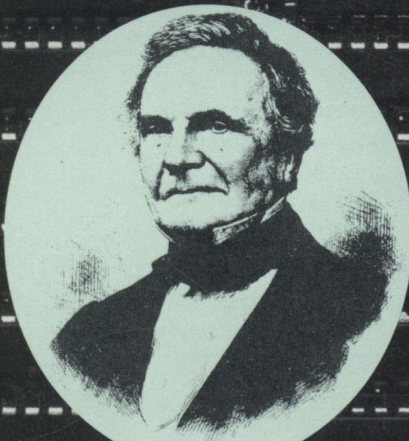
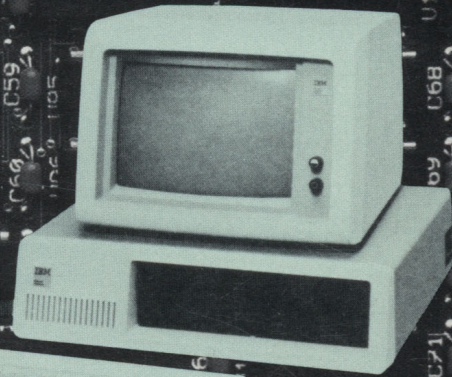


Business History Review

S P R I N G 1 9 9 2



Charles Babbage



The IBM PC

HIGH-TECHNOLOGY INDUSTRIES

Cover: The Personal Computer

There is perhaps no more ubiquitous symbol of high-technology industries in the twentieth century than the personal computer. The background of the front cover and the back cover itself depict one version of Intel's 386 system board, this one designed to upgrade AT models and enable them to use 32-bit 80386 technology. Imposed on part of the board are Charles Babbage (1791–1871), whose plans for an "Analytical Engine" are seen as a precursor of the computer, and the IBM PC, introduced in 1981, which set the standard for computer design in that decade and extended the market for personal computers dramatically. (System board reproduced courtesy of Intel Corporation; Charles Babbage portrait reproduced courtesy of the Babbage Institute, University of Minnesota; IBM computer reproduced courtesy of International Business Machines, Inc.)

For an article on the development of the computer industry, see pp. 1–50.

© 1992 by The President and Fellows of Harvard College
All rights reserved.

ISSN 0007–6805

Second-class postage paid at Boston, Mass.

Business History Review

Published Quarterly by the Harvard Business School
Volume 66 Number 1 Spring 1992

EDITOR · Steven W. Tolliday, *Harvard University*
ASSOCIATE EDITOR · Patricia Denault, *Harvard University*
BUSINESS MANAGER · Ann Chaney, *Harvard University*

EDITORIAL ADVISORY BOARD

Mansel Blackford, *Ohio State University*
Louis P. Cain, *Loyola University of Chicago*
Alfred D. Chandler, Jr., *Harvard University*
Rainer Fremdling, *University of Groningen*
Tony Freyer, *University of Alabama*
Patrick Fridenson, *École des Hautes Études*
Mark Fruin, *University of British Columbia*
Thomas P. Hughes, *University of Pennsylvania*
William Lazonick, *Barnard College*
Thomas K. McCraw, *Harvard University*
John J. McCusker, *Trinity University*
John P. McKay, *University of Illinois, Urbana-Champaign*
Roland Marchand, *University of California, Davis*
H. V. Nelles, *York University*
Daniel Nelson, *University of Akron*
Philip Scranton, *Rutgers University, Camden*
Richard S. Tedlow, *Harvard University*
Richard H. K. Vietor, *Harvard University*
Mira Wilkins, *Florida International University*
Takeshi Yuzawa, *Gakushuin University*

The *Business History Review* is published in the spring, summer, autumn, and winter by the Harvard Business School Publishing Corporation and is printed at the Office of the University Publisher.

- Manuscripts, books for review, and all editorial correspondence should be sent to

Business History Review Editorial Office
Cotting House 100
Harvard Business School
Boston, MA 02163
Telephone: 617-495-6154
Fax: 617-496-3740

- Queries regarding advertising and subscriptions, as well as all changes of address, should be sent to the business manager, Ann Chaney, at the same address.
- Correspondence regarding rights and permissions should be addressed to

Audrey Barrett
Permissions Editor
HBSPC
Harvard Business School
Boston, MA 02163

• *Annual Subscription Rates*

Individuals	\$25.00
Institutions	\$50.00
Students (with valid ID)	\$16.00
All subscriptions outside the U.S. and Canada	\$50.00

- Most issues of volumes 58-65 (1984-91) are available from our office for \$10.00 per issue or \$40.00 per volume. Please write for details.
- *Business History Review* articles are listed in *Business Methods Index*, *Book Review Index*, the *Journal of Economic Literature*, *Historical Abstracts*, *America—History and Life*, and ABI/INFORM.
- Notice of failure to receive issues must reach the office no later than six months after the date of mailing. Postmaster: Send address changes to *Business History Review*, Harvard Business School, Boston, MA 02163.

