

Endnotes

The following notes provide the historical background of many of the terms in this book. You do not need to know this information for the exam. It is simply provided for your interest and reference.

CHAPTER TWO

1. **Business case** This term has been in wide use for decades; business cases were being written and studied in the 1920s as part of the scientific management movement. They became popular in the 1950s after the Harvard Business School began using them as a teaching method. [Michael Davis, *Ethics and the University* (New York: Routledge, 1999), 145.]
2. **Benefits management plan** The benefits management plan was introduced in the 1990s in the United Kingdom. The concept spread to the United States in the early 2000s. [Roland Munro and Jan Mouritsen, *Accountability: Power, Ethos and the Technologies of Managing* (Stamford, CT: International Thomson Business Press, 1996), 133.]
3. **Project management office** The development of departments within organizations to manage projects dates back to the beginning of project management as a discipline. [Frank Parth, Cynthia Snyder, and Cynthia Stackpole, *Introduction to IT Project Management* (Vienna, VA: Management Concepts, 2007), 22.]
4. **Organizational project management** The concept of organizational project management began in the information technology sector in the 1980s; within a decade it had become widely popular throughout management science. [British Standards Institution, *Use of Network Techniques in Project Management: Guide to the Use of Graphical and Estimating Techniques* (London: British Standards Institution, 1984), 1.]
5. **Matrix** These categories were defined in 1971 by Jay R. Galbraith to help organizations improve their management efficiency. [Jay R. Galbraith, "Matrix Organization Designs: How to Combine Functional and Project Forms," *Business Horizons* 14, no. 1 (1971): 29–40.]
6. **Project expediter** The concept of the project expediter was developed in the Soviet Union to help projects get through the tangle of Soviet bureaucracy. [Karl W. Ryavec, *Soviet Society and the Communist Party* (Amherst: University of Massachusetts Press, 1978), 54.]
7. **Organizational knowledge repository** The concept of the organizational knowledge repository was created by J. M. An and fellow researchers in 1992, as they began work on early search engines. The idea was quickly adopted and was common in knowledge management research by the end of the decade. [J.M. An, R.G. Hung, and G.L. Sanders, "The Role of Domain Coverage and Consensus in a Network of Learning and Problem Solving Systems," in *Proceedings of the Twenty-Fifth Hawaii International Conference on System Sciences* (Los Alamitos, CA: IEEE Computer Society Press, 1992), 443.]
8. **Lessons learned repository** The organization of formal systems to integrate experience into corporate management is a fairly recent development. J. G. March and J. P. Olsen published a paper in 1975 that became the basis for "organizational learning." The concept of the lessons learned repository was developed by the US military to build on this as part of its 1985 overhaul of contracting standards; it was disseminated into wider management practice in the 1990s. [Department of Defense, *Military Standard Specification Practices* (Washington, DC: U.S. Department of Defense, 1985).]

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9. **Constraints** Dr. Martin Barnes was the first to describe what he called the “iron triangle” of time, cost, and output in his course “Time and Money in Contract Control” in 1969, laying the foundations for what has become known as the “triple constraint” (schedule, cost, and scope constraints). [Patrick Weaver, “The Origins of Modern Project Management” (lecture, Fourth Annual PMI College of Scheduling Conference, Vancouver, Canada, April 15–17, 2007).]
10. **Stakeholder** The first use of the word “stakeholder” in management literature was in 1963 in an international memorandum at the Stanford Research Institute. [Robert Y. Cavana and Arun A. Elias, “Stakeholder Analysis for Systems Thinking and Modelling.” Paper presented at ORSNZ, Wellington, New Zealand, December 2000.]
11. **Stakeholder management** The concept of stakeholders became central to management in 1984, when R. Edward Freeman published his book *Strategic Management: A Stakeholder Approach*. [Robert Y. Cavana and Arun A. Elias, “Stakeholder Analysis for Systems Thinking and Modelling.” Paper presented at ORSNZ, Wellington, New Zealand, December 2000.]

