

Index

- AB interaction, 422
- Absolute importance, 368–369
- Absolute zero point (ratio), 268
- Action plan, 359
- Activity duration estimating, 67–68
- Activity list, 63
- Activity resource estimating, 66
- Activity sequencing, 65–66
- Actual cost (AC), 78, 148
- Adjusted present value (APV), 392, 401–403
- Affinity diagram, 355, 365–366
- After-tax weighted average cost of capital, 396
- Agile approaches, 131, 161–162
- Agile/lean project management, 162
- Akao, Yoji, 216, 347
- Alpha risk, 39
- American Production and Inventory Control Society (APICS), 46
- Analogous estimate, 67
- Analysis of variances. *See* ANOVA (ANalysis Of VAriances):
- Analytical hierarchy process (AHP), 107–108, 143, 369
 - and consistency, 258–259
 - example of, 247–258, 436–439
 - functions of, 242
 - inconsistent matrix, 261–262
- “An Intuitive Explanation of Bayesian Reasoning” (Yudkowsky), 304
- Annual employee review. *See* employee review:
- ANOVA (ANalysis Of VAriances), 72, 430
- Apgar, David, 98
- Approved change request, 61
- Architecture design, 127
- “A Spiral Model of Software Development and Enhancement” (Boehm), 123
- Assignable-cause problem, 32
- Attributable cause, 325
- Attribute control chart, 324
 - types of, 336–338
- Attribute p and np charts, 337–338
- Attributes, 324
- Audit checks, 49
- Automated testing and configuration tools, 162
- Automatic application generation/4GL, 129–130
- Average, defined, 325
- Average and range charts, 328
- Average chart, 332
- Averaging, 328
- Awakening stage, 50
- Base case NPV, 401
- Basis-of-estimate process, 410
- Bayes, Thomas, 302–304
- Bayesian analysis, 454
- Bayesian Theorem, 302–304, 455, 457
- Bebchuk, Lucian, 198
- Bell curves:
 - used in performance reviews, 177–178
 - use of, 172
- Bell Telephone, 31

- Benchmarking, 82
- Best practices, 14, 82
- Beta risk, 39
- Blocks, 419
- Bonuses, 175
- Bottom-up estimating, 66–67, 75, 153–155
- Brainstorming, 98
- Buckaroo-Bonzai (risk management approach), 97
- Budgets and variances, 154
- Bureau of Citizenship and Immigration Services, 188
- Business requirements, 348
- Business school aptitude example, 299–302
- Buy-or-build analysis, 126

- Cancellation for cause, 109
- Cancellation for convenience, 108
- Capability Maturity Model (CMM), 50
- Capability Maturity Model (CMM) maturity processes, 213
- Capability Maturity Model Integration (CMMI): maturity processes, 213
- CASE tools, 129
- Cash flows, 390
- Causal relationship, 298
- Cause-and-effect diagram. See Ishikawa diagram (cause-and-effect or fishbone diagram):
- C chart, 336
- Certainty stage, 51
- Change control system, 61
- Change management processes, 410
- Change-or-die syndrome, 218–219
- Change request, 159
- Chaos Report*, 12
- Characterization experiments, 419
- Checksheets, 340–343
- Chief executive officers:
 - compensation of, 199
 - issues regarding, 199–200
 - personality profile of, 202
 - self-interest of vs. customer, 200
- Chrysler:
 - changes at, 213
 - competition to, 212
- Classified data, 266–267
- CMM certification, 182
- CMM/CMMI (capability maturity model integration), 191
- CMM/CMMI (capability maturity model integration) certification, 181–182
- CobIT, 214
- Command-and-control model (waterfall), 163
- Commercial-off-the-shelf (COTS) integration model, 126–127
- Common-cause problem, 32
- Common causes, defined, 325
- Communication, 184
- Communications management:
 - communications planning, 91–93
 - information distribution, 93
 - performance reports, 94
 - stakeholder management, 94–95
- Communications management plan, 94
- Communications planning, 91–93
- Competition, 212
- Competitive benchmarks, 381–382
- Competitive satisfaction performance, 370
- Competitive satisfaction performance scale, 444
- Computers, origins of, 11
- Conditional probability, 297–302
 - defined, 294
- Configuration management processes, 410
- Configuration management system, 61
- Consistency and analytical hierarchy process (AHP), 258
- Consistency index, 260, 262, 263, 265
- Consistency ratio, 259, 260, 262, 263
- Constraints:
 - multitasking as, 238
 - parallel vs. series, 237
 - removal of excess contingency, 239
- Constraint survey, 235–237
- Continuous data, 266, 268
- Continuous maturity processes, 213
- Continuum/subfeature approach, 385
- Contract administration, 108
- Contract closure, 108
- Contract types, 103
- Control chart, 32
- Controllable risk elements, 410
- Corrective actions, 71
- Cost budgeting, 76
- Cost control, 77
- Cost estimating:
 - bottom-up estimate., 75
 - enterprise environmental factors, 74
 - organizational process assets, 74

