The Internet and American Business

edited by William Aspray and Paul E. Ceruzzi

The MIT Press Cambridge, Massachusetts London, England © 2008 Massachusetts Institute of Technology

All rights reserved. No part of this book may be reproduced in any form by any electronic or mechanical means (including photocopying, recording, or information storage and retrieval) without permission in writing from the publisher.

For information about special quantity discounts, please e-mail special_sales@mitpress.mit.edu

This book was set in Stone Serif and Stone Sans on 3B2 by Asco Typesetters, Hong Kong. Printed and bound in the United States of America.

Library of Congress Cataloging-in-Publication Data

The Internet and American business / edited by William Aspray, Paul E. Ceruzzi.

p. cm. — (History of computing)
Includes bibliographical references and index.
ISBN 978-0-262-01240-9 (hardcover : alk. paper)
1. Internet—United States—Economic aspects. 2. Electronic commerce—United States.
3. Internet industry—United States. 4. Internet—United States—Social aspects. 5. Information technology—United States—Economic aspects. I. Aspray, William. II. Ceruzzi, Paul E.
HE7583.U6157 2008
384.3'30973—dc22 2007005460

10 9 8 7 6 5 4 3 2 1

Index

Abbate, Janet, 3, 106, 110 ABC (television network), 298 About.com, 289 Academia, 374, 541-542. See also Universities Academic addresses, 33-34 Academic researchers, 107, 147 Acceptable Use Policy, 27, 28, 29, 31, 34, 38, 543 Access, Internet, 394; among U.S. households, 98n. 31; availability of, 69-70, 223; first advertised prices for commercialized, 49; locations lacking, 70; and telemedicine, 358 Account information, spammers' access to, 121 Ackman, Dan, 513, 515 Active Desktop, 141 ActiveX programs, 145 Adams, Rick, 28 Address, e-mail, 33, 116, 120. See also Domain name analysis Adolescents: and Napster, 469; use of media by, 304 AdSense, Google's, 186 Adult entertainment industry, 501, 503, 504; corporatization of, 521; customization in, 505-506; Internet in, 492, 532; in mainstream media, 495, 506; major makeover of, 521-522; major players in, 522-532; media substitution in, 499-502; statistics for, 508-515; structure of, 520-522 Advanced Audio Coding (AAC), 459-460

Advanced Network and Services (ANS), 53, 65, 66

Advanced Research Projects Agency (ARPA), U.S. Dept. of Defense, 3, 9, 107, 111, 561; Information Processing Techniques Office of, 318; and Internet development, 22; as source of protocols, 31; and TCP/IP, 11-12 Advertising, 293, 558; commercial use of Internet for, 554; on community-based sites, 553; decline in magazine, 286; to finance Internet, 548; of media organizations, 296; search-related. 297 Advertising, Internet, 119, 160, 170-174, 171, 184, 295; and customer profiling, 172; and dot-com crash, 180; early mass, 543-544; Google's, 184; with instant messaging programs, 123; Internet search, 191; on navigation sites, 159; pay-per-click, 173, 186; preferential treatment in, 173; "pushed," 296; rising revenues in, 185; syndicated, 191; via spam, 121; on Web, 170-174, 186; Yahoo's first, 166 Aimster, 470 Airline reservations industry, 317, 320-321, 322-323, 400. See also Travel reservations industry Airlines, direct sales model of, 319

Ajax (Asynchronous JavaScript and XML), 146, 216

Akimbo, 299

Alcatel, in early server market, 59

Alexander, Kelly, 479 Alex.com, 181, 552 Alibris, 397 Allaire, ColdFusion produced by, 134 Allstate, 375 AltaVista, 159, 167, 169, 174, 181, 185, 190 Amazon.com, 133, 191, 233, 260, 315, 397, 412, 435; and customers' buying patterns, 411; and fraud, 559; Get Big Fast approach of, 261, 263-265, 272; origins of, 343n1, 408, 410; and social dynamics, 426 American Airlines, 318, 319 American Express, 318 American Idol franchise, 279 American Lawyer Media, 429 American Library Association, 461 AmericanSingles, 436 America Online (AOL), 17, 37, 38, 67, 177; advertising policy of, 177; as bulletin board operator, 57; chat rooms of, 17, 122; community orientation of, 426; competition with Microsoft, 99n45; converted services of, 427; customer services of, 188-189; early e-mail services offered by, 113; e-mail gateways of, 114; emerging operations of, 65, 130; flat-rate pricing of, 75; full Internet access offered by, 130; instant messaging applications, 68; Internet Explorer of, 68, 140; Kavak investment of, 324; in market for home Internet users, 131; market share of, 99n43; and media organizations, 280; Netscape acquired by, 143, 157n110, 544; Nullsoft acquired by, 464; online advertising revenues of, 172; pricing scheme of of, 427; restructuring of, 88; software promotion by, 154n73; travel service of, 322; in U.S. market, 119; volunteer network of, 427 Anderson, Chris, 244 Annals of the History of Computing, 557 Anticircumvention legislation, 461 Antipornography legislation, 501 Antispam industry, 121-122, 215 Antitrust law, enforcement agencies for, 56-57

Anycasting technique, 37 AOL Europe, 468 AOL Instant Messenger (AIM), 122-123, 552 AOL Time Warner, 143, 180 Apache software, 63, 70, 131-132, 544 Apollo, United Airlines, 318, 322 Apollo Group, Univ. of Phoenix owned by, 371 Apple Computer, 332; AAC of, 435, 460; iChat software of, 123; iPods sold by, 410; iTunes of, 469; iTunes Store of, 474-476, 546; record companies signed on with, 474 Application Service Providers (ASPs), 209-213; customization service provided by, 212-213; hosting services of, 211; and Internet bubble, 212; pure-play, 210-211 Arbitron research, 287 Architext, 170 ARPANET, 4, 9, 10, 11, 13, 26, 38, 107, 110; access to, 15; compared with commercialized Internet, 13–14; design for, 107; early history of, 105, 497-498; experimental connections of, 21; newsgroups from, 542; original nodes of, 368; replaced by Internet, 111; as research network, 21; TCP/IP protocols of, 12; transition from, 23; unsolicited commercial e-mail sent on, 120 ARTISTdirect, 468 Ask Jeeves service, 170, 174 ASP Industry Consortium, 212 Assets-Based Community Development (ABCD), 442–443 Assortment, for Internet retailers, 244-245, 248, 256n36 Asynchronous JavaScript + XML (Ajax), 146, 216 AT&T, 10, 87; court-ordered breakup of, 24-25; early e-mail services of, 113; emerging operations of, 65; monopoly of, 560; national fiber network of, 54; restructuring of, 88; as retail Internet provider, 69; as tier-1 provider, 66; Worldnet service of, 65, 75 Auction-hosting site, 246. See also eBay Auction houses, online, 234, 246, 248, 257n52, 549

Auction system, 173, 327–328 Audience: decline in print, 293; estimating size of, 286–287; and news creation, 300–301 Audio Home Recording Act (AHRA) (1992), 456, 457, 460, 466 Australian Record Industry Association (ARIA), 472 Authentication, problem of, 363 Automatic Data Processing (ADP), 202–203, 219 Automatic Payrolls, Inc., 203 Automobile industry, 271, 376, 395, 398

Backbone firms, 12, 66, 69, 80; as commercial resource, 28; NSF-supported, 25; overbuilding of, 71; public and private, 52; reselling capacity of, 74; run by commercial entities, 38; speeds upgraded for, 23-24 Backbone Network Service, 31 Baidu Chinese search engine, 159, 552 Ballmer, Steve, 142, 156n101 Bands, and fan sites on Internet, 479 Bandwidth, 543 Banking industry, 549; online, 400, 408, 419n14; outsourcing in, 402; telecommunication use in, 393 Bank of America, E-Loan investment of, 330 Baran. Paul. 11 Barthes, Roland, 503 Baud, use of term, 15 BBC, audience participation area of, 302 Beam-It service, 465 Beastie Boys, 458-459 Beate Uhse Ag., and pornography, 502 Bebo.com, 304 Bell, C. Gordon, 18, 23 Bell Labs, AT&T, 10, 19 Bellovin, Steve, 542 Benioff, Marc, 201, 214 Bennett, Frederick, 371 Berkeley Software Distribution (4.2BSD), 19 Berners-Lee, Tim, 61, 62, 124, 125, 126, 132, 133, 162-163, 165, 167-168, 191

Bertelsmann Music Group (BMG), 467-468, 469 Best Buy, 249, 258n64 Betamax Case, Sony, 456-457 Bezos, Jeff, 233, 260, 263, 264, 265, 432 Bhatia, Sabeer, 118 **Bibliometrics**, 183 Bicycle messenger services, 342 Big Blue, 317, 332 Biotech firms, B2B of, 400 BITNET, 20, 21, 25, 38, 112 BitTorrent, 452, 546 Blackberry, 85 Blacksburg Electronic Village, 424, 426 Bloch, Eric, 23 Blogs, 120, 303, 304, 498; cost structure for, 558; journalistic value of, 301 BN.com, 468 Board games, early, 550 Boczkowski, Pablo, 281, 282 Boles, David, 469 Boo.com, 261 Book dealers, secondhand, 397. See also Amazon.com BookLine, purchased by AOL, 131 Boston, Internet diffusion in, 58 Boston Globe, 290 Boucher, Rep. Rick, 29-30, 465 Bowie, David, 458 Bowman, Shayne, 300, 303 Brand, Stewart, 14, 16, 18, 426 Brands, 330; marketing value of, 341; online retailing, 233, 243 Braun, Lloyd, 301 Brin, Sergey, 182, 185 Broadband connections, 35, 64-65, 455-456; for AOL's customers, 188; availability of, 394; and computer games, 550; home, 545; of U.S. households. 98n32 Broadband Internet access firms, 81, 88, 89 Broadband servers: emergence of, 49, 81-83 Broadcast media: business models of, 295-296; impact of Web on, 297; online, 282, 291