C O N T E N T S

HIGH-TECHNOLOGY INDUSTRIES

INTRODUCTION • ix

ARTICLES

Richard N. Langlois External Economies and Economic Progress:
The Case of the Microcomputer Industry • 1

*Michael A. Cusumano, Yiorgos Mylonadis, and Richard S.
Rosenbloom* Strategic Maneuvering and Mass-Market Dynamics:
The Triumph of VHS over Beta • 51

Louis Galambos Theodore N. Vail and the Role of Innovation in
the Modern Bell System • 95

Glenn E. Bugos Intellectual Property Protection in the American
Chicken-Breeding Industry • 127

EDITOR'S CORNER • 169

BOOK REVIEWS

Peter Baldwin, *The Politics of Social Solidarity: Class Bases of the
European Welfare State, 1875–1975.* Reviewed by Pat Thane • 231

David T. Beito, *Taxpayers in Revolt: Tax Resistance during the
Great Depression.* Reviewed by Barry D. Riccio • 193

Lenard R. Berlanstein, *Big Business and Industrial Conflict in
Nineteenth-Century France: A Social History of the Parisian Gas
Company.* Reviewed by Gary Cross • 236

Michael H. Best, *The New Competition: Institutions of Industrial
Restructuring.* Reviewed by Jim Tomlinson • 210

Herrick Chapman, *State Capitalism and Working-Class Radicalism
in the French Aircraft Industry.*
Reviewed by Edward H. Lorenz • 238

Barry G. Cole, ed., *After the Breakup: Assessing the New Post-
AT&T Divestiture Era.* Reviewed by Kenneth Lipartito • 199

Clarence B. Davis and Kenneth E. Wilburn, Jr., eds., with Ronald
E. Robinson, *Railway Imperialism.* Reviewed by Peter J. Cain • 227

- Marc Allen Eisner*, *Antitrust and the Triumph of Economics: Institutions, Expertise, and Policy Change.*
Reviewed by Theodore P. Kovaleff • 201
- Steven A. Epstein*, *Wage Labor & Guilds in Medieval Europe.*
Reviewed by Thomas W. Blomquist • 216
- John W. Field*, *Fig Leaves and Fortunes: A Fashion Company Named Warnaco.* *Reviewed by* Bernard Smith • 185
- Richard Florida* and *Martin Kenney*, *The Breakthrough Illusion: Corporate America's Failure to Move from Innovation to Mass Production.* *Reviewed by* Craig Wollner • 208
- Steven Fraser*, *Labor Will Rule: Sidney Hillman and the Rise of American Labor.* *Reviewed by* Robert Asher • 180
- Marc Galanter* and *Thomas Palay*, *Tournament of Lawyers: The Transformation of the Big Law Firm.*
Reviewed by Tony Freyer • 174
- Charles R. Geisst*, *Visionary Capitalism: Financial Markets and the American Dream in the Twentieth Century.*
Reviewed by George D. Green • 203
- David J. Goldberg*, *A Tale of Three Cities: Labor Organization and Protest in Paterson, Passaic, and Lawrence, 1916–1921.*
Reviewed by Laurence F. Gross • 176
- Daniel R. Headrick*, *The Invisible Weapon: Telecommunications and International Politics, 1851–1945.*
Reviewed by James Schwoch • 223
- Paul Hirst* and *Jonathan Zeitlin*, eds., *Reversing Industrial Decline? Industrial Structure and Policy in Britain and Her Competitors.*
Reviewed by Alan Cawson • 225
- Jonathan R. T. Hughes*, *The Governmental Habit Redux: Economic Controls from Colonial Times to the Present.*
Reviewed by Louis Cain • 197
- Geoffrey Jones*, ed., *Banks as Multinationals.*
Reviewed by Richard Sylla • 229
- Massoud Karshenas*, *Oil, State and Industrialization in Iran.*
Reviewed by Frances Bostock • 244
- W. Carl Kester*, *Japanese Takeovers: The Global Contest for Corporate Control.* *Reviewed by* James A. Fairburn • 248

