IRI membership and were issued in the form of position statements.

The 1993 IRI Mission Development Survey revealed that some Reps/Alts, particularly those that were new in IRI, were unaware of IRI position statements. The enclosed booklet is intended, therefore, to make everyone in IRI familiar with our most recent position statements. Extra copies are available at no cost for circulation within your company or elsewhere.

Charles F. Larson
Executive Director

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Enclosure

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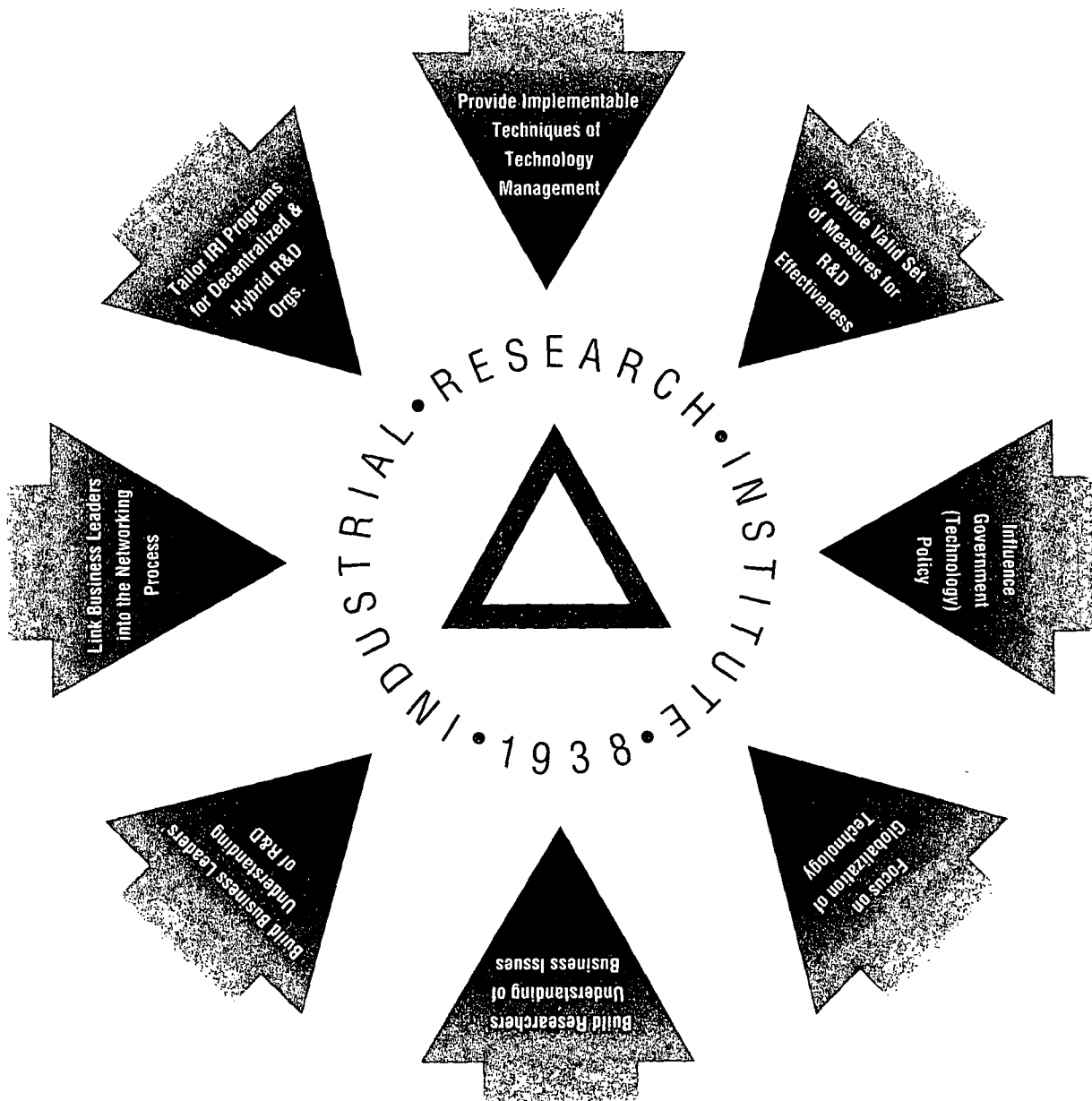
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IRI

Strategic Planning Process for 1996-2000





July 25, 1995

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**To: Participants in August 23 Roundtable on
Government S&T Policies**

(See attached list)

Subject: BACKGROUND READING MATERIALS

We look forward to seeing you here at 9:00 a.m. on Wednesday, August 23 for the roundtable meeting. Continental breakfast will be available at 8:30 a.m.

Enclosed are several articles and other information that will be pertinent to the discussion, including some questions that could be addressed. You may have others--bring them with you, please.

Please notify me if your plans to attend should change.

Charles F. Larson
Executive Director

CFL:pt
Enclosures



IRI Roundtable on Government S&T Policies
Wednesday, August 23, 1995

Expected Attendance

Aulisio, Lorraine	Center for Applied Engineering
Bingham, Pete	Philips Labs
Blair, John	Emeritus
Bonney, Jean (co-chair)	Digital Equipment Corporation
Burkart, Bob	IRI
Coburn, Chris	Battelle
Daniels, Alex	Philips Labs
Decker, James	Dept. of Energy
Good, Mary	Department of Commerce
Grucza, Margaret	IRI
Jackson, Auzzie	Emeriti
Janes, Don	3M
Johns, Skip	OSTP
Kammer, Ray	NIST
Knowlen, Dave (co-chair)	Boeing
Larson, Chuck	IRI
Levy, Bob	Energy Biosystems
Lieberman, Mel	Duke University
Longerbeam, Gordon	Lawrence Livermore Lab
Lynch, Janet	General Electric
Lyon, Frank	Rockwell International
Lyons, Peter	Los Alamos National Laboratory
Marya, Viverk	Digital Equipment Center
Mitchell, Graham	Department of Commerce
Quan, Fred	Corning
Reagan, Bill	Emeritus
Rice, John	Purdue University
Rood, Sally	National Technology Transfer Center
Saft, Mike	W. R. Grace
Starbuck, Beth	University of Minnesota
Stratton, Bob	Emeritus
Vermont, George	OSTP
Wiers, Brandon	Procter & Gamble
Wise, Jack	Mobil
Witterholt, E.J.	B.P. Exploration
Wolff, Mike	RTM
Yost, Jack	Penn State University
Zanner, Mary Ann	Sandia National Laboratories



DRAFT

AUGUST ROUNDTABLE QUESTIONS

- Is industry going to significantly increase its support of academic research if government cuts back? (Increases have been ~12% for the past 7-8 years; to fill the planned cuts in federal support of academic research, industry funding--now some \$1.7B for 1995-- would need to increase at rates of 50% or more each year for several years).
- Will industry continue its support of cooperative research programs through alliances such as those under ATP and TRP?
- Is DOD's dual-use approach to meeting the future defense needs of the U.S. realistic? (i.e., can our major defense contractors transform their business base to the commercial sector and still maintain our important edge in defense science & technology?)
- Would a reduced output of graduates and information from our research universities seriously impair industry's ability to stimulate technological innovation and compete in the global market after 2000?

CFL:pt
6/27/95
AugRT



2744 Sand Hill Road
Menlo Park, CA 94025-7020
Telephone: 415-854-6322
Fax: 415-854-7850

FOR IMMEDIATE RELEASE

CONTACT:

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Linn A. Weiss - 201/822-7400
Schering-Plough Corporation

Wayne Pines - 202/778-6334
APCO Associates Inc.

Frank Walton, Ph.D. - 212/593-6496
Ruder-Finn

NATION'S R&D LEADERSHIP IN JEOPARDY

**U.S. MUST INCREASE PRIVATE R&D FOR COMPETITIVENESS
AND STANDARD OF LIVING, REPORT WARNS
BASIC RESEARCH BY GOVERNMENT MUST BE MAINTAINED**

WASHINGTON, D.C., July 24, 1995—If the United States is to retain its standard of living and global competitiveness, government must continue funding basic research and create an environment in which the private sector can increase its investment in research and development (R&D), warns a study released today in Washington by the Institute for the Future, a California-based think tank.

"This groundbreaking study should jolt us as a nation out of our current state of complacency concerning the value of R&D," said William Pietersen, chairman of the Institute for the Future (ITF). "If our decreasing trend in overall R&D investment is not reversed quickly, our nation's scientific global leadership and economic standard of living will be seriously threatened—something that will affect every American."

The report, "The Future of America's Research-Intensive Industries," was prepared by ITF working with a task-force panel of senior executives from many of America's leading

research-intensive industries. In the course of its research, IFTF received policy input from both the public and private sectors, including leading think tanks, universities, trade associations, and government agencies. The study examines the ability of the nation's "top eight" U.S. research-based industries to continue their innovation track record—identifying both their future incentives and disincentives. "The study, ominously, concludes that America's entire R&D community is at increasing risk," said Pietersen. "Research is being undervalued at a time when it is needed most. If the cycle of innovation stalls, the United States will face new risks."

According to the report, which is the first comparative study of its kind and scope to analyze R&D investment trends in the "top eight" research-intensive industrial sectors, the engine that drives the U.S. economy—and makes people's lives longer, easier, and more productive—is sputtering. Over the last several decades, American R&D has fallen from 3% to 2.8% to 2.6% of Gross Domestic Product (GDP). "It is imperative that we at least match the level of our trading rivals Japan and Germany at 3%," observed J. Ian Morrison, Ph.D., president of IFTF.

"Historically," noted Morrison, "we have done much better. After World War II, the United States made massive investments in higher education, university research and corporate R&D, which made American science-based technology the decisive worldwide leader. For example, from 1953 through 1968, real-dollar expenditures on R&D grew at more than 8% per year, three times faster than GDP. But since 1968, R&D spending has been growing at a rate slightly lower than GDP. With tomorrow's jobs and living standard at stake, we cannot afford the recent slackening of our competitive pace."

The "top eight" research-intensive industries examined in the report—aerospace, chemicals, communications equipment, computers and office equipment, pharmaceuticals and biotechnology, scientific instruments, software, and semiconductors and electronic components—together pay for 70% of all industrial R&D conducted in America. Yet, their combined sales account for only 33% of total manufacturing sales. As a group, these industries are vital to this country's global competitiveness, jobs, balance of trade, and standard of living. Alarmingly, the R&D spending rates of four of the eight industries—aerospace, chemicals, scientific instruments, and semiconductors and electronic components—have fallen over the past five years. Within the last year, six of the 10 largest U.S. R&D-based firms cut real spending in R&D.

The report notes that both public- and private-sector policy must encourage research. Accomplishing this does not require massive changes in roles or public spending levels, but rather shifts in incentives that will stimulate changes in spending priorities and organizational adjustments. The report states that overall federal investment must continue at a rate of 1% of GDP, with greater emphasis on basic research that is smartly focused. Federal policies must actively encourage private R&D investment to increase to 2% of GDP, from the current rate of 1.6%. If this goal is met, total U.S. R&D investment will at least reach a parity of 3% with our leading global competitors.