Broadcast news, decline of, 285 Broadvision, 211 Broadwatch, 54 Brokerage industry, 398; declining number of brokers in, 407, 420n30; effect of Internet on, 405-408; first online Internet-based services in, 407; fixed commissions in, 406; rise in number of customers for, 406-407; transaction-based offerings of, 415; work-flow redesign in, 392 Brokerage services, 423, 430-435 Brown, James, 239, 252 Brown, John Seely, 371, 374 Browsers, 136–138; Mosaic; Navigator; diffusion of, 64; early, 126, 128; improvement of, 76; line mode text-only, 153n. 54; Mozilla-based, 145; Netscape's share in market, 144, 157n114; for online retail, 242; software, advances in, 130; Unix version of, 144; wars, 138-144, 176; widespread use of, 127, 129-131. See also Internet Explorer Bryan, J. Stewart III, 290 Buddy list, 99n44, 122 Bug Juice, 467 Bulletin board operators, 55-58, 58 Bulletin board system (BBS), 112, 542; and regulatory policy, 56; sharing of files on, 468 Buma/Stemra (Dutch music publisher), 471 Bundling, of media organizations, 296-297 BurnITFIRST.com, 467 Bush, Vannevar, 162 Bush (George W.) administration, 90, 142, 157n105, 503 Business directories, 173 Businesses: connection approaches for, 221; and e-commerce, 252; and "free" Internet, 547; information-dependent, 403; information retrieval in, 160; internal operations of, 401-404, 558; and Internet, 148; Internet channels added by, 395; and Internet in, 85-86; and Internet infrastructure, 131; and Internet of, 392; new online opportunity for, 409-412; online

customers of, 400; proprietary networks used by, 393-394; storefronts vs. Internet models of, 341; time-sharing access of, 225n20; Web sites of, 163. See also Entrepreneurs; Industry Business models, 292, 391, 412-414 Business Plan Archive (BPA), 247n17, 266 Business process outsourcing, 339 Business Software Alliance, 546 Business-to-business market, 299 Cable Act (1992), 460 Cable companies, 77, 81, 88, 98n32 Cable technology, 64, 221, 222, 229n73 Cable television, 284, 298, 305 Cactus Data Shield, 485n53 Call centers, 336, 338, 339 Campbell-Kelly, Martin, 417, 559 Canter, Laurence A., 120, 543 Capital markets, and commercial Internet, 269. See also Market, Internet Capitol Records, early Internet use of, 458-459 CarFinance.com, 330 Cars.com, 293 Case, Steve, 17, 33, 427 Case management services, 361-362 Catalog retailers, 243, 395 CBS (television network), 298 CCITT (international federation of telecommunications carriers), 114 CDNow, 233, 253n2, 468 CD-ROMs, interactive, 459 Cell phones, 398; text messaging on, 123; video presentations created by, 300; Webenabled, 253 Centrino program, 84 Cerf, Vint, 25, 27, 37 CERN, 124, 125, 126, 165 Chain stores, 233-234, 235, 249 Chandler, Alfred D. Jr., 398, 399, 416 Charter, Dennis, 549 Chat rooms, 17, 122, 402, 498 Chaum, David, 549 Chemical industry, B2B of, 399

Chemistry.com, 437 Chess, computer, 550 Chiariglione, Leonardo, 462 ChicagoTribune, 280 Child Online Protection Act (1998), 519 Children's Internet Protection Act, 519 China, 337-338, 341, 343, 560 Chinese instant messenger service, 552 Chomskytorrent.org, 546 Christmas season, and business, 263-264 CICS. 417 Cinemania film review archive, 136 Circuit City, 249, 258n64 Cisco (equipment supplier), 59, 86, 413 Citicorp, 401 "Citizendium," 555n16 Citizen journalists, 300, 304 Clark, Jim, 61, 354, 365 Clarke, Ian, 473 Classroom, computers in, 371, 372, 373-374, 375. See also Universities Clerical positions, decline in numbers of, 403 Cleveland Free-Net, 424 Click fraud. 186-187 Clinton administration, 62, 79-80, 408-409 Club Jenna, Inc., 522, 529, 530 CNET, 176 CNN (television network), 279, 280, 285, 288, 290 Coase, Ronald, 343n3 Cohen, Bram, 545 ColdFusion, 134 Cold war, and origins of Internet, 9 College credit, online courses for, 374 College professors, Internet use of, 368-369. See also Professors Comcast, AT&T cable assets acquired by, 81 Comedy Central, 298 Commerce, business-to-business or B2B, 399-400. See also e-commerce Commerce, U.S. Dept. of, 13, 36-37 Commercial Internet eXchange (CIX), 29, 32, 63

Commercialization: of early Free-Nets, 425; Internet's, 4, 148, 557 Committee 802, 83-84 Common carrier law, tradition of, 57 Common Gateway Interface (CGI), 128 Communication industry, and Internet, 54, 58 Communication networks, computermediated, 562. See also Networks Communications, 299, 416-417. See also Media; Telecommunications Communications Decency Act (1996), 519 Communities, online, 120; brokerage services, 430-436; building, 554, 560; community networking services, 440–443; conversational, 438; converted services, 427-430; discursive, 547; game, 549-550; global vs. local, 553-554; origins of, 424-426; social networking services, 436-440; virtual sexual, 496 Community informatics, 423, 441, 443 Community networking services, 423, 440-443. See also Networks Community seeking, 552 Community Technology Centers (CTC), 440-442 Compact discs (CDs), 135, 335, 454, 476 Compaq Corp., 332-333, 333 Competition, 48, 49; and FCC, 90; on global scale, 405; and pricing practices, 64; in voice telephony, 79 Competitive Local Exchange Carriers (CLECs), 77, 78, 90 Compression systems, 468. See also MP3 CompUSA, 333 CompuServe, 15, 27, 67, 113, 114, 427; bought by AOL, 68, 177; as bulletin board operator, 57; Internet Explorer distributed by, 140 Computer Fraud and Abuse Act, 25-26 Computer industry: browser wars in, 138–139; and demand for software, 203; disruptive technologies in, 217; and Internet music boom, 477; mainstream of, 129; Windows 95 in, 134

Computer literacy, 403 Computer manufacturing firms, Intranet used by, 401 Computer networks, 9, 10, 147. See also Networks Computer reservation systems (CRSs), 317, 318 Computers, 110, 121, 208, 358. See also Personal computer business Computer Sciences Corp. (CSC), 203, 209 Computer utility, 201, 204, 209-213, 220 ComScore Media Metrix, 185, 516 Concentric Systems, 211 Conferencing, Web-based, 402 Connection speed, in 1960s and 1970s, 221-222 Consignment selling, 234, 247 Consumer confidence, 16 Consumer relationship management (CRM), 315 Consumers, Internet, 250, 306, 426; customers, and augmented retailing, 253; increasing numbers of, 413; "new hybrid," 249; and online pricing, 255n33; and online retailing, 244; pornography, 496, 499, 517-518 Content providers, 413 Content Scramble System (CSS), 462 Control Video Corp., 16, 17 Converted services, 423, 427-429 Cookies, introduction of, 133 Coopersmith, Jonathan, 495, 501 Copyright infringement, 452, 457, 469, 470, 473 Copyright law, 456, 466 Copyright protection: in cyberspace, 373; and Internet, 410 Copyright violation: and home broadband access, 545-546; and music file sharing, 5 Corel, 138, 140 Corio, 210, 211, 212 Corley, Eric, 462 Corning, 86, 411

Corporate culture, 505 Corporate record indexing, market for, 194n49 Corporate search products, development of, 189 Corporate software products, 203-204 Corporations, 202, 203. See also Businesses Correspondence schools, 373 Costs, sales volume as driver of, 256n46. See also Pricing Counsel Connect, 428-429, 430 Counterculture, origins of cyberculture out of, 482n22 Courses, online-only, 374 Courseware, electronic, 373 Cox (cable television firm), 81 Craig's List, 293, 300, 558 Creative Commons, 551 Credit card transactions, 16, 395, 549, 559 CRM. See Customer relationship management CRSs. See Computer reservation systems CSC. See Computer Sciences Corp. CSNET, 19-20, 22, 38 CTSS system, at MIT, 150n. 12 Current TV, 301 Customer relationship management (CRM) software, 211, 214 Customers: in brokerage industry, 406-407; eBay's, 433; on Internet, 400, 415; profiling of, 172; reviews and ratings of, 322, 425-426 CyberCash, 171 Cybereducation, 370-375, 373 Cyberintermediaries, 321, 322-324, 326, 329-330 Cybersell, 120 Cyberspace, 16 "Darknet," 546 DASnet, 18 DAT. See Digital audio tape Databases, 14, 169 Data network, commercial, 15 Data processing service industry, batch data processing in, 202, 203

Data rate, 221-222, 229n74 Datek, 407 Dating sites, online, 436, 437, 438 Davies, Donald, 11 DeConcini, Dennis, 457 DeCSS program, 462 "Deep Blue," 550 "Deep web," 161 Defense, U.S. Dept. of (DOD), 21, 111, 401, 420n31. See also Advanced Research Projects Agency Defense Advanced Research Projects Agency (DARPA), 39n2, 62 Defense industry firms, Internet adopted by, 394, 418n6 Delivery services, effect of Web on, 342 Dell, Michael, 333, 334 Dell Computer, 316; business model of, 334; in China, 337-338; competition with Gateway of, 334; computer design of, 333, 334; direct model and logistics capabilities of, 336; direct sales of, 239; in India, 336; masscustomization strategy of, 334; Olympic product of, 333-334; Wi-Fi products of, 84 Delta Airlines, 319 Demand: and backbone capacity, 74; broadband, 83; for Internet traffic, 71, 74; and pricing practices, 74 Democracy: semiotic, 302, 452, 480, 489n91; and voluntary association, 440 Democratization: of innovation, 498; of pornography, 507-508 Department stores, 233–234. See also Retailers Design: retail sales in site, 242; social mechanisms behind, 107 Desktop operating system market, 141 Deviance, sociology of, 434 Dialog search site, 161, 172 Dial-up access, 35, 49; costs of, 74–75, 221; data rate for, 222, 229n73; modems for, 229n71; origins of market for, 92; and UUCP programs, 20 Diamond Multimedia, 466

