

# Index

- Alvey, John, 106  
American Council on Education, 150  
American Electronic Association, 147  
AT&T, 14, 16, 78, 111-134
- Babbitt, Governor Bruce, Arizona, 172  
Battelle Memorial Institute, 32  
Bell Laboratories, 11, 14, 16, 74, 113, 120, 153  
British Alvey Program, 18  
Brown, Charles L., president, AT&T, 128  
Buchsbaum, Solomon J., 123  
Bureau of Labor Statistics (BLS), 142, 146
- California Institute of Technology, 17  
case studies, 9  
    advanced computer architecture, 9, 55  
        changing computer architecture, 56  
        computer architecture R&D, 57  
        critical areas of research, 63  
        international efforts, 65  
        manpower, 65  
    artificial intelligence, 13, 87  
        content and conduct, 96  
        foreign national efforts, 105  
        R&D environments, 90  
    fiber optics, 12, 67  
        commercialization trends, 69  
        directions of U.S. research, 73  
        research in Japan, 74  
        United States R&D, 71  
    software engineering, 11, 75  
        content and conduct of software  
        engineering R&D, 79  
        international efforts in software  
        engineering R&D, 85  
        software R&D environments, 76  
Chynoweth, Alan G., 129  
Computer Technology Corp., 36  
Congress:  
    House Committee on Energy and Commerce,  
    3  
    House Committee on Science and  
    Technology, 3  
    Joint Economic Committee, 172  
    Senate Commerce Committee, 128  
Corning Glass Works, 73
- Defense Advanced Research Projects Agency  
(DARPA), 9, 29, 58, 93, 95, 219  
Department of commerce, 32  
Department of Defense (DOD), 5, 11, 13, 20,  
29, 41, 58, 75, 78, 89, 93, 279, 294, 329  
Department of Energy, 4, 10, 20, 58  
Department of Justice, 33, 111, 116  
deregulation and divestiture on research,  
    effects of, 111-135  
    antitrust laws, deregulation and divestiture,  
    113  
    divestiture, 116  
factors affecting research, 123  
    allocation of research and development  
    expenditures, 125  
    availability of research results, 130  
    basic research, 128  
    Bell Communications Research, Inc., role  
    of, 129  
    stability of earnings, 123  
    policy implications, 131  
    research at AT&T, management of, 120  
    Bell Labs after divestiture, 122  
    modified final judgment and Bell Labs, 121
- education and human resources for research  
    and development, 139-166  
    concern about manpower, 139  
    elementary and secondary education, 154  
    Federal role in manpower development, 157  
    identifying particular manpower problems  
    and solutions, 141  
    problems in higher education, 149  
    range of manpower predictions, 145  
    relationship between manpower development  
    and economic growth, 140  
    societal context for determining Federal  
    manpower policy, 161  
    supply of manpower, 149  
environment for R&D in information  
    technology, 25-52  
concepts for R&D, 27  
roles of the participants, 28  
    conflicts in perspectives, goals, and  
    policies, 42  
    Federal Government, 28  
    Government funding, 28  
    industrial R&D, 34  
    other Federal policies, 31  
        antitrust policy, 33  
        industrial policy, 33  
        patent policy, 31  
        R&D limited partnership, 33  
        tax credits, 32  
        technology transfer, 32  
    pattern of Government funding, 30  
    universities' role in R&D, 37  
measures of the health of U.S. R&D in  
    information technology, 43, 51

- information industry profile, 43
- U.S. patent activity, 45
- European Community (EC), 66
- European Economic Community (EEC), 216
- European Program for Research and Development in Information Technology, (ESPRIT), 18, 202, 216, 219
- Federal Communications Commission, 31, 111, 114, 115
- Federal Trade Commission, 33
- foreign information technology R&D, 201-276
  - conclusions, 221
  - international trends, 201
    - adapting technology, 202
    - international technology agreements, 208
    - multinational corporations, 206
    - patents, 210
    - science and engineering students, 212
    - scientific and technical literature, 211
    - technology exchange agreement, 207
    - trade, 201
    - U.S. computer trade, 203
  - Japan, 222
    - government, 226
      - Defense Agency, 239
      - Information Technology Promotion Agency (IPA), 236
      - Japan Electronic Computer Co., 236
      - Japan Development Bank, 239
      - Japan Robot Leasing Co., 236
      - Kokusai Denshin Denwa Ltd., 238
      - Ministry of International Trade and Industry, 228
      - Ministry of Posts and Telecommunications: Nippon Telegraph and Telephone, 236
      - national R&D projects, 231
      - Science and Technology Agency, 235
    - industry, 243
      - Fujitsu Ltd., 245
      - Hitachi Ltd., 245
      - NEC Corp., 244
      - Oki Electric Industry Corp., 246
    - size of Japanese participation in information technology markets, 225
    - university, 240
  - France, 246
    - government, 252
      - Agence de l'Informatique, 256
      - Centre d'Etudes des Systemes et des Technologies Avances, 257
      - Centre Mondial Informatique et Ressource Humaine, 257
    - Centre National d'Etudes Telecommunications, 254
    - Centre National de la Recherche Scientifique, 253
    - L'Institut National de Recherche en Informatique et en Automatique, 255
    - Ministere des Postes, Telecommunications, et Telediffusion, 253
  - Industry, 259
    - CII Honeywell Bull, 259
    - CIT Alcatel, 260
    - Sogitec, S. A., 261
    - Thomson CSF, 260
  - political environment, 248
  - size of participation in information technology markets, 247
  - social environment, 252
  - university, 257
- United Kingdom, 261
  - ESPRIT, 272
  - government, 263
    - British Technology Group, 269
    - Department of Education and Science, 268
    - Department of Trade and Industry, 265
    - Ministry of Defense, 268
  - industry, 270
    - British Telecom, 271
    - General Electric Co., 271
    - Plessey, 271
  - size of participation in information technology markets, 263
  - university, 269
- U.S. information technology R&D policies, implications for, 214
  - government/industry/university institutional arrangements, 217
  - government role, 216
  - industry participation, 219
  - science and technology policy goals, 215
- France, 66, 70, 87, 246
- French La Filiere Electronique program, 18
- General Accounting Office (GAO), 39, 78, 155
- General Electric, 181
- Georgia Institute of Technology, 30
- goals for Federal R&D policy, 3
- Great Britain, 66, 71, 86, 261
- Greene, Judge Harold H., U.S. District Court for the District of Columbia, 116
- Heckler, Representative Margaret, 139