The study sets forth an agenda of specific action steps necessary to increase incentives for R&D investment, including encouraging increases in long-term private R&D expenditures; maintaining federal support for basic research; reducing government-generated risk associated with innovation; protecting intellectual property; and supporting cooperative R&D efforts. The report advocates making the R&D tax credit substantial and permanent; lowering capital gains taxes; encouraging institutional investor participation; enacting tort reform; reexamining antitrust laws in light of emerging global markets; setting regulatory targets; and using market forces for regulation whenever possible.

"The basic assumptions upon which our nation has based its R&D decisions for the past 50 years are in a state of rapid transition," noted Gregory Schmid, Ph.D., one of the report's authors and director of strategic planning services at IFTF. "If America does not attain its R&D investment goals in the short term, the consequence may be irrevocable and society may rue that decision for years to come.

"Our research-intensive industries are under increasing threat as the public policy framework of R&D support built up during the Cold War unravels and as a competitive global economy forces our nation's largest industries to evolve their operations into new organizational and operational units," Schmid continued. "Therefore, an urgent task should be to make sure that the path of innovation remains open, unobstructed, and attractive."

"The Future of America's Research-Intensive Industries" is a non-partisan, peer-reviewed study sponsored by 23 research-based companies and is fully the responsibility of the Institute for the Future.

The Institute for the Future is a non-profit research and consulting group headquartered in Menlo Park, Calif., that specializes in long-term planning and forecasting for a variety of public- and private-sector organizations.

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Statement of the AAAS Board of Directors

June 24, 1995

At its June 23-24, 1995 meeting, the Board of Directors of the American Association for the Advancement of Science discussed the current policy climate for federal support of research and education and the potential impacts of proposed reductions on the economy, health, and the environment. The Board recognizes the seriousness of the federal budget situation and supports efforts to reduce the deficit and balance the budget. The Board is gratified to see that, despite the severe constraints imposed by deficit reduction efforts, federal funding for basic research continues to enjoy strong bipartisan support in Congress and the Administration. It is particularly pleased by the acknowledgment by congressional leaders of the key role played by science and technology in improving the nation's economy and quality of life. Nevertheless, the Board expressed strong concern over the future implications of budgetary trends contained in current legislation. AAAS analyses suggest, for example, that under the version of the Budget Resolution passed by the House, expenditures for nondefense R&D in constant (inflation-adjusted) dollars would drop an estimated 34 percent from fiscal year 1995 to 2002. Even the relatively

protected National Science Foundation budget for R&D would lose more than 20 percent during this period. The Board urges Congress to exercise great caution in making changes of this magnitude and consequence for the nation's vital research enterprise. It further encourages the research community to make known its concerns, and to do so with an appreciation of the fundamental unity of the research and education enterprise and an understanding of the importance of congressional concerns about the federal budget.

Projected Effects of House Budget Resolution on
Nondefense R&D

Agency/Program	KEY	(all figures in millions of dollars)								R&D*** FY 2002 constant \$	constant \$ difference 1995-2002
		R&D** FY 1995 estimated	R&D FY 1996 est.	R&D FY 1997 est.	R&D FY 1998 est.	R&D FY 1999 est.	R&D FY 2000 est.	R&D FY 2001 est.	R&D FY 2002 est.		
NIH	1	10,840	10,299	10,299	10,299	10,299	10,299	10,299	10,299	8,293	-23.5%
Agency Health Care Polc.	2	277	0	0	0	0	0	0	0	0	-100.0%
Other HHS R&D	3	610	610	610	610	610	610	610	610	491	-19.5%
Total HHS R&D		11,727	10,908	10,908	10,908	10,908	10,908	10,908	10,908	8,784	-25.1%
NASA Human Space Flt	1	1,902	1,883	1,805	1,675	1,607	1,483	1,483	1,483	1,194	-37.2%
NASA SAT Space R&D	1	5,072	4,476	4,348	4,209	3,980	3,948	3,948	3,948	3,179	-37.3%
NASA Mission Support	1	1,619	1,711	1,668	1,639	1,609	1,580	1,580	1,580	1,272	-21.4%
NASA SAT Aeronautics	1	882	677	649	631	613	594	594	594	478	-45.8%
NASA Wind Tunnels	2	400	0	0	0	0	0	0	0	0	-100.0%
Total NASA R&D		9,875	8,747	8,470	8,154	7,810	7,605	7,605	7,605	6,124	-38.0%
General Science (Physics)	1	974	989	940	890	890	890	890	890	717	-26.3%
Energy Supply R&D	1	2,210	1,790	1,620	1,560	1,486	1,431	1,431	1,431	1,152	-47.8%
Fossil Energy R&D	1	350	119	107	95	87	79	79	79	64	-81.8%
Energy Conservation R&D	1	396	213	206	198	193	188	188	188	152	-61.7%
Clean Coal Technology	2	37	0	0	0	0	0	0	0	0	-100.0%
Uranium Enrichment	1	3	2	1	1	1	1	1	1	1	-61.7%
Total DOE nondef R&D		3,969	3,113	2,874	2,745	2,658	2,590	2,590	2,590	2,086	-47.4%
Research & Related Acts.	4	2,061	2,045	2,106	2,169	2,233	2,300	2,300	2,300	1,852	-10.1%
Academic Research Infra.	1	250	100	100	100	100	100	100	100	81	-67.8%
Major Res. Equipment	1	126	70	55	26	0	0	0	0	0	-100.0%
Education and Hum. Res.	1	107	106	106	106	106	106	106	106	85	-20.3%
Total NSF R&D		2,544	2,320	2,367	2,401	2,439	2,506	2,506	2,506	2,018	-20.7%
Agri Research Serv. R&D	1	709	640	640	640	640	640	640	640	515	-27.3%
ARS R&D facilities	1	44	29	27	24	22	20	20	20	16	-63.4%
Coop. State Res/ Extension R&D	1	419	345	345	345	345	345	345	345	278	-33.6%
Coop State Res/ Ext. R&D facil.	1	63	3	0	0	0	0	0	0	0	-100.0%
Economics Research Serv.	1	54	34	27	27	27	27	27	27	22	-59.7%

Natl Agric. Stats Service	1	4	3	3	3	3	3	3	3	2	-35.4%
Foreign Agricultural Serv	1	1	1	1	1	1	1	1	1	1	-29.1%
Forest Service	6	204	160	156	156	156	156	156	156	126	-38.4%
Other USDA R&D	3	44	44	44	44	44	44	44	44	35	-19.5%
Total USDA R&D		1,540	1,259	1,242	1,239	1,237	1,235	1,235	1,235	995	-35.4%
US Geological Survey	1	368	295	295	295	295	295	295	295	237	-35.6%
Nat'l Biological Service	1	167	99	96	94	92	90	90	90	72	-56.6%
Bureau of Mines	1	103	90	78	66	53	41	41	41	33	-67.7%
Nat'l Park Service	1	19	17	17	17	17	17	17	17	14	-27.5%
Other Interior R&D	3	30	30	30	30	30	30	30	30	24	-19.5%
Total Interior R&D		686	531	516	501	487	472	472	472	380	-44.6%
FHWA (Highway Admin)	7	277	130	130	130	130	130	130	130	105	-62.1%
Federal Transit Admin.	1	21	0	0	0	0	0	0	0	0	-100.0%
Maritime Admin.	1	3	0	0	0	0	0	0	0	0	-100.0%
Federal Railroad Admin.	8	28	8	8	8	8	8	8	8	6	-77.6%
Other Transportation R&D	3	360	360	360	360	360	360	360	360	290	-19.5%
Total DOT R&D		687	497	497	497	497	497	497	497	400	-41.7%
Total EPA R&D	9	619	554	554	554	554	554	554	554	446	-27.9%
NOAA R&D Facils.	1	38	12	12	12	12	12	12	12	10	-75.1%
NOAA Operations, Res & Facils R&D	1	531	472	465	458	443	429	429	429	346	-34.8%
Other NOAA R&D	2	19	0	0	0	0	0	0	0	0	-100.0%
NIST Sci & Technical Res Service	4	214	225	231	239	245	253	260	268	216	1.0%
NIST ATP	2	409	0	0	0	0	0	0	0	0	-100.0%
NIST Construction	4	63	65	67	69	72	74	76	78	62	-0.9%
Econ. Develop. Admin.	2	1	0	0	0	0	0	0	0	0	-100.0%
Other Commerce R&D	3	10	10	10	10	10	10	10	10	8	-19.5%
Total Commerce R&D		1,284	783	784	787	782	777	787	797	642	-50.0%
Total Education R&D	10	175	0	0	0	0	0	0	0	0	-100.0%
Total AID R&D	10	314	0	0	0	0	0	0	0	0	-100.0%
Total Veterans R&D	3	297	297	297	297	297	297	297	297	239	-19.5%

Total NRC R&D	3	82	82	82	82	82	82	82	82	66	-19.5%
Total Smithsonian R&D	3	135	135	135	135	135	135	135	135	109	-19.5%
Total TVA R&D	5	89	0	0	0	0	0	0	0	0	-100.0%
Total Corps R&D	3	55	55	55	55	55	55	55	55	44	-19.5%
Total Labor R&D	11	62	26	26	26	26	26	26	26	21	-66.0%
Total Other R&D	12	164	164	164	164	164	164	164	164	132	-19.5%
TOTAL NONDEFENSE R&D		34,303	29,472	28,972	28,547	28,132	27,906	27,916	27,926	22,487	-34.4%

KEY:

- 1 = Based on specific program reduction in resolution, assuming R&D as percent of appropriation remains constant
- 2 = Elimination of account
- 3 = Not specifically mentioned in resolution; assumes freeze at FY 1995 level
- 4 = Based on specific program INCREASE in resolution, assuming R&D as percent of appropriation remains constant
- 5 = Planned privatization; would no longer be federal R&D
- 6 = Reductions in Forest Resources and Management Research and Ecosystems Research
- 7 = Assumes \$150 million reduction each year from elimination of Intelligent Vehicle Development R&D
- 8 = Elimination of \$20 million in R&D for High-Speed Rail
- 9 = Elimination of \$85 million in R&D for ETI; all other R&D frozen at FY 1995 level
- 10 = Assumes elimination of agency and all its R&D programs
- 11 = Elimination of ETA R&D; all other R&D frozen at FY 1995 level
- 12 = HUD, Justice, and USPS R&D frozen at FY 1995 levels

Data from

House Budget Committee Policy Assumptions: Fiscal Year 1996 Budget Resolution
prepared by the House Budget Committee, May 10, 1995

	1995	1996	1997	1998	1999	2000	2001 est.	2002 est.	1995-2002
Deflators	1.30	1.34	1.38	1.42	1.46	1.51	1.56	1.61	1.24
deflators from OMB, <i>Budget of the United States Government</i> FY 1996 until FY 2000, then 3.5 percent inflation thereafter									