CHAPTER THREE

1. **Project life cycle** Dr. Russell Archibald, a founder of PMI, was one of the theorists who refined the concept of the project life cycle. [R. Max Wideman, *The Role of the Project Life Cycle (Life Span) in Project Management* (Vancouver: AEW Services, 2004), 2.]
2. **Development life cycle** The concept of the development life cycle originated in US military contracting during the Vietnam War, influenced by the lessons learned by NASA during the space race of the 1950s and 1960s. It spread quickly into IT and general management in the 1970s. [Gerald R. Holsclaw, “Integrated Logistic Support—The Life-Cycle Task of Support Management,” *Defense Industry Bulletin* 4, no. 2 (June 1968): 11.]
3. **Phase gate** The phase gate concept is derived from the “stage gate” system developed by Robert G. Cooper in the late 1980s, which underlies most modern waterfall deployment models. [Robert G. Cooper, “Stage-Gate Systems: A New Tool for Managing New Products,” *Business Horizons* 33, no. 3 (May–June 1990): 44.]
4. **Progressive elaboration** The term “progressive elaboration” has been present in medical science since the nineteenth century, and was widely popularized during the twentieth century in a variety of contexts. Its use in management science dates to the 1980s, when it evolved from the iterative nature of computer science. [D.K. Hitchins, “Managing System Creation,” *IEE Proceedings-A* 133, no. 6 (September 1986): 343.]
5. **Rolling wave planning** This process was refined by Gregory Githens and J. Rodney Turner in the 1990s to improve the balance of flexibility and structured process in project management. [J. Rodney Turner, *The Handbook of Project-Based Management*, 3rd ed. (New York: McGraw-Hill, 2008), 56.]

CHAPTER FOUR

1. **Integration management** The concept of “systems integration management” arose from the highly technical management requirements of post–World War Two engineering projects. By the end of the 1960s, integration management was a common term in project management. [Society of Automotive Engineers, “Jet Plane Costs Need Not Skyrocket with Performance;” *SAE Journal*, August 1953: 66.]
2. **Benefit measurement methods** Benefit measurement first evolved as a cost-benefit analysis method. After a series of studies on productivity improvements and information technology in the 1990s, it became an important project management tool. [Sonia Mountain, “New Corporate Systems: Adding Value or Keeping with the Times?” Paper presented at the ATEM NZ Conference, Wellington, New Zealand, 1994, 9.]

3. **Murder board** The idea of a “murder board” came out of US military staff planning during World War II when major actions, ideas, and strategies were relentlessly grilled by a murder board. After the war, the concept moved out of military colleges and into corporate management. [Earl Burton, *By Sea and by Land: The Story of Our Amphibious Forces* (New York: McGraw-Hill, 1944), 47.]
4. **Constrained optimization methods** Constrained optimization as a pure mathematical technique dates back to the eighteenth-century French mathematician Lagrange. In the 1920s, students of the economist Alfred Marshall began applying optimization techniques to economic planning. The use of constrained optimization in project management has evolved from these techniques. [William Lazonick, *Business Organization and the Myth of the Market Economy* (Cambridge, MA: Cambridge University Press, 1991), 292.]
5. **Present value, net present value, internal rate of return, payback period, cost-benefit analysis, opportunity cost, sunk costs, depreciation** These key terms are borrowed from accounting and economics. The investment of time and money in a project should be reviewed as carefully as the investment of time or money in any business venture. [Colin Haslam and Alan Neale, *Economics in a Business Context* (London: Thomson, 2000).]
6. **Economic value added (EVA)** This term was coined by Thomas B. McMullen in 1997 as a new label for earlier work by Eliyahu M. Goldratt. [Thomas B. McMullen, *Introduction to the Theory of Constraints (ToC) Management System* (Boca Raton, FL: CRC Press, 1998).]
7. **Law of diminishing returns** This is one of the fundamental principles of modern economics, developed by David Ricardo and Thomas Malthus in 1815. It has been applied to many fields of social science in the two centuries since its discovery. [Mark Skousen, *The Making of Modern Economics: The Lives and Ideas of the Great Thinkers* (Armonk, NY: M.E. Sharpe, 2001), 100.]
8. **Project charter** While the concept of the project charter is very old, it was refined as part of the Six Sigma methodology. [Penelope Przekop, *Six Sigma for Business Excellence* (New York: McGraw-Hill, 2003), 61.]
9. **Assumption log** The assumption log is a new practice in project management. [John Murdoch et al, “Measuring Safety: Applying PSM to the System Safety Domain,” *Proceedings of the 8th Australian Workshop on Safety Critical Systems* 33 (2003): 50.]
10. **Project management plan** The integration of various project management techniques into a formal process began in the 1950s with projects coordinated for the US Department of Defense by the RAND Corporation and Booz Allen Hamilton. [Lauren Keller Johnson, Richard Luecke, and Robert Daniel Austin, *The Essentials of Project Management* (Boston: Harvard Business School, 2006), xv.]
11. **Baseline** The use of the baseline as a statistical tool dates to the nineteenth century. The word has been redefined in the context of management science, although it still generally refers to measurement using numerical or statistical methods. [Harold Kerzner, *Project Management: A Systems Approach to Planning, Scheduling and Controlling* (Hoboken, NJ: Wiley, 2001), 1014.]
12. **Configuration management system** Configuration management was first developed in the 1950s by NASA. The technique was then borrowed by the US Department of Defense, before it was refined by private corporations in the 1960s. It was originally intended to manage large, complex projects, such as the design and launch of rockets. [Frank B. Watts, *Engineering Documentation Control Handbook* (Norwich, NY: William Andrew, 2000), 10.]
13. **Work authorization system** The concept of a refined work authorization system evolved from the PERT methodology of the 1960s and quickly spread from the US federal government to private corporations. [Gregory A. Garrett and Rene G. Rendon, *U.S. Military Program Management: Lessons Learned and Best Practices* (Vienna, VA: Management Concepts, 2007), 133.]

