

Index

Entries in bold typeface denote tables or figures.

- 3M, 11, 120, 162
- absorptive capacity
 and network advantage gains, 109, 124
 impact of brokerage position on, 149
- actor network theory, 23
- adjacency matrix, 59–61, **61**
- Advanced Micro Devices (AMD), 75, 77
- adverse selection, 198, 203
- advice networks. *See* intra-organisational networks
- agent-based simulation models, 293
- alliance management learning, 136
- alliance portfolios
 influence of partner tie strength on learning and, 143–7
 management of composition of, 137–8, **138**, **147**
 management of diversity in, 140–5
 partner selection and, 99, 261–3
 radical innovations and, 106
- alliances
 impact of tie strength on, 131–4
 learning processes in, 135–6
 organisational learning and, 127–8
- An Evolutionary Theory of Economic Change* (book), 20
- analogous thinking, 29–30, 159–60
- Apple, 18, 30, 185, 241
- arbitrage, 287
- architectural innovation, 107–8.
See also innovation
- Arthur's model of diffusion, 235
- asymmetric degree distribution, 82
- automated broadcast notifications, 251
- aviation industry, **28**, 264
- Baden-Württemberg (Germany), 26
- balance perspective, 148
- balance theory, **86**, 86–7
- Barcelona municipality network structures, 48, **51**
- betweenness centrality, 66–7, 227, 243–4, **243**.
See also centrality metrics
- bibliometric data
 boundary specification for, 59
 use in analysis of technological domains, 77–9
 use in scientific publications and patents, 57–8
- Bibliothèque Nationale de France, 36
- big five, the, 269
- biomimicry, 18, 159
- biotechnology
 and pharmaceutical industry partnerships, 119, 286, 293
 network evolution and, 290–1
 uncertainty and, 289
- bipartite networks, 83
- BlaBlaCar, 17
- Black & Decker, 181–2
- black box model of innovation, 19
- blau index, 145
- BMW, 105, 133
- board interlocks, 201–2
- boundary spanners
 creativity, and, 166–7, **167**
 definition of, 15
 external knowledge integration and, 136
 inter-team relations and, 52
 organisational change and, 48
 role within cohesive teams and, 169
 user involvement and, 190
- boundary specification, 58–9
- bounded awareness, 199–200
- bounded rationality, 116
- BP, 53, 272
- breakthrough innovation, 105, 108, 121
- breakthrough inventions, 70
- breakthroughs, 25, 115, 288
- bridging ties, 88, 150, **285**
- brokerage. *See also* network position
 antecedents of, 284–8