** - Source: AAAS Report XX: Research and Development FY 1996

*** - expressed in FY 1995 dollars. Adjusted for inflation according to GDP deflators

President Clinton's Economic Plan
to Balance the Budget by 2005

Projections of OUTLAYS	fiscal years											constant dollars		% change in constant dollars	
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2002	2005	'95-200	'95-2005
NONDEFENSE DISCRETIONARY															
President's '96 Budget	282	288	290	287	284	282	NA	NA	NA	NA	NA				
President's New Plan	280	285	287	286	284	281	286	293	297	303	308	236	224	-15.7%	-20.1%
House Budget Res.	282	271	260	252	247	244	249	243	NA	NA	NA	195		-30.7%	
Senate Budget Res.	278	268	254	250	248	250	248	248	NA	NA	NA	200		-28.2%	

DEFENSE DISCRETIONARY

President's '96 Budget	272	261	257	255	260	268	NA	NA	NA	NA	NA				
President's New Plan	272	262	258	255	260	268	276	281	282	283	283	226	206	-16.8%	-24.4%
House Budget Res.	272	266	266	266	272	280	280	280	NA	NA	NA	225		-17.0%	
Senate Budget Res.	270	262	257	255	261	268	268	270	NA	NA	NA	217		-19.5%	

NA = data not available

Specific S&T programs exempted from cuts in discretionary spending:
R&D Outlays for selected programs FY 1995 and FY 2002

(in millions of dollars)	constant dollars					
	Est.* FY 1995	House 2002	Pres. 2002	Pres. 2002	% change '95- Pres. 2002	
NIH R&D	10,840	10,299	13,233	10,656	-1.7%	
NSF R&RA/ EHR R&D	2,168	2,406	2,557	2,059	-5.0%	Research and Related Activities / Education and Human Resources
DOE Sci. Facilities Utiliz	100	NA	200	161	61.1%	Scientific Facilities Utilization Initiative
DOC ATP R&D**	409	0	706	568	38.9%	Advanced Technology Program
NASA basic research	1,850	NA	2,350	1,892	2.3%	
Defense:						
DOD TRP R&D**	443	0	457	368	-16.9%	Technology Reinvestment Project

* - from AAAS *Research and Development FY 1996*.

Assumes R&D as portion of total appropriation remains constant.

** - FY 1995 figures do not include rescissions enacted in Public Law 104-6.

Fiscal Year	1995	1996	1997	1998	1999	2000	2001 est	2002 est	2003 est	2004 est	2005 est.	1995-2002	1995-2005	
Deflators		1.30	1.34	1.38	1.42	1.46	1.51	1.56	1.61	1.67	1.73	1.79	1.24	1.38
deflators from OMB, <i>Budget of the United States Government FY 1996</i> until FY 2000, then 3.5 percent inflation thereafter														

Chart 3.

Early House appropriations subcommittee action on selected R&D programs in the FY 1996 budget
budget authority in millions of dollars

	FY 1995 Est.	FY 1996 Request	FY 1996 Approved	Subcommittee Action			
				Change from Reque Amount	Change from FY 1995 Percent	Change from FY 1995 Amount	Change from FY 1995 Percent
Dept. of Interior:							
Bureau of Mines	102.5	85.6	0.0	-85.6	-100.0%	-102.5	-100.0%
National Biological Service	166.9	172.7	112.0	-60.7	-35.1%	-54.9	-32.9%
Dept. of Energy:							
General Science and Research	973.6	1006.6	964.2	-42.4	-4.2%	-9.4	-1.0%
High Energy Physics	(642.1)	(685.6)	(674.1)	-11.5	1.7%	32.0	5.0%
Nuclear Physics	(331.5)	(321.1)	(290.1)	-31.0	9.6%	-41.4	-12.5%
Biological and Env. Research	423.7	424.1	382.7	-41.4	-9.8%	-41.0	-9.7%
Fusion Energy	356.8	356.4	222.1	-134.4	-37.7%	-134.7	-37.8%
Basic Energy Sciences	725.9	811.4	782.7	-28.7	-3.5%	56.8	7.8%
University and Science Educati	57.6	53.1	0.0	-53.1	-100.0%	-57.6	-100.0%
ER Lab Tech. Transfer	56.6	58.8	0.0	-58.8	-100.0%	-56.6	-100.0%

R&D figures from FY 1995 and FY 1996 request are from
AAAS Report XX: Research and Development FY 1996.
FY 1996 approved figures are author's estimates based on
appropriations June 1995 of subcommittees of the House
Appropriations Committee. These appropriations have not yet
been approved by the full House.

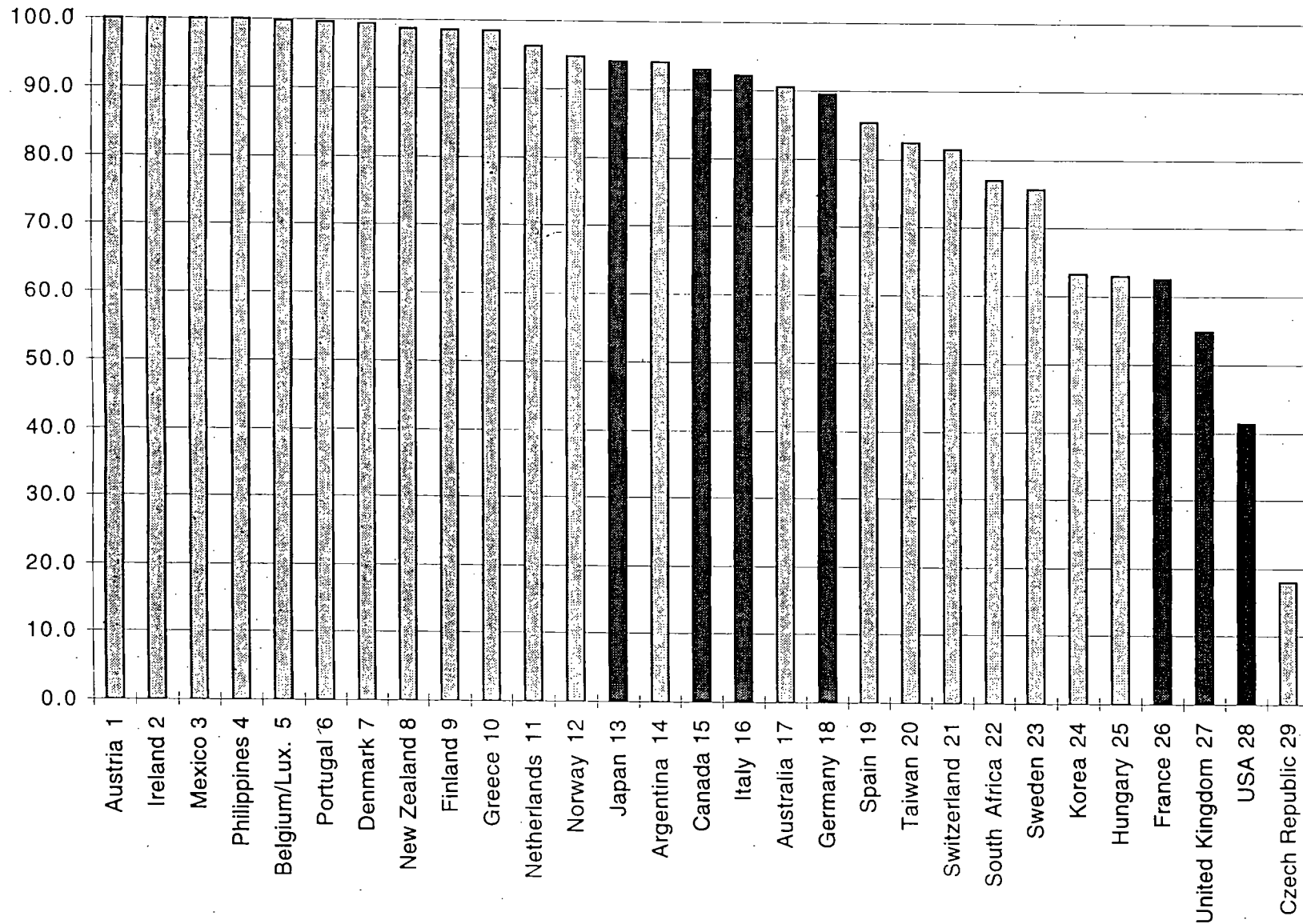
Projected Federal Non-Defense R&D

*1996 Budget Resolution
1996-2002*

July 19, 1995

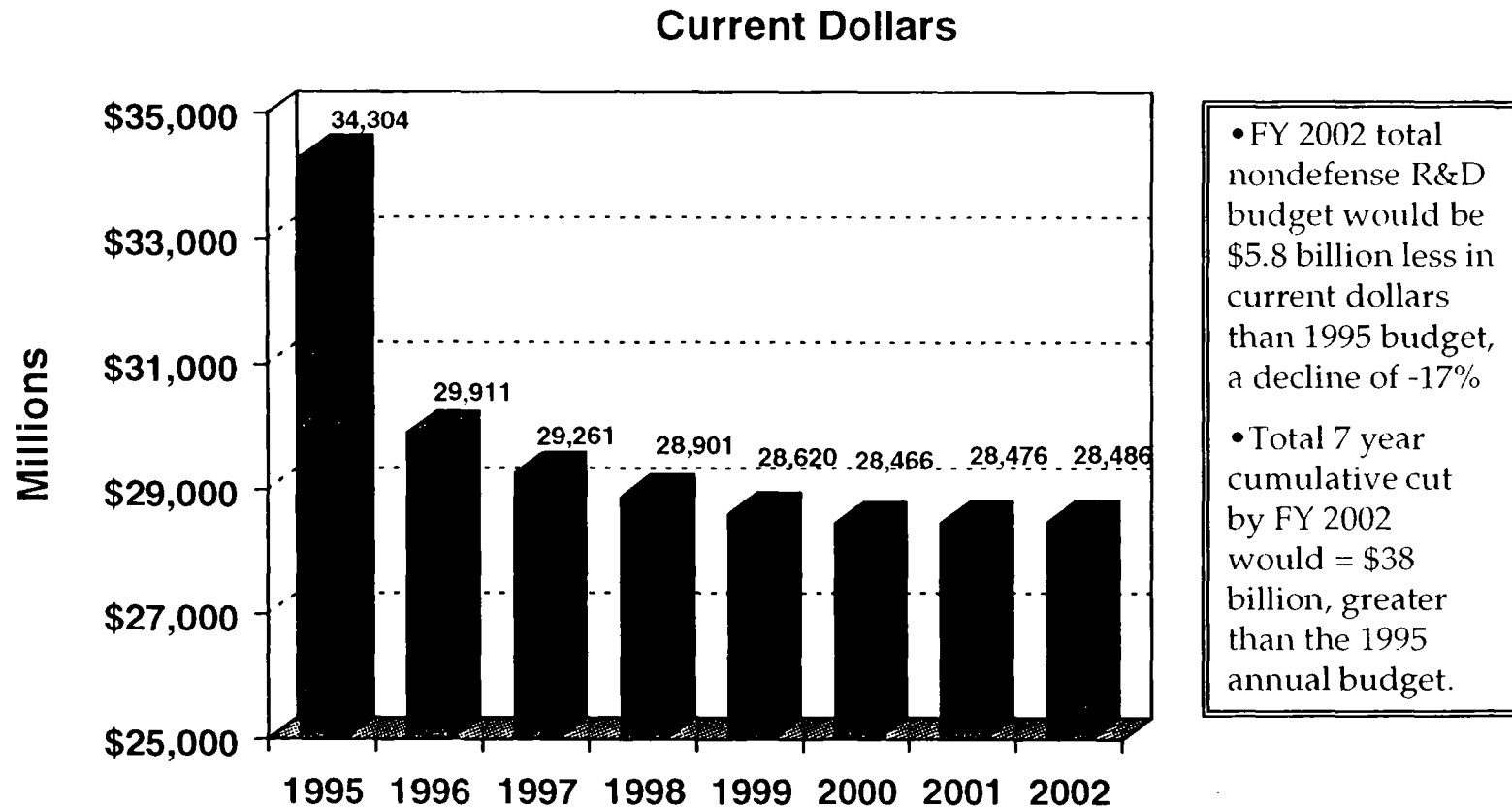
Office of Technology Policy, Technology Administration, U.S. Department of Commerce