Digital Audio Music, 465 Digital audio tape (DAT) recorders, 455, 456 Digital Audio Tape Recorder Act (1991), 457 Digital camera business, 340 Digital communication technologies, 287 Digital content, emergence of, 546 Digital Equipment Corp. (DEC): ALL-IN-1 system of, 113; DECnet of, 19; PDP-10s of, 40n16; VAX computers of, 21; VT-100 of, 13; X.400 capabilities of, 114 Digital film sharing, 452 Digital Millennium Copyright Act (DMCA) (1998), 453, 460, 461-462, 463, 466, 473 Digital minidisc players, 457 Digital photo kiosks, 340, 341 Digital Playground, 521 Digital subscriber lines (DSL), 64, 83, 456; asymmetrical protocol for, 548; costs of, 221; data rate for, 222, 229n73; maximum coverage radius for, 82, 102n72 Digital technologies: and recording industry, 453-456; and television networks, 298 Dimmick, John, 283, 284 Directory services, 159, 165–167, 173 Discursive communities, 547 Discussion groups, noncommercial uses of, 554 Disintermediation, 321, 375, 378, 498 Disk operating system (DOS), 60 Distribution: impact of Internet on, 559-560; and online retail, 244; for SaaS, 218 DLJdirect, 406 Doctors, Internet use by, 559. See also Physicians "Docuverse," 162 Domain name analysis, of pornography market, 499 Domain Name System (DNS), 32-38, 61, 125, 561 Domino, web mail offered by, 119 Dorner, Steve, 117 DOS operating system, 39n10 Dot-com boom, 5, 51, 94n. 4, 159, 160, 174

Dot-com bust, 78, 80, 86, 87, 91, 94n4, 179– 181, 269, 562 Dot-com era, 6, 179, 268–269; business history of, 261; business planning documents from, 266; firms, 269–271, 272–273; follies of, 164– 165; GBF in, 262–265; startups, 558; stock valuations during, 186; survival of firms in, 261–262; venture creation during, 265–267 Doubleclick.com, 172, 186 Drucker, Peter F., 416 DrugEmporium.com, 375, 376 DSL. *See* Digital subscriber lines Dulles Airport, and DNS registry, 37 DVD Forum, 462 DVDs, 462, 495

Earthlink, 65

Earth Station Five file sharing system, 473 easySABRE, 319

- eBay, 191, 233, 246–248, 261, 315, 411, 430, 431, 443; business model of, 432; community orientation of, 426, 432–433; and complementary suppliers, 248; fees set by, 246, 247 *fig.*; and fraud, 559; history of, 431; and Meetup.com, 439; PayPal purchased by, 548; rating scale of, 435; revenues of, 431; Skype purchased by, 552; transitioning of, 246
- e-Chemicals, emergence of, 408 e-commerce, 86, 233, 256n48, 264, 405, 430, 514; business sales in, 252; determination of success in, 263; discriminatory laws on, 101n65; disintermediation in, 375; mortgage brokers in, 329; multichannel retailing in, 249–252; online auctions in, 246; potential scale of, 238; small vs. large firms in, 247; and social dynamics, 426; within supply chain, 238; transition to, 241; travel reservations industry in, 316–317

Economy: e-commerce in, 397; goods and services in, 397, 405; integrated multichannel retailing in, 249–252; Internet in, 413; online

retail sales in, 237-239, 240; retail sector in, 235, 236, 237; successful Internet-based enterprises in, 412; Wal-Mart expansion in, 239 - 240Ecotourism, 325, 559 Edmond, A., 516 eDonkey, 452 Education: impact of Internet on higher, 368; and Internet, 305, 352; Internet-based, 371; online, 372, 373. See also Academia; Universities Educational management organizations, 373 Educational reform, and World Wide Web, 370-371 eGovernment Portals, 179 Egreetings Network, 468 eHarmony, 436, 437 E-health, 352-356, 358-367 Electronic commerce. See e-commerce Electronic Data Interchange (EDI), 392, 405, 414-415, 415 Electronic Data Systems (EDS), 209 Electronic digital computer, early goals for, 10. See also Computers Electronic Frontier Foundation, 463 Electronic information industry, personal computer in, 14. See also Information Electronic mail. see E-mail Electronic publishing systems, 159, 160 Electronic university, 371 Ellis, Jim, 542 Ellison, Larry, 138, 211 Elm (public domain product), 111 E-Loan, 330, 331 e-mail, 18, 55, 109, 114; of ARPANET, 110; bulk, 121; demand for, 105; dramatic increase of, 116; early commercial, 113; Internet as gateway for, 85, 111–115; limitations of, 110; for masses, 115-116; Microsoft application for, 60; and person-to-person communication, 110-111; physician aversion to, 362; university faculty use of, 369-370,

385n97; unstructured nature of, 363; volume of, 116; weaknesses of, 120 e-mail address formats, 115. See also Domain name system Emdeon, 365, 366 EMI, online albums of, 467, 485n50 Employees: economic effects of Internet on, 404-405; and intranet use, 403, 419n19 eMusic. 466. 477 Encarta encyclopedia, 136 Encryption technologies: and average Internet users, 363; for DVDs, 462 Engelbart, Douglas, 15 Enterprise e-mail and calendaring systems, market for, 118 Enterprise Resources Planning, 189 "Enterprise search," 189 Enterprise software products industry, growth of. 210 Entertainment: online auction houses providing, 248-249; shopping as, 245 Entertainment industry, 461-463, 504. See also Adult entertainment industry Entrepreneurs, 49, 260, 272, 273, 439 Entropy file sharing system, 473 E-rate program, 78 Eritmo.com, 468 E-tail sales. 405 Ethernet network, 26, 38, 223 Ethernet standard, 83 Ethical issues, in online advertising, 292 e-tickets, 320 eToys.com, 261, 263, 315 E*Trade Financial, 407, 408, 430 Eudora, 117, 119, 122, 151n32 Event ticketing, 239, 240 Excel, 135 Excite, Inc., 119, 159, 164, 173, 178, 181, 190, 322; emergence of, 170; liquidation of, 180; public offerings of, 174 Exodus, 211 Expedia, 321-322, 323, 326

Facebook, 147, 299, 303, 304, 437-438, 438, 441 Faculty, university, 374. See also Professors FairPlay antipiracy technology, 475 FanGlobe, 468 Fanning, Shawn, 433, 468, 469 Farechase, 324 FastTrack, 471, 472 Faxes. 112. 342 Federal Communications Commission (FCC), 24; and bulletin boards, 56; in enhanced service markets, 80; and exploratory investments, 89-90 Fees, original e-mail, 116. See also Costs; Pricing Felten, Edward, 463, 477 Fiber-optic connections, 23, 24, 222, 229n73 FidoNet, 112, 114, 150n18 File sharing: based on FastTrack, 471; and music industry, 451-452; Napster and, 468-473; peer-to-peer, 470, 473; privatization of, 480; and record sales, 476; technology of centralized, 451. See also Music file sharing File transfer protocol (FTP), 125, 168, 458, 468 Film, 480, 492 Film industry, 340-341; and circumvention, 460-461; pornography in, 499; and streaming, 460; and video file sharing, 451-452. See also Adult entertainment industry, business strategies of Filo, David, 166 Financial industries, early Internet use of, 397-398 Financial press, 129 Financial Times (London), 290 First mover advantage (FMA), 262-263 First Virtual (start-up firm), 171 Fisher, William III, 282, 302, 480, 497 Flickr.com, 191, 300, 552 Floppy hard drive, 455 FlowerNet, 341

Flynt, Larry, 503-504 Folksonomy, 191, 498 Forrester Research, 320, 329, 518 ForSaleByOwner.com, 289 Foucault, Michel, 496 401 (k) accounts, 406, 407-408 Foxfire browser, 145 Fox television network, 279, 298 Frankel, Justin, 455, 464, 470 Freedom to Innovate Network, 144 Freenet file sharing system, 473 Free speech, 547, 549, 555n14 Free Speech Coalition, 509 Frequent-flier plans, 319, 322 Friedman, Thomas L., 338 Friendster.com, 304, 437, 438, 439, 552, 561 Friis, Janus, 471 FrontBridge (antispam service), 215 Front Page (Web site creation tool), 135 Fuzzball software, 41n32 Galbraith, John Kenneth, 262 Galileo, 322

Gambling online, 497 Games, computer, 16, 480, 549-550 Garageband.com, 466 Gates, Bill, 25, 135, 147, 378, 416; Internet Tidal Wave memo of, 166; retirement from Microsoft management of, 156n101 Gateway, Inc., 334-335 Gateway, use of term, 195n54 Gateway device, 18, 21, 239 General Electric, 410 General Motors, proprietary EDI network of, 393 Genie, 67, 113, 114 Genuity, 79, 87, 88 GeoCities, 468, 486n57 Germany: Internet conference in, 5-66; privacy in, 560 Gerstner, Louis, 59 Get Big Fast (GBF) strategy, 261-265, 272 GetMusic.com, 467

Glaser, Rob, 459 Global access points, up-to-date map of, 553 Global community, Internet as, 549 Global Crossing, 87, 88 Global delivery systems (GDSs), CRS enterprises as, 324 "Global digitized village," 553 Globalization, 338, 442 Glossbrenner, Alfred, 14, 16, 18, 28, 35 Gmail, 119, 123, 146 Gnutella, 464, 470-471, 545 Go.com Web portal, 177, 315 Goodmusic, 466 Google, 159, 160, 182-183, 190, 191, 315, 552; advertising of, 184, 186; business operations of, 411; corporate culture of, 185; dominant position of, 187; Earth satellite image browser, 187; financing of, 548; free e-mail service of, 119; information retrieval capabilities of, 185; Maps, 146, 187, 216; as Microsoft competition, 147; Office, 215; PageRank algorithm of, 183–184; Print book indexing project, 188; public offering of, 185; revenues of, 189; search appliance of, 184, 189-190; services offered by, 187-188; service to China of, 479; Spreadsheets, 147, 216; Usenet absorbed by, 21; video store, 299; YouTube acquired by, 553 Goolsbee, Austan, 243 Gopher, 125–127, 168 Gore, Vice Pres. Al, 30, 31, 78, 301, 461 GoTo.com, 173 Government agencies, and Internet, 402, 408-409 Government Systems, Inc. (GSI), 36 govWorks, 179 Gracenote, 467 Grateful Dead, the, 458 Great Plains, Microsoft's acquisition of, 218 Greenberg, Eric, 259 Grokster file sharing program, 471, 472-473 Gross, Bill, 173 Grove, Andy, 416

GTE, emerging operations of, 65 Guardian Unlimited (British), 302 Guba, 299 Gurstein, Michael, 443 Hafner, Katie, 3 Handy, Charles, 416 Hard drives, personal computer, 455 Hardware. 12 Harris Interactive, 284 Hawkins, Gordon, 509, 513, 520 Hayes Communications, 222 HBO, 180 HCL Technologies, 339 Health Care Financing Administration (HCFA), 361 Health care industry, 354, 364; case management services in, 361-362; interactive communication, 352, 353; selective Internet use in, 352; technological innovation in, 356, 415; third-party benefits providers in, 361; waste in, 353, 365 Healtheon, 354, 365 Health informatics, 352, 353 Health information: portals, 365; protected, 363 Health Insurance Portability and Accountability Act (HIPAA), 363 Heiferman, Scott, 439 Hewlett-Packard, 114, 336, 466 High Performance Computing Act (1991), 30, 36 High-speed connections, 67, 82, 222-223, 229n73 HIPAA. See Health Insurance Portability and Accountability Act Hirsch, Steven, 531 History, Internet, 107, 108, 109-110, 562n1 Home-based businesses, 403 Home computer revolution, 109 Home Depot, 377 Home sales, commissions in, 331, 348n83 Hosted antispam service, 215