- parametric estimate., 75–76
- project scope statement, 75
- Cost estimating relationships (CERs), 75
- Cost guide, 158
- Cost management, 73–79
 - cost budgeting, 76
 - cost control, 77–79
 - cost estimating, 74–76
- Cost of poor quality, 148–149
- Cost of quality, 83
 - real, 51
- Cost of Quality (COQ), 24
- Cost performance index (CPI), 155–158, 162
- Cost-plus contracts, 126
- Cost savings, 44
- Counting data, 324
- Crashing, 69
- Cringely, Robert X., 169
- Criteria averages, 253
- Criteria scores, 251
- Criteria weighting, 259
- Critical chain method, 70
- Critical chain project management (CCPM), 70–71, 231
- Critical path, 65
- Critical path elements, 280–282
- Critical path method, 69
- Critical-to-quality (CTQ) characteristics, 418
- Crosby, Philip B., 50–51
 - on quality, 24, 81
 - on real cost of quality, 51
 - on state of U.S. business, 201
 - zero defects slogan, 41
- “Crystal ball effect”, 275
- Cumulative distribution, 281, 327
- Current rating, 371
- Current ratio, 371
- Current satisfaction performance, 371
 - vs. goals, 371
- Customer involvement, 161
- Customer needs:
 - identification and structure of, 353–358
 - prioritization of, 359
- Customer process model, 351
- Customers:
 - dissatisfied with defects and delays, 149
 - importance lists, 368
 - irritations suffered by, 204
 - needs of, 41
 - quality viewed by, 25
 - as source of all revenue, 197
 - treatment of, 202
- Customer satisfaction, 153
 - evaluation criteria, 180
- Customer satisfaction performance, 370, 378, 383
- Customer segment definition, 350–351
- Customer segments table, 351
- Customer service:
 - declining level of, 198
 - with offshoring, 184
- Customers’ needs, 347
- Customer specification limit, 334–336
- Customer voice table (*gemba* visit), 349, 351–353
- Customer wants and needs, 364, 365
 - vs. technical response, 362
- Customer workflow diagram, 351
- Custom software development, 170
- Data, average and range of, 329
- Data flowcharts, 338
- Data measurement and analysis, 265–269
- Data types, 265–266
- Decision criteria, 243
- Decision criteria list, 248–249
- Decision forks, 293
- Decision processes, 243
- Decision tools and processes, 18
- Decision tree analysis, 100, 143, 291
 - terms used in, 293–294
- Decision trees, 294–297
- Defect prevention, 85
- Defined-benefit plan, 200
- Deming, W. Edwards, 34–38
 - adopts cause-and-effect diagrams, 43
 - on employee review process, 179
 - on knowledge, 39–40
 - on learning, 31
 - on management, 169
 - meets Roger Smith, 212–213
 - on models, 278, 283
 - on psychology, 40
 - on state of U.S. business, 201
- Design of experiments (DOE), 82–83, 216
 - characterization experiments, 419
 - defined, 417
 - fixed-effects model, 419
 - mixed models, 419
 - optimization experiments, 419

