
Index

- Access
 - education and income as predictors of, 444
 - expanding and contracting
 - proximity of, 382
 - Internet and society, 375–378
 - link for information, 243
 - role of Internet in reconfiguring, 378–379
 - social nature of Internet, 395–396
- Access, reconfiguring, 379–386
 - changing cost structures, 381–382
 - creating or eliminating gatekeepers, 383–384
 - expanding and contracting
 - proximity of access, 382
 - redistributing power between senders and receivers, 385
 - restructuring architecture of networks, 383
 - social factors shaping digital choices, 386–394
 - user controls, 385–386
- ACP (Advanced Cyberinfrastructure Program), 166
- Advanced comprehensive virtual federation, 157
- Aftermarkets, rise in cross-border, 309
- After-sales markets, 301–306
 - construction and maintenance, 301–306
 - manufacturer-customer relationship, 301–306
- ALP (average labor productivity), 54
- ASP (application service providers), 350
- Asset provision, complementary, 288–290
- Assets, intangible, 27–48
 - changing customer relationships, 33–34
 - changing interactions with suppliers, 32–33
 - evidence on IT, organization , and productivity, 34–44
 - qualitative case examples, 29–30
 - transforming firms, 31–32
- Atmospheric emissions control, 290–292
- Automobile industry, 283–312
 - OEMs and after-sale lives of, 303
 - record keeping, 305
- Automotive informatics, 283–312
 - enhanced product platforms, 290–296
 - enterprise transformation in
 - automobile industry, 283–312
 - industry in context, 284–287
 - information technology in
 - automobile industry, 283–312
- IT and enterprise transformation in automobile industry, 306–310
- IT as engine of industry transformation, 287–288
- production and distribution systems, 296–306

- Automotive informatics (cont.)
 - use and service monitoring with IT, 288–290
- BEA (Bureau of Economic Analysis), 49
- Behavior
 - estimate studies, 449–450
 - monitoring, 402
- Bloggers, 404
- Braess paradox, 235–236
- Brand-name manufacturers, relationships and, 338–340
- Broadband Internet, games shaping implications of, 394
- BTF (build-to-forecast), 317
- Build-to-order (BTO), 317
- Bureau of Economic Analysis (BEA), 49
- Business networks, 203–204
- Business processes, knowledge in, 144–145
- Capital, 136–137
 - communications, 189
 - customer, 141–142
 - defined, 137–138
 - financial, 399
 - human, 139–140, 399
 - ICT supports for building and maintaining social, 401–402
 - impersonal sociotechnical, 399–411
 - input of information technology, 57
 - intellectual, 189
 - knowledge as, 136–139
 - market, 188
 - organizational, 188–190
 - physical, 399
 - relationship, 189
 - social, 399–400
 - sociotechnical, 400
 - stakeholder, 141–142
 - structural, 140–141, 189
 - substitution of impersonal sociotechnical, 403
- Cellular phones, 427–429
- Centralization/decentralization in companies, 186
- Chains
 - direct sales value, 315
 - flexible supply, 318–321
 - indirect sales value, 314
- China, 484–485
- Clusters of innovation, 191–194
- Clusters to growth nodes, 199–201
- CMS. *See* Contract manufacturers
- CNNIC (China Internet Network Information Center), 484
- CNPNS (cross-national production networks), 265, 271
- Collaborative markets, 269
- Collaboratory for Research and Electronic Work (CREW), 158
- Collective action among strangers, 399–411
- Communication
 - in families, 419–421
 - and Internet's arrival into society, 438
- Communication media typology, pre-Internet, 439
- Communications capital, 189
- Communication technologies, 420–421, 431
 - characteristics, 422–430
 - cellular phones, 427–429
 - e-mail, 422–425
 - instant messaging, 430
 - paper notes, 426–427
 - telephone, 425–426
- Commuting versus telecommuting, 238–241
- Compaq Europe supply chain
 - for build-to-order desktop personal computers, 320
 - for standard desktop personal computers, 319
- Complementary asset provision, 288–290
- Computers
 - changing customer relationships, 33–34

- changing interactions with suppliers, 32–33
- changing structure of industry, 314–315
- economic impact of, 27–48
- evidence on IT, organization , and productivity, 34–44
- and innovation, 28
- qualitative case examples, 29–30
- transforming firms, 31–32
- use, list of activities covered by, 417
- Congestion, 235
- Consumer electronics, 264
- Consumers and order/purchase of products, 242
- Contract manufacturers (CMs), 317, 335
 - changing social division of labor, 338–346
 - contract manufacturing in Whitelist IT industry, 336–337
 - e-commerce, 346–351
 - electronics, 335–357
 - information networks, 346–351
 - manufacturing sites of leading, 345
 - manufacturing value chain, 346–351
 - supply-chain management and global overcapacities, 351–354
 - vertical reintegration among, 340–341
- Contract manufacturing in Whitelist IT industry, 336–337
- Conventional products
 - with digital function, 274–275
 - with physical function, 274–275
- Conviviality, 294–296
- Copresence, mediated, 213
- Corporate knowledge, 189
- Costs
 - changing structures, 381–382
 - reduction of information, 185
- Countries
 - comparisons, 467–497
 - Internet access and use, 471–485, 490
 - trends of digital divide by, 491
- Creative thinking, 184
- CREW (Collaboratory for Research and Electronic Work), 158
- Cross-border aftermarkets, rise in, 309
- Cross-national production networks (CNPNS), 265, 271
- CSCW (computer-supported cooperative work), 157
- Customer capital, 141–142
- Customer contact intensive enterprise, knowledge in, 146–147
- Customer relationships, 33–34. *See also* Manufacturer-customer relationships
- Cyberinfrastructure
 - blue ribbon advisory panel on, 164–165
 - for wide use, 165–168
- Cyberinfrastructure-based knowledge environments, 155–176
 - broader impact and future, 168–172
 - impact on civil society, 171–172
 - impact on education, 169–170
 - impact on national security, 170–171
 - recommendations, 172–173
 - virtual research communities for science and engineering, 157–168
- Cycles, acceleration of product, 315
- Data collections, Internet, 439–441
- Debate, tacit-codified knowledge, 213
- Decentralization.
 - See* Centralization/decentralization in companies
- Decision making
 - human, 238
 - modeling teleshopping versus shopping, 241–245
 - process, 230
 - telecommuting versus commuting, 238–241
- Demand-driven production, direct sales and, 315–316