Hosting services, 67, 211 HOSTS.TXT file, 33 HotBot search service, 170 Hotels: adult movies in, 502; and bundling of travel packages, 322; Internet access in, 223; web site development of, 395 Hotline, MP3 distribution of, 545 Hotmail, 118, 119, 187, 189, 213 Hot spot locations, 223 HotWired, 170, 171, 194n38, 426 Households, U.S., with Internet access, 47, 48 H&R Block, 376, 411 Hummer Windblad, 469 Hun's Yellow Pages, 506 Hurricane Katrina, and Web activity, 300 Hypercard system, 162 Hypertext, 162, 190 Hypertext markup language (HTML), 124-125, 163; early support for, 61; and Web systems, 127 - 128Hypertext transfer protocol (http), 124-125, 132, 148

IBM Global Network, emerging operations of, 65 IBM (International Business Machine), 53; in Chinese personal computer market, 337; civilian air traffic control system of, 430; internal applications of, 401; and Internet, 392, 413; as ISP for business, 59; Notes, 118; and NSF, 24, 53; PC, 39n10, 332-333; PROFs system of, 113; proprietary protocols of, 23; RS/6000 computer, 37; SABRE developed by, 317-318; and SAGE, 317; Systems Network Architecture of, 19; System/370 mainframes, 20; TCP/IP used by, 24; as tier-1 provider, 66; unbundling decision of, 205 ICANN. See Internet Corporation for Assigned Names and Numbers iChatAV, 552 ICQ (I seek you), 68, 122-123 Illinois, Univ. of, and Mosaic, 128 Inclusion, Internet's philosophy of, 33

Income, and Internet, 305 Incumbent Local Exchange Carrier (ILEC), 77 Independent software vendors (ISVs), impact of SaaS on, 217-219 Indexes, for Web directories, 165-166, 167 India, 336, 339 Industry portals, 178-179 INFONET network, 209-210 Informatics: community, 423, 441, 443; health, 352, 353; social, 424, 429, 438-439 Information: contracted-for services, 399; cross-channel flow of, 249; health-related, 365-366; and market's balance of power, 408; offshoring, 317; for online shoppers, 241-243; Wikipedia-type, 304 Information and Communications Technologies (ICT), 423 Information ecosystems, 303 Information Infrastructure Task Force (IITF), 461 Information Processing Techniques Office (IPTO), ARPA, 10, 11 Information retrieval systems, 160-161, 162 Information science, 160 Information Segment, 413 Information services, 424; brokerage services, 430-436; community-oriented, 440-443, 444; converted services, 427-430; development of online, 161; niche markets for, 444; origins of, 424-426; social networking services, 436-440 Information society, 109 "Information superhighway," 30, 109, 544 Information technology, 52, 391; for auto industry, 393; automating functional activity in, 86; and brokerage industry, 407; employees in, 404; heavy users of, 86; incremental adoption of, 417; investment in, 85; offshoring of, 338, 339, 349n108; and private sector, 399; proprietary, 367; and social contexts, 429; transformation of, 201; VC-backed, 266-267; Wal-Mart's use of, 239 Infoseek, 172, 174, 177, 181, 190, 194n. 42

Infosys, 339 Infrastructure markets, investment in, 49 In-house computing, vs. time-sharing services, 208, 226n22, 226n23. See also Intranets Inktomi, 170, 174, 185 Innovation: democratization of, 498; effect on market structure of, 51; and indispensable intermediaries, 379; and regulatory policy, 93: user-driven. 148: Web's reliance on. 190. See also Technological innovation Inova Health Systems, 357 Instant messaging, 99n44, 122; adoption of, 124; AOL's version of, 68; as business tool, 123-124 Institute for Scientific Information, 183 Institute of Electrical and Electronics Engineers, 76, 83 Insurance, employer provided health, 366-367 Insurance industry, 395, 401, 402 Integrated Media Systems, 459 Integrated services digital network (ISDN), 65 Intel Corp., 84, 332, 334 Intellectual property, academic vs. commercial understanding of, 549 Intellectual property law, and noncommercial home recording, 456 Interactive books, market for, 136 Intercarrier compensation issues, 80 Interconnection: of networks, 112; technology of, 57 Interface Message Processor, 108 Intermediaries, indispensable, 352, 375-379 International Conference on Computer Communication (Washington, D.C.), 1972, 11 International perspective, on Internet, 560 Internet, 5, 18: academic, 54, 106; beginnings of, 21; in business, 391-392, 396, 399-400; in China, 337; commercial development of, 4-5, 61, 245, 260, 379; and community, 443, 541-542; diffusion of, 239, 285; early history of, 497-498; economic effects of, 404-405; economics of providing information on, 170;

effects on public sector of, 408-409; expansion in U.S., 393; forces driving, 557; free, 547-549; governance of, 13, 36, 38, 561; incremental adoption of, 417; for internal operations, 404; mass media's use of, 299; and media businesses, 279; monitoring deployment of, 393, 418n2; and music business, 476-480; music files distributed on, 454; and niche theory, 284; number of Americans connected to, 229n69, 229n74; overseas expansion of, 32; paid, 296; and personal computer business, 332-338; and pornography, 496-497, 502, 532; precommercial, 148; privatization of, 47, 51-52, 54, 58, 63-64; realtors and mortgage brokers in, 326-331; resistance to, 351; slow business acceptance of, 414; and social change, 305; structure of, 52; and TCP/IP creation of, 107; threat of, 342; traditional applications of, 5; and travel agencies, 317-326; use of term, 18. See also Access; Protocols Internet Activities Board (IAB), 62 Internet adoption, stages of, 393-399 Internet bubble, 29, 557. See also Dot-com bubble; Dot-com era Internet Corporation for Assigned Names and Numbers (ICANN), 12, 36, 37, 38, 62 Internet Engineering Task Force (IETF), 62, 76 Internet Explorer, 99n45, 134, 136, 544; competition with Netscape of, 143; first release of, 138; Microsoft's support for, 141; versions of, 68, 139, 144, 146 Internet fraud, 547-548 Internet music companies, 466-467. See also Music industry Internet navigation services, development of, 190. See also Navigation industry Internet Network Information Center (InterNIC), 35, 36 Internet payment firms, 171 Internet protocol, voice-over, 87. See also Protocols, Internet Internet-related firms, public offerings of, 165

Internet Relay Chat, 122 Internet Revolution, 129 Internet service providers (ISPs), 15, 65, 560; academic, 52-53; and CIX, 63; connectivity of, 52, 53; distribution of, 72, 73; earliest advertisements for, 54; and FCC policies, 77; first commercial, 53, 95n. 9; geographic coverage of, 69; home service first offered by. 75: increased reliability of. 80: local. 52: location of, 70; mom-and-pop, 65, 68; nonprofit regional networks replaced by, 38: origins of, 12; and peering, 31; phone numbers supported by, 65; and POP capabilities, 116; pricing policies of, 64, 76; and regulatory norms of bulletin board industry, 57; regulatory umbrella for, 80; and routine network operations, 67; smaller-scale, 38; Web sites of, 394-395 Internet Society, 12, 62 Internet Tax Freedom Act (1998), 79, 101n65 Internet Underground Music Archive, 458, 545 Interoperability, 20, 26 Intranets, 403, 404-405, 419n18 Inventory replenishment, 86 iPods, 295, 410, 435, 474, 475 IPv6. 87 IRA accounts, 407-408 ISPs. See Internet service providers iTunes. 410. 475 iTunes Music Store, 434, 473-476 iXL, 260

Jabber instant messaging standard, 123 Jaffee, David, 374 James, David, 531 Jameson, Jenna, 507, 529 Java, 137–138, 140, 147 JavaScript, 137 Java System Web Server, Sun's, 544 JD Uniphase, 86 Jennings, Dennis, 22 JetBlue, 324 Jobs, Steve, 474 Johansen, Jon, 462 Johnson, David, 428-429 Johnson Commission, 520 Journalism, 291-292, 300, 301, 304, 315 Joy, Bill, 19 Jupiter Research, 263, 264 Kahn, Robert, 11, 25, 37 Kamali, Peter, 439 Katz, Jon, 281 Kawasaki, 375 Kay, Alan, 14, 163 Kayak (Internet site), 324 Kazaa, 433, 435, 471–472, 545 Kearby, Gerry, 459 Kelly, Jill, 507 Kendrick, Walter, 501, 503 Killebrew, Kenneth, 292 Kimsey, Jim, 17 Kleiner Perkin, 183 Kling, Rob, 429, 430, 498 Knight Ridder, 294 Knowledge, sociology of, 369 Kodak, and digital camera technology, 340 Krol, Ed, 126, 129, 130 Labor costs, 402, 404-405

Language, and Internet-based interaction, 418n9. See also Communication Larson, Christopher, 330 Lasercomb v. Reynolds, 461 Lastminute.com, 322 Law, impact of Internet on, 559 Leavitt, Mike, 373 Lebda, Doug, 330 Legacy systems, and Internet business, 415 Legal case opinions, searchable database of, 428 Lehman, Bruce, 461 LendingTree, 330, 331 Lenk, Toby, 263 Lenova (Chinese firm), 337 Lessig, Lawrence, 106, 428, 429, 430

Letters, e-mail as replacement for, 109, 551-552 Level3, 87 Levi Strauss & Co., withdrawal from ecommerce of, 375, 376 Lexis, creation of, 161 LexisNexis, 161, 172, 427, 428-429, 494, 495 Lexmark. 463 Libraries, 78, 127, 462, 541 Licklider, J. C. R., 10 Lifeco, 318 LimeWire, 433, 471, 545 Linux, 63, 218, 462 Liquid Audio, 459, 467 Listen.com, 467, 468 Listservs, 20, 112-113 Live Journal, 561 Local area networks (LANs), 26 "Long tail," 191, 244 LookSmart, 166–167 "Look-to-book" ratio, in airline industry, 320 Lord, Rob, 458, 464 Los Angeles Times, 302 Lotus, 113, 206, 214, 332 Lotus Notes, 119, 214, 401, 430 L-systems, and demand for software, 203 Lucent, 59, 86 Luini, Jon, 458 Lycos, 119, 159, 164, 167, 178, 181, 190; and dot-com crash, 180; public offerings of, 174 Lycos Europe, 468 LycoShop, 178 Lynx browser, 127