- Design of experiments (*Continued*)
 - random-effects model, 419
 - screening experiments, 419
- Design vs. inspection, 45
- Desirable events, 231
- Development resources, 184
- Development standard, 119
- Dilbert postings, 150–151
- Direct and manage project execution, 112
- Discount rate, 390, 398
- Discrete data, 266
- Discretionary dependencies, 65–66
- Dodging bullets ‘R’ Us (risk management approach), 97
- DOE factorial concepts, 217
- Domain analysis, 126
- Do nothing option, 291
- Drucker, Peter:
 - on customers’ needs, 347
 - on idea dilution, 201
 - on incentives, 151
 - on quality, 26
- Earned value, 155
 - computation of, 17
 - on software project, 160
 - for SPI and CPI, 162
- Earned value (EV), 78
- Earned value (EV) management, 388
- Earned value analysis, 72
- Earned value calculation, 77
- Earned value technique (EVT), 78, 112
 - benefits of, 79
- Effect interactions, 429
- Effects, 429
- The Eight Wastes, 142
- 80/20 Rule, 313–315
- Empirical model (agile/iterative: Plan-Do-Check-Act), 163
- Employee recognition, 202–203
- Employee review:
 - annual review, 173
 - bell curves used in, 177–178
 - Deming on process of, 179
 - and forced ranking, 174
 - management’s view of, 198
 - uses of, 174
- Employee review process failure:
 - management’s responsibility for, 179
 - pseudostatistics, 175–179
 - steps to improve, 179–180
 - summary of, 179
- Employment taxes, 188
- Enlightenment stage, 60
- Enron, 214
- Enterprise environmental factors, 74
- Equally spaced (interval), 268
- “Essay Towards Solving a Problem in the Doctrine of Chances”, 302
- Estimates:
 - analogous, 67
 - basis-of-estimate process, 410
 - bottom-up, 75, 153–155
 - cost estimating, 75–76
 - estimates, 75, 153–155
 - forecasted completion, 78
 - multiple critical path, 282–288
 - padded, 240
 - parametric, 67, 75–76
 - PERT, 67–68
 - REBE (rectally extracted basis approach), 153–154
 - single path, 280–282
 - three-point, 67–68
- Evaluations (employee). *See* employee review:
 - Evolutionary model, 123–126
- Excel spreadsheet, 68, 193
 - triangular distribution example, 284–285
- Excel spreadsheets, 328
- Expected value, 291
 - defined, 293
- External affinity diagram, 365–366
- External dependencies, 66
- Failure modes and effect analysis (FMEA), 217
- False acceptance rate (FAR), 453
- False rejection rate (FRR), 453
- Fast tracking, 69–70. *See also* merge bias
- Feigenbaum, Armand, 144–145
- 50% Pad, 145
- Financial incentives, 151
- Financial tools, 389–395
- Finish-to-finish relationship, 65
- Finish-to-start relationship, 65, 120, 447
- Fishbone diagram. *See* Ishikawa diagram (cause-and-effect or fishbone diagram):
 - Fisher, Ronald, 217
 - “Fitness of Quality” concept, 42
 - 5W And H, 351

- 5W And H list, 91–93, 97
- The Five Whys, 142
- Fixed-effects model, 419
- Float, 69
- Flowcharts, 338
- Flows to equity (FTE), 392, 398–401
- Forced ranking and employee evaluation, 174
- Ford Motors, 225
- Forecasted completion estimates, 78
- 4GL Tools, 129–130
- Four Ms and E*, 319
- 14 Points” (Deming), 35, 36–37
- Frequency distribution, 267
- Frequency histogram, 308
- Fried, Jesse, 198
- Functional hierarchy, 246, 247
- Functional requirements, 359
- Future cash flows, 390

- Galvin, Bob, 29
- Gantt software tools, 68–69
- Gantt chart, 147
- Gantt limitations, 192–193
- Gates, Bill, 186–187
- Gemba* visit. *See* customer voice table (*gemba* visit):
- General Motors (GM):
 - financial condition of, 225
 - plant closings, 212
- Global Crossing, 214
- Goals, 370
 - vs. current satisfaction performance, 371
- Goldratt, Eliyahu, 70, 231
- Good decisions vs. positive outcomes, 294
- “Greenbeans”, 147
- Guide To Quality Control* (Ishikawa), 85, 216, 307, 317, 340

- H1-B/L1 visa program, 187–188
- H1-B visa resources, 186
- Hidden factory, 145, 198
- Hidden plant, 144–145
- Hierarchy diagram, 365, 366
- Hierarchy process, 246
- Histogram, 308–309
- Hoffman, Robert, 187
- Honda, 213
- House of Quality (HOQ), 4, 348, 359–362
 - example of, 365–366

- Human resource management, 86–91
 - human resource planning, 87
 - project team acquisition, 87–88
 - project team development, 88
 - project team management, 89–91
- Human resource planning, 87

