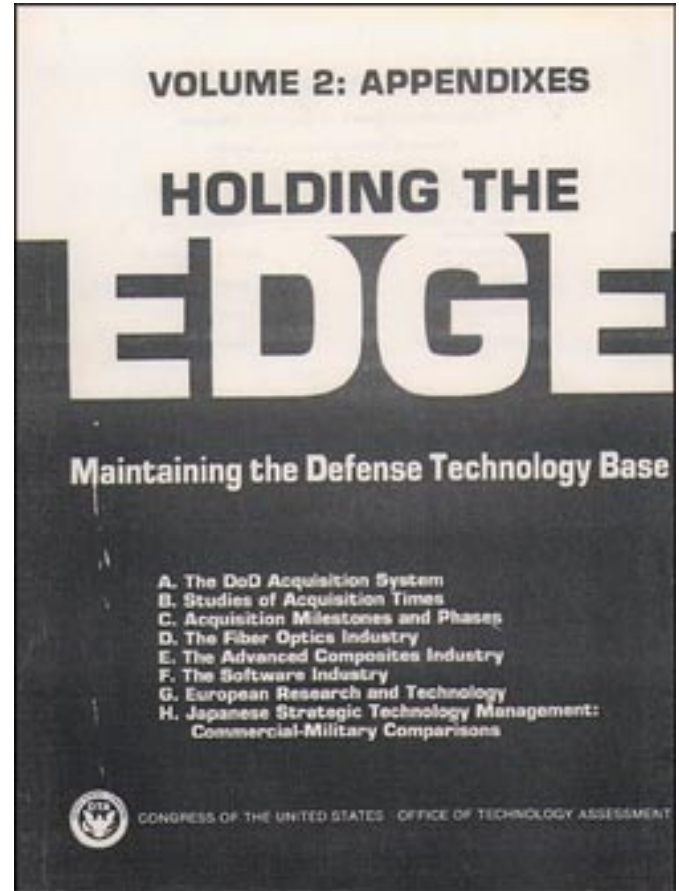


*Holding the Edge: Maintaining the Defense  
Technology Base—Vol. II, Appendices*

January 1990

OTA-ISC-432

NTIS order #PB90-253345



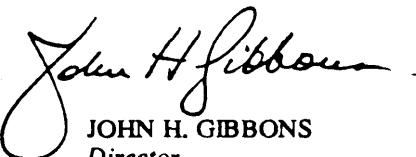
## Foreword

OTA'S report "Holding the Edge: Maintaining the Defense Technology Base," noted that America's defense technology base has weathered significantly, with challenges to U.S. high-Technology firms from abroad, increasing dependence on foreign and civilian sources of technology for use in military systems, and growing technological sophistication of our adversaries.

These challenges formed the basis on which the Senate Committee on Armed Services requested an assessment of the defense technology base. The first report of that assessment, "The Defense Technology Base: Introduction and Overview" (OTA-ISC-374, March 1988), gave an introduction to the defense technology base, while the second, "Holding the Edge: Maintaining the Defense Technology Base" (OTA-ISC-420, April 1989), analyzed several major problems in depth. It examined the management of Department of Defense laboratories, how technologies are introduced into defense systems, and the exploitation of civilian technologies for defense needs, keeping in mind the questions of encouraging rapid military access to civilian technologies, as well as maintaining the health of the technology base.

In the course of producing the "Holding the Edge" report, extensive analyses were performed that were too voluminous for inclusion in the report. I believe that those analyses are of sufficient interest to be presented in their own right, and they are included in this volume. Three of the appendixes deal with the DoD acquisition processes, three deal with industry case studies (fiber optics, advanced composites, and software), and the remaining two appendixes concern European and Japanese defense technology research, development and management.

The help and cooperation of the Army, Navy, Air Force, the Office of the Secretary of Defense, the Department of Energy, NASA, and the National Institute of Standards and Technology are gratefully acknowledged.



JOHN H. GIBBONS  
*Director*

## Defense Technology Base Advisory Panel

Walter B. Laberge, *Chair*  
Vice President of Corporate Development  
Lockheed Corp.

Michael R. Bonsignore  
President  
Honeywell International

William Carey  
Consultant to the President  
Carnegie Corp. of New York

Thomas E. Cooper  
Vice President  
Aerospace Technology  
General Electric

John Deutch  
Provost  
Massachusetts Institute of Technology

Robert Fossum  
Dean  
School of Engineering and Applied Sciences  
Southern Methodist University

Jacques Gansler  
Senior Vice President  
The Analytic Sciences Corp.

B.R. Inman  
Admiral, USN (retired)  
Chairman and Chief Executive Officer  
Westmark Systems, Inc.

Paul Kaminski  
President  
H&Q Technology Partners, Inc.

Lawrence Korb  
Director  
The Center for Public Policy  
Brookings Institution

George Kozmetsky  
Executive Associate-Economic Affairs  
University of Texas System  
University of Texas, Austin

Ray L. Leadabrand  
President  
Leadabrand & Assoc.

Jan Lodal  
President  
INTELUS

Edward C. Meyer  
General, USA (retired)

Robert R. Monroe  
Vice Admiral, USN (retired)  
Senior Vice President & Manager, Defense & Space  
Bechtel National, Inc.

William J. Perry (ex officio)  
Managing Partner  
H&Q Technology Partners, Inc.

Richard Pew  
Principal Scientist  
BBN Laboratories, Inc.

Herman Postma  
Senior Vice President  
Martin Marietta Energy Systems, Inc.

