
Index

A

A3 diagram, 413
A3 report, format for, 444
Accelerated learning, 142–144; and improvement efforts, 142; using the PDSA Cycle, 142–144
Access to information, 222, 291, 379
Achieving improvement by implementing change to, 179–185
Ackoff, Russell, 87
Act phase, Plan-Do-Study-Act (PDSA) Cycle, 99
Adaptation, of known good ideas, 40–41
Advanced skills for improvement, development of, 337–338
Advertising, and short-term demand, 235
Affinity diagram, 412, 427; for input to planning process, 428
Affordances, using, 401
Alliances, developing, 385–386
Alternatives creativity tool, 419
Analysis: and change, 320; paralysis, 142, 453

Analytic study, 82–83

Argyris, Chris, 87

Associates in Process Improvement (API), xxi

Attracting people to change, 84–85

Automation, using, 373

B

Balanced scorecard, 319

Bank improvement team survey, 418

Banking organization, linkage of processes for, 416

Batalden, Paul, xii

Before-and-after design, 154–156; advantages of, 155–156

Behavior, and motivation, 84

Behavior change, 238, 240

Benchmarking, 123–125, 411, 418; sample process, 124

Best practices, 181

Black belts, use of term, 106, 342

Bottlenecks, 78; identifying/removing, 247, 372–373

- Bottom-up approach, 322–323
 Box plot, 439
 Building knowledge, 81–83, 140
- C**
- Calibration, 434
 Camp, Robert, 123
 CareOregon, improving credentialing process at (case study), 291–292; background, 291–292; summary of results, 292
 Carlile, Paul, 87
 Case studies, 49–71, 263–306; CareOregon, credentialing process improvement at, 291–292; contamination in shipping drums, 63–66; dental office service improvement, 55–60; drill process improvement, 270–276; energy use reduction in school, 66–71; infection/mortality rate reduction in a pediatric intensive care unit, 276–284; manufacturing plant safety, 285–291; morning meeting, 49–55; no-fault-found (NFF) components, reducing occurrence of, 264–270; specialty chemical company, sales improvement, 292–305; teaching methods for biology, 60–63
 Causal loop diagram, 412; example of, 415
 Cause-and-effect diagram, 412, 429
 Central Law of Improvement, 79
 Chain reaction: confidence in, 329; defined, 312; and value improvement, 311
 Challenge creativity tool, 419
 Change: attracting people to, 84–85; and cooperation, 46; developing, 27, 32–33, 35–41, 109–137; effect of, 190; fundamental, 120–136; human side of, 45–46, 83–85; implementing, 8, 20–23, 27, 43–44; publicizing, 190; reactions to, 46; reactive vs. fundamental, 111–116; resulting in improvement, 15–16; running a test, 18–20; supporting, with data, 27–35; testing, 7–8, 27, 41–43, 139–171; use of term, 2
 Change concepts, 5–6, 10, 131–136, 217, 363–408; access to information, giving, 379; affordances, using, 401; alliances/cooperative relationships, developing, 385–386; applications of, 361–363; automation, using, 373; basics, taking care of, 380–381; bottlenecks, finding/removing, 372–373; classifications, reducing, 367–368; coaching customers to use product/service, 387; components, reducing the number of, 405; consequences, emphasizing, 384–385; considering people in the same system, 374–375; constraints, using, 400–401; contingency plans, developing, 396–397; controls on system, reducing, 365–366; coordinator, using, 388; core processes, focusing on, 383–384; cross-training, implementing, 382; customer outcome, focusing on, 387–388; defects/problems, disguising, 405–406; defined, 357; demotivating aspects of the pay system, reducing, 381; desensitization, 397–398; differentiation, using, 399–400; discounts, 391–392; fashion trends, influencing/taking advantage of, 404–405; features, reducing choices of, 377–378; “free,” outsource for, 389; handoffs, minimizing, 371; how to use, 358–360; for increasing demand, 232; inspection level, optimizing, 389–390; intangibles, emphasizing, 403–404; intermediaries, removing, 366; investing resources in improvement, 382–383; listening to customers, 386–387; maintenance, optimizing, 392; mass customization, 401–402; matching inventory to predicted demand, 376; moving steps in the process close together, 372; multiple brands, reducing, 378–379; multiple entry, eliminating, 364–365; multiple processes, scheduling into, 370–371; multiple processing units, using, 375; natural/logical consequences,