- Design, knowledge and
 - organizational, 187–191
- Desktop personal computers
 - Compaq Europe supply chain for build-to-order, 320
 - Compaq Europe supply chain for standard, 319
- Development, growth nodes in
 - regional, 202
- Development groups, software, 366–367
- Digital age
 - competing in, 266–269
 - transition to, 264–266
- Digital choices, social factors shaping, 386–394
 - conceptions and responses of users, 390
 - ecology of games, 392–394
 - economic resources and constraints, 387–388
 - geography of space and place, 390–391
 - ICT paradigms and practices, 388–390
 - institutional arrangements and public policy, 391–392
 - strategies of others, 392–394
- Digital choices reconfiguring access, 379–386
 - changing cost structures, 381–382
 - creating or eliminating gatekeepers, 383–384
 - expanding and contracting
 - proximity of access, 382
 - redistributing power between senders and receivers, 385
 - restructuring architecture of networks, 383
 - user controls, 385–386
- Digital divides, 445–447
 - bridging, 491–492
 - charting, 467–497
 - comparing rural-urban Internet access and use, 467–497
 - comparing socioeconomic, gender, life stage, 467–497
 - multifaceted nature of, 467–492
 - in specific populations, 446–447
 - technological and social aspects of digital divide, 469–471
 - trends by country, 491
- Digital era, production in, 257–281
 - American comeback, 264–266
 - asset or commodity, 270–275
 - competing in digital age, 266–269
 - digital era in historical perspective, 260–264
 - future of manufacturing, 258–260
 - transition, 264–266
- Digital functionality, conventional products with, 274–275
- Digital goods and markets, 270–272
- Digital tools, 266–267
- Digital year in historical perspective, 260–264
 - American dominance, 261–262
 - challenges from abroad, 262–264
 - Fordism and mass manufacture, 261–262
 - lean production and flexible specialization, 262–264
- Direct sales
 - and demand-driven production, 315–316
 - value chain, 315
- Dissemination, electronic, 244
- Distribution systems, production and, 296–306
- DSL (Digital Subscriber Line), 388
- Eastern Europe, manufacturing sites
 - of leading contract manufacturers in, 345
- E-business, 104, 180
- E-commerce, 104, 321, 325–327, 346–351
- Ecologies, knowledge, 156
- Economic environment, emerging, 181

- Economic fabric of region, social and, 193
- Economic performance, 40–44
factors affecting diffusion of ICT, 80–84
ICT and firm-level performance, 89–106
ICT's impact on growth, 84
impact of ICT on, 77–109
impact of investment in ICT, 85–86
international comparison and analysis, 77–109
IT-producing and ICT-using sectors, 86–89
resources and constraints, 387–388
sources of growth, 54
state of ICT diffusion, 77–80
structural changes and globalization of processes, 193
- Economy
financial component, 182
information technologies and knowledge, 113–129
network, 230
quality of knowledge in context, 190
transition to knowledge-driven, 188
two systems of political, 272
- EDI (electronic data interchange), 32, 299
- Education, 169–170
and income as predictors of access, 444
- Electromechanical functionality, 267
- Electronic dissemination of goods, 244
- Electronic finance, 249
- Electronic marketplaces, procurement in, 349–350
- Electronics, consumer, 264
- Electronics contract manufacturing, 335–357
changing social division of labor, 338–346
contract manufacturing in Whitelist IT industry, 336–337
e-commerce, 346–351
information networks, 346–351
manufacturing value chain, 346–351
supply-chain management and global overcapacities, 351–354
- Electronic transactions, structure of financial networks with, 250
- E-mail, 422–425
- Emissions control, atmospheric, 290–292
- Empowerment, negotiation and, 433
- EMS (electronics manufacturing services), 335
- Engineering, virtual research communities for science and, 157–168
blue ribbon advisory panel on cyberinfrastructure, 164–165
current examples, 161–163
cyberinfrastructure for wide use, 165–168
e-science, 160
general properties of virtual research federations, 160–161
- Grid, 158–160
laboratory without walls, 157–158
laying foundations for research revolution, 163
- Enterprises, knowledge in, 131–154
customer capital, 141–142
customer contact intensive, 146–147
handling transformative knowledge, 148–151
human capital, 139–140
information and communication technology, 148–151
information intensive, 147–148
material intensive, 142–145
network, 187–191
source of transformation, 136–139
stakeholder capital, 141–142
stakeholder contact intensive, 146–147
structural capital, 140–141
transforming society, 131–132