- entrepreneurialism and, 207
- factors that influence the effectiveness of, 149–53
- organisational sustainability of, 161–2
- positional roles in, 163–7
- brokers
 - common characteristics of, 284–8, **285**
 - their roles in innovation diffusion, 246–8
- Burt's constraint, 63–4
- business network, 12
- buy-in ties, 67, 208
- Canon, 195
- capability transfer, **96**, 99
- capability bias, 218–19
- centrality metrics. *See also* degree centrality; closeness centrality; betweenness centrality
 - and detection of opinion leaders, 242–6
 - change agents and, 225–7
- chaebol* (Korean), 71
- Challenger space shuttle, 200
- change agents
 - acceptance of organisational change and, 223
 - adoption of social technologies and, 213–14
 - centrality positions of, 225–7
- change management, 15, 95–7
- Cisco, 138, 213, 221
- citation networks, 68–70, 79–80
- clique, 71
- closeness centrality, 66, 226.
 - See also* centrality metrics
- closure, 89, 148
- clustering bias, 83
- clustering coefficient, calculation of, 85
- clustering of innovation, 21, 26–7, **28**
- cognitive biases, 198–203, **199**
- cohesion, 84, 168, 223–4
- cohesive networks. *See also* cohesiveness
 - decision-making, cognitive biases in, **96**, 101
 - diffusion mechanisms and, 249–50
 - influences on entrepreneurial start-up success, 206–7
 - structural holes and, 89–90
- cohesive subgroups, 71–2, **74**
- cohesiveness. *See also* cohesive networks
 - and its effect on creativity, 168–71
 - and its impact on diffusion, 249–50
 - and its impact on organisational change, 222–4
 - network metrics of, 224, **225**
- co-invention networks, 73, **74**
- Coleman, James, 22
- community detection algorithm, 72
- community isomorphism, 273–4
- competence-destroying innovation, 216
- competence-enhancing innovation, 216
- competency trap, 195
- complex knowledge, 149
- complexity (knowledge base), 79
- complementarities and tie formation/dissolution, 261–3
- component innovation, 107–8
- computer industry
 - bridging positions and, 286
 - changes in network structure of, 280
 - development of, 27
 - impact of national policies on, 119
 - impact of regulations on, 290
 - small-world networks and, 150
- conflict resolution, 50, 270
- consultant brokerage position, 163–4, **164**
- contagion, 235–6
- content learning alliances, 136
- contingency perspective, 148
- Cool Farm Tool, 18
- coordinating motives, 276
- coordinator brokerage position, 164–5
- Copenhagen municipality network structures, 48, **49**
- core-periphery networks, **175–6**, **245**
- corporatism, 119
- cosine index, 145
- countering motives, 276
- creativity. *See also* innovation
 - characteristics that enhance, 158–61
 - cultural and social dimensions of, 156–8
 - idea creation and validation and, 208–10
 - impact of brokerage on, 161–7
 - influence of workplace design on, 173
 - inter-organisational level, **172**
 - intra-organisational level, **171**
- creativity management, 98
- Cree, 75
- cross-boundary knowledge flow, 65
- cross-categorical network effects and tie dynamics, 276–8
- cross-industry collaborations, 105
- cut-point, 248
- data sources, 55–7, 73
- decision-making, 101
- degree centrality, **62**, **67**, 226, 242–3, **243**.
 - See also* centrality metrics
- density of network, 84
- departmental silos, 136, 201
- departmental thought worlds, 52–3
- depth (knowledge base), 77
- design structure matrix, 180–1
- digitalisation, 213
- direct network externality, 233

- disruptive innovations, 122, 197
 diversification, 123
 diversity
 alliance portfolios, management of, 140–5
 as a factor of team performance, 49–50
 effects on creativity, 160–1
 impact on decision-making, 202–3
 influence on creativity, 168–71
 dominant design, 114
 dyadic level learning
 impact of alliance management capability on, 135–6
 impact of inter-organisational knowledge overlap on, 134–5, **135**, **137**
 impact of tie strength on, 131–4, **131–4**
 dynamic capabilities, 195
- Echelman, Janet, 156–7
 economic geography model of innovation, 21
 economies of scope, 120
 Edison, Thomas, 26
 effective size metric, 64
 ego network density, 146
 ego network density metric, 64
 E-I index, 65
 eigenvector centrality, 68, 227
 embeddedness
 over-, 149
 relational, 274–5, 283
 structural, 46, 275–6, 283
 Emilia-Romagna (Italy), 26
 endogeneity problem, 245–6
 entrepreneurship
 network tie structure and, 266
 the roles of networks in, 205–8
 episodic change, 213
 Euclidian distance, 145
 Euler, Leonhard, 3
 evolutionary economics, 9, 20
 evolutionary model of innovation, 21
 exploitation, 46, 106, 128–30
 exploitative innovations, 107, 266
 exploration, 46, 106, 128–30
 explorative innovations, 107, 266
- Facebook, 4, 34, 199, 213, 251
 false consensus effect, 198–9
 first mover advantage, 114
 fit between formal and informal networks, 219–21
 flow of knowledge, 5
 foci, 23, 88, 270
 gatekeepers, 166, 174–5, 247
 General Motors (GM), 127–8
 genetic algorithms, 23
 global networks. *See also* networks
 creativity and, 173–6
 structure of, 80–5, **81**
 Google, 11, 15, 186, 262
 graph theory, 3
 group polarisation, 201–2
 groupthink, 168, 201
 Gunther, Max, 11
 Gutenberg's printing press, 30
- Heider's POX schema, **86**, 87
 Hewlett Packard (HP), 15, 162, 174
 Hollywood, 176, 206
 homophily, 86–8
 and organisational learning, 135
 as a factor in tie formation, 270, 276
 rule of, 87
 vs influence, 232, 250, 260
 Hotmail, 251
 hub-complementor relations, 186
 hybrid corn, 231, 250
- ideation, 158
 IDEO, 50–2, 163, 176
 incremental innovations, 106, 123, 141, 289
 incrementalist approach to strategy, 93
 industry life cycles, 266
 influence, 65–6, 209, 221–2
 influentials, 101, 230, 239–42
 information and communication technology (ICT), 142, 218
 information asymmetry, 205
 information cascade, 233
 information flow, 65–7
 information heterogeneity, **110–13**
 information management, 193–6
 innovation. *See also* creativity; architectural innovation
 advantages of a network perspective on, 5–7
 and the need for information management, 196–8
 and uncertainty, 29–31
 clustering of, 26–7, **28**
 effect of inventor's centrality and brokerage on, 149–53
 evolution of, 9–10, 19–22
 interactions with users and, 17–19
 models of, 19–22, **22**, **24**
 patent intensity and, 57–8, **58**
 recombination and, 29–30
 role of serendipity in, 10–11