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14. **Defect repair** Defect repair has been a management term for decades. [Barbara M. Bouldin, *Agents of Change: Managing the Introduction of Automated Tools* (Old Tappan, NJ: Pearson Education, 1988).]
15. **Integrated change control processes** The concept of integrated change control was refined at NASA, where an Integrated Change Control Board was organized in the late 1970s. [Gale Research Company, *Acronyms, Initialisms and Abbreviations Dictionary* (Farmington Hills, MI: Gale Research Company, 1980), 1512.]
16. **Change control board** The change control board was an important part of the change control process from its earliest days in the 1970s. [John A. Burgess, *Design Assurance for Engineers and Managers* (Boca Raton, FL: CRC Press, 1984), 96.]

CHAPTER FIVE

1. **Requirements elicitation** This term became widely popular in the field of information science during the 1980s and quickly assumed an important role in project management. [Rudy A. Hirschheim, *Information Systems Development as Social Action: Theory and Practice* (Oxford: Oxford Institute of Information Management, 1987), 2.]
2. **Work breakdown structure (WBS)** The work breakdown structure was developed as part of the PERT methodology, although it was not mentioned by name in the 1959 paper that introduced PERT. The term was in widespread use by 1961. [Gregory T. Haugan, *The Work Breakdown Structure in Government Contracting* (Vienna, VA: Management Concepts, 2003), 8.]
3. **Multicriteria decision analysis** This was popularized as a management concept in the 1980s. [Milan Zeleny, *MCDM: Past Decade and Future Trends: A Source Book of Multiple Criteria Decision Making* (Greenwich, CT: JAI Press, 1984).]
4. **Affinity diagrams** Affinity diagrams were devised as part of the total quality management method in the 1970s. [Shigeru Mizuno, *Management for Quality Improvement: The Seven New QC Tools* (New York: Productivity Press, 1988).]
5. **Mind maps** While similar techniques have been used for centuries, the modern mind-mapping technique was developed by British consultant Tony Buzan. Buzan first conceived of the mind map in the 1970s and has continually refined the technique. [Tony Buzan, *How to Mind Map* (New York: Thorsons, 2002).]
6. **Nominal group technique** This technique was invented by researchers Andre Delbecq and Andrew Van de Ven in 1971 to overcome the hesitation some participants might feel in a face-to-face meeting. [Charles M. Judd and Harry T. Reis, *Handbook of Research Methods in Social and Personality Psychology* (Cambridge, MA: Cambridge University Press, 2000), 181.]
7. **Context diagrams** Context diagrams began as a tool for structured analysis management in the 1970s. [Tom DeMarco, *Structured Analysis and System Specification* (New York: Yourdon, 1978).]
8. **Requirements traceability matrix** The requirements traceability matrix was developed in the software industry and was adopted as standard procedure by the US Department of Defense in 1988. [Deborah A. Cerino, Judith A. Clapp, and Wendy W. Peng, *Software Quality Control, Error Analysis, and Testing* (Park Ridge, NJ: Noyes Data Corporation, 1995), 45.]
9. **Project scope statement** The concept of the project scope statement is very old, but the term itself originated in IT projects of the 1970s. [Maurice Blackman, *The Design of Real Time Applications* (Hoboken, NJ: Wiley, 1975), 236.]
10. **Control account** This concept was developed as part of the work breakdown structure; it has been part of the PERT methodology since 1959. [Gregory T. Haugan, *The Work Breakdown Structure in Government Contracting* (Vienna, VA: Management Concepts, 2003).]