- Enterprise transformation and innovation, network topology of, 179–197
- clusters of innovation, 191–194
- importance of networked organizational knowledge, 180–187
- knowledge and organizational design, 187–191
- network enterprise, 187–191
- organizational knowledge and firms, 191–194
- Entertainment, 294–296
- Environment
- emerging economic, 181
- fostering for effective use of ICT, 102–103
- presence and ICT-mediated, 216–217
- transportation and telecommunications versus, 237–238
- trust in institutional, 183
- Equity, concerns about, 204–205
- ERE (Environmental Research and Education), 163
- ERP (enterprise resource planning), 298
- E-science, 160
- Europe, IT-enabled growth nodes in, 199–228
- assessing knowledge management, 206–208
- business networks, 203–204
- from clusters to growth known, 199–201
- concerns about equity, 204–205
- conditions to sustain and develop, 205–206
- development and interaction, 213–214
- identifying and measuring, 211–212
- I-Space and effects of ICT, 210–211
- I-Space, 206–208
- knowledge sharing, proximity, and ICT, 214–216
- learning systems, 203
- network institutional orders, 208–210
- policy perspective, 219–220
- presence and ICT-mediated environments, 216–217
- regional development, 202
- shared ICT infrastructure, 217–219
- social factor, 203
- toward growth node policies, 220–221
- Europe, manufacturing sites of leading contract manufacturers, 345
- Explicit knowledge, 189
- Extended warranties, 304
- External networks, 323–327
- impacts of IT, Internet, and e-commerce on personal computer industry, 325–327
- Facilitators, global supply chain, 341
- Factory models, Internet-based, 347–349
- Families, communication in, 419–421
- categories analyzed, 420
- social dimensions of communication technologies, 420–421
- Family networks
- prevailing approaches, 415–417
- visual representation of, 414
- FAQs (frequently asked questions), 364
- Federations
- advanced comprehensive virtual, 157
- general properties of virtual research, 160–161
- Finance
- electronic, 249
- ICT and, 181
- Financial capital, 399
- Financial component of new economy, 182
- Financial networks, 248–250
- Financial securities, 182

- Firms
flexible supply chains, 318–321
ICT and performance, 89–106
IT, Internet and e-commerce in
personal computer industry, 321
organizational knowledge, 191–194
outsourcing of production, 316–318
spatial organization of, 185
structure changes, 316–321
transforming, 31–32
- Flexible specialization, lean
production and, 262–264
- Flexible supply chains, 318–321
- Flexible volume production, 262
- Flows, 232
- Fordism and mass manufacture,
261–262
- Forms, 118–121
- Framework, supernetwork, 243
- Functions
comprehensiveness, 166
conventional products with digital,
274–275
conventional products with physical,
274–275
electromechanical, 267
technological progress in
information processing, 27
- Future of manufacturing, 258–260
- Games, ecology of, 392–394
- Games shaping implications of
broadband Internet, 394
- Gatekeepers, creating or eliminating,
383–384
- GDP (gross domestic product), 40,
49, 53
- Geography of space and place,
390–391
- Germany, 476–478
- Gini coefficients, 445
- Global overcapacities, 351–354
- Global supply chain facilitators, 341
- GN. *See* Growth nodes
- Good-faith effort, 306
- Goods
electronic dissemination of, 244
and services, 101–102
- Government programs, efficient,
105–106
- GPS (Global Positioning System),
407
- Grassroots politics, 404–405
- Grid, 158–160
- GriPhyN (Grid Physics Network),
162
- Groups, software development,
366–367
- Growth
in average labor productivity, 55
in GDP, 53
ICT's impact on, 84
network, 432
output, 58
projecting productivity, 49, 58–69
sources of, 53
sources of economic, 54
sources of labor productivity, 56
unleashing in service sector,
104–105
- Growth nodes (GNs), 200
assessing knowledge management in,
206–208
business networks, 203–204
from clusters to, 199–201
conditions to sustain and develop,
205–206
development and interaction,
213–214
equity concerns, 204–205
existing, 201–202
growth node development and
interaction, 213–214
identifying and measuring, 211–212
- I-Space and effects of ICT, 210–211
- I-Space, 206–208
and ICT-mediated environments,
216–217
- IT-enabled, 199–228
- knowledge sharing, proximity, and
ICT, 214–216
- learning systems, 203

- Growth nodes (GNs) (cont.)
 network institutional orders,
 208–210
 policies, 219–221
 in regional development, 202
 shared ICT infrastructure, 217–219
 social factor, 203
- Growth resurgence, lessons from
 U.S., 49–75
- GSS (General Social Survey), 443
- Health support, volunteer, 364–365
- Historical perspective, digital era in,
 260–264
- Homeland security, 170
- Home networking since 1980s,
 417–419
- Horizontally organized innovation,
 117–119
- HOV (high-occupancy vehicle), 406
- Human capital, 139–140, 399
- Human decision making, 238
- Hypothesis, knowledge spillover, 215
- ICT (information and communication
 technology), 77, 131, 179, 199,
 206, 376, 399–411
 and behavior monitoring, 402
 diffusion of, 77–84
 and finance, 181
 fostering environment for effective
 use of, 102–103
 goods and services, 101–102
 impact of investment on, 85–86
 importance of, 89–91
 increasing price and process
 transparency, 184
 infrastructure, shared, 217–219
 infrastructure for growth node
 development and interaction,
 213–214
 I-Space and effects of, 210–211
 knowledge sharing, proximity, and,
 214–216
 paradigms and practices, 388–390
 rewarding successful adoption of,
 103–104
 supports for building and
 maintaining social capital, 401–402
- ICT, impact of, 94–99
 on growth, 84
 links to innovation, 97–98
 complementary to skills, 94–95
 emergence over time, 98–99
 organizational change, 95–96
 ownership, competition, and
 management, 97
- ICT, impact on economic
 performance, 77–109
 factors affecting diffusion of ICT,
 80–84
 ICT and firm-level performance,
 89–106
 ICT's impact on growth, 84
 impact of investment in ICT, 85–86
 international comparison and
 analysis, 77–109
 IT-producing and ICT-using sectors,
 86–89
 state of ICT diffusion, 77–80
- ICT and firm-level performance,
 89–106
 factors that affect impact of ICT,
 94–99
 differences across countries, 99
 importance, 89–91
 impacts, 91–93
 policy implications, 99–106
- ICT-mediated environments, 216–217
- ICT-producing and ICT-using sectors,
 86–89
- Impersonal sociotechnical capital,
 substitution of, 403
- Income as predictors of access,
 education and, 444
- Income effect, 402–403
- Indirect sales value chain, 314
- Industrial organizations, 119
- Industry
 automobile, 283–312