- search and selection activities, 12–13
- sources of, by sector, 141
- timing of, 113–15
- user involvement and, **188**, 190
- innovation adoption
 - decision factors for, 236–9
 - influence of networks on, 33–4
 - self-reinforcement mechanisms of, 232–3
- innovation barriers
 - cognitive biases and, 198–203
 - dependence on organisational routines and, 194–6
 - failure to recognize market signals, 196–8
- innovation diffusion. *See also* knowledge diffusion
 - brokerage positions and, 246–9
 - factors that affect, 252–4
 - impact of networks on, 34, 235–9, **238**
 - impact of opinion leaders on, 239–42
 - network redundancy and, 244–5
 - studies of, 231–2
 - threshold models of, 232–5
- innovation models and networks, **24**
 - black box, 19
 - economic geography, 21
 - evolutionary, 21
 - interactive, 21
 - linear, 20–1
 - system, 21
- innovation network management. *See also* network management
 - barriers to adaptation of, 94–5, 97
 - stages of, **97**
- innovation networks
 - as nested systems, **38**, **40**
 - components of, 26
 - dimensions of, **12–13**
- Intel, 27, 77, 262, 267
- intellectual property rights (IPR), 113, 291
- interactive model of innovation, 21
- internal combustion engine, 25
- International Business Machines (IBM)
 - computer industry position of, 27, 186
 - labour mobility and, 287
 - transformation of, **138**, 138, 217
 - Watson Health data venture and, 18
- International Patent Classification, 59
- inter-organisational networks.
 - See also* networks
 - alliance level, 43–6
 - as a form of governance, 44–6
 - as a nested network, 36–7
 - network level, 46
 - platform level, 47
- intra-organisational networks.
 - See also* networks
 - advice and friendship network interactions and, 227–9
 - network horizon levels in, 49–53
 - Project LIPSE, 48
 - radical innovations and, 107
 - tie formation/dissolution and, **272**
- intrapreneurship, 102
- inventor collaborations, 73
- Ising model, 237
- Jaccard index, 145
- Kasper Instruments, 195, 216
- k-core, 72
- keiretsu* (Japanese), 71
- knowledge base
 - Cree Incorporated and, 75
 - definition of, 98
 - effect of network horizon on, 121
 - Intel and AMD structure of, 77
 - network evolution and, 290
 - scientific base of, 79
 - structures of, 75–7, **76**, **78**
- knowledge brokerage, 105–6
- knowledge diffusion. *See also* innovation diffusion
 - as an essential aspect of innovation, 22–6, **25**
 - impact of cohesiveness on, 223–4
 - response to external shocks and, 200
 - the effects of modularity on, 184–5
- knowledge leakage, 133, 266, 275
- knowledge management, 15, 98
- knowledge mapping, 72–80
- knowledge networks, 12
- knowledge overlap, 134
- knowledge-based theory, 45
- k-plex, 72
- learning-based organisational networks, 46
- learning-by-doing, 31, 136
- legitimacy, 203–5
- Lenoir, E. (Jean Joseph Etienne), 25
- liaison brokerage role, **165**, 165–6, 209–10
- linear model of innovation, 20–1
- Linux, 181–2, 188
- locus of control, 269
- managerial practices, diffusion of, **96**, 100–1
- market mavens, 240–1
- markets as a network approach, 23
- Matthew effect, 82
- Milgram, Stanley, 80–1