- emphasizing, 384–385; need, matching amount to, 368–369; offering product/service anyplace, 403; offering product/service anytime, 402–403; operational definitions, developing, 395; order of process steps, 407–408; overkill, reducing/eliminating, 365; peak demand, adjusting to, 375–376; predictions, improving, 395–396; proper measurements, using, 380; pull systems, using, 377; quality dimensions, differentiating product using, 406–407; reaching agreement on expectations, 388–389; recycling/reusing, 366; for reducing costs, 227; reminders, using, 398–399; risk sharing, 384–385; sampling, using, 369; setup/startup time, reducing, 390–391; smooth work flow, 373–374; sorting product into grades, 397; specialists' time, extending, 393; standardization, 394; substitution, 367; suppliers, working with, 390; synchronization, 370; tampering, stopping, 394–395; targets/setpoints, changing, 369–370; tasks, performing in parallel, 374; things not used, eliminating, 364; training, conducting, 381–382; uncertainty, managing, 408; useful for redesign, 221; variation, exploiting, 398; wait time reduction, 323
- Change package/bundle, 119
- Charters, 90–92
- Check sheet, 419
- Chemotherapy process, partial FMEA for, 425
- Christensen, Clayton, 87
- Chronic Care Model, 40
- Classifications, reducing, 367–368
- Coaching customers to use product/service, 387
- Collaboratives, use of term, 207
- Collection, and change, 320
- Commitment to change, guidelines for, 189–191
- Communication of awareness, feedback loop, 211–213
- Communication plan, 206–208
- Compatibility, of an idea, 45
- Complex context, 251
- Complexity diagram, 413
- Complexity, of an idea, 45
- Complicated context, 251
- Components, reducing the number of, 405
- Concept extraction, 419
- Concept fan, 419
- Concept, use of term, 357
- Consequences, emphasizing, 384–385
- Constancy of purpose, establishing, 312–317
- Constraints, 78, 400–401
- Contamination in shipping drums (case study), 63–66; changes resulting in improvement, 64; developing change, 65; human side of change, 66; implementing a change, 65–66; improvement goals, 63; PDSA Cycle 1, 64; PDSA Cycle 2, 64–65; primary measures of change as improvement, 63; supporting change with data, 65; testing a change, 65
- Contingency plans, developing, 396–397
- Contingency tables, 441
- Continuity, use of term, 1
- Cooperative relationships, developing, 385–386
- Coordination, 238
- Coordinator, using, 388
- Core processes, focusing on, 383–384
- Creative thinking, 37–40; challenging boundaries, 38; and developing changes, 128–131; evaluating the purpose of activities being performed, 39; new ideas for change, 40; rearranging the order of the steps, 37; smooth work flow, 39; visualizing the ideal, 39
- Creativity methods, 411, 418
- Creativity tools, 419
- Critical path method (CPM), 443