- changing structure of personal computer, 314–315
- in context, 284–287
- contract manufacturing in Whitelist IT, 336–337
- personal computer, 319, 321, 325–327
- Industry structure, changes in firm and, 316–321
 - flexible supply chains, 318–321
 - outsourcing of production, 316–318
 - use of IT, Internet, and e-commerce in personal computer industry, 321
- Industry structure, factors disrupting, 315–316
 - acceleration of product cycles, 315
 - direct sales and demand-driven production, 315–316
 - rapid decline in prices, 315
 - widespread adoption of Internet, 316
- Industry structure, personal computer, 319
- Industry transformation, IT as engine of, 287–288
- Information
 - access link for, 243
 - and communication technology, 148–151
 - from knowledge, 189
 - knowledge and, 132–134
- Information and communication technology. *See* ICT
- Information costs, reduction of, 185
- Information intensive enterprise, knowledge in, 147–148
- Information/knowledge era, 138–139
- Information networks, e-commerce, and manufacturing value chain, 346–351
- Information processing functions, technological progress in, 27
- Information Society Technologies (IST) Programme, 199
- Information technology. *See* IT
- Infrastructure. *See* Cyber-
 - infrastructure-based knowledge environments described, 155
 - ICT shared, 217–219
- Innovation
 - clusters of, 191–194
 - computers and, 28
 - and creative thinking and knowledge, 184
 - modularity and ways to manage, 119
 - paths toward, 184
 - science contributing to, 115
 - and technology diffusion, 105
- Innovation, new models of, 113–129
 - filling up with innovative capacity, 121–128
 - horizontally organized innovation, 117–119
 - modular structures with freedom to innovate, 119–121
 - role of users, 117–119
- Innovation, science-based, 114–117
 - science contributing to innovation, 115
 - sectoral cases, 115–116
 - two forms of connection, 116–117
- Innovative capacity, filling up with, 121–128
 - harnessing benefits of multiple experiments, 127–128
 - innovation technologies and economies of innovation, 124–126
 - knowledge openness as key feature in each model, 124
 - minimizing incurring costs, 126–127
 - networks and collective nature of innovation, 121–122
 - public domain of knowledge and information, 122–123

- Innovative capacity (cont.)
 public knowledge in modular-based innovation model, 124
 public knowledge in science-based innovation model, 123
 public knowledge in user-based innovation model, 123
- Innovators defined, 117–118
- Instant messaging, 430
- Institutional arrangements and public policy, 391–392
- Institutional environment, trust in, 183
- Institutional forms, 118–119
- Institutional orders, network, 208–210
- Institutional structures, emergence of, 403
- Institutions and I-Space locations, 209–210
- Intangible assets and economic impact of computers, 27–48
 changing customer relationships, 33–34
 changing interactions with suppliers, 32–33
 evidence on IT, organization, and productivity, 34–44
 qualitative case examples, 29–30
 transforming firms, 31–32
- Integration, types of OEM-CM, 340.
See also Reintegration
- Intellectual capital, 189
- Intellectual property, 265
- Intensive enterprise
 knowledge in customer contact, 146–147
 knowledge in information, 147–148
 knowledge in stakeholder contact, 146–147
- Intensive enterprises, knowledge in material, 142–145
- Interactions
 changing with suppliers, 32–33
 network, 236–237
- Internet, 321, 325–327, 439
 games shaping implications of broadband, 394
 intrinsic social nature of, 395–396
 personal factors and, 443
 role in reconfiguring access, 378–379
 widespread adoption of, 316
- Internet, public volunteer work and, 361–374
 case examples, 364–368
 organizing volunteer activity offline and online, 361–364
- Internet, social impact of, 375–378, 437–465
 2003 update, 437–465
 digital divides, 445–447
 Internet data collections, 439–441
 nonsocial activity, 451–457
 people online, 442–445
 social activity and Internet use, 447–451
 time and activity, 458–459
 time-diary studies, 451–454
 time-estimate questions, 454–455
- Internet access and use by country, 471–485, 490
 China, 484–485
 Germany, 476–478
 Japan, 478–481
 Korea, 481–483
 United States, 473–476
- Internet and communication, 438
- Internet and social transformation, 375–397
 digital choices reconfiguring access, 379–386
 Internet and society, 375–378
 intrinsic social nature of Internet, 395–396
 role of Internet in reconfiguring access, 378–379
 social factors shaping digital choices, 386–394
- Internet-based factory models, 347–349
- Internet data collections, 439–441