NON-DEFENSE PERCENTAGE OF GOVERNMENT R&D



Source: World Competitiveness Report 1994, World Economic Forum
Geneva, Switzerland

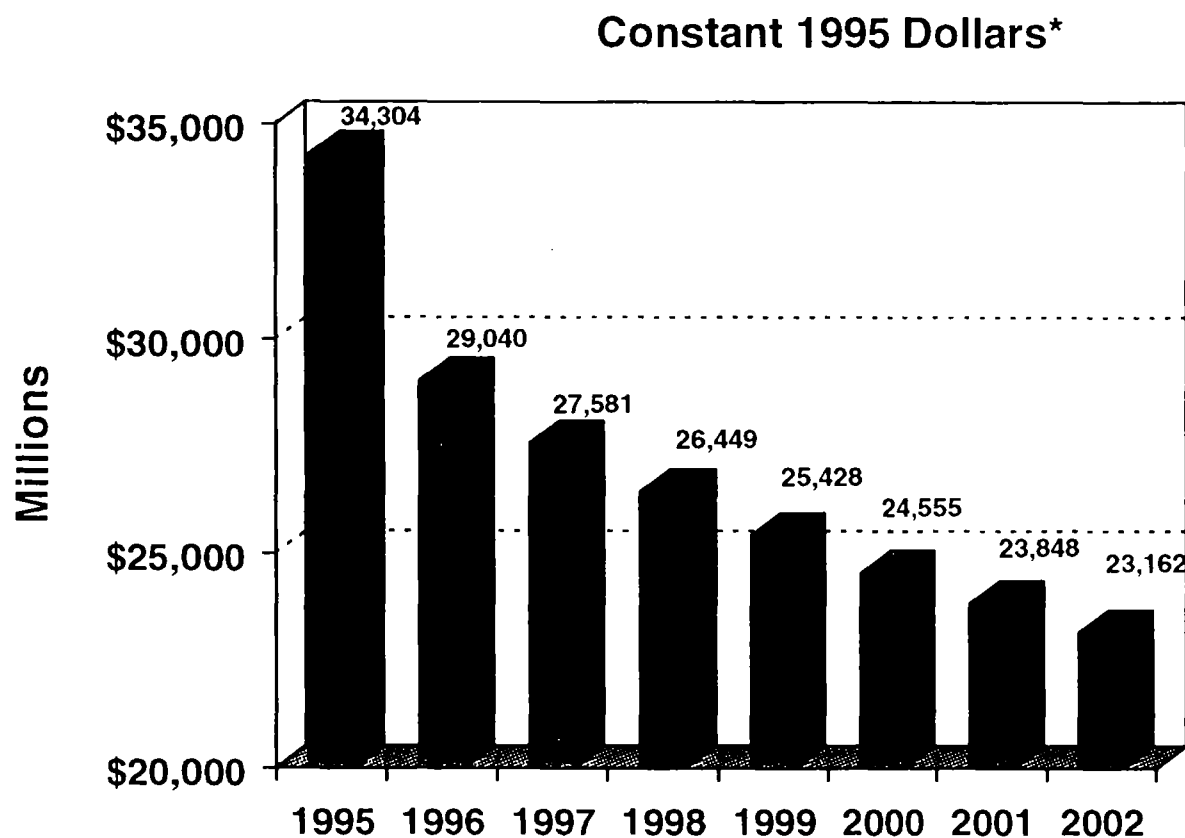
Projected Non-Defense R&D, 1996 Budget Resolution



Source: AAAS preliminary data.

Office of Technology Policy, Technology Administration, U.S. Department of Commerce

Projected Non-Defense R&D, 1996 Budget Resolution



- FY 2002 total nondefense R&D budget would be \$11.1 billion less in constant dollars than 1995 budget, a decline of -32.5%

- Total 7 year cumulative cut by FY 2002 would = 60.1 billion, almost twice the 1995 annual budget.

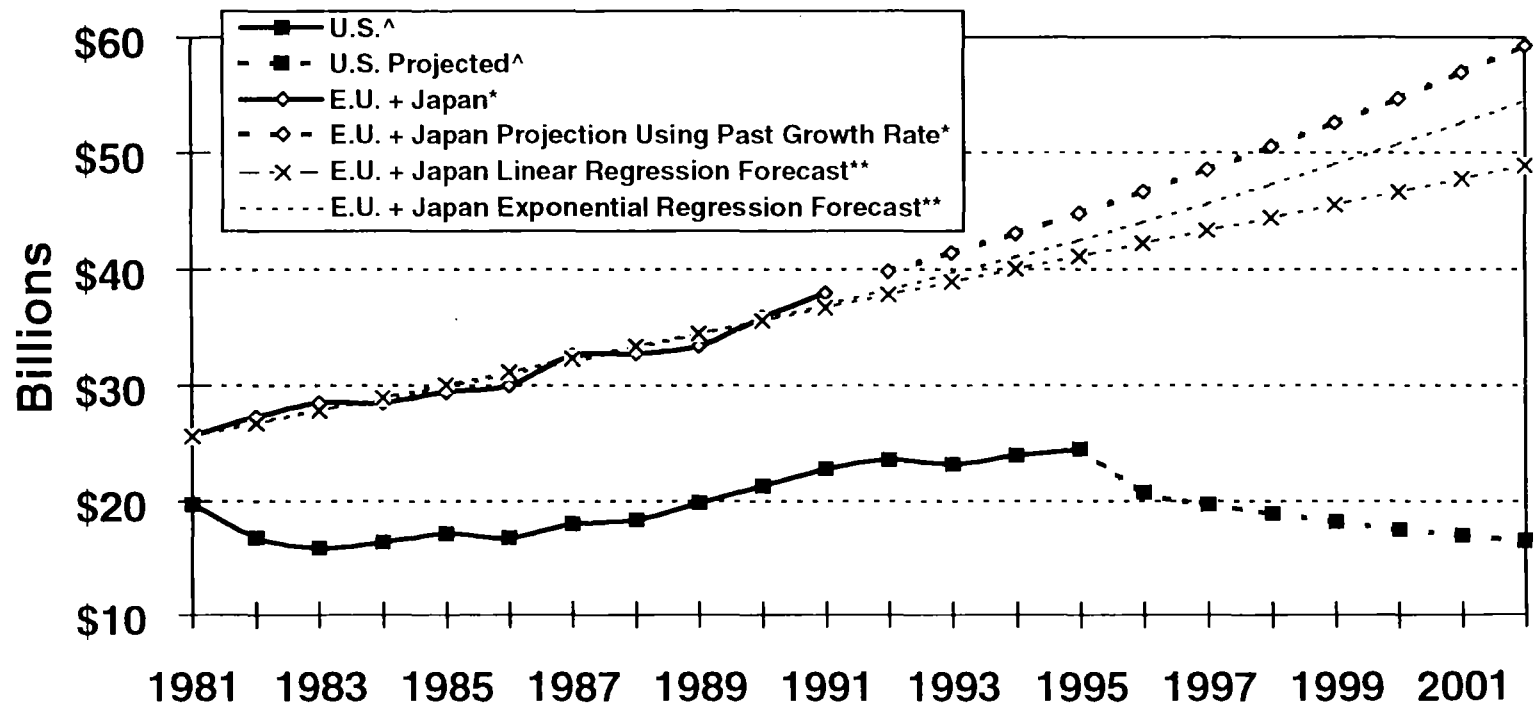
*Expressed in FY 1995 dollars, adjusted for 3 % inflation rate.

Source: AAAS preliminary data.

Office of Technology Policy, Technology Administration, U.S. Department of Commerce

1996 Budget Resolution Non-Defense R&D Compared to Projected Japanese & European Union Budgets

Constant 1987 Dollars



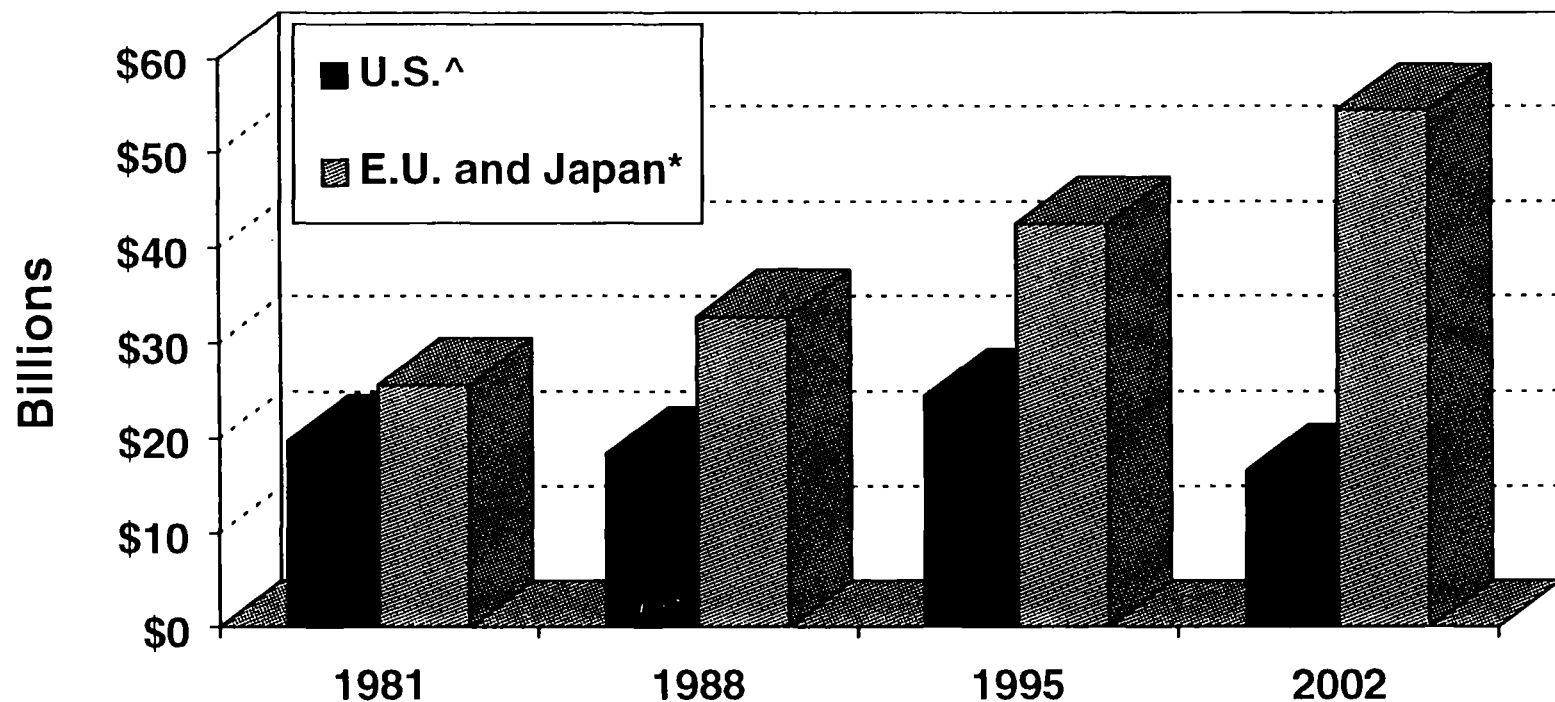
*Foreign amounts are expressed in Constant 1987 Purchasing Power Parity Dollars with projections assuming continuation of the 1981-1991 E.U. & Japan constant dollar average annual growth rate. **Regression forecast trends. The E.U. & Japan 1981-1992 figures are derived from unpublished NSF sources, July 1995. All E.U. data is for current membership.