- Critical thinking, 129
- Cross-training, implementing, 382
- Customer outcome, focusing on, 387–388
- D**
- Data: collecting/displaying, 28–30; defined, 28; learning from, 30–35; on personal experience, 420–423; plan to collect data, 28–29; plotting over time, 31, 33–34; supporting change with, 27–35; themes/patterns in, 30–31; types of, to support improvement efforts, 29; variation in, 32
- Data collection: forms for collecting data, 418; forms of, 419
- Data display, types of, 106
- Data redundancy, 364–365
- De Bono, Edward, xix, 136
- Deductive/inductive learning, and Plan-Do-Study-Act (PDSA) Cycle, 82
- Defects/problems, disguising, 405–406
- Degree of belief, 141
- Delayed response, 237
- Deming Cycle, 454
- Deming, W. Edwards, xi–xiii, xv–xvi, xix, 5, 75, 82, 86–87, 131, 136, 357–358
- Demotivating aspects of pay system reducing, 381
- Dental office, improving service in (case study), 55–60; developing a change, 55; human side of change, 55; implementing a change, 55; PDSA Cycle 1, 56–57; PDSA Cycle 2, 57–58; PDSA Cycle 3, 58–59; supporting change with data, 53–55; testing a change, 55
- Department of Transportation of Washington, D.C. (DDOT) prototype, 255
- Desensitization, 397–398
- Design for disassembly, 366
- Design of a process/product service, 109
- Designs for testing change, 153–168; before-and-after design, 154–156; factorial design, 164–168; observational design, 153–4; time series designs, 156–164
- Developing change, 27, 35–41, 109–137; adapting known good ideas, 40–41; change concepts, 131–136; creative thinking, 37–40, 128–131; problems in, 110–111; processes/systems of work, understanding, 36–37; reactive vs. fundamental change, 111–116; theory for change, 116–119; using technology for, 125–127
- Dewey, John, 86
- Differentiation, using, 399–400
- Direction, and change, 189, 320
- Discounts: setting up timing to use, 391–392; and short-term demand, 235
- Disruption, 238
- Dissatisfaction, and need for change, 189
- Dissemination, and change, 320–321
- DMADV, 458
- DMAIC, 457–458
- Do phase, Plan-Do-Study-Act (PDSA) Cycle, 98
- Dodge, H. F., 86
- Drill process improvement (case study), 270–276; goal, 270; PDSA Cycle 1, response plots from, 272–273; PDSA Cycle 2, 270–271; planned experiment for drill study, 271; required changes, 270; summary of results, 275–276; updated control charts, 269
- Driver diagram, 286, 412, 429
- Dynamic complexity, 78
- Dynamic simulation, 411, 417
- E**
- Early adopters: feedback loop, 210–211, 211–213; identification of, 210–211; knowledge transfer/application, 213; maintaining gains, 214–216
- Education, defined, 338
- 8D problem-solving methodology, 461–462
- Emery, Fred, 87

- Energy use reduction in school (case study), 66–71; changes resulting in improvement, 67; developing change, 70; energy conservation checklist, 69; energy use analysis, 70; implementing a change, 70; improvement goals, 66; measures of change as improvement, 66–67; PDSA Cycle 1, 67; PDSA Cycle 2, 67–68; PDSA Cycle 3, 68; PDSA Cycle 4, 68–70; spreading improvements, 71; supporting change with data, 70; testing a change, 70
- Enumerative study, 82–83
- Error proofing, 399
- Errors, embracing, 190
- Escape provocation, 419
- Estimation, and enumerative studies, 83
- Executing and refining the spread plan phase, 210–216; communication of awareness, 210–211; feedback loop, 211–212; identification of early adopters, 210–211; knowledge transfer/application, 213; spread work plan, 211
- Executive sponsor, 198–199
- Executives: development of, 335–337; discovery stage, 335–336; executive review processes, 327–328; expectations of, 332; external promotion to others, 336–337; implementation stage, 336; learning stage, 336
- Expectations, reaching agreement on, 388–389
- Extrinsic motivation, 84
- F**
- Factorial design, 164–168, 440; two-factor design, 164–167; two-factor design with planned grouping, 167–168
- Factors, 164
- Failure mode and effects analysis (FMEA), 411, 423, 425
- Fashion trends, influencing/taking advantage of, 404–405
- Features, reducing choices of, 377–378
- Feedback, 16–17; loops, 21–23
- First-line supervision, expectations of, 333
- First-order change, 78
- Fishbone diagram, *See* Cause-and-effect diagram
- Fisher, Ronald, 86
- Five-S movement, 380
- Flow diagram (flowchart), 317, 410–414, 419; for the “return parts” process, 414
- FOCUS-PDCA, 461
- Follett, Mary Parker, 86
- Force field analysis, 412, 417; example of, 428
- Ford Motor Company, 8D problem-solving methodology, 462
- Forrester, Jay, 87
- Frameworks, 245–247; defined, 245
- Frequency plot, 412, 436–437, 437
- Front-line employees, 235; and defects/problems, 320; expectations of, 333
- Fundamental attribution error, 84
- Fundamental change: benchmarking, 123–125; learning from others, 123–125; logical thinking about the current system, 120–123; methods for developing, 120–136
- G**
- Gantt chart, 413, 443
- Gantt, Henry L., 443
- General PDSA project planning form, 446
- Gilbreth, Frank and Lillian, 86
- Godfrey, A. Blanton, xii
- Goldratt, Eliyahu, 87
- Gold standard, 141
- Government organization, chain reaction from improving value in, 311
- Grades, sorting product into, 397
- Green design, 366
- Guiding coalition, 240
- Guiding teams/projects using Model for Improvement, 106