- “If it moves-kill it” (risk management approach), 97
- Immediate feedback, 49
- Impact ranking, 411
- Implied needs, 25–26, 357–358
- Improvement ratio, 371
- In control process, 325
- Independent events, 298
- Information distribution, 93
- Information technology (IT):
 - development of industry, 11
 - failure and success rates of projects, 12–14
 - Governance Institute (ITGI), 214
 - resource shortage, 186–191
- Information Technology Infrastructure Library (ITIL), 214
- Integrated change control, 113
- Intelligent waterfall design, 117
- Interactive voice response (IVR) systems
 - alternative, 205
- Internal affinity diagram, 365–366
- Internal rate of return (IRR) analysis, 403–407
 - defined, 404
 - limitations of, 407
 - and negative cash flows, 405
- International Standards Organization (ISO), 25
- Interval scale, 267
- Interviews, 98
- Ishikawa, Kaoru, 43–45, 85, 307, 340
- Ishikawa diagram (cause-and-effect or fishbone diagram), 43, 98, 460
 - benefits of, 317, 319
 - examples of, 316–317, 320–324
 - steps in creating, 320
- Issue log, 90
- Iterative/agile model, 121–123

- Japan:
 - approach to quality in, 35–36, 186
 - customer-focused model of, 224
 - quality changes in, 28

- Japan (*Continued*)
 - receptivity to quality focus, 40–41, 43–44, 224
 - Robust Design movement in, 46
 - software error rates in, 86
- Japanese auto industry, 212, 217
- Japanese programmers, 186
- Japanese Union of Scientists and Engineers (JUSE), 40, 43, 216, 307, 317
- Juran, Joseph, 40–43
 - models for quality, 205–206
 - quality defined by, 42
 - on quality development, 43
 - on state of U.S. business, 201
- Juran, Joseph M., 313
- Juran Institute, 42
- Just-in-time concept, 46
- Kaizen* (continuous improvement), 46–47, 216
- Kawakita, Jiro, 355
- Kepner-Tregoe process, 84
- Key requirements, 126
- KJ Method, 355
- Knowledge:
 - about variation, 39
 - theory of, 39–40
- Knowledge worker model, 151
- L1 visa program, 188
- Latin square, 419
- Leadership vs. management, 152
- Lean (concept), 29
- Lean manufacturing, 46
- Lean production, 32
- Lean Six Sigma, 216
- Learning pipeline, 98
- Lessons learned, 90
- Leverage, 393
- Leveraged buyout (LBO), 393
- Levered firms/equity, 393–394
- Linear graphs, 45
- Logical fallacy, 298
- Logic flow diagram flowcharts, 338, 340
- Loss function, 45, 46, 216
- Lower control limit (LCL), 32–33
 - defined, 325
- Lower specification limit (LSL), 325
- Low hanging fruit focus, 315
- Main effects plot, 420
- Maintenance model, 128–129
- Make-or-buy decisions, 103
- Management:
 - Deming on, 169
 - incompetence of, 205
 - vs. leadership, 152
 - quality leadership of, 35
 - quality responsibility of, 215
 - by sounding smart, 225
- Management process (MP) tools, 348
- Management reserve, 76, 411
- Mandatory dependencies, 65
- Maximum value table (MVT), 359
- McCoy, John, 200
- Measurement scales, 265–266
- Merge bias, 65, 70, 277, 283
- Merge bias calculation, 448
- Microsoft, 186
- Microsoft Project Professional (software), 66, 68, 70, 146–147, 155, 167, 192
- Milestone list, 63
- Minitab (software), 83, 193
- Mistake-proofing concept, 41, 49. *See also* *poka-yoke* (mistake-proofing) process
- Mistakes, 49
- Mixed models, 419
- Mizuno, Shigeru, 347
- Models:
 - “A Spiral Model of Software Development and Enhancement” (Boehm), 123
 - Capability Maturity Model (CMM), 50
 - Capability Maturity Model (CMM) maturity processes, 213
 - Capability Maturity Model Integration (CMMI), 191, 213
 - CMM/CMMI (capability maturity model integration), 191
 - CMM/CMMI (capability maturity model integration) certification, 181–182
 - command-and-control (waterfall), 163
 - commercial-off-the-shelf (COTS) integration, 126–127
 - customer-focused, of Japan, 224
 - customer process, 351
 - Deming on, 278, 283
 - eight basic plus one, 119–137
 - empirical (agile/iterative: Plan–Do–Check–Act), 163
 - evolutionary, 123–126
 - fixed-effects, 419
 - iterative/agile, 121–123

- of knowledge worker, 151
- maintenance, 128–129
- mixed, 419
- nonnumeric target modeling, 385–386
- for quality, 205–206
- random-effects, 419
- reengineering, 128
- rehost, 127
- spiral, 123
- System Development Lifecycle Model (SDLM), 119–137
 - waterfall, 119, 120–121
- Monitor and control project work, 112
- Monte Carlo analysis, 100, 143, 273–275
 - “what if” analysis., 70
 - example of, 278–280, 445–451
 - merge bias, 70
- Moore, Michael, 212
- Multiple critical path estimate, 282–288
- Multiple critical tasks, 278
- Multitasking as a constraint, 238