Judith Reppy  
Associate Director  
Cornell Peace Studies Program

Richard Samuels  
Professor  
Department of Political Science  
Massachusetts Institute of Technology

John P. Shebell  
Manager, RAMP Engineering  
Customer Service Systems Engineering  
Digital Equipment Corp.

Michael Thompson  
Executive Director  
Integrated Circuit Design Division  
AT&T Bell Laboratories

S.L. Zeiberg  
Vice President Technical Operations  
Martin Marietta Electronics and Missiles Group

NOTE: OTA appreciates and is grateful for the valuable assistance and thoughtful critiques provided by the advisory panel members. The panel does not, however, necessarily approve, disapprove, or endorse this report. OTA assumes full responsibility for the report and the accuracy of its contents.

## OTA Project Staff-Defense Technology Base

Lionel S. Johns, *Assistant Director, OTA*  
*Energy, Materials, and International Security Division*

Peter Sharfman, *International Security and Commerce Program Manager* (through February 1989)

Alan Shaw, *International Security and Commerce Program Manager* (from March 1989)

Alan Shaw, *Project Director*

William W. Keller

Gerald L. Epstein

Laurie Evans Gavrin <sup>1</sup>

Christine Condon <sup>2</sup>

Todd La Porte

Congressional Research Service Contributor

Michael E. Davey

Administrative Staff

Jannie Home (through November 1988)

Cecile Parker

Jackie Robinson

Louise Staley

Contractors

P. Robert Calaway

Arnold Levine

MIT/Japan Science and Technology Program

---

<sup>1</sup>On assignment from OTA's Energy and Materials Program.

<sup>2</sup>On assignment from the Department of Defense.

## **Workshop on the Relationship Between Military & Civilian Fiber Optics**

John R. Whinnery, Chair  
University Professor Emeritus  
Department of Electrical Engineering and Computer Sciences  
University of California, Berkeley

James H. Davis  
Director, Fiber Optics Program Office  
Naval Sea Systems Command

Brian Hendrickson  
Chief  
Electro-Optics Technology Branch  
U.S. Air Force

Raymond E. Jaeger  
President and CEO  
SpecTran Corp.

Donald B. Keck  
Director  
Applied Physics Research & Development Laboratories  
Coming Glass Works

Tingye Li  
Department Head  
Light Wave Systems Research Department  
AT&T Bell Laboratories

John W. Lyons  
Director  
National Engineering Laboratory  
National Institute of Standards and Technology

Alan McAdams  
Professor  
Johnson Graduate School of Management  
Cornell University

William C. McCorkle  
Technical Director  
U.S. Army Missile Command-Redstone Arsenal

Kenneth Nill  
Executive Vice President  
Lasertron

Paul Polishuk  
President and Chairman  
Information Gatekeepers Group of Companies

Jan H. Suwinski  
Senior Vice President and General Manager  
Telecommunications  
Corning Glass Works

Robert W. Tarwater  
Light Guide Fiber & Cable Manager  
AT&T Network Systems

## **Workshop on the Relationship Between Military & Civilian Software**

Larry E. Druffel, *Chair*  
Director  
Software Engineering Institute  
Carnegie-Mellon University

Victor R. Basili  
Professor  
Department of Computer Sciences  
University of Maryland College Park

Barry Boehm  
Chief Scientist  
TRW. Inc.

Elaine Bond  
Senior Vice President  
The Chase Manhattan Bank

Mike Devlin  
Executive Vice President  
Rational

Jeffrey M. Heller  
Senior Vice President  
Electronic Data Systems

Dana P. Lajoie  
Technical Director  
Government Systems Group  
Digital Equipment Corp.

John A. Lytle  
Director of Technical Development  
Planning Research Corp.

Allan L. Scherr  
Vice President, Development & Integration  
Applications Systems Division  
IBM

Mike Weidemer  
Deputy Director  
Mission Critical Computer Engineering  
Air Force Systems Command

David M. Weiss  
Principal Member-Technical Staff  
Software Productivity Consortium

### **Workshop on the Relationship Between Military & Civilian PMCs**

Dick J. Wilkins, *Chair*  
*Director*  
Center for Composite Materials  
University of Delaware, Newark

Ric Abbott  
Principal Engineer  
Advanced Composites Project  
Beech Aircraft Corp.

James N. Burns  
Vice President of Marketing  
Hercules, Inc.

Samuel J. Dastin  
Director, Advanced Materials  
Grumman Aircraft Systems

Bernard M. Halpin, Jr.  
Manager, Composites Development Branch  
Materials Technology Laboratory  
U.S. Army Laboratory Command

James J. Kelly  
Program Area Manager  
Materials  
Office of Naval Technology

Robert Manildi  
Manager, Advanced Composites  
Hexcel Corp.

Michael J. Michno  
Director of Technology  
Advanced Composites  
Amoco  
Performance Products

Alan G. Miller  
Unit Chief, Chemical Technology  
Boeing Commercial Aircraft

Thomas F. O'Brien  
Segment Manager  
Advanced Composites Division  
DuPont Co.

Frances Rensvold  
Physical Science Administrator  
Aero Mechanics Technology, Andrews Air Force Base

Douglas C. Ruhmann  
Chief Design Engineer  
Manager, Materials & Processes  
McDonnell Douglas Astronautics Co.

Nick Spenser  
Sales Manager  
Composites Materials  
CIBA-GEIGY

NOTE: OTA appreciates and is grateful for the valuable assistance and thoughtful critiques provided by the participants in the workshops. The workshop participants do not, however, necessarily approve, disapprove, or endorse this report. OTA assumes full responsibility for the report and the accuracy of its contents.