^U.S. 1981-1995 amounts are expressed in 1987 dollars and are derived from NSF *Federal R&D Funding by Budget Function, FY93-95*. The 1996-2002 projections are based on AAAS preliminary data derived from the 1996 Congressional Budget Resolution and assume a 3% inflation.

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Non-Defense R&D Compared to Projected Japanese & European Union Budgets

Constant 1987 Dollars



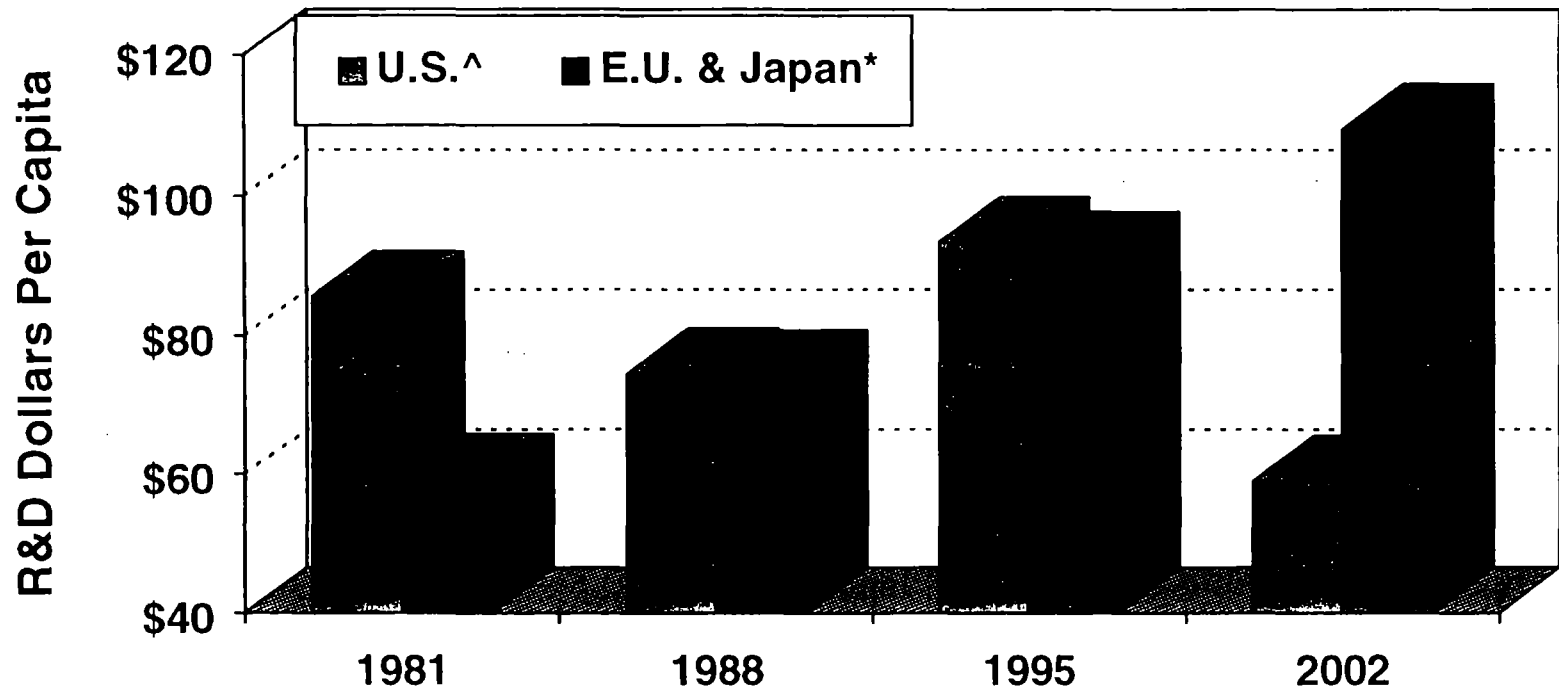
*Foreign amounts are expressed in Constant 1987 Purchasing Power Parity Dollars with projections to 2002 using a regression forecast based on unpublished NSF E.U. and Japan budget figures for 1980-92. All E.U. data is for current membership.

^U.S. 1981-1995 amounts are expressed in 1987 dollars and are derived from NSF *Federal R&D Funding by Budget Function, FY93-95*. The 1996-2002 projections are based on AAAS preliminary data derived from the 1996 Congressional Budget Resolution and assume a 3% inflation.

Office of Technology Policy, Technology Administration, U.S. Department of Commerce

U.S. Lags Behind Japan & the European Union in Per Capita Civilian R&D Investments

Constant 1987 Dollars



*Foreign amounts are expressed in Constant 1987 Purchasing Power Parity Dollars with projections to 2002 using a regression forecast based on unpublished NSF E.U. and Japan budget figures for 1980-92. All E.U. data is for current membership.

^U.S. 1981-1995 amounts are expressed in 1987 dollars and are derived from NSF *Federal R&D Funding by Budget Function, FY93-95*. The 1996-2002 projections are based on AAAS preliminary data derived from the 1996 Congressional Budget Resolution and assume a 3% inflation. Population projections are based on 1980-92 growth trends

Office of Technology Policy, Technology Administration, U.S. Department of Commerce

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EDITORIAL

A Department of Science (and Technology)?

Governmental research and development (R&D) reorganization, including a proposal for a department of science, is under debate in Congress today. Advocates of consolidation stress increased visibility for science, administrative cost savings, and improved coordination of R&D. The proposal also presumes that one or more current departments will be shut down. Opponents cite the strengths of today's pluralistic R&D system. Even if the department does not advance, the fate of R&D in Commerce and Energy must be decided if those departments are terminated. What makes sense for the present and the future?

Consolidation of R&D was first proposed more than 100 years ago by a congressional commission. The post-World War II organization of R&D was scarcely in place before new advocates of a centralized R&D system appeared. Periodic discussion—and rejection—of a science department should not lull anyone into thinking that the idea will fail again. The end of the Cold War, concerns about global competitiveness, debate about relevancy of fundamental research, possible elimination of one or more current departments, budget realities, and sizable congressional majorities in both houses of Congress for a party that was last in leadership nearly two generations ago produce a strong momentum for change. This confluence gives major R&D reorganization the greatest chance of passage in decades.

There should be an extensive, open policy discussion of the ramifications of R&D reorganization. What missions and functions would be better served? Would consolidation actually save money? Public debate should address these and other questions:

- Would a department of science work any better than corporate conglomerates and other large departments of government?
- If elevation of support for basic science to cabinet level is an objective, can a department of science exclude the National Institutes of Health?
- How would the National Science Foundation (NSF) fare in R&D reorganization, if space and environmental monitoring programs would be put in more direct competition with NSF funding than they are now, or if Energy's physical science research and particle accelerators were transferred to it?
- Given congressional criticisms of current industrial technology programs, what is the appropriate role of government in advancing technologies companies cannot pursue alone?
- Cabinet officers are loyal to constituencies and Congress as well as to their president; will the president get adequate advice under future organizational arrangements?
- Would R&D coordination be any better than it is now?
- Is a department the needed reorganization or should attention be given to more focused changes, for example, consolidating environmental monitoring functions in one agency?
- Will congressional jurisdictions be rearranged to accommodate the changes?
- Should the country be consolidating R&D when some industrial nations with centralized departments of science are dismantling them?

These are but a few of the policy issues that should be debated.

Many claim that our pluralistic R&D system, though not perfect and doubtless in need of scrutiny, has served national interests well. It will not do to rely on that argument today. The mood in Washington and among the electorate is for change. Scientists and engineers, professional societies, university and industry associations, informed citizens, the administration, and congressional committees should join the discussion and ensure that all arguments are on the table. The policy purposes and functions of a department or other R&D reorganization, not just the administrative provisions, should be fully debated. Our scientific and technological preeminence today results from the vision of national political and science leaders whose penetrating debates and compromises in the decade after World War II set up the current R&D system. Organizational changes made in the mid-1990s will profoundly influence government R&D policy until well into the next century. As the current discussion goes forward, all of us need to understand the issues and register our views.

Philip M. Smith

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America's Technological Leadership Is In Jeopardy!

Since World War II, Americans have demonstrated an unwavering bipartisan commitment to US technological leadership. Investments in science and technology have created a technology base that is the envy of the world, and have paid rich dividends—generating new industries, millions of jobs and higher living standards.

Presidents from Truman to Bush have supported a strong role for the federal government in building the nation's scientific and technical capabilities. This sustained commitment to civilian research and development has delivered an enormous bang for the buck for American taxpayers. Yet, the 1996 Congressional budget resolution would cut dramatically these critical investments. Proposals to cut the United States' investment in civilian technology are penny wise and pound foolish and, if enacted, could jeopardize our children's economic future and America's technological leadership. Here are the facts:

◆ It is no accident that industries which grew from investments of the federal mission agencies dominate world markets today:

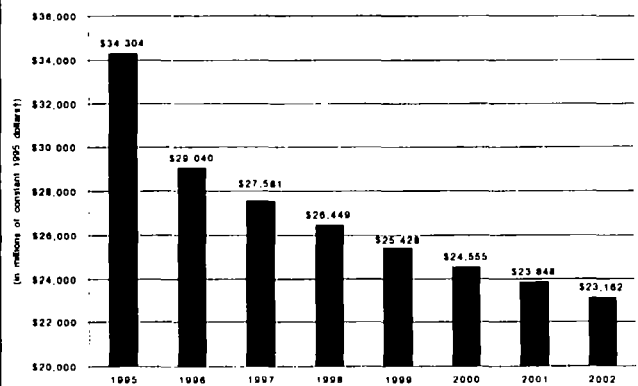
- Investments in defense and space helped to establish American firms as leading players in advanced aircraft, electronics, computers and satellite communications.
- Public health research has spawned miracle drugs, built a world class pharmaceutical industry, and given birth to a new American growth industry—biotechnology.
- A small federal investment in the nucleus of the Internet helped make American firms world leaders in networking technologies.