- NASA, 11
- Needs, stated and implied, 25–26
- Negative cash flows, 405
- Net present value (NPV), 389
- Net present value (NPV) of the financing decisions, 401, 403
- New United Motor Manufacturing, Inc. (NUMMI), 212
- Noise, 44–45
- Nominal scale, 267
- Noncompete contract elements, 103
- Nondisclosure contract elements, 103
- Nonnumeric target modeling, 385–386
- Normal distribution, 175, 326
- Normalized raw weight, 372
- Np chart, 336

- Offshore companies, 191
- Offshoring:
 - communication and, 184
 - customer service with, 184
 - of development resources, 184
 - of problems, 180–181
 - reliability problems with, 183–184
- Offshoring jobs, 198
- Ohno, Taiichi, 46
- One-factor-at-at time (OFAT) approach, 418
- One-factor two-level design, 420–421
- 100% Audit checks, 49

- Opportunity cost of capital (OCC), 390
- Optimization experiments, 419
- Oracle, 186
- Ordinal importance, 369
- Ordinal scale, 267
- Organizational development, 88
- Organizational process assets, 74
- Orthogonal arrays, 45, 249–252, 427
- Out of control process, 325
- Out of the Crisis* (Deming), 35

- Padded estimates, 240
- Parameter design, 45
- Parametric estimate, 67, 75–76
- Pareto, Vilfredo, 313–315
- Pareto analysis, 460
- Pareto approach, 56
- Pareto chart, 313–315
- Pareto’s Principle, 313
- Pay without Performance* (Bebchuk and Fried), 198
- P chart, 336
- Performance measurements, 71, 78
- Performance reports, 90, 94
- Performance reviews. See employee review:
- Personal computers, 11
- PERT (Program Evaluation and Review Technique), 68, 446
- PERT estimate, 67–68
- Plan contracting, 105
- Plan-Do-Check-Act* (Deming), 161
- Plan-Do-Study-Act (PDSA) Cycle* (Deming), 33–34
- Planned value (PV), 78
- Planning matrix, 362, 364, 368
- Planning process steps, 362
- PMBOK:
 - limitations of, 55
 - process areas of, 56–57
- PMBOK process:
 - adapts to IT projects, 11
 - areas of, 17
 - limitations of, 14, 15
 - loss of, 23
 - as quality process, 24
 - tools of, 16–17
- Point-of-origin inspection, 49
- Poka-yoke* (mistake-proofing) process, 41, 46, 48–50, 216
- Positive risk, 102
- Potential dollar loss, 411

- Precedence diagramming method, 17, 65
- Preliminary scope statement, 111
- Preliminary scope statement development, 111
- Primavera Team Play, 66
- Priorities, 371–378
- Prioritization matrix method, 365
- Probability, defined, 293
- Probability ranking, 411
- Problem identification, 168–169
- Problem reports, 128–129
- Process flowcharts, 338
- Procurement management:
 - contract administration, 108
 - contract closure, 108
 - plan contracting, 105
 - purchases and acquisition plans, 103–105
 - seller responses, 106
 - seller selection, 107–109
- Product analysis, 60
- Productivity of software development, 186
- Program Evaluation and Review Technique (PERT), 67–68, 446
- Project charter development, 109–110
- Project closure, 113–114
- Project dependencies, 447, 451
- Project goal definition, 350
- Project integration management:
 - direct and manage project execution, 112
 - integrated change control, 113
 - monitor and control project work, 112
 - plan development, 111
 - preliminary scope statement development, 111
 - project charter development, 109–110
 - project closure, 113–114
- Project management:
 - current status of, 12
 - history of, 10–11
 - myths and inaccuracies about, 9
 - plan development, 111
 - waterfall approach to, 117
- Project Management Institute (PMI), 10, 214
 - earned value defined by, 78
 - process areas, 56
 - on quality planning, 80
- Project management principles, 143–158
 - build vs. buy decision, 169
 - cost of quality vs. cost of doing business, 148
 - customers vs. investors, 152–153
 - Gantt Chart limitations, 192–193
 - iterative development, 155
 - low-hanging fruit focus, 149–150
 - on offshoring quality problems, 180–181
 - process simplification, 144
 - quick fixes, 168–169
 - REBE (rectally extracted basis of estimate) approach, 153–154
 - resource utilization, 146
 - on rework as cost of doing business, 144–145
 - state of management competency (SMC), 150–151
- Project Management Professional certification, 14, 15
- Project Management Professional status, 14
- Project management software, 66–67
 - Gantt software tools, 68–69
 - Microsoft Project Professional (software), 66, 68, 70, 146–147, 155, 167, 192
 - Minitab (software), 83, 193
- Project management tools, 17
 - application of, 167
 - familiarity with, 165–166
 - lack of fit, 166–167
- Project postmortem, 90
- Project quality management:
 - quality assurance performance, 83–84
 - quality control performance, 84–85
 - quality planning, 80–83
- Project risk, overall evaluation of, 131–137
- Project risk management, 95–103, 407–412
 - business risks, 408
 - project risks, 408
 - qualitative risk analysis, 99
 - quantitative risk analysis, 100–101
 - risk factors, 409
 - risk identification, 98–99
 - risk management planning, 97–98
 - risk monitoring and control, 102–103
 - risk response planning, 101–102
 - tools for, 408
- Project scope statement, 75, 103
- Project team acquisition, 87–88
- Project team development, 88
- Project team management, 89–91
- Project teams, 164
- Project timeline, 451–452