- W. Dean Kinzley*, *Industrial Harmony in Modern Japan: The Invention of a Tradition*. *Reviewed by* Yuzuru Suzuki • 246
- Rachel N. Klein*, *Unification of a Slave State: The Rise of the Planter Class in the South Carolina Backcountry, 1760–1808*.
Reviewed by Mary Stovall Richards • 171
- Amedeo Lepore*, *La questione meridionale prima dell'intervento straordinario*. *Reviewed by* David G. LoRomer • 240
- John L. McLucas*, *Space Commerce*. *Reviewed by* Alice Hill • 207
- Maria Cristina Marcuzzo* and *Annalisa Rosselli*, *Ricardo and the Gold Standard: The Foundations of the International Monetary Order*. *Reviewed by* Leonard Gomes • 219
- Benjamin Martin*, *The Agony of Modernization: Labor and Industrialization in Spain*. *Reviewed by* Pamela B. Radcliff • 234
- Jerry L. Mashaw* and *David L. Harfst*, *The Struggle for Auto Safety*. *Reviewed by* Peter C. Carstensen • 191
- Archer H. Mayor*, *Southern Timberman: The Legacy of William Buchanan*. *Reviewed by* James E. Fickle • 183
- Karen A. Mingst*, *Politics and the African Development Bank*.
Reviewed by Dennis M. P. McCarthy • 242
- David E. Nye*, *Electrifying America: Social Meanings of a New Technology, 1880–1940*. *Reviewed by* Jeffrey L. Meikle • 188
- Arnold Pacey*, *Technology in World Civilization: A Thousand-Year History*. *Reviewed by* Joel Mokyr • 221
- Howard B. Rock*, ed., *The New York City Artisan, 1789–1825: A Documentary History*. *Reviewed by* Thomas R. Winpenny • 173
- Hilda Sabato*, *Agrarian Capitalism and the World Market: Buenos Aires in the Pastoral Age, 1840–1890*.
Reviewed by Donna J. Guy • 214
- Eric W. Sager*, *Seafaring Labour: The Merchant Marine of Atlantic Canada, 1820–1914*. *Reviewed by* Gordon Boyce • 212
- Eric W. Sager*, with Gerald E. Panting, *Maritime Capital: The Shipping Industry in Atlantic Canada, 1820–1914*.
Reviewed by Gordon Boyce • 212
- Virginia Scharff*, *Taking the Wheel: Women and the Coming of the Motor Age*. *Reviewed by* Lois W. Banner • 190

**Walter G. Vincenti, What Engineers Know and How They Know It:
Analytical Studies from Aeronautical History.
Reviewed by Trevor J. Pinch • 205**

**Craig Wollner, The City Builders: One Hundred Years of Union
Carpentry in Portland, Oregon, 1883–1983.
Reviewed by Mark Erlich • 178**

CONTRIBUTORS

Glenn E. Bugos is a fellow of the German Marshall Fund of the United States. He received his Ph.D. from the Department of the History and Sociology of Science at the University of Pennsylvania in 1988, and he has written on program management and systems engineering in the American and European aerospace industries. From 1988 to 1990, as a research fellow at the California Institute of Technology, he wrote a series of articles on plant biotechnology.

Michael A. Cusumano is associate professor of management at the Massachusetts Institute of Technology's Sloan School of Management, specializing in competitive strategy and the management of technology in Japanese firms. He graduated from Princeton University in 1976 and received a doctorate from Harvard University in 1984. He is fluent in Japanese and has lived and worked in Japan for six years. He held two Fulbright fellowships while studying at the University of Tokyo, Faculty of Economics, during 1980–83. In 1984–86, he was a postdoctoral fellow in Production and Operations Management at the Harvard Business School. In 1992 he was a visiting professor at Hitotsubashi University in Tokyo. He has written two books: *The Japanese Automobile Industry: Technology and Management at Nissan and Toyota* (1985) and *Japan's Software Factories: A Challenge to U.S. Management* (1991), as well as numerous articles on product development and manufacturing innovations in Japanese firms.

Louis Galambos is professor of history and editor of *The Papers of Dwight David Eisenhower* at Johns Hopkins University. A former president of the Economic History Association and the Business History Conference, he has written extensively on U.S. business history, on business-government relations, on the economic aspects of modern institutional development in America, and on the rise of the bureaucratic state. His books include *The Rise of the Corporate Commonwealth* (co-authored with Joseph Pratt, 1988) and *America at Middle Age* (1982). His major current interest is the process of innovation and its relationship to the

growth of large-scale business organizations, professional institutions, and government in the twentieth century.

Richard N. Langlois, who is professor of economics at the University of Connecticut, Storrs, received his Ph.D. from Stanford University in 1981 in Engineering-Economic Systems. He is the editor of *Economics as a Process: Essays in the New Institutional Economics* (1986) and the lead author of *Microelectronics: An Industry in Transition* (1988). He has undertaken case study research on the prewar American automobile industry and the present-day semiconductor equipment industry. His principal interest, however, lies in thinking about the economics of organization. He is now at work, with Paul Robertson, on the manuscript for a book linking transaction-cost economics with the evolutionary theory of economic capabilities.

Yiorgos Mylonadis is the Douglas Vickers Term Assistant Professor of Management at the Wharton School of the University of Pennsylvania. He will receive his Ph.D. in management from the Massachusetts Institute of Technology in June 1993. He holds an M.A. in economics from the University of California, Los Angeles (1986), Ptychio in economics from the National and Capodistrian University of Athens (1985), and a B.A. in sociology from the American College in Greece (1984). His research interest lies in exploring the claim that organizations act as thinking entities in a variety of contexts: competitive analysis, technology strategy, and organizational failure. His current research project examines the response of industrial firms to the social concern for protecting the natural environment.

Richard S. Rosenbloom is the David Sarnoff Professor of Business Administration at the Harvard Graduate School of Business Administration, where he has taught courses on Competition and Strategy, the Management of Technology, Manufacturing Policy, and Operations Management. He has published widely on the management of technology and innovation and is the editor of an annual series, *Research on Technological Innovation, Management and Policy*, published by JAI Press. He is currently at work on a book on "The Future of Industrial Research."