◆ Proposed Congressional cuts will deliver a devastating blow to our R&D infrastructure. We're not just cutting fat, we're cutting muscle, bone and vital organs—**eliminating at least 35,000 scientists and engineers from the U.S. R&D enterprise, to include university and private sector labs and research facilities across the country.** If we dissolve teams of scientists and engineers, discourage the best and brightest from pursuing technical careers, and close world class facilities, we may never be able to rebuild our capabilities.

◆ The timing of these cuts could not be worse. The United States is in a battle for global markets, where the spoils of war are jobs and national prosperity.

- Foreign competitors are dead even or ahead of us in many technologies that will shape the future.
- Japan invests 35% more than the US on a per capita basis in civilian technology; and Germany invests 30% more.
- **The US ranks 28th in the percentage of public R&D funding dedicated to civilian research—just ahead of the Czech Republic.**

Projected Science and Technology Cuts[†]
1995—2000



[†] assumes 3 percent annual inflation

◆ Under the 1996 Congressional budget resolution, the United States would invest nearly \$7 billion less annually (about \$11.1 billion annually, when adjusted for 3 percent inflation), in civilian technology in the years 2002 and beyond than we are investing in 1995. The cumulative effect of the cuts proposed by the House Science Committee alone would be reduced investment of about \$27 billion from 1995 through 2000. In particular:

- Energy R&D would be cut by \$8.8 billion;
- NASA would be cut by \$9.4 billion; and
- At Commerce, \$4 billion of R&D would be cut, including innovative programs designed to ensure that U.S. industry harvests the fruits of American science and technology.

Fund Science, Not Technology?

The Myths and Facts

Science and technology—like bread and butter—are inextricably linked in the minds of most Americans. However, some in Congress are attempting to draw arbitrary lines between them.

Some argue that the government should fund science because it is pure, basic research. Pursuing and attaining scientific knowledge does not interfere in the marketplace. Technology, on the other hand, should not receive government funding because it will skew markets. Federal funding for technology means replacing the market's judgment with that of government bureaucrats—picking winners and losers.

In reality, science and technology have been interdependent throughout human history. In some cases, science has supported technological achievements, as with atomic reactions; and sometimes technology has been an enabler of scientific discovery, as with telescopes and microscopes. In many fields today, researchers are engaged in the simultaneous pursuit of both. In short, arbitrary distinctions between science and technology don't make sense. Government support for both is essential.

The current Washington debate over funding science and technology is rife with myths. Here are a few:

MYTH: There is a clear line of demarcation between science and technology.

FACT: The line between science—the search for knowledge—and technology—the application of knowledge to practical ends—has become, in many disciplines, increasingly blurred.

◆ In the fields of pharmacology and biotechnology, medical science and commercial products converge as scientists attempt to develop medical therapies to cure disease and illness. There is often little technical gap between the discovery of a miracle drug and its commercial production. Gene therapy research is simultaneously pursuing both science and technology, as is cellular biology research to develop a treatment for leukemia.

MYTH: Technological breakthroughs flow in a linear path from the generation of scientific knowledge.

FACT: Technology often drives science. Many of the world's greatest technological advancements have preceded the science that explains how and why they work.

◆ Thomas Edison's invention of the lightbulb preceded a scientific understanding of how it worked.

◆ Technological capabilities in high-performance computing and communications are playing a critical role in the Human Genome project, a fundamental science program mapping the human genetic blueprint, and helping us to monitor the health of our planet through modeling and simulation of global climate change.

◆ Fundamental scientific discoveries about the nature and origin of our universe, derived from the U.S. space program, have been made possible by the application of leading-edge technologies across a broad range of engineering disciplines—optics, materials, electronics, communications, sensors, and aerospace.

◆ Space technology is providing life-saving scientific knowledge by helping weather forecasters better predict the occurrence of hurricanes, blizzards and other severe weather.

◆ Astronauts are conducting zero-gravity experiments in space that are impossible to conduct on earth, such as growing pure crystals. This research is yielding both basic scientific knowledge and potentially valuable materials and pharmaceuticals.

◆ Advanced instruments—the product of technology—also expand our base of scientific knowledge. The scanning electron microscope provides a portal for viewing the behavior of atomic particles and insights into the nature of materials on a sub-molecular level. This scientific knowledge has, in turn, yielded further technological advances, such as thin film technology for advanced electronics.

MYTH: Eliminating U.S. support for applied research places U.S. companies on an even playing field and allows market forces to pick the winners and losers.

FACT: Other countries do not saddle themselves with esoteric debate over the distinction between science and technology.

◆ To our global competitors, this argument is akin to the age-old theological debate over how many angels can fit on the head of a pin—unlikely to be resolved and of no practical consequence. European and Asian nations are freely pursuing technology policies that will produce growth, create jobs, and increase the standard of living for their citizens.

MYTH: U.S. investments in science improve the competitiveness of American firms.

FACT: No firm—or nation—can hope to exclusively appropriate the generation of scientific knowledge. Science enriches U.S. firms and competitors alike.

◆ For centuries, the world has operated on the principle of free and open access to scientific knowledge for the advancement of human understanding. But this virtue also prevents science from providing a competitive advantage to American firms.

◆ Science developed in the United States is often transferred to foreign competitors and used against us in the marketplace. While science advances human knowledge, it is technology that enables economic growth and job creation. It is absurd for the United States to fund only that research which is believed to have no conceivable application in the marketplace.

◆ Funding both science and technology is the only strategy that will ensure American firms are the primary beneficiaries of the leading-edge research conducted by our universities and national laboratories.

Disarming America in the Global Economic Competition

Some Members of Congress have proposed the elimination of the only Department in the Federal government that works in partnership with U.S. industry to promote the competitiveness of the United States.

Meanwhile, our foreign competitors are moving forward with a full head of steam. Both industrialized nations—such as Japan, Germany, and France—and rapidly industrializing nations—such as Korea, Singapore, and Taiwan—are pursuing policies aimed at giving their nations' corporations a competitive edge in world markets against U.S. firms.

America is in danger of pursuing a one-way path of unilateral technology disarmament in the arena of global competition. Faced with the realities of today's global economy, the United States government must work in partnership with American industry to maximize technology's contribution to economic growth and job creation here at home. If we fail to capitalize on U.S. taxpayer-funded science and technology, our foreign competitors stand ready to seize the opportunity. Here are some key facts about the policies and programs of our foreign trading partners:

- ◆ **The United States now ranks 28th in the world in the percentage of R&D invested in civilian technology**, behind every industrialized nation, and only slightly ahead of the Czech Republic.
 - ◆ **Japan** outinvests the United States on a per capita basis by more than 35 percent; **Germany** outinvests the United States by nearly 30 percent.
 - ◆ **Germany** has shifted its R&D strategy from basic science research to "competition relevant" technology research that will enhance the competitiveness of German industry. The German government is now working in partnership with industry to identify critical, high-risk technologies that merit government support, including information technology, biotechnology, and advanced materials.
 - ◆ **France** is funding industrial research across a broad range of technologies, including information technology, and medical and biological research.
 - ◆ **The United Kingdom** recently announced a new science and technology policy aimed at improving the competitiveness of British firms based on the identified needs of industry and the science community.
 - ◆ **The European Union**, with the support of all 12 member nations, is pursuing a program of pre-competitive technology development. The Fourth Framework initiative supports research in information technology, telecommunications, advanced materials and industrial R&D.
 - ◆ **Japan's** industrial technology programs are promoted vigorously by the Ministry of International Trade and Industry's Agency of Industrial Science and Technology. In 1995, Japan will spend about \$1.4 billion in direct subsidies for private sector participation in the government's major research and development programs.
 - ◆ **Other emerging Asian economic powers** also are pursuing aggressive technology development policies:
 - **Korea's** new five-year economic program is aimed at transforming the nation from an "exports oriented" economy to a "technology incentive" economy; top priority is given to technological innovation and industrial promotion.
 - **Singapore** is co-financing private sector research and development projects to enhance the technological competitiveness of Singapore companies.
 - In **Taiwan**, government science and technology policy is focused on the market potential of emerging industries. The government of Taiwan supports industrial technology R&D, as well as large-scale research consortia in partnership with industry.
- The United States cannot afford to turn its back on American industry, telling our firms to go it alone in the global economy, while foreign governments work hand-in-hand with their firms to compete and win in world markets. Doing so will not only cede competitive advantage, but eventually American jobs and economic growth.**

THE TECHNOLOGY ADMINISTRATION

Maximizing Technology's Contribution to U.S. Economic Growth

More than ever before, U.S. economic growth and prosperity depend on technology. It underpins America's fastest growing industries and high wage jobs. Technology provides the tools necessary to compete in every business today, and drives growth in every major industrial nation. For countries and companies alike, technological leadership means the difference between success and failure in the new global economy.

While the resources, capability, and responsibility for bringing innovations to market reside primarily with the private sector, the Federal government has a vital role to play in the innovation process. The Commerce Department's Technology Administration is the premier agency working in partnership with the private sector to promote U.S. industry's technological competitiveness.

THE TECHNOLOGY ADMINISTRATION

The Technology Administration is the only Federal agency charged with the explicit mission of working with industry to maximize technology's contribution to U.S. economic growth.

Directed by the Under Secretary for Technology, the Technology Administration consists of three agencies: the National Institute of Standards and Technology, the Office of Technology Policy, and the National Technical Information Service.

In addition to managing these agencies, the Under Secretary provides national leadership in civilian technology. She:

- ◆ chairs the President's **Civilian Industrial Technology Committee**, linking industry's needs and government technology efforts in electronics, manufacturing, materials, environmental technologies, and building and construction.
- ◆ leads the Federal government's participation with U.S. automobile manufacturers in the **Partnership for a New Generation of Vehicles**, a ten-year technical collaboration aimed at achieving groundbreaking improvements in fuel efficiency, emissions and safety.

THE OFFICE OF TECHNOLOGY POLICY

The Office of Technology Policy develops and advocates national policies that foster technological innovation.

- ◆ OTP serves as **an important voice for industry** on issues affecting civilian technology and U.S. competitiveness.
- ◆ OTP provides important **value-added analysis** to Federal policymakers and the private sector.
- ◆ OTP provides American entrepreneurs with **information and technical assistance** offered by no other Federal agency.
- ◆ OTP **leverages its extremely limited resources** by working closely with U.S. industry and attracting private sector participation.

NATIONAL INSTITUTE OF STANDARDS & TECHNOLOGY

The National Institute of Standards and Technology addresses basic technology needs, delivering broadly useful results shared among companies, industries, and consumers. Results of NIST's four programs underpin the technical efforts of U.S. industry. Industry drives NIST's programs and priorities.