- mimetic isomorphism, 224, 273–4
- modularity
 and its impact on product design and performance, 181–3
 definition of, 179–80
 design structure matrix and, **180–1**
 platforms and, 185–7, **187**
 tie formation/dissolution and, 267–8
- Moreno, Jacob, 4, 5
- Motorola, 114, 138
- Mozilla, 181–2, 267
- multiplexity, 152
- multi-sided platforms, 47
- National Health Service, 223
- n-clique/n-clan, 72
- nested networks, 36–54
- Netscape, 138, 181, 267
- network analysis.
 and industry competitiveness, 99
 benefits to product marketing, 101
 components of, 102–4
- network centralisation, 83–4, 107
- network churn, 281
- network density, calculation of, 84
- network equivalence, 90–1
- network evolution
 brokerage antecedents and, 284–8, **285**
 clustering and centrality antecedents and, 283–4
 network sparseness and, 291–4
 sources of network change and, 288–91
 structural regularities in, 280–1, **282**
 vs network dynamics, 91–2
- network externality, 122, 233, 254
- network fit, 97, 219–21
- network horizon
 costs associated with expansion of, **115–17**, 120
 firm-specific factors that influence the expansion of, 123–4
 institutional factors that influence the expansion of, 119
 inter-organisational level, 42–7
 intra-organisational level, 47–53
 organisational learning and, **153–5**
 purpose of, 39–41, **41**
 technology and market-specific factors that influence the expansion of, 120–3
- network inertia, 197
- network interventions, 14–15, 103, 230
- network management. *See also* innovation network management
 barriers to adaptation of, **96**
 control of bias and, 202–3
- direct network interventions and, 14–15
 purposes of, 95–102
 situation analysis and, 15–16
- network path length, calculation of, 85
- network perception, 204–5
- network perspective
 and structure vs agency, 91–2
 core concepts of, 7–9
 management of organisational change and, 211–12
 organisational change and, **216**
- network position. *See also* brokerage
 influence on innovation implementation, 102
 innovation adoption and, 237
 sources of social capital and, 89–90
- network surveys, 241
- network ties
 diversity of, 141
 impact on inter-organisational learning and, 131–4
 innovation adoption and, 235–9, **238**
 strength of, 88–9
- networks. *See also* social networks; intra-organisational networks; inter-organisational networks; global networks
 and myths associated with informal, 220
 as signals of legitimacy, 203–5
 cognitive biases and, 198–203, **199**
 creativity process and, 208–10
 evolution of, 9–10
 impact of research and development intensity on, **108–9**
 influence of network structure on Twitter content, 253
 influence on adoption of path-dependent technologies, 27–9
 measurements of interaction intensity, 84–5
 search and selection processes and, 31–5, **35**
 sectoral difference measures, **118**
 sectoral differences in structure of, 117–19, **117**
 social capital and, 148–9
 new product development, 107
- New United Motor Manufacturing Incorporated (NUMMI), 127–8
- New York Times* (newspaper), 17–18
- New York Training School for Girls, 4
- Nike, 30
- node removal, Kappa Comics, 247
- nodes, roles in
 advice networks, 56, 60–2
 buy-in ties, 67–8
 cross-boundary knowledge flow, 65
 information flow control, 66–7
 knowledge brokerage, 63–4