Mac computer, 552 MacCoun, Robert, 479–480 Macintosh, and Foxfire browsers, 145 Macy's, comparison matrix used by, 258n64 Madster, 470 Magazine industry, 294 Magazines, 283, 286, 293, 494, 495 Magellan directory, 166, 174 Mail-order houses, 233-234, 405, 544 Mainframes, 13, 392, 202, 208, 223 Malpractice suits, and e-mail, 362 Management consulting firms, outsourcing of, 402-403 Manufacturing, 397, 405; e-commerce in, 397; exit rates in, 271; work-flow redesign in, 392. See also Industry MapQuest, 187 Market, Internet access, 62, 92, 554; commercial viability of, 54; competition in, 48; early evolution of, 47, 51-52; and enterprise computing, 86; fast growth of, 55, 70, 80; innovation in, 48, 49; new businesses in, 50; new users in, 68; retail access providers in, 51; revenues in, 93n1; transition of bulletin board operators to, 57; U.S., 64; and venture-funded entrepreneurial firms, 63-64. See also Access, Internet Market Watch, 289 Mark's Bookmark, 506 Martha's Girls, 521 Massachusetts Institute of Technology (MIT), 128.371 Mass media, 279; and asymmetrical digital subscriber line protocol, 548; Internet as extension of, 543; on Web, 304 Mass media online. 280-284 Match.com, 426, 436, 437 McClatchy (newspaper co.), 294 MCI, 24, 53; Backbone Network Service of, 31; early e-mail services of, 113; headquarters for, 37; Internet services offered by, 59; MFS absorbed by, 32; national fiber network of, 54; network connection of, 27; and NSF, 24, 53; as tier-1 provider, 66 MCI Mail, 27, 28, 114 MCI-WorldCom, 87 McKinley (start-up), 166 McLuhan, Marshall, 553, 561 McNair, Brian, 494 McPheters, Rebecca, 286 Mead Data Central, 428

Media: business models in, 561; changes in, 299–300; and cultural changes, 292; early Internet in, 25-26; international, 129; and Internet technology firms, 265; interpersonal, 304; narrowcasting of content in, 305; participatory, 301 Media businesses, 287; early Internet use of, 397-398; electronics in, 416; estimating audience size in, 286-287; and Internet, 279; and niche theory, 283; online vs. off-line, 284-287; organizational transformation of, 287-292 Media General, integrated operations of, 290 Media Metrix Research, 516 Media news, and Internet, 304-305 Media organizations, 280; business models for, 292-299; and cultural changes, 287-288, 291-292; and interactive capability of Internet, 281; multimedia platforms of, 302; online strategies of, 288; "platforms" of, 290; structural changes in, 287, 288 Medical claims, electronic processing of, 366 Medical practice, influence of Internet on, 354-355 Medical records, 352, 353, 362 Medicare, Medicaid, and State Childrens' Health Insurance Program Benefits Improvement Act (2001), 361 Medicine, Internet-based transformation of, 354. See also Health care industry; Telemedicine Meeker, Mary, 55 Meeker, Matt, 439 Meese Commission, 520 Meetup.com, 436, 439, 440, 443 MessageLabs, 215 Metadata, 191 Metallica (heavy metal band), 478-479 Metasearch business strategy, 323 Metasearch firms, impact of, 324 Metcalfe, Bob, 83 Metcalfe's Law, 40n25 Metropolitan Access Exchange (MAE), 32

Metropolitan Fiber Systems (MFS), 32 Michigan Education Research Information Triad (MERIT), 24, 27, 53 Micropayment firms, 171 Microprocessors, development of, 332 Microsoft, 25, 138-139, 144, 206, 340; antitrust case against, 60, 144, 469; and antitrust law, 141-142, 156n95; brain trust for, 97n24; and commercialization of Internet, 148; competition with Netscape of, 155n85; e-mail software of, 118; European Union's case against, 143-143; and formation of MSNBC, 282; Hotmail acquired by, 213; and impact of SaaS, 218; instant messaging networks of, 123; Internet Platform and Tools Division of, 139; Internet strategy of, 60–61; MS-DOS operating system of, 163; msn.com of, 176; MSN of, 159, 181; near monopoly of, 334; online advertising revenues of, 172; online information and entertainment provided by, 135; Outlook package of, 113, 117; in PC market, 136–137; and proprietary standards, 60; sued by Sun, 156n91; and Web, 134-136; Web site searches of, 172-173; Windows CE of, 85; Windows Live initiative of, 189; Windows 95 of, 60; X.400 capabilities of, 114. See also Internet Explorer; Microsoft Exchange, 113, 118, 119 Microsoft Network (MSN), 55, 67, 68, 189, 552 Microsoft Office, 134, 135, 215, 216 Microsoft Outlook, 121 Microsoft Plus! pack, 134 Microsoft's Xbox, 550 Midbar, 468 Military, intranet used by, 401 Miller, Matthew, 529, 530 Miller test, 493 MILNET, 13, 21, 35, 107 Min, Jean, 300 Mindspring, 65 Minicomputers, and time-sharing industry, 223 "Mirror sites," 168

MITRE Corp., 317 MIT survey, of Web servers, 165 Mjuice, 467, 477 Mobile phone companies, deals with record industry of, 475. See also Cell phones Modems, 75, 221, 222, 229nn 71, 73 Modularity, in auction economics, 246 Mokapetris, Paul, 33 Monster.com, 261, 293 Moore's Law, 23, 351 Morpheus file sharing system, 472 Morris, Robert T., 25, 26 Mortgage brokers, 326, 329, 330, 331 Mosaic, 61, 127, 128, 129, 131, 544 Motion Picture Association of America (MPAA), 460, 462, 473 Motley Fool personal finance guide, 170 Movie industry, and illegal copying, 546. See also Film industry Movielink, 299 Movies: adult, 500, 506; pirated, 420n35. See also Film industry Moving Picture Experts Group (MPEG-1), 455 Mozilla. 145. 544 MPAA. See Motion Picture Association of America MP3 (compressed audio format), 434; creation of standard for, 454-455; illegal files in, 468; Internet music business, 464-468; and Liquid Audio, 459-460 MP3.com, 459, 464, 465 MP3 players, 462, 464 MSN. See Microsoft Network MSNBC cable news channel, 136, 279, 282 MSN Group, 303, 304 MTV (television network), 298, 434, 458, 483n23 Multiforce concept, 220 Multihoming, 66 Multiple Listing Service (MLS), 326–327, 377, 378 Multipurpose Internet Mail Extensions standard, 111

Murdoch, Rupert, 249, 295, 304 Music: bands, and fan sites on Internet, 479; Internet propagation and sharing of, 451, 545; pirated, 420n35; traditional distribution system for, 452-453 Music, sharing: early legal foundations for, 456-458; early uses of Internet for, 458-460; experiments with, 460; legal swapping in, 480, 488n89; technologies for, 451 MusicCity, 472 Music file sharing, 433, 559, 476, 479, 487n76 Musicians, 458, 478. See also Recording artists Music industry: anticircumvention in, 463; exposés of, 481n5; file sharing and, 451-452; and illegal copying, 546; impact of Internet on, 476-480; Internet experiments of, 467-468; iPods in, 410; and MP3 technology, 464-468; SDMI of, 462. See also Film industry; Record industry Music locker services, 465, 468 Music Owners' Licensing Rights Act, 465 Music subscription services, 459 Mutual funds, professionally managed, 408 MySpace, 289, 298, 437, 441, 552, 561, 563n7; functions of, 295; growth of, 303; long-term implications of, 303-304

Nando Times, 281

Napster, 430, 433, 434, 435, 445n20, 477, 545; creation of, 468–469; and file sharing, 468–473; immediate popularity of, 469; intellectual property of, 486n59; and Internet music business, 464; and Metallica case, 478– 479; music distribution system of, 545; online file sharing system of, 459; used to share music, 451; users of, 479 Napster 2, 469 NASA, and telemedicine, 357 NASDAQ exchange, 179, 265, 406, 523 National Association of Realtors (NAR), 327, 377, 378, 379 National Broadband Co., 289 National Center for Atmospheric Research, 22 National Center for Supercomputer Applications (NCSA), 61, 127, 544 National Commission on Cost of Higher Education, 371 National Music Publisher's Association, 477 National Research Council Report, 515 National Science Foundation (NSF), 13, 22-32, 52 Navigation industry, 159, 172, 190, 242 Navigator browser, 117, 123, 136, 334; first release of, 129; upgrades of, 144; version 2.0 of, 137 NBC (television network), 282, 289, 298 Nelson, Ted, 162, 163, 170, 190 Netcenter, 175 Netcom, emerging operations of, 65 "Netiquette," 120, 543, 548 NetMeeting, 135 Net neutrality, 89, 148 Netscape Communications Corp., 54, 60, 61, 167, 365, 544; AOL acquisition of, 100n46, 143, 157n110; browser business of, 137, 145; and commercialization of Internet, 148; competition with Microsoft, 155n85; Enterprise Server of, 544; and HTML support, 61; http cookies introduced by, 133; initial public offering of, 55, 130; Open Directory Project acquired by, 167; Secure Sockets Layer of, 132. See also Navigator browser NetSuite, 213 Network Access Points (NAPs), 31, 32 Network Control Protocol (NCP), transition from, 21 Network operations, 10; cooperation in, 52; emergence of routine, 64-67; idea of host of, 220 Networks, 107; academic, 19-21, 541-542; forprofit private, 19; high-bandwidth home, 109; interconnectivity of, 38, 112; regional, 52; social, 551-553; television, 285-286 Network Solutions, Inc. (NSI), 36, 37 New Frontier Media, Inc., 505, 514, 522, 527-529