- Internet diffusion, growth in, 442
- Internet surveys, methodological differences in, 459–461
- Internet use, social activity and, 447–451
 - behavior estimate studies, 449–450
 - time-diary studies, 447–449
 - World Internet Project, 450
- Introducer systems, 400
- Investment, impact in ICT, 85–86
- ISP (Internet service provider), 388
- I-Space, 206–208
 - and effects of ICT, 210–211
 - institutions, 209–210
 - social learning cycle, 207
- IST (Information Society Technologies) Programme, 199
- IT (information technology), 49, 126, 283, 321, 325–327
 - as engine of industry transformation, 287–288
 - and enterprise transformation in automobile industry, 306–310
 - impact in automobile industry, 288
 - large-sample empirical evidence on, 34–44
 - and productivity, 34–36
- IT, capital input of, 57
- IT, use and service monitoring with, 288–290
 - complementary asset provision, 288–290
 - property regulation, 288–290
 - risk mitigation, 288–290
- IT and changing social division of labor, 335–357
 - changing social division of labor, 338–346
 - contract manufacturing in Whitelist IT industry, 336–337
 - e-commerce, 346–351
 - information networks, 346–351
 - manufacturing value chain, 346–351
 - supply-chain management and global overcapacity, 351–354
- IT and knowledge economy, 113–129
 - horizontally organized innovation, 117–119
 - innovative capacity, 121–128
 - modular structures with freedom to innovate, 119–121
 - role of users, 117–119
 - science-based innovation, 114–117
- IT and organization, measurement of interrelationship between, 36–40
- IT and personal computer industry, 313–333
 - changes in firm and industry structure, 316–321
 - changing structure of personal computer industry, 314–315
 - external networks, 323–327
 - factors disrupting industry structure, 315–316
 - internal IT systems, 321–323
- IT-enabled growth nodes in Europe, 199–228
 - assessing knowledge management in growth nodes, 206–208
 - business networks, 203–204
 - from clusters to growth nodes, 199–201
 - concerns about equity, 204–205
 - conditions to sustain and develop growth nodes, 205–206
 - growth node development and interaction, 213–214
 - growth nodes existing, 201–202
 - growth nodes in regional development, 202
 - identifying and measuring growth nodes, 211–212
- I-Space, 206–208
- I-Space and effects of ICT, 210–211
- knowledge sharing, proximity, and ICT, 214–216
- learning systems, 203
- network institutional orders, 208–210
- policy perspective, 219–220

- IT-enabled growth nodes in Europe
(cont.)
presence and ICT-mediated
environments, 216–217
shared ICT infrastructure, 217–219
social factor, 203
toward growth node policies,
220–221
- IT industry, contract manufacturing
in Whitelist, 336–337
- ITR (Information Technology
Research), 158, 162
- IT systems, internal, 321–323
- Japan, 478–481
- Job classification, 143
- Knowledge
in business processes, 144–145
as capital, 136–139
corporate, 189
explicit, 189
importance of networked
organizational, 180–187
and information, 132–134,
138–139, 189
innovation and creative thinking, 184
organizational, 191–194
and organizational design, 187–191
quality of, 190
role in material intensive enterprises,
142–145
and social change, 136
spillover hypothesis, 215
tacit, 189
transformative, 131–132, 148–151
- Knowledge, using to transform
enterprises, 131–154
customer capital, 141–142
customer contact intensive, 146–147
handling transformative knowledge,
148–151
human capital, 139–140
information and communication
technology, 148–151
information intensive, 147–148
material intensive, 142–145
source of transformation, 136–139
stakeholder capital, 141–142
stakeholder contact intensive,
146–147
structural capital, 140–141
Knowledge debate, tacit-codified, 213
- Knowledge driven economy,
transition to, 181, 188
- Knowledge ecologies, 156
- Knowledge economy, information
technologies and, 113–129
- Knowledge environments,
cyberinfrastructure-based, 155–176
impact and future, 168–172
impact on civil society, 171–172
impact on education, 169–170
impact on national security,
170–171
virtual research communities for
science and engineering, 157–168
recommendations, 172–173
- Knowledge management, accessing in
growth nodes, 206–208
- Knowledge sharing, proximity, and
ICT, 214–216
- Korea, 481–483
- Labor, 136–137
- Labor, changing social division of,
335–357
contract manufacturing in Whitelist
IT industry, 336–337
e-commerce, 346–351
information networks, 346–351
manufacturing value chain, 346–351
relationships and brand-name
companies, 338–340
supply-chain management and
global overcapacity, 351–354
transnational production networks,
343–346
vertical reintegration among
contract manufacturers, 340–341
work organization in
manufacturing, 341–343

- Laboratory without walls, 157–158
- Labor productivity, sources of
 - growth, 55–56
- Labor productivity projections, 64–66
- Land, 136–137
- Lean production and flexible specialization, 262–264
- Learning, processes of organizational, 192
- Learning systems, 203
- Leases, 302
- LHC (Large Hadron Collider), 163
- Links, 232

- Macroeconomic performance, 40–44
- Maintenance, construction and, 301–306
- Management, 136–137
 - network, 432–433
 - supply-chain, 351–354
- Manufacture, Fordism and mass, 261–262
- Manufacturer-customer relationship, 301–306
- Manufacturers. *See* Contract manufacturers (CMs)
- Markets
 - capital, 188
 - collaborative, 269
 - markers, 269
 - procurement and electronic, 349–350
 - redefining, 268
- Mass manufacture, Fordism and, 261–262
- Material intensive enterprises, knowledge in, 142–145
- Materials, sectors based on new processes and, 272–274
- Maximum flow problem, 233
- Media, findings regarding TV and other, 456
- Mediated copresence, 213
- Media typology, pre-Internet communication, 439