- ◆ **NIST continues to perform the measurement, test and standards functions** of its predecessor, the National Bureau of Standards, providing a common language needed by industry in all stages of commerce.
- ◆ The **Advanced Technology Program** provides cost-shared awards to companies and consortia for competitively selected projects to develop high-risk, enabling technologies during the pre-product phases of R&D.
- ◆ The **Manufacturing Extension Partnership** is a nationwide network of extension centers, co-funded by state and local governments, that provide small and medium-sized manufacturers with technical assistance as they upgrade their operations to boost performance.
- ◆ The **Baldrige National Quality Program** provides U.S. industry with comprehensive and extensively used guides to quality improvement through the **Malcolm Baldrige National Quality Award**, managed in close cooperation with the private sector.

NATIONAL TECHNICAL INFORMATION SERVICE

The National Technical Information Service **collects and disseminates scientific, technical, engineering and related business information** produced by the U.S. government and foreign sources. With a comprehensive inventory of more than 2.5 million products, NTIS serves more than 60,000 customers annually generating annual revenues of more than \$31 million in 1993.

NTIS recently introduced **FedWorld**, an innovative on-line service which provides public electronic access to a wide variety of technical information.

THE OFFICE OF TECHNOLOGY POLICY

Forging Jobs and Economic Growth Through Innovation

In today's global economy, technological leadership often means the difference between success and failure in the marketplace. The Commerce Department's Office of Technology Policy plays a critical role in creating a business environment in which the creative efforts of American industry can flourish.

The Office of Technology Policy is the only office in the Federal government with the explicit mission of developing and advocating national policies to maximize technology's contribution to U.S. competitiveness. Eliminating this office will have negligible impact on the Federal budget deficit, but it will deprive U.S. industry of an effective advocate for technological innovation at a time of intensifying global competition. OTP fulfills several unique missions:

OTP is an important voice for industry on issues affecting civilian technology and U.S. competitiveness:

- ◆ OTP fought to **remove legal barriers to joint research and joint production** efforts by U.S. industry.
- ◆ OTP's advocacy helped **alleviate restrictions on the export of pharmaceuticals and other medical products**. These restrictions were encouraging U.S. companies to move their manufacturing and R&D operations overseas.
- ◆ OTP serves as a forceful advocate for improving the way in which the Federal government establishes and modifies environmental regulations, helping to **create a more predictable climate for investment**.

OTP provides important value-added analysis to Federal policymakers and the private sector:

- ◆ OTP's **Benchmarking Initiative** is assessing the competitive position of America's major industries relative to our foreign competitors. These benchmarks will help American industry track its progress against foreign competition and provide essential information to U.S. policymakers.
- ◆ The **Federal Technology Partnership** team has solicited industry's views on federal efforts to support the development of commercially-promising technologies. These industry perspectives form the cornerstone of OTP's strategy for effective government-industry partnerships, and provide critical information for optimizing the performance of these efforts.

OTP provides American entrepreneurs with information and technical assistance offered by no other Federal agency:

- ◆ OTP initiated and supports an innovative program that places mid-level U.S. engineers on the shop floor of Japanese manufacturing facilities for up to one year. **The U.S.-Japan Manufacturing Technology Fellowship Program** provides American technologists critical insights into Japanese "best practices" and the realities of foreign competition.
- ◆ OTP serves as the U.S. secretariat for the **Intelligent Manufacturing Systems Partnership**, an international collaborative effort involving industry, academia and governments of 20 industrialized nations. OTP has leveraged negligible Federal expenditures into a multi-million dollar, industry-led R&D program in which U.S. companies and universities are benefiting from collaboration with 132 world-class foreign participants.

Few agencies provide American taxpayers with more bang for their buck than OTP. OTP leverages its extremely limited resources by working closely with U.S. industry and attracting private sector participation:

- ◆ Industry foots nearly all costs of the U.S.-Japan Manufacturing Technology Fellowship Program, including the salaries, travel and living expenses of the participants.
- ◆ For every dollar spent by OTP in support of the industry-led Intelligent Manufacturing Systems Partnership, U.S. industry provides \$4 and foreign governments and industry provide \$161.
- ◆ OTP has greatly leveraged its small investment in the Benchmarking Initiative. More than 50 world-class experts have contributed to the reports at no cost to the federal government.

Republican Budget Reductions Alarm R&D Community

■ **Republicans in both the House and Senate call for R&D cuts to help balance the budget, upsetting the scientific community**

Wil Lepkowski and Janice R. Long,
C&EN Washington

The die is cast, the gauntlet's down, and whoops of Republican jubilee fill the political air. Republicans have a concrete plan to balance the federal budget by 2002, and they are proud of what they have accomplished—in fact, what they were elected to do. Now the country's scientists and engineers dependent on federal funds are assessing the impact of the plan on their work and see disaster looming. The scientific and technical community seems uncertain of what it can do to avert that disaster but is starting to organize a response.

The House and Senate each has its own, slightly different plan for balancing the federal budget. Under the House-approved plan, three departments—Commerce, Education, and Energy—13 agencies, and 284 programs would be eliminated, saving the federal government \$1.4 trillion over the next seven years. By then, federal income—\$1.59 trillion, according to the House Budget Committee, which formulated the plan—will equal outgo, the deficit will end, and the budget will be balanced.

The plan set forth by the Senate Budget Committee—which was scheduled for floor consideration last week—is not quite as specific as the plan adopted by the House. It calls for elimination of only one department—Commerce—and terminates some 100 programs for savings of \$961 billion from 1996 through 2002.

What shape the federal science estab-

lishment will be in by then is anybody's guess. It is really not too likely that those in power in Congress in 2000 will follow guidelines laid out in 1995. But it could happen, and it is certain that for the next two years, at least, the science community is in for a bumpy ride.

With their balanced budget plan, Republicans are, in effect, reshaping the entire conduct and values of national science and technology policy, says Rep. Robert S. Walker (R-Pa.), chairman of the House Science Committee and deputy chairman of the House Budget Committee. It's a development long overdue, according to Walker. Research will now be driven by the private sector, he says, and he is eager to let the process begin.

Programs will end, laboratories will close, university centers and institutes will expire. "What must be, must be," is the Republican response. The pain must be distributed.

"The place we made large hits were in those areas doing corporate welfare," Walker explains. "Technology development in the agencies," he says, "will be reduced to fundamental mission research. . . . We protected basic science, and we are reforming and restructuring the missions of departments that need saving."

Walker's R&D philosophy is best summed up by his attitude toward the Commerce Department's so-called Clean Car Initiative. "It's eliminated," he says, without regret. "In my view, we ought to look at revising any policy that allows major companies to come together and have a consortium without any threat of government involvement in antitrust." Walker says such programs do not necessarily need federal funding.

However, Rep. George E. Brown Jr. (D-Calif.) charges the cuts "represent a retreat from the federal government's historical role as a driver in research and development." For years, Brown

was chairman of the committee now headed by Walker, and as ranking member of the committee he can only snipe powerlessly at the actions of the new order. But he persists. "The [Republican] budget," Brown says, "is the equivalent of unilateral disarmament in the war to maintain the American standard of living. It destroys the investment portfolio of the nation."

The Commerce Department, the Department of Energy, the Environmental Protection Agency, and the National Aeronautics & Space Administration all would take serious hits in the proposed budget. Under the House plan, for example, DOE's energy-supply R&D program would be cut \$630 million below current levels to \$2.7 billion in fiscal 1996, and be cut even more in each of the ensuing years until leveling off at \$2.1 billion in 2000.

What would happen to the National Institutes of Health's budget is still unclear, but early analyses by academic groups in Washington, D.C., indicate that NIH faces a \$2.5 billion cut in fiscal 1996 from its 1995 level of \$11.3 billion. "The impact of cuts to NIH will be devastating," says a memo prepared by the recently organized Ad Hoc Group for Medical Research Funding. According to the memo, no new non-AIDS projects would be funded, existing research grants would be cut back, no new clinical trials would be started, ongoing trials could be halted, and research laboratories would close.

The National Science Foundation emerges as probably the most favored agency of all, with its budget growing slightly to \$3.3 billion in 2002. Its fiscal 1995 budget was \$2.9 billion. Still, NSF officials say any leveling off will hurt the total research enterprise in the country.

And funding for NASA's space program would fall from the fiscal 1995 level of \$14.5 billion to \$12 billion in fiscal 1999.

Both budget committees have targeted quite similar lists of programs for elimination. These consist of a host of newly established and vintage programs, such as all Commerce's technology assistance programs, including the Advanced Technology Program and the Manufacturing Extension Partnership at the National Institute of Standards & Technology.

Gone, too, would be the National Information Infrastructure, seen as the virtual soul of the Clinton Administration's technology policy. Also on the chopping block is Congress' own Office of Technology Assessment, a Democratic Party invention established in 1971 to study for legislators the complex impacts of new technologies on the public and the economy.

NSF's social, behavioral, and economic science programs would probably be cut severely, though contrary to fears not totally. The Critical Technologies Institute—an adjunct to the Office of Science & Technology Policy—would fold. The U.S. Geological Survey's budget would fall 20% to \$472 million. The National Biological Service would die. Agricultural research would decline because of an amalgamation of the Agricultural Research Service with state-shared research funding for the land-grant colleges. The list goes on.

"What the Republicans are trying to do," says one Washington academic lobbyist, "will hurt so many people so hard for such a long time that it will be a Pyrrhic victory. They will have destroyed the foundation of scientific research in this country. We are dealing with a very intense, black versus white ideology. I think they care about people only in terms of numbers."

Veteran observers call the response of the technical establishment to these proposals paltry. Industry is holding its fire for fear of offending leaders of a party that is promising them relief from regulation. So organizations such as the National Association of Manufacturers and the private Competitiveness Council have criticized the new policies only in the most general of terms.

As for the scientific community itself, a veteran Democratic staffer on Capitol Hill says he is not impressed by the response. "I don't sense that the affected technical communities are coming forth with any oomph," he says. "A lot of

these folks haven't had to mobilize before, although by the way they are organized nationally, they are perfectly structured to carry it off—[with] horizontal distribution across geographic areas and vertical information flow to a centralized focus. A number of scientific societies are just now preparing to do something, but they're way behind the curve."

The American Chemical Society, however, is one scientific society that has made its views known. In a letter to Sen. Pete V. Domenici (R-N.M.), chairman of the Budget Committee, ACS expresses its strong opposition to proposals to greatly reduce basic scientific research. The society points out: "Few American industries are so strongly supported by basic research as the pharmaceutical, biotechnology, and chemical industries. Years of federal investment in university chemistry and biochemistry research have provided the basic knowledge and skilled scientists that allow these industries to compete effectively with any in the world. The return on this federal investment is clearly seen in the large positive contribution of these industries to America's trade balance—more than \$18 billion in 1994."

Former NSF Director Eric Bloch is particularly critical of the scientific and technical community's response so far. Bloch, a distinguished fellow at the Washington, D.C.-based Council for Competitiveness, helped spearhead the high-tech community's support for the Clinton presidential campaign in 1992. Now, he says, Clinton has lost that support.