News, digital access to, 480. See also Broadcast media; Media News Corp., 279, 289, 297 Newsgroup messages, 121 News organizations, cost structure for, 558 Newspapers: adult entertainment in, 494, 495; audience for, 294; decline of, 285, 293, 294; and niche theory, 283; online, 281, 282, 291; staff reductions of, 292-293; Web portals and, 178; Web sites of, 133, 295-296 NewsRecord (Greensboro, NC), 302 Newsweek, 286 New York City, Internet diffusion in, 58 New York Stock Exchange, 525 New York Times, 161, 290, 291 New York Times Co., and Web potential, 288 New York Times Electronic Media Co., 280 Nexis Information service, 428 NeXT computers, 124 NFM Inc., sales of, 528 Niche markets, 191, 558 Niche theory, 283 Nielsen/NetRatings, 303, 323, 516 Nintendo machines. 550 Noble, David, 372, 373 Nortel, 59, 86 North American Industry Classification (NAIC), 235, 413 Northern Light, 172 NorthWestNet, 27 Norwest, 330 Novell Netware, 59, 113, 114, 118 NSFNET (National Science Foundation Network), 4, 14, 15, 38, 41n33, 97n26, 107 NH, Inc., 515 Nullsoft, 464, 470 Nupedia Internet project, 551 NYSERNET, 27

Oasis, 479 Obscenity, litmus test for, 493 Obscenity and Pornography, U.S. Commission on, 520 OfficeMax, B2B of, 399 Offshoring, 338, 339-340, 340 OhmyNews, 300 Oh Yeon-ho, 300 Olim brothers, 233 Omidyar, Pierre, 233, 431, 432, 439 OnDemand (Siebel's CRM), 214 Online communities. See Communities, online On Line Guitar Archive, 477 Online services: health-related information. 365; home market for, 55; information, 80; during 1980s, 114 Online time, and contractual limits, 75 Onsale.com, 257n49 Oodle (classified advertising site), 293 Open access, wikis and, 550-551 Open Archive, 551 OpenCourseWare, 371, 551 Open Directory Project, 167, 182, 193n. 24 Openness, Internet's philosophy of, 26, 33 Open System Interconnection (OSI), 31, 114, 151n24, 561 Open Text, 174, 189 Open TV, Spyglass acquired by, 154n. 65 Oracle, 204, 211, 217, 218-219 Orbitz.com, 321, 322, 323, 559 O'Reilly, Tim, 146 Organizational structure, and Internet, 416 Orkut.com, 437, 438, 552 Orlikowski, Wanda, 430 OS/2 Netware, 113 Outing, Steve, 288 Outlook Express, 117, 152n. 33 Outsourcing, 252, 334, 339, 402 Overture, 173, 174, 184, 185 Ovitz, Michael, 469-470

Package delivery services, 392 Packet switching, 11, 15 Page, Larry, 182, 185 PageRank algorithm, Google's, 183–184 Palm, 85 Pape, Jeff, 259 Parcel tracking, 392 Path dependency, 399 Pathfinder, 176, 180, 288, 291 Patient-physician communication, 359, 360 PatroNet, 459 Patterson, Jeff, 458 Paulson, Ken, 290 Pawlowski, Janina, 330 Payment methods, 545, 549, 559-560 PayPal, 171, 431, 432, 548 PayPal Buyer Protection Plan, 433 "Pay-per-click" model, 173 Pay2See, 171 PC Flowers, 233, 253n1 PDP-10 computer, 23 PDP-11 computer, 23, 42n51 Peeps Republic, 467 Pentium chips, 130 PeopleSoft, 211 Perdue, Lewis, 513 Performance Systems International, 28 Performing rights organizations, 452 Personal ads, 436 Personal computer business, 136, 332, 333, 334, 336, 337-338 Personal computer gaming industry, 546 Personal computers: advent of inexpensive, 14; availability of, 38; costs of, 140; demand for, 332, 334; development of processors for, 455; Internet e-mail on, 117; pricing of, 207, 226n25; and SaaS, 202; storage devices for, 455; and time-sharing industry, 206, 208-209, 223, 224 Personal computer services, 14, 15-16, 32 Personal computer software industry, 206 Personal electronics industry, and Internet music boom, 477 Petroleum companies, proprietary networks of, 394 Pets.com, 261, 315, 342 Pew Internet and American Life Project, 284, 478, 480 Pew Internet survey, 285 Pharmaceutical industry, 342, 367, 400 Philips, and introduction of DAT recorders, 457

Phishing, 26, 121, 559 Phoenix, Univ. of, 371, 374, 385n102 Photo compact discs, 340 Photography industry, film development segments of, 340. See also Film industry PHP (open-source package), 134 Physicians: continuing medical education for, 354; and HIPAA requirements, 363; Internet use by, 352, 355; and reimbursement Internet-based activities, 355; use of e-mail by, 359-360, 364 Picard, Robert, 296, 299 "Pick, pack, and ship" model, 244, 250 Pittman, Bob, 458 Pizza Hut, 544, 553 PlaceWare, 218 PlanetRX.com, 342 Playboy Enterprises, Inc., 522, 524-525, 526, 527 Plugged In, 441, 443 Podcasts, 287 PointCast, 297 Point of presences, 71 Point-of-sale tracking, 86 Political blogs, 300 Politics, and origins of Internet, 12 POP (Post Office Protocol), 116 Porn actors, 505, 506-507, 529 "Porn chic," 518 Pornography, 493, 504, 559–560, 562n3; access to, 494, 519; "alternatives," 506; amateur, 508; antipornography legislation, 501; availability of, 67; and censorship laws, 494; child, 503, 519; consumers of, 517-518; contradictory attitudes to, 503; corporatization of, 504-507; democratization of, 507-508; do-it-yourself, 507; domestication of, 502-504; in history, 491; impact of Internet on, 560; increasing popularity of, 532–533; Internet, 5, 58, 497; and law enforcement, 504; mass consumer market for, 500; new forms of spectatorship in, 492; and new media, 492; nonmainstream forms of, 497; in public discourse, 518; "reality," 497;

Pornography (cont.) representations in, 492-493; retail business, 501-502; social construction of, 494; sociotechnical analysis of, 498; traffic volume for, 516, 519; U.S. television/cable revenues in, 518, 519; video revenues in, 517, 519. See also Adult entertainment industry Pornography, U.S. Dept. of Justice's Commission on, 520 Pornography industry: aggregate revenues in, 510; infrastructure providers in, 520; Internet revenues in, 511-513; media substitution in, 499-502; niche market suppliers in, 532; preference for VHS over Betamax in, 495; problems for, 498-499; revenues in, 510-513, 515; size of, 500, 501; Web sites in, 514-515 Portable People Meters, 287 Portal industry, 181 Postcasts, 295 Postel, Jonathan, 33, 36, 37 Postini, 215 Powells, 397 PowerPC chips, 130 PowerPoint. 38, 135 Preferential treatment, with Web advertising, 173 Press, the: business, 265, 266, 272; financial, 129; freedom of, 560; trade, 315; use of term, 562n4. See also Media Pressplay (online music store), 469, 473 Preview Travel, 322 Priceline.com, 321, 432 Pricing, 64; of academic ISPs, 53, 95n7; for broadband, 82; for dial-up ISPs, 74-75; fees set by transaction, 246, 247; flat-rate, 51, 75; Internet's impact on retail, 243, 255n33; for local telephone calls, 56; and online retail sales, 243-244, 255n33; and peak load issues, 75; and regulatory decisions, 50; in timesharing experience, 221 Print media, 280-282, 293, 295-296 Privacy: patient, 363; and social informatics, 438-439

Private Gold (pay-television channel), 527 Private Media Group (PMG), Inc., 500, 508, 519, 522, 523-524 Private networks, and Internet business, 415 Private sector, adoption of Internet by, 393 Private Spice (pay-television channel), 527 Privatization plan, of NSF, 52 Processing services industry, 209 Processor capability, increase in, 455 Prodigy, 17, 18, 57, 67, 113, 131, 140 "Productivity paradox," 430 Product providers. Web sites of, 394-395 Professionals, Internet use by, 559 Professors, university: Internet use by, 352, 375, 559; and online instructional technology, 370 PROFS, 401, 417 Programming, open-source, 551 Progressive Insurance, 394 Progressive Networks, 459 Proprietary surveys, 437 "Prosumer," pornographic, 507 Protocols, Internet, 105-106, 147-148, 149n2; for browsers, 129-131; design in, 19, 106; for e-mail, 111; instant messaging, 122-124; Internet e-mail software, 116-118; for packet switching, 11; publicly available, 108; spam, 120-122; for Webmail, 118-120; World Wide Web. 124-128 Providers. See Internet service providers PSINet, 28, 29, 65, 87, 88 Public discourse, pornography in, 518. See also Communities Public offerings, of new Internet ventures, 71 Public policies, 76-77, 78-79, 79 Public relations, to finance Internet, 548 Public sector, effects of internet on, 408-409 Public sphere, sexualization of, 496 Publishers, business model for, 296-297 Publishing: off-line, 171; on Web, 160-165, 171, 186 Purchasing, diffusion of, 239, 254n18 Putnam, Robert, 439

Index

Qmail, 118 Qualcomm, 117 Quantum Computer Services, 17 Quicken, 331 QuickenMortgage, 330 Qwerty keyboard, 110 Qwest, 87, 88

Radio, 282, 287; commercial history of, 561; digital access to, 480; Internet, 543; and niche theory, 283; satellite, 286, 287; and technological innovation, 459 Radio frequency identification (RFID) tags, inventory-tracking, 408, 420n31 Radiology, in telemedicine, 361 Radio Webcasts, 282 Raleigh News and Observer, 281, 289 Rbuy, Inc., 328 Reader's Digest, LookSmart launched by, 166-167 Read-Only Memory-Basic Input-Output System code (ROM-BIOS), 332 RealAudio, 459 Real estate brokers, 377-379; businesses, 326, 329; commissions in, 331; electronic auctions in, 327-328; Internet strategies in, 327; MLS in, 326-327; mortgage rates in, 328, 329 Really Simple Syndication (RSS), 295 RealNetworks, 460, 462, 467 RealOne media player, 467 RealPlayer, 467 Record industry: and Apple, 474; and circumvention, 460-461; and DAT technology, 457-458; distribution in, 452-453; DMCA and, 477; and Internet, 410; and iPod use, 435; legal resources of, 462-463; and MP3.com, 465; and MP3 players, 466; and MTV, 458; and music file sharing, 434; Napster case and, 469; as oligopoly, 453; online albums of, 467; sales in, 476; and streaming, 460; and technological innovation, 453-456; and Webcasting music, 282