H

Handoffs, minimizing, 371
 Herzberg, Frederick, 87
 High-impact changes, developing in large/
 complex systems, 243–250
 Histogram, 439
How We Think (Dewey), 86
 Human side of change, 45–46, 83–85

I

Implementation, use of term, 173
 Implementing change, 8, 20–23, 27, 43–44;
 to achieve and maintain improvement,
 179–185; compared to testing a change,
 174–175; documentation, 181–182;
 implementation checklist, 185; imple-
 mentation resources, 184; “just do it!”
 approach, 178; measurement, 182–183;
 parallel approach, 178; sequential
 approach, 179; as a series of cycles,
 176–178; social aspects of, 186–193;
 standardization, 181; training, conduct-
 ing, 183–184
 Improvement, *See also* Plan-Do-Study-Act
 (PDSA) Cycle; System of improvement:
 case studies, 49–71; Central Law of
 Improvement, 79; change as, 93–96;
 changes resulting in, 15–25, 96–97; char-
 ters, 90–92; common framework for, 23;
 current system, removing as an alterna-
 tive, 93; defined, 16; developing change
 resulting in, 17; example of, 16; imple-
 menting a change, 20–23; increasing
 capability to make, 76; iterative nature of,
 82; leadership for, 9; methods, 73; model
 for, *See* Model for Improvement; numeri-
 cal goals, 92–93; principles of, 15–23,
 16–23; roles/responsibilities of team
 during life of, 107; science of, 75–88;
 skills, 27–47; spreading, 8–9, 44–45,
 195–216; testing change, 7–8, 18; tools/
 methods supporting, 409–451; working
 with people, 9

Improvement advisors, 341–342
 Improvement aim, 16
 Improvement capability, 331–354;
 advanced skills for improvement, devel-
 opment of, 337–338; capabilities to dif-
 fuse knowledge in the system, 345–346;
 database and data analysis capabilities,
 343–345; organization to support the
 focus on improvement, 340–343; organi-
 zationwide, 338–340; in the workforce,
 developing, 333–340
 Improvement projects: degrees of difficulty
 in, 238; nested in political environment,
 240–241; standard forms for, 444–446;
 translating strategic initiatives to, 322
 Improvement teams, 240, 343
 Incentives, and short-term demand, 235
 Infection/mortality rates in a pediatric
 intensive care unit, reducing (case study),
 276–284; baseline, 277, 280; CA-BSI,
 278; goals, 276–277; implementation,
 279; lessons learned, 280–284; measure-
 ment, 277, 280; PICU improvement
 effort, family of measures for, 281–283;
 social impact of change, 279; summary
 of results, 280; supporting changes,
 278–279; VAP, 277
 Infrastructure, 217; and quality problems,
 222–224
 Initial spread plan development, phase for,
 198–199; communication plan, 206–208;
 measurement plan, 208–209; organiza-
 tional structure, 205–206; work plan, 210
 Inspection level, optimizing, 389–390
 “Instant pudding,” xiii
 Intangibles, emphasizing, 403–404
 Integration, 238
 Interaction plots, 441
 Intermediaries, removing, 366
 Internal advisors, 342
 Internal consultant, 106
 Interrelationship diagram, 412, 432
 Intrinsic motivation, 84