- social influence, 65–6
- Nokia, 98
- normative pressure of adoption, 233
- observer hub network, 190
- open innovation model of innovation, 23
- open source/crowdsourcing network
 - structures, 190
- open systems, 10
- opinion leaders
 - and innovation diffusion, 247–8
 - characteristics of, 239–42
 - factors that affect the influence of, 252–4
 - network metrics used to detect, 242–6
- opportunity recognition, 205
- Organisation for Economic Cooperation and Development (OECD), 108, **110**
- organisational ambidexterity, 129–30
- organisational change
 - management of, **215–16**
 - post-change network management and, 218–21
 - pre-change network management and, 221–2
 - sources of planned, 212–14
- organisational field, 273
- organisational learning
 - exploration and exploitation, 46, 128–30
 - the influence of routines on, 194–6
- organisational routines, 162, 194, 212, 216
- Otto, Nikolaus August, 25
- outsourcing, 183–4
- pairwise diversity, 141–3
- partner-specific learning alliances, 136
- patent connectivity analysis, **69**, 69–70
- patents
 - data collection, uses of, 57–8, **58**, 59
 - methods to detect successful, 68–71
 - role of collaboration in successful, 25
- path lengths
 - and small-world networks, 80–2
 - and speed of knowledge diffusion, 85
- path-dependence, 27, 197
- PatVal project, 70
- personal network exposure, 239
- pervasiveness (knowledge base), 79
- Platt, Lew, 15
- Polaroid, 196
- positive sciences model of
 - innovation, 23
- preferential attachment, 82, 284
- process innovations, 104–5
- Procter & Gamble (P&G), 104, 106, 166, 188
- product innovations, 105–6
- product system, 178–9
- Project LIPSE (Learning Innovation in Public Sector Environments), 48
- prominence
 - network position and, 100, 207
 - node-based measures and, 60, 65
 - social status and, 204, 207
- propagation costs, 181
- proximity and tie formation/dissolution, 264
- punch cards, 30
- Q parameter, 174
- quadratic assignment procedure, 87
- quanxi* (Chinese), 150
- QWERTY, 34
- Racal Vadic, 27
- radical innovations, 106–7
- reciprocity, 42, 86
- recombination, 29–30, 80, 158–60
- Reebok, 30
- regular equivalence, 90
- relational pluralism, 276
- research and development (R&D)
 - at 3M, 162
 - at BMW, 133
 - influence of collaboration on, 124, 290
 - intensity of, 109, 130
- resistance to change, 214, 216–17
- resource compatibility and tie formation/dissolution, 263
- resource mobilisation, 206
- resource-based theory, 45
- Rotterdam network structures, 48, **50**
- Route 128 (Boston Region), 26, 174, 287
- scale-free networks, 82–3
- Schelling segregation model, 234–5
- Schumpeter, Joseph Alois, 20
- search path node pair, 69–70
- search processes, 31–2
- sectoral systems of innovation, 24, 110, 119
- selection processes, 32–5
- self-monitoring behaviour, 268
- self-reinforcement, 28, 230
- serendipity, 11
- Seven Bridges of Königsberg, 4
- Sharp Electronics, 27
- shortest path, 243
- signalling, 33, 203
- signals
 - competency traps and, 195
 - failure to recognise, 197
 - networks as, 203–5
 - venture capital and, 101–2