- Psychology, 40
- Purchases and acquisition plans, 103–105
- Pure effect, 423
- Purple squirrel syndrome, 215

- Qualitative risk analysis, 99
- Quality:
 - defined, 355
 - defined by Juran, 42
 - defined by Taguchi, 46
 - implementation practices of U.S.
 - business, 220–221
 - International Standards Organization (ISO) on, 25
 - management responsibility for, 215
 - methodologies of, 26–31
 - vs. quantity, 211–212
 - real cost of, 51
 - timeline of, 26–31
- Quality adoption levels:
 - House of Quality, 220
 - Quality Bunker, 221
 - Quality Condo, 220–221
 - Quality Crypt, 223
 - Quality Dungeon, 222–223
 - Quality Factory, 220
 - Quality Landfill, 221–222
 - Quality Outhouse, 222
 - Quality Tenement, 221
- Quality assurance performance, 83–84
- Quality characteristics, 372
- Quality control (QC), 41
 - performance of, 84–85
- Quality control circles, 43
- Quality Control Handbook* (Juran), 40
- Quality dispersion, 319
- Quality functional deployment (QFD), 29, 216
 - defined, 347
 - example of, 439–444
 - steps of, 349
 - tools of, 349
- Quality functional deployment (QFD)
 - diagram:
 - nonnumeric target modeling, 385–386
 - priorities, 371–378
 - targets, 382–384
 - technical benchmarks, 381–382
 - technical correlations, 379–380
- Quality Functional Deployment (QFD)
 - Institute, 348
- Quality functional deployment II (QFD II), 348
- Quality improvement, 41
- Quality is Free* (Crosby), 24, 50
- Quality personnel types:
 - Quality Homeless, 223
 - Quality Practitioner, 223
 - Quality Prostitute, 224
 - Quality Roadkill, 223–224
 - Quality Zombie, 223
- Quality planning, 41
 - cost–benefit analysis, 81
 - quality checklists, 81
 - quality metrics, 81
- Quality problems:
 - how not to resolve, 219
 - on offshoring of, 180–181
- Quality processes:
 - essence of, 217
 - failure causes of, 28–29
- Quality trilogy, 41
- Quantitative risk analysis, 100–101
- Quantitative risk analysis matrix (QRAM), 411
 - example of, 445–451
- Quantity vs. quality, 211–212
- Questionable cause fallacy, 298

- RAD tools, 129–130
- Random consistency, 261
- Random consistency table, 263
- Random-effects model, 419
- Randomized-block-design, 419
- Range average, 330
- Range chart, 331, 332
- Range checking, 328
- Rank order (ordinal), 268
- Rapid application development (RAD)
 - tools, 129–130
- Rational Unified Process (RUP), 214
- Ratio scale, 268
- Raw weight, 371
 - seven tools plus one, 371
- Real random number sequence generator, 276
- Recommended corrective action, 61
- Reengineering model, 128
- Rehost model, 127
- Relationships, 365, 372, 373
- Relative importance, 369
- Requested changes, 61, 71