- Mentoring and tutoring, volunteer, 368
- Messaging, instant, 430
- Minimum cost flow problem, 233
- Model, financial network, 249
- Modeling teleshopping versus shopping decision making, 241–245
- Models, Internet based factory, 347–349
- Modular forms, trade-off in three different, 120–121
- Modularity and ways to manage innovation, 119
- Modular structures with freedom to innovate, 119–121
- Monetary, behavior, 402
- Multiple classification and analysis (MCA), 454
- Multifactor productivity (MFP), 84

- National security, 170–171
- NEES (Network for Earthquake Engineering Simulation), 162
- Negotiation and empowerment, 433
- NEON (National Ecological Observatory Network), 162
- Network, addressable device in wireless communications, 295
- Network economy, 230
- Networked home, 417–419
 - approaches to family networks, 415–417
 - communication in families, 419–421
 - communication technologies and their characteristics, 422–430
 - conceptual issues, 419
 - current trends and future promise, 413–435
 - home networking since 1980s, 417–419
 - negotiation and empowerment, 433
 - network growth, 432
 - network management, 432–433
 - research study of social networks, 419–421

- Networked home (cont.)
 significance of networked home,
 413–415
 tech-enabled, 413–435
- Networked organizational
 knowledge, importance of,
 180–187
- Networks. *See also* Supernetworks
 abstract, 229
 ad hoc, 191
 business, 203–204
 classical, 232–234
 cross-national production, 271
 current, 234
 enterprise, 187–191
 external, 323–327
 family, 415–417
 financial, 248–250
 growth, 432
 information, 346–351
 institutional orders, 208–210
 interactions, 236–237
 interdisciplinary nature, 233
 levels of nodes, 242
 links, and flows, 232
 management, 432–433
 restructuring architecture of, 383
 social, 419–421
 structure of financial, 250
 supply chain, 245–248
 transnational production, 343–346
 visual representation of family,
 414
- Network topology of enterprise
 transformation and innovation,
 179–197
 clusters of innovation, 191–194
 importance of networked
 organizational knowledge, 180–187
 knowledge and organizational
 design, 187–191
 network enterprise, 187–191
 organizational knowledge and firms,
 191–194
- New consumer electronics, 264
- New economy, 182, 190
- New institutional structures,
 emergence of, 403
- New processes and materials, sectors
 based on, 272–274
- News monitoring and opinion
 formation, 404
- NIPA (National Income and Product
 Accounts), 51
- Nodes, 232
 assessing knowledge management in
 growth, 206–208
 from clusters to growth, 199–201
 conditions to sustain and develop
 growth, 205–206
 growth, 202
 identifying and measuring, 211–212
 IT-enabled growth, 199–228
 networks consist of four levels of,
 242
- Notes, paper, 426–427
- NTIA (National Telecommunications
 and Information Administration),
 442
- NVO (National Virtual Observatory),
 162
- ODMs (original design
 manufacturers), 317, 337
- OECD (Organization for Economic
 Cooperation and Development),
 469
- OEM-CM integration, types of,
 340
- OEMs and after sale lives of
 automobiles, 303
- Online
 number and percentage of
 population, 487
 organizing volunteer activity offline
 and, 361–364
 people, 442–444
- Open source software, 272
- Opinion formation, news monitoring
 and, 404
- Optimal routes of travel, 239
- Optimization, 235–236

- Organization
 - large-sample empirical evidence on, 34–44
 - measurement of interrelationship between IT and, 36–40
- Organizational capital, 188–190
- Organizational design, knowledge and, 187–191
- Organizational knowledge
 - and firms, 191–194
 - importance of networked, 180–187
- Organizational learning, processes of, 192
- Organization of firms, spatial, 185
- Organizations, industrial, 119
- Output, 58, 63–69
 - Outsourcing of production, 316–318
- Overcapacities, global, 351–354
- Paper notes, 426–427
- Passenger safety, 292–294
- PCs. *See* Personal computers
- PDAs (personal digital assistants), 149
- Performance
 - ICT and firm level, 89–106
 - impact of ICT on economic, 77–109
 - implications for macroeconomic, 40–44
- Personal computer (PC) industry, 314–315, 319, 321, 325–327
- Personal computer industry, information technology and, 313–333
 - changes in firm and industry structure, 316–321
 - external networks, 323–327
 - factors disrupting industry structure, 315–316
 - internal IT systems, 321–323
- Personal computers (PCs)
 - Compaq Europe supply chain for build-to-order desktop, 320
 - Compaq Europe supply chain for standard desktop, 319
- Personal factors and Internet use, 443
- Phones, cellular, 427–429
- Physical capital, 399
- Physical function, conventional products with, 274–275
- Pinto case, 305
- PIPs (Partner Interface Processes), 324
- Place, geography of space and, 390–391
- Policies
 - institutional arrangement and public, 391–392
 - toward growth node, 220–221
- Political economy, two systems of, 272
- Politics, grassroots, 404–405
- Population online, number and percentage of, 487
- Populations, digital divides in specific, 446–447
- Pre-Internet communication media typology, 439
- Presence and ICT-mediated environments, 216–217
- Prices
 - percent increase in stock, 183
 - rapid decline in, 315
 - technology improvements and falling real, 27
- Processes and materials, sectors based on new, 272–274
- Procter & Gamble (P&G), 32
- Procurement and electronic marketplaces, 349–350
- Product cycles, acceleration of, 315
- Production
 - direct sales and demand-driven, 315–316
 - flexible volume, 262
 - lean, 262–264
 - outsourcing of, 316–318
- Production, transforming in digital era, 257–281
 - American comeback, 264–266
 - asset or commodity, 270–275