- Is-or-is-not analysis, 426
- Ishikawa diagram, *See* Cause-and-effect diagram
- Ishikawa, Kauro, 5
- J**
- Japanese auto manufacturers, and change, 4
- Joiner, Brian, xix
- Juran, Joseph, xii, 5; Universal Sequence for Quality Improvement, 456–457
- “Just do it!” approach, to implementing change, 178
- K**
- Kano, Noriaki, xix
- Knowledge building, 81–83, 140
- Knowledge management systems, 197
- Knowledge of subject matter, and improvement, 27
- Knowledge transfer/application, 213; feedback loop, 214
- Knowles, Malcolm, 87
- L**
- Langley, Gerald J., xxi–xxii
- Large/complex systems: bottlenecks, identifying/removing, 247; complex context, 251; complicated context, 251; enhancements to the model for improvement to, 239; frameworks, 243–247; high-impact changes, developing, 243–250; improving, 237–262; management, 239–243; measurement, 252–254; multiplicative scale-up, 259–260; name/theme, 242; operating rules, 243–244; preoperative visit at a hospital, 247–248; processes, 243–245; project setup, 239–243; prototypes, developing/testing, 254–256; scale-up, learning during, 256; segments/paths in system, defining, 249–250; sequencing of large changes to smooth the transition, 257–259; simple context, 250–251; simultaneous testing by cooperating entities, 260–261; steering team/guiding coalition, 240; structures, 243–244; structures and operating rules, understanding, 243–245; system, understanding, 243–250; testing and learning systems, 250–261; theory building, 252–254
- Leaders of improvement, 9, 85, 197, 242
- Lean Improvement, 358, 463–464
- Lean manufacturing, 247
- Lean Six Sigma, 457
- Learning: accelerated, 142–144; deductive/inductive, 82; iterative nature of, 82; during scale-up, 256
- Learning loop, 102–103
- Leverage, 78
- Lewin, Kurt, 86
- Lewis, C. I., 86
- Linkage of processes, 412, 415
- Listening to customers, 386–387
- Logical consequences, emphasizing, 384–385
- Logical positive thinking, 129
- M**
- Maintenance, optimizing, 392
- Malcolm Baldrige Quality Award, 124–125
- Managers, expectations of, 332
- Managing people, 380–381
- Manufacturing plant, improving safety at (case study), 285–291; charter, 287–291; driver diagram of safety problems and areas for improvement, 286
- Maslow, Abraham, 87
- Mass customization, 401–402
- Matrix diagram, 412, 429–430
- Mayo, Elton, 86
- McGregor, Douglas, 86–87
- Measurement plan, 208–209
- Measurement system analysis, 411, 434
- Measurements: and feedback, 197; proper, 380
- Measures, 218; whole system, 319
- Mind and the World Order* (Lewis), 86