- Requirements analysis, 127
- Resource availability, 451
- Resource leveling, 70
- Resource-leveling, 146
- Resource utilization, 147
- Reverse-engineering process, 128
- RFP games, 106
- Risk:
 - defined, 102
 - sequences of, 447
 - summary of, 412
 - ways to handle, 101
- Risk assessment, 444
- Risk-assessment matrix, 131–137
- Risk evaluation, 412
- Risk factors, 409–410
- Risk identification, 98–99
- Risk management, 412
- Risk management planning, 97–98
- Risk management training, 412
- Risk monitoring and control, 102–103
- Risk probability and impact assessment, 100
- Risk register, 101
- Risk response planning, 101–102
- Robustness, 45
- Roger and Me* (Moore), 212
- Rolled throughput yield (RTY), 143, 145
- Roosevelt, Eleanor, 166
- Root-cause analysis, 168–169
- Root cause analysis (RCA), 84
- R. S. Means, 14
- R.S. Means-Building Construction Cost Data*, 156
- “*Rule of Seven*”, defined, 325
- Rules, 142, 153

- Saaty, Thomas L., 245
 - on precision, 261
- Safety net, 145
- Sales point, 371
- Sarbanes-Oxley Act (SOX), 214
- Scatter diagram:
 - example, 309–313
 - interpretation of, 310–313
- Schedule compression, 69
- Schedule control, 71–73
- Schedule development, 68
- Schedule performance index (SPI), 155–158
 - earned value for, 162
- Schedule risks, 409
- Scientific management, 173

- Scope control, 61
- Scope creep, 154
- Scope definition, 59–60
- Scope planning, 59
- Scope risks, 409
- Scope verification, 61
- Screening experiments, 419
- SEI (Software Engineering Institute), 412–413
- SEI certification, 182
- Selected criteria, 243
- Self-improvement methods, 183
- Seller responses, 106
- Seller selection, 107–109
- Sensitivity analysis, 297–302
 - defined, 293
- Service level agreement (SLA), 129
- “Seven Deadly Sins” (Deming), 38
- “Seven Quality Tools”, 216
- Seven tools:
 - checksheet, 340–343
 - defined, 307
 - flowcharts, 338
 - histogram, 308–309
 - Ishikawa diagram (cause-and-effect or fishbone diagram), 315–324
 - Pareto chart, 313–315
 - scatter diagram, 309–313
 - statistical process chart (SPC), 324–336
- “Seven Tools of Quality” (Ishikawa), 43
- Seven tools plus one:
 - competitive satisfaction performance, 370
 - current satisfaction performance, 371
 - customers importance lists, 368
 - goals, 371
 - improvement ratio, 371
 - normalized raw weight, 372
 - raw weight, 371
 - sales point, 371
- Sheehan, George, 199
- Shewhart, Walter, 31–34, 216
- Shingo, Shigeo, 46–50
 - on poka-yoke process, 48
- Shrink-wrapped solution, 170
- Siemens, 188
- Single minute exchange of dies (SMED), 46, 47–48
- Single path estimate, 280–282
- Six Sigma, 42, 72, 214
 - origins of elements of, 216
 - tools of, 349

- Slack, 69
- Slogans, 37, 41, 222
- SMED (single minute exchange of dies), 46–48
- Smith, Roger, 212–213
- Soft skills, 10, 88
- Software:
 - development sequence, 158–159
 - error rate of, 185
 - productivity development of, 186
 - version 1.0 of, 172
- Software Development Life Cycle (SDLC) steps, 117
- “Software Development Worldwide: The State of the Practice”, 185
- Software industry:
 - business processes, 15
 - lack of cost guide for, 158
- Software project, earned value on, 160
- Solution options, 353–358
- Space program development, 11
- Spiral model, 123
- Spiral Software, System Development Lifecycle Model (SDLM):
 - eight basic plus one, 119–137
 - vs. waterfall model, 119
- Sprints, 122
- Staff burnout rate, 148
- Staged maturity processes, 213
- Stakeholder analysis, 60
- Stakeholder feedback, 93
- Stakeholder information, 94–95
- Stakeholder management, 94–95
- Standard deviation, 330
 - defined, 325
- Standard distribution, 327
- Standish Group, 12, 170
- Start-to-start relationship, 65
- Stated needs, 25
- Statement of work (SOW), 103
- State variables, defined, 294
- Statistical Method from the Viewpoint of Quality Control (Shewhart), 33–34
- Statistical process chart (SPC):
 - invention of, 31, 216
 - for risk, 408
 - seven tools, 324–336
 - terms used in, 325
 - tools, 460
- Statistical quality control approach, 49
- Statistical tools list, 85
- Structural hierarchy, 246
- Student syndrome, 69
- Subprocess areas, 57
- Substitute quality characteristics (SQC), 364, 372
- Supplemental executive retirement program (SERP), 200
- SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis, 98, 411
- System design, 45
- System integrators, 171
- “System of Profound Knowledge” (Deming), 38
- System quality control (SQC), 211
- Systems, defined, 38–39
- Taguchi, Genichi, 44–46, 216
 - quality defined by, 46
- Targets, 382–384
- Tata, 188
- Taxes, 188
- Tax rate, 392
- Tax shield, 392, 395
- Taylor, Frederick W., 173, 212
- Team-building challenges, 152
- Teams, profit sharing within, 180
- Technical benchmarks, 381–382
- Technical correlations, 362, 379–380
- Technical matrix, 362, 376
- Technical response, 364, 372
 - vs. customer wants and needs, 362
- Texas Instruments, 11
- The Apprentice* (tv show), 164
- The New Economics* (Deming), 35
- Theory of constraints, 231, 234
- Thinking tools, 142
- Three-point estimate, 67–68
- Time and material contracts, 126
- Time-boxed deliverables, 161
- Time management:
 - activity definition, 63–65
 - activity duration estimating, 67–73
 - activity resource estimating, 66–67
 - activity sequencing, 65–66
 - milestone list, 63
 - schedule control, 71–73
 - schedule development, 68–71
- Time vale of money, 392
- Tolerance design, 45
- Tools:
 - automated testing and configuration, 162
 - CASE, 129