11. **Scope creep** This term was coined by the military during the Vietnam War, but it did not become widely popular until the 1990s. [U.S. House of Representatives, *Military Construction Appropriations for 1973* (Washington, D.C.: U.S. Government Printing Office, 1973), 315.]
12. **Decomposition, deconstruction** These terms were developed as part of the work breakdown structure; they have been part of the PERT methodology since 1959. [Gregory T. Haugan, *The Work Breakdown Structure in Government Contracting* (Vienna, VA: Management Concepts, 2003).]

CHAPTER SIX

1. **Rolling wave planning** See note 1 for chapter 3.
2. **Network diagrams** The network diagram was developed in the 1950s as part of the PERT methodology. [Robert T. Futrell, Donald F. Shafer, and Linda Shafer, *Quality Software Project Management* (Upper Saddle River, NJ: Prentice Hall PTR, 2002), 501.]
3. **Arrow diagramming method (ADM)** James E. Kelley and Morgan Walker began devising the algorithms that became the Activity-on-Arrow scheduling method in 1956 and 1957 for E. I. du Pont de Nemours. [Patrick Weaver, "A Brief History of Scheduling: Back to the Future" (lecture, Canberra, Australia, April 4–6, 2006).]
4. **GERT** The GERT method was developed by Alan Pritzker in 1966 for the RAND Corporation to improve the scheduling of work. [Peter W. G. Morris, *The Management of Projects* (London: Telford, 1994), 79.]
5. **Precedence diagramming method** The precedence diagramming method was developed in 1961 by Dr. John Fondahl as an alternative to the critical path method. [Patrick Weaver, "The Origins of Modern Project Management" (lecture, Fourth Annual PMI College of Scheduling Conference, Vancouver, Canada, April 15–17, 2007).]
6. **Mandatory, discretionary, external dependency** The use of these terms in project management dates to the 1980s, when they were popularized as part of the Six Sigma methodology. [Mathematical Sciences Education Board and National Research Council, *Reshaping School Mathematics: A Philosophy and Framework for Curriculum* (Washington, DC: National Academies Press, 1990), 34.]
7. **Lessons learned register** While the general concept of "lessons learned" is centuries old, the lessons learned register is a recent innovation that did not begin appearing regularly in management literature until the first decade of the twenty-first century. [Jonathan Paul Scopes, "London 2012: A New Approach to CDM Coordination," *Proceedings of the Institution of Civil Engineering* 162, no. 2 (May 2009).]
8. **Resource breakdown structure** This concept is related to the work breakdown structure; like that concept, it was also developed as part of the PERT methodology. [Gregory T. Haugan, *The Work Breakdown Structure in Government Contracting* (Vienna, VA: Management Concepts, 2003), 8.]
9. **Analogous estimating** This type of top-down estimation is ancient. The term itself derives from mathematical theory, and its use in project management dates to the 1990s. [American Mathematical Society, *20 Lectures Delivered at the International Congress of Mathematicians* (Providence, RI: American Mathematical Society, 1974), 111.]
10. **Regression analysis** Regression analysis was first developed by the British scientist Sir Francis Galton as part of his research into human heredity in 1886. [Michael Patrick Allen, *Understanding Regression Analysis* (New York: Plenum Press, 1997), 2.]
11. **Heuristics** Heuristics are as old as human language. Modern computer-assisted heuristics can be traced to the work of information theorist Claude Shannon in the 1950s. [Bruce Abramson, *Digital Phoenix: Why the Information Economy Collapsed and How It Will Rise Again* (Cambridge, MA: MIT Press, 2005), 86.]