Record Industry Association of America (RIAA), 457, 469, 471-472, 482n15, 545 Recording artists: costs of, 452–453; early Internet use of, 458-459; and illegal file sharing, 478; revenues for, 452 Regulation: in adult entertainment industry, 524; of community sites, 542; in Internet access market, 50; and investment trends, 92-93; political, 543; of pornography, 519-520 Reid, Brian, 542 Reimbursement, in telemedicine, 360-361 Religiosity, and pornography, 494 Rental car businesses, and bundling of travel packages, 322 Request for Comments (RFC), 19 Research and development, offshoring of, 340 Research community, and private development, 61. See also Academic research; Professors Research in Motion, 84-85 Retailers: big-box, 234, 239; e-commerce capabilities of large national, 252; and Internet services, 69, 239; and online commerce, 234; online operations of, 250, 251, 252; and online transition of customers, 253; pure-play, 234, 253n5; small independents, 233-234 Retailers, online: auctions used by, 248-249: start-up costs for, 245 Retail industries: Web site development in, 395; work-flow redesign in, 392 Retailing codes, NAIC, 235 Retailing functions, 240-243, 244, 245 Retailing techniques, online, 233 Retail sales: e-commerce in, 397; online accounts as percentage of, 234 Retail sales, online: classification of, 239, 240; growth of, 237-238; modular auctions, 245-249; user reviews in, 242; value of, 397, 405 Retail sector, 236; characteristics of, 235-237; consumption expenditures in, 235, 237, 254n8; direct sales methods in, 237; spending in, 237

RetroRaunch, 521 Revenues, vs. market share, 413, 421n39 Rhapsody, 473 Rheingold, Howard, 424, 426 RIAA. See Record Industry Association of America Riffage.com, 467, 468 RightNow, 214 Rio portable player, 466 Roberts, Larry, 10, 15 Robertson, Michael, 459, 464 RocketMail, 119 Rolling Stone, 434 Rollins, Kevin, 336 ROM-BIOS. See Read-Only Memory-Basic Input-Output System Root Zone File, 38 Rose, 508 Rothenbuhler, Eric, 283 Routers, 12, 21 Roxio, 434-435, 469 RT computers, IBM, 24, 41n37 Rural access, 70-71, 100n51, 100n52 Ryobi, 375, 377

SAGE. See Semi-Automatic Ground Environment Sales, online, 237, 240, 395, 419n10. See also Retail sales Salesforce.com, 201, 213, 214, 220 Sales tax, and online retail, 243-244 Samuel, Arthur, 550 San Francisco Chronicle, 280 San Francisco Examiner, 280 Santa Cruz Operation, Inc. (SCO), 544 SAP, 204, 213, 217, 219 Sargent (software vendor), 211 Satellite connections, 221, 222, 229n73 Satyam, 339 SBC, mergers of, 90-91 Schmidt, Eric, 416 Schneier, Bruce, 549

Schools, 78, 371. See also Classroom; Universities Schrader, William L., 28 Science and Technology Act (1992), 29-30 Science Applications International Corporation (SAIC), 36 Science fiction, 562 Scient Corp., 259-260, 261, 272, 273n1 Scientific research, sharing community in, 541 SCO Group, 544 Scour Exchange (SX), 469 SDMI. See Secure Digital Music Initiative Seagate, 455 Sealey, Peter, 331 Search engines, 159, 170; after dot-com crash, 182; effectiveness of, 190; and online advertising, 172; for online retail, 242; as portals, 181; spamming of, 182; usage charges for, 172. See also Google Search Engine Watch, 182 Search goods, information requirements of, 242, 255n28 Sears, 17, 257n58 Seattle Community Network, 424 Second Life, 561 Secure Digital Music Initiative (SDMI), 462, 463, 484n36 Secure Sockets Layer (SSL), 132 Securities industry, online trading in, 407 Security, Internet, 16, 32, 548 Security First Network Bank, 408-410 Security technologies, circumvention of, 460-462 Sega Enterprises v. Accolade, 461 Selling, over Web, 133. See also Retail sales Semantic Web, 191 Semi-Automatic Business Research Environment (SABRE) system, 317, 318, 319 Semi-Automatic Ground Environment (SAGE) radar. 317 Semiotic democracy, 302, 452, 480, 489n91 Sendmail, 111, 118

Sequoia Capital, 183 Serial copy management system (SCMS), 457, 482n16 Seriff, Marc, 17 Server software, early, 131 Service bureaus, 202, 205 Service providers. See Internet service providers Seventeen magazine, 286 Sex industry, 491; and changing mores, 437, 494; and Internet, 501; legal, 491; on stock market, 506. See also Pornography industry Sexploitation films, 499 Sextracker, 516 Sexualization, of public sphere, 496 Sforce platform, 220 Shannon, Claude, 549 Shapiro, Carl, 413-414, 562 Sharman Networks, 471, 472 Shelf space, for Internet retailers, 244-245 Sherman, Chris, 182 Shop.org, survey of, 250 Shoppers, 240-241, 249, 257n53, 257n54. See also Consumers Shoppers, online, 241-245 Shopping: electronic, 405; online, 238-239, 245, 251-252; as recreational activity, 245 Shopping assistant, in online retailing, 251 Shopping.com. 432 SHOUTcast MP3 streaming media server, 464 "Shovelware," 281 Sidgmore, John, 29 Siebel Systems, 211, 213 Siegel, Martha S., 120, 543 Silicon Graphics, 365 Silicon Valley, Internet diffusion in, 58 Simple Mail Transfer Protocol (SMTP), 106, 111, 115, 120, 124, 148 Skylink Technologies, 463 Skype, 123, 432, 471, 552 Slashdot, 547 Slate (online magazine), 136, 289 Sloan Foundation, 266

Small-to-midsize business (SMB) sector, 213 Smartmodem, 222 Smith, Cyrus R., 317 Smith, Jack, 118 Smith, R. Blair, 317 Social change, and shaping of Internet, 305-306 Social networking, 303-304, 423, 436, 437, 439.551-553 Social networks, development of, 561. See also Communities Society, place of Internet in, 28 Sociology: of deviance, 434; of knowledge, 369; symbolic interactionist tradition in, 436 Sociosexual realm, of Internet, 533 Sociotechnical analysis, 498 Software: from custom written to standardized, 210; of early Internet, 12; free, 555n12; independent of hardware, 203; Internet e-mail, 116-118; licensing of, 128; middleware server for, 134; social, 551-553; sold on Internet, 545; terminal-emulation, 129 Software, on-demand, 213, 214-216, 217 Software as Service (SaaS), 201, 213; impact on independent software vendors of, 217-219; and power/software locus, 220; and service bureaus, 203; survival of, 209-213; vs. computer utility idea, 201 Software industry, 204; anticipation of Internet in, 59-60; contractors, 203, emergence of, 206; Google in, 147; piracy in, 434 Software package, pre-Internet, 417 Software producers, and illegal copying, 546 Sony, 456, 457, 469, 550 SoundScan, 476 Source Telecomputing Corp., The, 15, 16 Southwest Airlines, 324 Spam, 120, 121; blocking of, 121-122; costs of, 153n47; early eradication programs for, 215; first case of, 543; prevalence of, 559; volume of, 121; vulnerability to, 115

Specialized services, attraction of, 558 Spider, in Web indexing systems, 169 Spink, J., 514, 516 Spoofing, 26 Spreadsheet programs, 215 Sprint, 27, 54, 65, 66, 87 Spyglass, 128, 154n65 St. Petersburg Times, 280 Stallman, Richard, 547 Starbucks, Wi-Fi access at, 83 StarOffice, 215 Starr Report, 502 Startup.com (documentary film), 179 Start-ups, Internet, 209, 272; investment in, 177; perceived value of, 273; retail, 234, 250; venture-backed dot-com retail entrants, 250; and venture capitalists, 180 State Farm, intranet used by, 401 State government agencies, internal intranet applications of, 402 Stevenson, Veronis Suhler, 286 Stewart, Justice Potter, 493, 562n3 Storage devices, for personal computers, 455 Streambox, 462 StreamCast, 472 Strossen, Nadine, 491 Students, and Internet, 368. See also Universities Students Against Facebook News Feed, 438 Subscription business, 172, 296, 473 Subscription sites, in pornography industry, 510 Sullivan, Danny, 182 Sulzberger, Arthur, 291 Sun, 139, 156n91 Sunburst Farms, 341 Sunflower Travel Agency, transformation of, 325 Sun Microsystems, 137, 215 Supercomputers, 13, 22 Supply-side issues, 82 SURANET, 27

Symantec, 215 Synchronous Optical Network (SONET), 31-32 "Sysops," 112 System Development Corp. (SDC) and SAGE, 317 Tagged.com, 304 Tallinn, Jaan, 471 Tata Consulting, 339 Tauzin-Dingle Bill (2002), 90 Taxation, and provision of Internet access, 79 Tax savings, and online retail, 243-244 Taylor, Robert, 11 TCP/IP. See Transmission-Control Protocol/ Internet Protocol Teaching resources, online, 372 Technological innovation: and adult entertainment business, 501; and business practices, 415; and health care industry, 415; investment in, 126; management and, 394; and medical practice, 356; and organized workplace, 429-430; and pornography, 494-496; and recording industry, 453-456; and unemployment, 370 Technology: adoption of new, 351; and business, 416; and "creative destruction," 562; DAT recorder, 456; digital vs. analogue, 453, 454; interconnection, 57; Internet, 4; offshoring, 317; peer-to-peer, 545; relationship between information and communication, 492; and retail sales, 242; and sex industry, 491; social shaping of, 106, 497-499; and success of Web, 128; of web mail, 119. See also Information technology Teenagers, 469, 437-438, 563n7. See also Adolescents Telecom Meltdown, 87, 91 Telecommunications: in brokerage industry,

406; business use of, 393, 417; and emergence of Internet, 109; and global competition, 405; merger policy for, 79; and outsourcing, 402 Telecommunications Act (1996), 47, 50, 77, 79, 89, 90 Telecommunications industry, U.S., 560 Telecommunications policy, and fostering exploration, 90 Telehealth, 352 Telemedicine, 352, 355, 356; benefits of, 353; cost-effectiveness of, 357; and e-mail, 362; and federal programs, 361; lack of widespread access to, 367; National Library of Medicine projects in, 358; radiology in, 361; reimbursement in, 360-361; "store and forward" feature of, 357-358, 361 Telephone directories, on Web, 127 Telephone industry: and bulletin board operators, 55-58; and computer II, 56; and dial-up ISP business, 69; and DLS services, 82; and DSL services, 91; household subscriptions of, 98n32; and ISPs, 95n. 6; merger of local, 88-89; U.S., 80 Telephone networks, regulating interconnection to, 101n. 63 Telephony systems, 79, 123, 551-552 Telepsychiatry system, 356 Teletext, 281 Television: broadcast news on, 285; cable, 284, 298, 305; commercial history of, 561; culture, 302; digital access to, 480; early Web ventures of, 282; impact of Web on, 297; and niche theory, 283; reality, 303 Television industry, 271, 297-298 Tel-Save telephone firm, 178 Terra Networks, 179 Terrorist attacks, September 11, 2001, 87, 319, 326 Texas Instruments, 323, 340 Text messaging, 84-85 Text-searching companies, 173-174 The Globe (dot-com firm), 261 TheStreet.com, e-commerce index of, 265 The WELL. See Whole Earth 'Lectronic Link Thinking Machines, 169 Third-party benefit providers, 361, 367