- Tools (*Continued*)
- decision, 18
 - financial, 389–395
 - 4GL, 129–130
 - Gantt software, 68–69
 - management process (MP), 348
 - of PMBOK process, 16–17
 - for project management, 17, 165–167
 - for project risk management, 408
 - of quality function deployment (QFD), 349
 - rapid application development (RAD), 129–130
 - seven tools, 307, 308–336, 338, 340–343
 - seven tools plus one, 368, 370–372
 - of Six Sigma, 349
 - for specific issues, 453
 - statistical, 85
 - thinking, 142
- Total quality control (TQC), 26–31, 144–145
- Total quality management (TQM), 26–31
- Toyota, 212, 225
- Transactions of the Royal Society of London*, 302
- Tree diagram, 364, 365–367
- Triangular distribution, 281
- Triangular distribution formula, 284
- Trouble tickets, 128–129
- Tsuda, Yoshikasu, 35–36
- Two factorial design, 421–431
- Two-level factorial design, 430
- U chart, 337
- Uncertainty fork, 293
- Uncertainty stage, 50
- Uncontrollable risk elements, 410
- Undesirable effects (UDEs), 234
- Union of Japanese Scientists and Engineers (JUSE), 43, 307
- Unlevered firms/equity, 393–394
- Upper control limit (UCL), 325
- Upper control limits (UCL), 32–33
- Upper specification limit (USL), 325
- Upside risk, 102
- U.S. Army, 211
- U.S. auto industry, 212
- U.S. business:
 - Crosby on state of, 201
 - Deming on state of, 201
 - failures of, 201–202
 - Juran on state of, 201
 - quality failures of, 213
 - quality implementation practices of, 220–221
- U.S. Department of Defense (DOD), 160
- Utility, defined, 293
- Value of information, defined, 293
- Vaporware, 171
- Variable control chart, 324, 328
- Variable data, 324
- Variance analysis, 61–62
- Variances, 72
- Variation, 39
- Varying debt to equity ratio, 401
- Version 1.0 of software, 172
- Virtual teams, 83
- Voice of the customer (VOC), 220, 364, 365
- Waterfall approach, 61, 95, 166
 - change adversity of, 63
 - to project management, 117
- Waterfall model, 120–121
 - vs. Spiral Software, System Development Lifecycle Model (SDLM), 119
- Waterfall SDLC approach, 119
- Weighted average cost of capital (WACC), 392, 395–398
- Weighted criteria averages, 251
- Weighted scores, 243
- Weight ranking of selected criteria, 245
- Western Electric, 40
- Western Electric Statistical Quality Control Handbook* (Juran), 40
- “What if” analysis, 70
- “Who Killed the Virtual Case File?”, 154–155
- Wide Band Delphi, 98
- Wisdom stage, 51
- Work breakdown structure (WBS), 61
- Workday-length, 146
- Working environment, 179
- Work-made-for-hire, 172
- Work performance information, 90
- World Com, 214
- Yates Notation (Yates Standard Order), 425–426
- Yudkowsky, E., 304
- Zero defects quality (ZDQ) system, 49
- Zero defects quality control, 41