- IBM, 12, 36, 53
- information technology R&D, nature of, 6  
 close boundary between theory and application, 8  
 complexity, 8  
 multidisciplinary nature, 7  
 software as technology, 7
- Inman, Admiral Bobby, 194
- Institute of Electrical and Electronic Engineers, 148
- issues and strategies, 14  
 changing roles of universities, 17  
 foreign programs, 18  
 science policy, 19  
 scientific and technological manpower, 16  
 telecommunications deregulation, impacts of, 14
- Japan, 65, 70, 74, 85, 222
- Japanese Fifth Generation Computer Project, 13, 18, 65, 105
- Japan Ministry of International Trade and Industry (MITI), 65, 75, 105, 219, 228
- Lawrence Livermore National Lab, 58
- legislation:  
 Economic Recovery Tax Act, 32  
 House Authorization Act of 1984, 41  
 Merrill Act of 1862, 158, 159  
 National Cooperative Research Act of 1984, 33  
 National Defense Education Act of 1958, 159  
 Public Law 96-517, 31  
 Sherman Antitrust Act, 113  
 Stevenson-Wydler Technology Innovation Act of 1980, 32, 215  
 Tax Equity and Fiscal Responsibility Act of 1982, 32
- Lewis, David, 148
- Library of Congress, 133
- Los Alamos National Lab, 58
- Lotus Development Corp., 202
- Massachusetts Institute of Technology (MIT), 17, 177
- McCarthy, John, 90
- Microelectronics Center of North Carolina, 36, 184, 188
- Microelectronics & Computer Technology Corp., 36, 120, 172, 193
- Microsoft, Inc., 204
- National Aeronautics and Space Administration (NASA), 4, 10, 30, 31
- National Bureau of Standards, 37, 85
- National Center for Education Statistics, 34
- National Oceanic and Atmospheric Administration (NOAA), 4
- National Science Foundation (NSF), 8, 9, 27, 29, 30, 40, 41, 58, 94, 142, 147, 159
- National Science Teachers Association, 155
- National Telecommunications and Information Administration, 133
- Nelson, Richard R., 129
- new roles for universities in information technology R&D, 169-195  
 forces driving new relationships, 171  
 impacts of new university arrangements, 173  
 expected benefits, 174  
 potential costs, 175  
 new roles, 176  
 Microelectronics Center of North Carolina, 184, 188  
 Microelectronics & Computer Technology Corp., 193  
 Microelectronics and Information Sciences Center, University of Minnesota, 178  
 MIT Microsystems Industrial Group, 177  
 Rensselaer Polytechnic Institute for Industrial Innovation, 180  
 Semiconductor Research Corp., 189  
 Stanford University Center for Integrated Systems, 182, 185
- North Carolina State University, 30
- Ohio State University, 30
- Penzias, Arno, vice president, Bell Labs, 130
- Perot, H. Ross, 194
- principal findings, 5
- Rensselaer Polytechnic Institute, 30, 73, 180
- Research Triangle Park, NC, 173, 231
- Semiconductor Research Corp., 36, 120, 189
- Stanford University, 182, 185
- technology and industry, 307  
 characteristics of the U.S. information industry, 316  
 employment, 317  
 industry structure, 320  
 international trade, 317  
 smd entrepreneurkd firms, 321  
 composition of information technology, 308  
 examples of system applications, 309  
 cellular mobile radio communications, 310  
 computer simulation, 312

direct broadcast satellites, 310  
financial services, 315  
heart pacemakers, 314  
robotics, 311  
importance of information technology, 307  
where the technology is heading, 323  
convergence of biotechnology and  
information technology, 330  
gallium arsenide integrated in circuits, 328  
microelectronics, 324  
silicon integrated circuits, 324  
software, 331-334  
Texas A&M University, 194  
top 15 U.S. companies in R&D spending, 44  
Trilogy Ltd., 33  
Tsukuba Science City, Japan, 231  
Turing, Alan, 90  
  
University of Arizona, 74  
University of Minnesota, 178  
University of Rhode Island, 30

University of Rochester, 73  
University of Texas, 194  
U.S. patent activity, 45  
U.S. Patent and Trademark Office, 47  
U.S. science and technology policy, 279  
background, 280  
general policies, 280  
science policy statements, 282  
tenets of science and technology policy,  
285  
information technology R&D policies, 286  
key issue areas, 290  
international competitiveness, 298  
military/civilian balance of R&D funding,  
294  
organization of government, 290  
  
Vetter, Betty M., 147  
von Neumann, John, 90  
  
West Germany, 66, 70