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12. **Three-point estimating** Three-point estimating is part of the PERT methodology. [Christopher D. McKenna, *The World's Newest Profession: Management Consulting in the Twentieth Century* (New York: Cambridge University Press, 2006), 294.]
13. **Beta distribution** This is a statistical term associated with the PERT process. [Rodney D. Stewart, Richard M. Wyskida, and James D. Johannes, *Cost Estimator's Reference Manual* (New York: Wiley, 1995).]
14. **PERT** The concept of PERT was developed in 1957 by a team from the US Navy Special Projects Office, Bureau of Ordnance, and the consulting firm Booz Allen Hamilton. [Patrick Weaver, "A Brief History of Scheduling: Back to the Future" (lecture, myPrimavera06, Canberra, Australia, April 4–6, 2006).]
15. **Standard deviation (SD)** The term "standard deviation" was invented in 1893 by the mathematician Karl Pearson, although the technique had been used by earlier mathematicians, such as Gauss. [Theodore M. Porter, *Karl Pearson: The Scientific Life in a Statistical Age* (Princeton, NJ: Princeton University Press, 2004), 237.]
16. **Contingency reserve and management reserve** These concepts have been part of financial planning for decades; Samuel Paul suggested integrating reserve analysis techniques into project management in 1982. [Peter W. G. Morris, *The Management of Projects* (London: Telford, 1994), 18.]
17. **Schedule model** This concept was developed by the RAND Corporation in the 1960s and popularized in management theory over the next few years. [William J. Abernathy et al., *A Three-Stage Manpower Planning and Schedule Model* (Stanford, CA: Stanford University Press, 1972).]
18. **Critical path method** The critical path method was developed in 1956 when E. I. du Pont de Nemours was trying to find a use for its UNIVAC computer. James E. Kelley and Morgan Walker presented the critical path method to the public at a conference in 1959. [Patrick Weaver, "A Brief History of Scheduling: Back to the Future" (lecture, myPrimavera06, Canberra, Australia, April 4–6, 2006).]
19. **Near-critical path** This concept was developed as part of the critical path method. [Patrick Weaver, "A Brief History of Scheduling: Back to the Future" (lecture, myPrimavera06, Canberra, Australia, April 4–6, 2006).]
20. **Float** The concept of float is part of the critical path methodology. [Rocco Martino, *Project Management* (Springfield, MO: Management Development Institute, 1968), xiii.]
21. **Schedule compression** Schedule compression and the terms "fast tracking" and "crashing" are part of the critical path methodology. [Charles Heath and James L. Riggs, *Guide to Cost Reduction Through Critical Path Scheduling* (Englewood Cliffs, NJ: Prentice Hall, 1966), 118.]
22. **Crashing** This informal engineering term was popularized in management theory in the 1980s. [American Society of Civil Engineers, *Proceedings of the Second Conference on Computing in Civil Engineering* (Reston, VA: American Society of Civil Engineers), 1980.]
23. **Monte Carlo analysis** The Monte Carlo method was first used in 1930 by Enrico Fermi to calculate the properties of the neutron. It was also used by scientists working on the Manhattan Project during World War II; the development of the electronic computer allowed the Monte Carlo method to be refined in the 1950s. [Jeffrey Seth Rosenthal, *Struck By Lightning: The Curious World of Probabilities* (Washington, DC: Joseph Henry Press, 2006), 186.]
24. **Resource optimization** This is an engineering term that entered management theory in the early twentieth century. [Frank K. Schenck, *Application of Time Study to Foundry Operations* (Flemington, NJ: Foran Foundry, 1955).]

25. **Resource leveling** This concept was first used in the construction industry; it rapidly spread to other areas of management science in the 1980s. [Thomas J. Driscoll, Stephen B. Hurlbut, and Jon M. Wickwire, *Construction Scheduling: Preparation, Liabilities, and Claims* (New York: Aspen Publishers, 2003), 423.]
26. **Resource smoothing** This concept is taken from the critical path management method. [Paul Barnetson, *Critical Path Planning: Present and Future Techniques* (London: Newnes Books, 1968).]
27. **Milestone charts** Milestone charts were developed in the 1940s. [Patrick Weaver, "The Origins of Modern Project Management" (lecture, Fourth Annual PMI College of Scheduling Conference, Vancouver, Canada, April 15–17, 2007).]
28. **Bar charts** The bar chart was first developed by Karol Adamiecki in 1896; it was popularized and refined during the 1910s by management consultant Henry Gantt. [Peter W. G. Morris, *The Management of Projects* (London: Telford, 1994), 18.]