- Production, transforming in digital era (cont.)
 - competing in digital age, 266–269
 - digital era in historical perspective, 260–264
 - future of manufacturing, 258–260
 - transition to digital age, 264–266
- Production and distribution systems, 296–306
 - after-sales markets, 301–306
 - expediting and coordinating production and distribution, 296–301
- Production as asset or commodity, 270–275
 - conventional products with digital functionality, 274–275
 - conventional products with physical function, 274–275
 - digital goods/digital markets, 270–272
 - sectors based on new processes and materials, 272–274
- Production networks
 - cross-national, 271
 - transnational, 343–346
- Production workers, 271
- Productive resources, 399
- Productivity, 27
 - growth, projecting, 49, 58–69
 - historical records, 51–58
 - IT and, 34–36
 - labor sources, 55–56
 - large-sample empirical evidence on, 34–44
 - lessons from U.S. growth resurgence, 49–75
 - projecting productivity growth, 58–69
 - output and labor, 64, 66
- Productivity paradox question, 28
- Product platforms, enhanced, 290–296
 - atmospheric emissions control, 290–292
 - entertainment, conviviality, and control, 294–296
 - passenger safety, 292–294
- Products
 - consumers and order/purchase of, 242
 - conventional, 274–275
 - distinctions between services and, 268
- Product to service, shift from, 308
- Programme, Information Society Technologies (IST), 199
- Programs, efficient government, 105–106
- Projections
 - output and labor productivity, 64, 66
 - output and productivity, 63–69
 - range of labor productivity, 65
 - range of output, 65
- Property regulation, 288–290
- Proprietary manufacturing skills, 267
- Protection comparison, 68
- Protection revisions, private domestic economy, 67
- Public policy, institutional arrangements and, 391–392
- Public transportation, 405–408
- Public volunteer work on Internet, 361–374
 - case examples, 364–368
 - organizing volunteer activity offline and online, 361–364
- Purchasers, rise in information access for, 306
- Purchasing and design, integrating, 350–351
- Quality of knowledge and new economy, 190
- Questions, time-estimate, 454–455
- Radio frequency identifiers (RFIDs), 306
- Receivers, redistributing power between senders and, 385
- Recommender systems, 401
- Reconfiguring access, 375–397

- digital choices, 379–386
- role of Internet in, 378–379
- Regional development, growth nodes in, 202
- Regions, social and economic fabric of, 193
- Regulation, property, 288–290
- Reintegration, vertical, 340–341
- Relationship capital, 189
- Relationships, changing customer, 33–34
- Reputation systems, 402
- Research communities, virtual, 157–168
- Research federations, general properties of virtual, 160–161
- Research revolution, laying foundations for, 163
- Resources, 387–388, 399
- RFIDs (radio frequency identifiers), 306
- Risk mitigation, 288–290
- Routes, optimal, 239

- Safety, passenger, 292–294
- Sales, 314–316
- Scholastic work, volunteer scientific and, 367–368
- Science and engineering, virtual research communities for, 157–168
- blue ribbon advisory panel on cyberinfrastructure, 164–165
- current, 161–163
- cyberinfrastructure for wide use, 165–168
- e-science, 160
- Grid, 158–160
- laboratory without walls, 157–158
- research revolution, 163
- virtual research federations, 160–161
- Science contributing to innovation, 114–117
- Scientific and scholastic work, volunteer, 367–368

- Sectors
 - ICT-producing in ICT-using, 86–89
 - unleashing growth in service, 104–105
- Securities, financial, 182
- Security, 170–171
- Semi-public transportation, 405–408
- Senders and receivers, redistributing power between, 385
- Service life, growing vehicle, 308
- Services
 - and products, 268
 - shift from products to, 308
 - strengthening competition in ICT goods and, 101–102
- Service sector, unleashing growth in, 104–105
- Shopping versus teleshopping, 241–245
- Shortest path problem, 233
- Skills, proprietary manufacturing, 267
- SLC (social learning cycle), 207
- SMEs (small and mid-sized enterprises), 204
- SoC (Science of Collaboratories), 158
- Sociability, studies on Internet and, 452
- Social activity and Internet use, 447–451
 - behavior estimate studies, 449–450
 - time-diary studies, 447–449
 - World Internet Project, 450
- Social and economic fabric of regions, 193
- Social capital, 399–400
 - ICT supports for building and maintaining, 401–402
- Social dimensions and communication technologies, 420–421, 431
- Social factors shaping digital choices, 386–394
 - conceptions and responses of users, 390
 - ecology of games, 392–394