Thomas, Sean, 497 3Com, in early server market, 59 Ticketing, online sales of, 239, 240 Tijuana bibles, 501 Time, 12, 286, 288, 291 Time-sharing, computer, 204, 221 Time-sharing industry, 202, 204-206; competition faced by, 207, 226n25; destruction of, 218; growth of, 207-208; interactivity of, 205; and other computing models, 223; resurrected, 220, 221; Tymshare in, 205; typical customer of, 225n20 Time-sharing services: instant messaging and, 122; operating systems for, 110, 150n12; vs. in-house computing, 208, 226n22, 226n23 Times Mirror Co., 290 Time Warner, 81, 143, 176, 180 Tivo, 451 Toffler, Alvin, 109, 507, 508 TopTenReviews.com, 516 Tower Records, 377 TownOnline, 441 Toyota, 375 TP/4 protocol, 114 Trade, and asymmetrical digital subscriber line protocol, 548 Trading, online, 407 Transaction costs: economics of, 316, 343n3, 377 Transactions, of media organizations, 296 Transit services, 66, 71 Transmission capacity, redundant investment in, 87 Transmission-Control Protocol/Internet Protocol (TCP/IP), 11, 12, 106, 148, 561; commercial sales of, 28; compatible files, 60; flexibility of, 109; NSF adoption of, 22; universal use of. 13 Transmission costs, 76 Transparency, lack of, 33 Transportation, 395, 405 Trans World Airline (TWA), 318

594

Travel agencies, 317, 324-325, 559; decline in numbers of, 320-321; and online travel packages, 323; reduced dependence on, 400; transformation of, 325. See also Travel reservations industry Travelocity, 321, 322, 323, 325 Travel reservations industry: commissions in, 319-320; consolidation in, 318; growth in, 316-317; and Internet, 325-326, 342-343; online, 321, 324; revenues in, 318-319; specialization in, 325 Tribune Co., 289, 290, 294 Trilian program, 123 Troland, Thomas R., 294 True.com, 437 Truscott, Tom, 542 Turing, Alan M., 549 Turner, Fred, 425 Tuvalu, domain names registered in, 35 Twang This!, 467 Tymnet, 15 Tymshare, 205-206, 208 Uhse, Beate, 502, 523

Unemployment, technologically driven, 373 United Airlines, 318 United Kingdom, privacy in, 560 Universal Music Group, 465 Universities: adoption of Internet by, 394, 418n6; connected through regional networks, 27; and early Internet, 368; e-mail used in, 369-370, 385n97; virtual, 373 Unix, 19, 20, 21, 62, 111, 126, 542 Unix Netware, 113 Unix-to-Unix CoPy program (UUCP), 20, 21, 99n40 Upstartle, 216 URL (uniform resource locator), 125 U.S. News and World Report, 280, 286 Usage charges, for search engines, 172 USA Today, 280, 288, 290 Usenet, 20-21, 25, 113, 542, 543-544 Usenet newsgroups, AOL incorporation of, 131

Usenix conference, 1980, 542 Users of Internet, 9–10, 68, 284 USinternet-working (USi), 210, 211, 212 UUCPNET, 113, 114 UUNet, 21, 28–29, 29, 66

Vault Corporation v. Quaid Software, 460 VAX computer, 23 Venture capital, 30, 261, 354 Venture creation, during dot-com era, 260, 265-267 Venture Economics (database), 267, 274n21 Venture investors, decision making of, 267 Verisign, 38 Verity (Web site search pioneer), 189 Verizon, 24, 79, 90 Vermeer Technologies, 97n22, 135 Veronica, creation of, 168 VHS videocassette recorder standard, 110 Video cassette recorders (VCRs), 456 Videoconferencing, 357, 543, 552 Video equipment, for telemedicine, 356-357 Videos: adult, 505; neighborhood stores for, 341; on-demand, 543 Video telephony, 552 Videotex, 280-281, 281, 296 Viola browser, 126 Virtual community centers, 295 "Virtual reality spaces," 137 Virtual red-light zone, 503 "Virtual Sex," 521 Viruses, computer, 26, 559 Virus writers, 215 Vivid Entertainment Group, Inc., 522, 531-532 Vixie, Paul, 37 VM mainframe operating systems, 417 Vodcasts, 295 Voice traffic, vs. packet-switched data traffic, 25 Vongo, 299 von Hippel, Eric, 146, 498 von Meister, William, 16 Voyeur sites, Web-based, 494

Wainwright, Julie, 264 WAIS. See Wide Area Information Server Walled garden approach, of AOL, 68 Wall Street Journal, 289, 290, 296 Wal-Mart, 234, 235, 239, 254n20, 559; employees of, 254n13; and local retailers, 240; and retail changes, 254n19; RFIDS used by, 420n31 Warner American Express Satellite Co., 458 Warner Brothers Records, 377 Washington Post Co., 288, 289 Washington University, WebCrawler of, 169 Waste file sharing systems, 464 Watchravesringkan, Kittichai, 436 Watermarking process, 481n8 Wayback Machine, 269 Web, 147-148, 148; dynamically generated pages on, 127; early design of, 168; firms adversely impacted by, 316; free, 296; interactive use of, 551; online newspapers on, 282; and personal computer business, 332-338; pornography sites on, 509-510, 514-515; selling over, 133; television industry's adoption of, 298 Web 2.0, 146, 561 Web browsers: home page for, 175, 195n57; and media businesses, 279-280; role of, 120. See also Browsers Web-browsing, Internet adoption for, 85 Webcams, in telemedicine, 357-358 "Web crawler," 169 WebCrawler (navigation service), 174 Web directories, 165-167 Webex, 214-215, 216 "Webisodes," 291 Web mail, 118-120, 152n. 41 WebMD.com, 354, 364, 365, 366 Web-native applications, 213, 215-216, 217 Web navigation industry, 132, 185-190 Web pages, 76, 161 Web portals, 159, 174-179; and dot-com crash, 179-180; end of, 180, 190; Go.com, 177; msn.com, 176; national, 178; Netcenter,

175-176; origins of, 164; and partnership deals, 178; personalization features of, 181; popularity of, 179; services offered by, 175; specialist, 178; use of term, 174-175; Yahoo, 191 Web publishing industry, 132, 171, 176, 186 Web search, development of, 167-170 Web services, 219-220, 246 WebSideStory, 214 Web sites, 124; airline, 319, 320; business development of, 393, 394; catalog-based, 250, 251; experts for, 404; most visited, 175, 552-553; off-shore, 560; retail, 250, 251; storebased, 250, 251; sudden proliferation of, 169 Webvan, 261, 315, 342 Western Governors' Virtual University Project, 373 Western Union, 10 Westinghouse, early computer network of, 150n11 West Publishing Co., 428 Whitman, Meg, 432 Whole Earth Catalog, 425-426, 431, 433 The Whole Earth 'Lectronic Link (The WELL), 425, 426, 427, 440, 458 Wholesale industry, 392, 397, 405 Wiatt, Ted, 334-335 Wide Area Information Server (WAIS), 168-169, 193n30 Wi-Fi Alliance, 84, 85 Wi-Fi mode, 83 Wikipedia, 146, 300, 304, 551 Wikis, 120, 551 Williams, Linda, 87, 504 Willis, Chris, 300, 303 Winamp, 464 Winamp MP3, 455 Windows, Microsoft, and Foxfire browsers, 145; Hypertext in, 162; redesign of, 146; target markets for, 97n. 23 Windows 95, 60, 134 Windows 98, 141 Windows Live Desktop, 152n. 34

Windows Vista operating system, Windows Mail, 117 Windows XP, 145 Windows X version, of Mosaic, 127 Winplay3, 455 Wipro Technologies, 339 Wired magazine, 281, 434 Wireless access, 49, 83-85 Wireless Ethernet Compatibility Alliance (WECA), 84 Women, Web sites for, 498 Wood, David, 260 Word, Web pages created in, 135 WordPerfect word processor, 138 Word processing, 147, 215 Wordstar, MicroPro's, 332 Workplace, and technological innovation, 373, 430 WorldCom, 69, 79, 88 World Information Property Organization (WIPO), 461 World (ISP), 38 World Summit on Information Society (2005), UN-sponsored, 36 World Wide Web, 12; accessing, 129–130; appeal of, 126; as business platform, 131-134; commercialization of, 163; creation of, 106, 124; demand for, 105; dynamic page generation on, 133; and early browsers, 127; early free publicity for, 166; as electronic publishing system, 160-165; spread of, 129; standards of, 124-125 World Wide Web Consortium, 62, 76, 133 World Wide Web Virtual Library Subject Catalog, of CERN, 165 Worm, early appearance of, 25-26 WrestlingGear.com, 259, 260, 261, 272 Writers, Internet-related demands on, 291-292 Wulf, William, 30

Xanadu global hypertext network, 162, 170 X-rated products, media substitution for, 500– 501 X.400 standard, 114, 115, 120 X.500 standard, 114, 115

Yahoo!, 119, 159, 166, 261, 315, 552; adult content sold by, 520; and dot-com crash, 181; Farechase acquired by, 324; geographic spread of, 70; initial public offering of, 166; instant messaging of, 68, 123; online advertising revenues of, 172; Overture purchased by, 185, 186; search technology of, 185; in U.S. market, 119; user-generated content of, 301; in Web directory field, 166-167 Yahoo Internet Life (print magazine), 166 Yahoo Mail, 119 Yang, Jerry, 166 Yellow Pages, 173 YHOO, 179 Y2K, 403 York University, automated instruction at, 372 Yost, Jeffrey, 377, 378, 395, 558, 559 Young people, media use of, 303. See also Adolescents; Teenagers YouTube, 146, 147, 191, 552, 553, 561

Zennstrom, Niklas, 471 Zimmerman, Phil, 549 Zimring, Franklin, 509, 513, 520 Zuse, Konrad, 549, 550