- Miscommunication, 190
- Mistake proofing, 399
- Model for Improvement, xiii, 5, 13, 23–25, 33, 73, 89–108, 110, 126, 181, 238, 250, 259, 263–264, 409–411, 453–456; advantages of, 455; applying, 25; basis of, 102; diagram of basic form of, 454; fundamental questions, 454; guiding teams and projects using, 106; as improvement framework, 25; Plan-Do-Study-Act (PDSA) Cycle, 5, 23–25
- Moen, Ronald D., xxii
- Morning meeting, improving (case study), 49–55; developing a change, 55; human side of change, 55; implementing a change, 55; PDSA Cycle 1, 51; PDSA Cycle 2, 52; PDSA Cycle 3, 52–53; PDSA Cycle 4, 53; supporting change with data, 53–55; testing a change, 55
- Motivation, and behavior, 84
- Multiple brands, reducing, 378–379
- Multiple entry, eliminating, 364–365
- Multiple processes, scheduling into, 370–371
- Multiple processing units, using, 375
- Multiplicative scale-up, 259–260
- N**
- Natural consequences, emphasizing, 384–385
- Need, matching the amount to, 368–369
- Nested systems, 245
- New thought patterns, provoking, 129–131
- Newsletters, 45
- Newton, Isaac, 130
- No-fault-found (NFF) components, reducing occurrence of (case study), 264–270; Charter for No-Fault-Found Improvement Effort, 265–266; NFF, defined, 264; Pareto chart for NFF reasons, 268; PDSA Cycle 1, 266–268; summary of results, 270
- Nolan, Kevin M., xxii
- Nolan, Thomas W., xxii
- Norman, Clifford L., xxii–xxiii
- O**
- Observability, of an idea, 45
- Observation, 28
- Observational design, 153–154
- Operating principles, 217
- Operating rules, 243–244, 317
- Operational definitions, 83, 419–420; developing, 395
- Order of process steps, changing, 407–408
- Organizational readiness for spread, phase, 197–205; executive sponsor and project manager, 198–199; spread team, 199–205; strategic topic, 197–198
- Organizational structure, 205–206
- Overconfidence, and change, 190
- P**
- Parallel approach, to implementing change, 178
- Pareto analysis, 426
- Pareto chart, 412, 436–437, 437, 439; for NFF reasons, 268
- PDSA Cycle, *See* Plan-Do-Study-Act (PDSA) Cycle
- Peak demand, adjusting to, 375–376
- Peer-to-peer interaction, to share data, 45
- People management, 380–381
- Perfect change: defining, 35–36; as inhibitor of real change, 7; and paralysis by analysis, 453
- Personal letters, to share data, 45
- PERT chart, 413, 443
- Pie chart, 439
- Plan-Do-Study-Act (PDSA) Cycle, 5, 23–24, 97–100, 110, 173, 263–264, 409, 411, 442–443; Act phase, 99; data collection suggestions, 104–105; deductive/inductive learning, 82; display/analysis of data, 105–106; Do phase, 98; as framework for trial-and-learning methodology, 24–25; general PDSA project planning

- form, 446; guiding teams/projects using Model for Improvement, 106; PDSA Cycle form with checklist format, 447–451; Plan phase, 98; repeated use of, to test use of a scribe, 103; Study phase, 99; using data in, 102–104; using sequentially to test changes, 102; using to build knowledge, 100–106; as vehicle for learning and action, 99
- Plan phase, Plan-Do-Study-Act (PDSA) Cycle, 98
- Planned experimentation, 411, 440
- Platt, Lew, 345
- Porter, Elias, 87
- “Practical Problem-Solving Process” (Toyota), 462
- Predictions: as aim of an analytic study, 83; change as, 81; formulation of a scientific basis for, 141; improving, 395–396; and testing change, 140
- Price, 217
- Principles of testing change, 41–43, 144–153; collect data over time, 148–151; include wide range of conditions in sequence of tests, 152–153; test on a small scale and build knowledge sequentially, 145–148
- Pro-and-con analysis, 426–427
- Problem solving, 411, 426
- Process layout picture, 419
- Process mapping, 410, 411
- Processes, 36–37, 243–245
- Profound, defined, 75
- Profound knowledge, xii, 76–85; appreciation for a system, 77–79; components of, 76, 85; human side of change, 83–85; interaction of the components of, 85; knowledge building, 81–83; milestones in the development of, 85–88; System of Profound Knowledge, 75, 77; variation, understanding, 79–81
- Project leaders, 242
- Project manager, 198–199
- Project operational team, formation, 242
- Prototypes, large systems, 254–256
- Provost, Lloyd P., xxiii
- Pull systems, using, 377
- ## Q
- QC Story, 462–463
- Quality, 217; assuming customer’s role, 234–235; dimensions of, 233; expanding customer expectations to increase demand, 230–235; increasing demand, measures associated with, 231–232; infrastructure, 233; observing the customer, 233–234; process and system changes to increase demand, 232; reducing costs while maintaining/improving, 224–230
- Quality assurance, xi
- Quality council, 343
- Quality dimensions, differentiating product using, 406–407
- Quality function deployment (QFD), 411, 423
- Quality managers, 342
- Quality problems: eliminating, 218–224; and faults of the system, 235; and infrastructure, 222–224; and process/system changes, 221–222; reducing, 235; system-level measures related to, 220–221
- Quality technology staff, 343
- ## R
- Radar chart, 412, 432–433, 439; example of, 433
- Random entry, 419
- Randomization, 164
- Reaching agreement on expectations, 388–389
- Realism of Pragmatism* (Dewey), 86
- Recycling/reusing, 366
- Redesign of a process/product service, 109
- Relative advantage, of an idea, 45
- Reminders, using, 398–399
- Resistance to change, 191–193