Walker: protect basic science

"We've made major changes over the past few years," Bloch says, "but they haven't really become institutionalized. It takes a constant push. That has to come from industry, universities, and professional societies. But if there's no perception that the environment is right for it, they just give up. The danger is that the current time may be interpreted as being little more than a hiccup."

"The community should stand its ground," Bloch says. "But there's not much courage either from the Administration, from the people in industry, or from people in universities. And if they think that downstream everything is going to become rosy, they are badly mistaken."

"The Republicans in power today have no understanding of what technology is all about. They have a simplistic view of the world, and that's extremely dangerous."

It is, of course, a long way from Republican goals to legislative finality. A budget resolution, which is what all the current agony is about, is merely a specific set of goals, in the form of budget caps, for the Senate and House to work from. After each branch passes its own budget resolution, conferees will work out differences between the two versions of the budget balancing plan.

That resolution will set ceilings for federal spending under 20 broad budget functions—such as Function 050: Defense, and Function 250: General Science, Space & Technology—not in terms of individual programs and agencies. For example, Function 250 spans research performed and/or sponsored by parts of DOE and NASA and all of NSF's programs.

The House and Senate authorization and appropriations committees work within these budget function ceilings when deciding exactly how much money will be spent on individual federal programs in the upcoming fiscal year. These committees are not required to follow the budget committees' proposals.

As the process moves along, the House will make its program trade-offs; the Senate will do the same. Legislators with promises to keep will attempt to rescue programs wanted by their constituents—a new road here, a clinic there, a laboratory someplace else, a subsidy farmers cannot do without. Amendments and earmarks will be

Federal R&D funding in dire straits as Congress acts to balance budget

Both the House's and Senate's plans for balancing the federal budget by 2002 include major cutbacks in funding for a number of federal R&D programs, including those of the Department of Energy and the National Aeronautics & Space Administration. The plans call for cutting and then freezing for seven years the budgets of other agencies such as the National Institutes of Health.

Following are highlights of the two budget plans as they affect the chemical community, by budget function or category:

Function 050: Defense consists of the activities of the Department of Defense, defense programs in the Department of Energy, and some other minor defense-related activities in other agencies.

House: Only specified reduction in a budget that increases 10% between 1995 and 2000 is a cut in DOD's civilian acquisition workforce.

Senate: Spending for four major budget components—military personnel, operations and maintenance, procurement, and research and development—declines over the next two years and then begins to increase in 1998.

Function 150: International Affairs funds the Department of State, the Agency for International Development (AID), and the Arms Control & Disarmament Agency (ACDA). It includes resources for trade promotion activities, U.S. participation in multilateral development banks, and international organizations including the United Nations.

House: Eliminates funding for ACDA, AID, and a number of trade advisory organizations, including the chemical industry sector trade advisory council; reduces aid to states of the former Soviet Union.

Senate: Terminates ACDA, consolidating functions into the State Department; substantially reduces bud-

get authority for export financing and trade promotion programs.

Function 250: General Science, Space & Technology includes NASA's civilian space programs, DOE's basic research programs (physics), and the National Science Foundation.

House: Increases funding for NSF's research and related activities account 12% to \$2.4 billion by 2000, while decreasing funding for other NSF programs 38% to \$808 million. Funding for NASA's scientific and technical research falls 20% to \$212 million, while funding for DOE's general science and research programs falls 9% to \$900 million by 1998 and is frozen at that level thereafter.

Senate: Assumes a \$100 million reduction in NSF's research program funding and refocus on its original mission of basic scientific research. Goes along with President Clinton's cuts in academic infrastructure and major research equipment funding. Assumes President's freeze and out-year reductions in DOE's physics research.

Function 270: Energy includes civilian activities of DOE, including solar, renewable, fossil, and conservation R&D, civilian nuclear waste disposal, strategic petroleum reserves, and the Uranium Enrichment Corp.

House: Immediately—fiscal 1996—cuts funding for DOE energy-supply R&D activities 20% to \$2.7 billion; further reduces it to \$2.1 billion by 2000—assumes R&D programs are not eliminated along with DOE. Funding for fossil R&D immediately falls two-thirds to \$150 million and gradually to \$100 million in 2000; that for conservation research falls 48% to \$377 million by 2000.

Senate: Provides total of \$21 billion over next five years for energy R&D efforts; freezes funding for solar and conservation R&D at 50% of their respective 1990 levels of \$142 million and \$159 million; reduces corporate technology subsidies by

phasing in a 50% reduction in near-term commercialization efforts.

Function 300: Natural Resources & Environment includes funding for water resources, conservation and land management, and pollution control and abatement activities carried out by the Department of the Interior, the Environmental Protection Agency, and the National Oceanic & Atmospheric Administration (NOAA).

House: Dissolves the National Biological Service; cuts funding for the U.S. Geological Survey 20% to \$457 million and freezes it at that level through 2002; freezes funding for EPA R&D and abatement, control, and compliance programs at \$1.7 billion through 2002; applies a cost-benefit test to Superfund projects.

Senate: Reduces NOAA's budget 5% and freezes it at that level, dissolves the National Biological Service, phases out EPA grants for local water treatment facilities.

Function 350: Agriculture covers all Department of Agriculture activities, such as direct assistance and loans to food and fiber producers, research, and food assistance programs.

House: Freezes through 2002 funding for the Agricultural Research Service (ARS) at \$643 million, 10% below current levels, and that for the Cooperative State Research, Education & Extension Service at \$357 million, an 18% cut from current levels; requires that all CSREES grants be competitively awarded.

Senate: Reduces funding for ARS and CSREES by 10% and holds those levels through 2002; eliminates CSREES's special earmarked grants.

Function 370: Commerce & Housing Credit includes federal housing programs and commerce programs, such as international trade and exports, science and technology, and the periodic census.

House: Terminates in 1996 Com-

added, some kept, most swept away, many inserted behind closed doors.

Then, in the next step, proposals will be debated on the House and Senate floors, votes will be taken, appropriations bills passed. After that will come probably a raucous House/Senate conference phase. And then? Probably a presidential veto. All this

will transpire over the summer and into late fall.

And this is merely the first year of a seven-year journey. Other Congresses will take their own place and reflect differing public moods as the impact of reductions becomes more vivid in cities and towns.

Thus, all of the numbers aired so far

are, in a sense, tentative because they deal with a political, social, and economic future no one can predict. Still, if the same Republicans stay in power, reductions almost certainly will happen. The question is whether the results will have as drastic an impact as Republican critics are making them sound. Republicans say that balancing the budget will result

merce's industrial technology services, including the Advanced Technology Program, but increases funding for scientific and technical research 25% to \$325 million by 2002; makes the Patent & Trademark Office (PTO) self-funding and independent; eliminates trade promotion activities of the International Trade Administration.

Senate: Gradually eliminates the Department of Commerce, but preserves PTO, NOAA, the Bureau of the Census and of Economic Analysis, and most of the Export Administration either by making them independent or parts of other organizations.

Function 500: Education, Training, Employment & Social Services encompasses total of 321 programs, in-

cluding all those in the Department of Education.

House: Eliminates funding for Goals 2000 programs, which include making U.S. students the best in the world in science and mathematics; gradually eliminates student loan subsidy program.

Senate: Freezes funding for major programs such as Head Start, Special Education, and Pell grants at current levels and "enhances graduate and professional students' responsibility for education expenses by removing government interest rate subsidies."

Function 550: Health includes mandatory spending for Medicaid. On the discretionary side, this function encompasses the National Institutes

of Health, the Centers for Disease Control & Prevention (CDC), and consumer and occupational safety and health programs.

House: Freezes NIH funding at \$10.8 billion, 5% below current levels, through 2000 to "encourage prioritization of NIH-supported research"; eliminates redundant functions at the National Institute for Occupational Safety & Health; increases user fees on products regulated by the Food & Drug Administration (FDA).

Senate: Does not specifically mention NIH, but reduces overall discretionary funding 10% to \$18.8 billion by 2002; assumes full funding for CDC and FDA; reduces funding for the Occupational Safety & Health Administration 50%.

\$ Billions	1995*	1996	1997	1998	1999	2000	2001	2002	1996-2002 total
050: Defense									
House	\$261.4	\$267.3	\$269.3	\$277.3	\$291.3	\$287.3	\$287.3	\$287.2	\$1,967.0
Senate	261.4	257.6	253.3	259.5	266.2	275.9	275.9	275.9	1,864.3
150: International Affairs									
House	18.9	15.8	13.7	11.3	9.7	10.5	12.0	12.0	85.0
Senate	18.9	15.4	14.3	13.5	12.6	14.1	14.3	14.2	98.4
250: General Science, Space & Technology									
House	17.2	16.7	16.3	15.7	15.3	14.9	14.9	14.9	108.7
Senate	17.2	16.7	16.3	16.1	16.0	15.8	15.8	15.8	112.5
270: Energy									
House	6.3	4.4	3.9	3.6	3.9	3.6	3.6	3.5	26.5
Senate	6.3	2.9	1.7	3.3	4.2	4.1	4.0	4.0	24.2
300: Natural Resources & Environment									
House	22.3	19.3	19.1	17.2	18.6	17.4	17.9	17.8	127.3
Senate	22.3	19.5	18.3	15.6	16.8	16.4	15.0	15.8	117.4
350: Agriculture									
House	14.0	13.0	12.8	11.6	11.4	10.2	8.1	8.1	75.2
Senate	14.0	13.1	12.2	11.8	11.7	11.7	10.5	10.1	81.1
370: Commerce & Housing Credit									
House	8.9	6.4	10.9	4.0	5.0	1.7	1.3	1.0	30.3
Senate	8.9	6.6	8.3	1.8	3.0	1.5	0.5	0.2	21.9
500: Education, Training, Employment & Social Services									
House	58.3	45.7	45.0	44.8	45.4	45.9	45.0	44.6	316.4
Senate	58.3	48.1	47.3	47.2	47.4	47.8	47.3	47.3	332.4
550: Health									
House	116.6	121.9	127.7	132.1	136.7	141.5	146.3	149.1	955.3
Senate	116.6	120.1	126.6	132.1	137.0	141.1	145.2	149.6	951.7

Note: All figures represent budget authority for discretionary programs. * Figures for 1995 are those specified in current law.

in an economic bonanza with jobs abundant for anyone with talent and a technical degree.

Science and technology are not the only—and hardly the largest—segment of federal programs that would be affected by the budget cuts. Farmers, the elderly, children, school systems, college students, welfare mothers, the handi-

capped—you name it—are all warning of fatal wounds. They will be competing to win back what they believe morally to be their share. And their clout likely will exceed science and technology's political popularity, if not importance.

Politics notwithstanding, the technical community—from neurologists to electrical engineers—see themselves as spe-

cial. Perhaps they can persuade Congress of the importance of their work. But lobbying comes hard for scientists and engineers. According to one news source, a poll was taken among 50 scientists asking whether they would contact their congressman to protest the impact of lower budgets. Not one said he or she could find the time. □