- Silicon Valley
 clustered innovation and, 26–7
 labour mobility and, 162, 287
 patent collaborations and, 174
- Simmelian tie, 152
- situation analysis, 15
- small-world networks
 impact on creativity, 173–5
 structure of, 80–3, **81**
- small-world ratio, 82–3
- SNA. *See* social network analysis
- snowball targeting, 251–2
- social comparison theory, 221
- social influence theory, 222
- social information processing theory, 222
- social learning, 254
- social network analysis
 and detection of opinion leaders, 241–2
 and innovation networks, **85**
 and organisational change, **225**
 and use of nodes and edges, 7
 sources of data for, 55–8
- social network metrics
 adjacency matrix, 59–60, **61**
 and degree centrality, **67**
 boundary specification strategies for, 58–9
- social network theory, 7
- social networks, 11, *See also* networks
- social status, 34, 203–4, 207
- social technologies in the workplace, 213–14
- social utility of network connections, 8
- socio metric targeting, 241
- solar panels, 18, 230
- Sony, 47, 138, 186
- Sophia Antipolis (France), 26, 287
- standards-based industries, 113–14
- statistical mechanics, 23, 237
- stochastic actor-based network evolution models, 292
- strategic alliances
 impact of tie strength on, 132–4
 knowledge overlap and, 134–5
 management capabilities of, 135–6
 marketing and licensing, 132
 scope of, 134–5
 technology and equity-based, 132
- strong ties
 definition of, 88, 131
 entrepreneurship and, 206, 265
 exploitation and, 106, 141, 148
 knowledge transfer and, 89, 132, 168
- structural embeddedness, 46
- structural equivalence, 224, 250–1
- structural holes, 89, 148, 150, 265
- structural patterning of social life, 8
- structuralist perspective in network research, 13–14
- structure-agency debate, 13–14
- structure-loosening network change, 288–9
- structure-reinforcing network change, 290
- supply chain management, 100
- Suzhou Industrial Park (China), 26
- switching costs, 34, 232
- symbolic management, 205
- system model of innovation, 21
- tacit knowledge
 cohesiveness and, 149, 161
 influence of tie strength on, 89, 132, 184, 272
 Toyota network and, 146
- task-specificity, 169
- Teachman/Shannon entropy index, 145
- technological domain analysis, 77–80
- technological opportunities, 121
- tertius gaudens* (Latin), 151
- tertius iungens* (Latin), 151
- tetracycline, 90, 231
- the big five, 269
- The Luck Factor* (book), 11
- threshold models of diffusion
 network-related determinants of adoption and, **238**, 235–9
 Schelling segregation model and, 234
- tie formation and dissolution
 and innovation management, **261**
 and inter-personal networks, **272**
 cross-categorical network effects on, 276–8
 dyadic attributes and, 261–5
 effect of embeddedness on, 274–6
 effect of uncertainty on, 122–3
 organisational factors, effect on, 265–8
 personality and 268
 proximity and 264
- tie repetition, 274–5
- Toyota, 127–8, 146
- transaction cost economics, 44
- transitivity, 86, 275
- triadic closure, 89, 276
- trust
 closure networks and, 148, 153
 influence of tie strength on, 133, 149
- Twitter, 213, 236, 242, 253
- two-mode data, 73, 74, 83
- two-step communication model, 231
- uncertainty
 innovation and, 29
 job-related, 218
 markets and, 31
 strategic, 217

- structural, 217
- technology and, 29
- USA Today* (newspaper), 221
- user innovation, 104

- validation and creativity, 208–10
- Velcro, 159
- venture capital networks, 207–8
- VHS, 186
- video games industry, 47, 121, 186, 264
- Vocalpoint, 189–90
- Volvo, 218

- Washington Post* (newspaper), 17, 230
- Watson Health data venture, 18

- weak ties, 88, 132, 134, 166
- wearable technology, 262
- whole network data, 144
- word-of-mouth, 34, 245
- workflow and tie formation/dissolution, 271–2
- World Intellectual Property Organization (WIPO), 59

- Xerox Park, 27

- Yahoo, 11, 15
- Yule's Q, 144

- Zagat, 240–1
- Zara, 189