- Risks, sharing, 384–385
- Rogers, Carl, 87
- Rogers, Everett, 45, 85, 210
- Ross, Lee, 87
- Rumors, 190
- Run chart, 412, 435
- Running a test, 18–20

- S**
- Sample agendas, for getting started/
sponsors/improvement advisors, 348
- Sampling, using, 369
- SBAR format, 328
- Scale-up: learning during, 256; multiplicative, 259–260
- Scatterplot, 413, 441–442; example of, 442
- Schön, Donald, 87
- Science, defined, 75
- Science of improvement, 75–88; applying to testing, 140–144; designs for testing change, 153–168; principles for testing change, 144–153; strategies for testing, 168–170
- Second-order change, 78
- Senge, Peter, 87
- Sense of urgency, developing, 240
- Sequential approach, to implementing change, 179
- Sequential testing, 42
- Setbacks, embracing, 190
- Setpoints, changing, 369–370
- Setup, 197
- Setup time, reducing, 390–391
- Seven-Step Method problem-solving model, 459–461
- Shewart Cycle, 454
- Shewhart control chart, 412, 436, 438–439
- Shewhart, Walter A., 32–34, 79, 81, 86, 141
- Simple context, 250–251
- Simultaneous testing by cooperating entities, 260–261
- Six-Sigma DFSS, 458–459
- Six-Sigma DMAIC, 457–458, 464
- Six Sigma methodology, 358, 457
- Skills to support improvement, 27–47;
 - developing a change, 27, 35–41; implementing a change, 8, 20–23, 27, 43–44;
 - supporting change with data, 27–35; testing a change, 27, 41–43
- Smooth work flow, 39, 373–374
- Social aspects of implementing change, 186–193; commitment to change, guidelines for getting, 189–191; initial results of implementation, 187–189; reactions to change, 186–187; resistance, 191–193
- Social system, development of, 197, 250
- Sorting product into grades, 397
- Spaghetti diagram, 415, 419
- Specialists' time, extending, 393
- Specialty chemical company, improving sales at (case study), 292–305; credentialing administrative assistant/provider information specialist, time spent per claim by, 300; flow diagram for credentialing request process, 294; lessons learned, 303–305; model for improvement in a tree diagram, 293; PDSA Cycle 1, 301; PDSA Cycle 2, 301; PDSA Cycle 3, 302; PDSA Cycle 4, 302–303; PDSA Cycle 4a, 302–303; PDSA Cycle 4b, 303; PDSA Cycle 5, 303; summary of results, 303; test elimination of tracking spreadsheet, 295–299
- Spider chart, 432, 439
- Spread rate, theoretical curve of the rate of, 212
- Spread team, 199–205, 213–216
- Spreading improvement, 8–9, 44–45, 195–216; communication, 45; defined, 195; developing an initial spread plan, phase for, 205–210; executing and refining the spread plan, phase for, 210–216; framework for spread, 196–197; organizational readiness for spread, phase for, 197–205; spread work plan, 211
- Stable process, 80