- Social factors shaping digital choices (cont.)
 - economic resources and constraints, 387–388
 - geography of space and place, 390–391
 - ICT paradigms and practices, 388–390
 - institutional arrangements and public policy, 391–392
 - strategies of others, 392–394
- Social impact of Internet, 437–465
 - 2003 update, 437–465
 - digital divides, 445–447
 - Internet data collections, 439–441
 - nonsocial activity, 451–457
 - people online, 442–445
 - social activity and Internet use, 447–451
 - time and activity, 458–459
 - time-diary studies, 451–454
 - time-estimate questions, 454–455
- Social learning cycle in I-Space, 207
- Social networks, research study of, 419–421
 - categories analyzed, 420
 - social dimensions of communication technologies, 420–421
- Social status, 443
- Social transformation, Internet and, 375–397
 - digital choices reconfiguring access, 379–386
 - Internet and society, 375–378
 - intrinsic social nature of Internet, 395–396
 - role of Internet in reconfiguring access, 378–379
 - social factors shaping digital choices, 386–394
- Societal changes, television and, 437
- Society
 - civil, 171–172
 - Internet and, 375–378, 438
 - knowledge transforming, 131–132
- Sociotechnical capital, 400
 - impersonal, 399–411
 - substitution of impersonal, 403
- Software, 272, 366–367
- Space and place, geography of, 390–391
- SPARC (Space Physics and Aeronomy Research Collaboratory), 169
- Spatial organization of firms, 185
- Specialization, lean production and flexible, 262–264
- Spillover hypothesis, knowledge, 215
- Stakeholder capital, 141–142
- Stakeholder contact intensive
 - enterprise, knowledge in, 146–147
- Stock prices, percent increase in, 183
- Strangers, collective action among, 399–411
- Structural capital, 140–141, 189
- Structural changes and globalization
 - of economic processes, 193
- Structures
 - changes in firm and industry, 316–321
 - changing cost, 381–382
 - emergence of situational, 403
 - of financial networks with electronic transactions, 250
 - modular, 119–121
 - personal computer industry, 319
 - supernetwork, 246
- Studies
 - behavior estimate, 449–450
 - of Internet and sociability, 452
 - time-diary, 447–449, 451–454
- Supernetworks, 229–254
 - and applications, 238
 - Braess paradox, 235–236
 - classical networks, 232–234
 - and commuting versus telecommuting, 239
 - congestion, 235
 - current, 234
 - financial networks, 248–250
 - large-scale nature and complexity, 234–235

- modeling teleshopping versus shopping decision making, 241–245
- multilevel level supply chain, 247
- multitiered, 238
- network interactions, 236–237
- paradoxes, 229, 237–238
- structures of supply chain networks, 246
- system organization versus user optimization, 235–236
- telecommuting versus commuting decision making, 238–241
- transportation and telecommunications versus environment, 237–238
- Suppliers, changing interactions with, 32–33
- Supply chains
 - for build-to-order desktop personal computers, Compaq Europe, 320
 - flexible, 318–321
 - global facilitators, 341
 - management, 351–354
 - networks, 245–248
 - supernetwork, multilevel, 247
- Support, volunteer, 364–365
- Surveys, methodological differences in Internet, 459–461
- System optimization versus user optimization, 235–236
- Systems
 - economic, 181
 - internal IT, 321–323
 - introducer, 400
 - learning, 203
 - production and distribution, 296–306
 - recommender, 401
 - reputation, 402
- Tacit-codified knowledge debate, 213
- Tacit knowledge, 189
- Tech-enabled networked home, 413–435
- Technical support, volunteer, 364
- Technological progress in information processing functions, 27
- Technologies
 - capital input of information, 57
 - communication, 422–430, 431
 - information, 113–129
 - information and communication, 148–151
 - social dimensions of communication, 420–421
 - television, 437
- Technology diffusion, innovation and, 105
- Technology improvements and falling real prices, 27
- Tele-access, shaping, 375
- Telecommunications, 237–238, 249
- Telecommuting versus commuting, 238–241
- Telephone, 425–426
- Teleshopping, 241–245
- Television, 437–438, 456
- TFP (total factor productivity), 49
- Thinking, creative, 184
- Time and activity, 458–459
- Time-diary studies, 447–449, 451–454
- Time-estimate questions, 454–455
- Tools, digital, 266–267
- Topology, network, 179–197
- Transactions, structure of financial networks with electronic, 250
- Transformations
 - areas for future changes, 402–408
 - firms, 31–32
 - grassroots politics, 404–405
 - Internet and social, 375–397
 - IT as engine of industry, 287–288
 - news monitoring and opinion formation, 404
 - production in digital era, 257–281
 - semi-public transportation, 405–408
 - source of, 136–139
 - structural impact of, 186

- Transformative knowledge, 148–151
- Transnational production networks, 343–346
- Transportation
 - semi-public, 405–408
 - and telecommunications versus environment, 237–238
 - telecommuting, 241
- Travel, optimal routes of, 239
- Trust in institutional environment, 183
- TV, 437–438, 456

- United States, 473–476
- User controls, 385–386
- User optimization, system
 - optimization versus, 235–236
- Users, 117–119, 390
- U.S. growth resurgence, 49–75

- Value chain, 314–315
- Vertical reintegration among contract manufacturers, 340–341
- Virtual federation, advanced
 - comprehensive, 157
- Virtual research federations, general properties of, 160–161
- VOIP (voice over Internet protocol), 295
- Volume production, flexible, 262
- Volunteer activity, 361–374
 - case examples, 364–368
 - health support, 364–365
 - mentoring and tutoring, 368
 - organizing offline and online, 361–364
 - public work, 361–374
 - scientific and scholastic work, 367–368
 - technical support, 364

- Walls, laboratory without, 157–158
- Warranties, extended, 304
- WebUse, features of, 461–462
- Whitelist IT industry, 336–337
- WiFi (Wireless Fidelity), 382
- Wireless communications network,
 - addressable device in, 295
- Work-at-home issues, 418–419
- Workers, production, 271
- World Internet Project, 450