- Standardization, 394
- Standards, 181
- Star chart, 432
- Startup time, reducing, 390–391
- Statistical methods, 411, 434
- Statistical process control (SPC), 394–395, 411, 433–434
- Statistical theory, 79–80
- Steering committees, 343
- Steering team, 240; project operational team, formation of, 242
- Stem-and-leaf plot, 439
- Stepping-stone provocations, 419
- Strategic improvement initiatives, 317
- Strengths Deployment Inventory (SDI), 291
- Structures, 243–244
- Study phase, Plan-Do-Study-Act (PDSA) Cycle, 99
- Subject matter knowledge, 75
- Substitution, 367
- Suppliers, working with, 390
- Surveys, 22, 411, 417–418
- “Swim-lane” flow diagram, 413
- Synchronization, 238, 370
- System boundaries, 78
- System, defined, 37
- System of improvement: building, 312–328; business planning, integrating planning for improvement with, 321–325; constancy of purpose, establishing, 312–317; improvement initiatives, managing/learning from a portfolio of, 325–328; system for gathering, analyzing, managing information, designing, 319–321; viewing the organization as a system, 317–319
- System of Profound Knowledge, xv, xix, 75, 77, 131, 357–358
- Systematic diagrams, 430–432
- Systems diagrams/maps, 318
- Systems of work, understanding, 36–37
- Systems theory, 78–79
- T**
- Tampering, 394–395
- Targets, changing, 369–370
- Tasks, performing in parallel, 374
- Taylor, Frederick, 86
- Teaching methods for biology, improving (case study), 60–63; improvement goals, 61; PDSA Cycle 1, 61–62; PDSA Cycle 2, 62; primary measures of change as improvement, 61, 64; spreading improvements, 63; supporting change with data, 63; testing a change, 63
- Technology: cautions for making changes involving, 126–127; defined, 125
- Temporal effects, 78
- Test design, defined, 153
- Testing change, 7–8, 27, 41–43, 139–171, 174; applying the science of improvement to, 140–144; designs for, 153–168; gold standard, 141; PDSA Cycle, 41; planning the test, 42–43; principles of, 41–43, 144–153; sequential testing, 42; strategies, 168–170; test scale, 41–42
- Theory, 81
- Time series chart, 435
- Time series designs, 156–164; before-and-after time series, 156–159; time series with a control group, 162; time series with planned grouping, 162–164; time series with replication, 159–161
- Top-down approach, 322–323
- Top-down flow diagram, 413
- Topical agenda, for development of internal improvement advisors, 352–354
- Toyota Production System (TPS), 464; framework from, 246–247
- TQM (total quality management) programs, 457
- Training, conducting, 381–382
- Tree diagram, 412, 430–432
- Trend chart, 435
- Trialability, of an idea, 45
- Trist, Eric, 86

TRIZ, 136

Two-factor design, 164–167; with planned grouping, 167–168

Two-way table, 413, 441; to evaluate effect of sales brochure, 442

U

Uncertainty, managing, 408

Union of Japanese Scientist and Engineers (JUSE) Research Committee, 462

Unstable process, 80

U.S. automakers, and change, 4

U.S. Malcolm Baldrige Quality Award, 124–125

V

Value, concept of, 217

Value engineering, 367

Value improvement: as business strategy, 309–329; chain reaction from, 311;

developing an environment conducive to, 235; integrating methods, 217–236

Value stream mapping (VSM), 413, 415

Variation, exploiting, 398

Vision statement, 241–242

von Bertalanffy, Ludwig, 86

VSM, *See* Value stream mapping (VSM)

W

Wait time, reducing, 393

Whole system measures, 319

Work, processes/systems of, understanding, 36–37

Work breakdown structure (WBS), 413, 444

Work flow, smooth, 373–374

Work force, developing improvement capability in, 345–346

Work plan, 210–211

Working: with people, 9; with suppliers, 390