CHAPTER SEVEN

1. **Life cycle costing** The modern conception of life cycle costing can be traced to 1965, when the Logistics Management Institute published a document outlining the basics of the concept. [B. S. Dhillon, *Medical Device Reliability and Associated Areas* (Boca Raton, FL: CRC Press, 2000), 172.]
2. **Value analysis** Value analysis was first developed by L. D. Miles, a researcher for General Electric, in 1947. He was trying to develop a new method to scientifically predict the best way to reduce costs while improving the value of projects. [D. H. Stamatis, *TQM Engineering Handbook* (Boca Raton, FL: CRC Press, 1997), 306.]
3. **Cost risk** First developed in the 1970s, cost-risk analysis seeks to estimate exact cost figures for risks, mainly by using Monte Carlo simulations. [John Bartlett et al., *Project Risk Analysis and Management Guide* (High Wycombe, UK: APM, 2004), 163.]
4. **Bottom-up estimating** This is an old practice, but time-consuming. Parametric estimating was developed to solve some of the difficulties with bottom-up estimating. [John C. Goodpasture, *Quantitative Methods in Project Management* (Boca Raton, FL: J. Ross, 2004), 89.]
5. **Rough order of magnitude (ROM) estimate** This type of estimating has been around for a long time, although the title is fairly new. The RAND Corporation developed parametric estimating to refine their ROM estimates. [RAND Corporation, *The Rand Paper Series* (Santa Monica, CA: RAND Corporation, 1988), 17.]
6. **Funding limit reconciliation** This term was recently invented. However, the process it describes—checking costs against the project's budget—has been a part of project management since its beginning. [U.S. Department of Defense, *Financial Management in the Department of Defense* (Washington, DC: U.S. Department of Defense, 1954), 21.]
7. **S-curve** The application of the S-curve to corporate planning can be traced to B. Ryan and N. C. Gross at Iowa State University, who were projecting the adoption of corn varieties by farmers in 1943. [Hendrik Van den Berg and Joshua J. Lewer, *International Trade and Economic Growth* (Armonk, NY: M. E. Sharpe, 2007), 118.]
8. **Earned value measurement** The earned value technique was developed by the US Department of Defense in the 1960s as an alternative to the PERT methodology. It began to spread into the corporate world in the 1980s. [Wayne F. Abba, "Earned Value Management: Reconciling Government and Commercial Practices," *PM Magazine*, January/February 1997, 58–63.]
9. **Cost performance index (CPI)** This is a standard accounting term. Its use in project management is derived from US Department of Defense contracts of the 1950s. [Cecil Hamilton Chilton, ed., *Cost Engineering in the Process Industries* (New York: McGraw-Hill, 1960), 337.]

CHAPTER EIGHT

1. **Gold plating** This term is commonplace in contracting; it was already the subject of criticism in a 1962 paper analyzing US defense contracts. [Peter W. G. Morris, *The Management of Projects* (London: Thomas Telford, 1997), 58.]
2. **Kaizen** Masaaki Imai made the term *kaizen* famous in his 1986 book, *Kaizen: The Key to Japan's Competitive Success*. [Masaaki Imai, *Kaizen: The Key to Japan's Competitive Success* (New York: McGraw-Hill, 1986).]
3. **Total quality management (TQM)** Ways to implement total quality management can be traced to quality gurus such as Philip B. Crosby, W. Edwards Deming, Armand V. Feigenbaum, Kaoru Ishikawa, and Joseph M. Juran. [“Total quality management (TQM),” ASQ Quality Glossary, s.v., accessed October 14, 2008, <http://www.asq.org/glossary/t.html>.]
4. **Six Sigma** In the late 1980s, Mikel Harry, an engineer at Motorola, developed the concept of Six Sigma, which became a key method for doing business at Motorola. [George Eckes, *The Six Sigma Revolution: How General Electric and Others Turned Process Into Profits* (New York: Wiley, 2001), 5.]
5. **Just in time (JIT)** JIT systems were refined by Japanese corporations during the 1980s, although the process may have originated from the observations of Taiicho Ohno, who studied the stocking systems of US supermarkets during the 1950s. [Ian Inkster, *The Japanese Industrial Economy: Late Development and Cultural Causation* (New York: Routledge, 2001), 106.]
6. **CISG** This acronym stands for the United Nations Convention on Contracts for the International Sale of Goods, which is a treaty governing international trade. The CISG is in constant change, and the courts of many nations interpret it in different ways. Periodically, conventions have met to reconcile the differing interpretations. [Joseph M. Lookovsky, *Understanding the CISG in the USA*. (The Hague, Netherlands: Kluwer Law International, 2004), 34.]
7. **ISO 9000** The ISO (International Organization for Standardization) introduced the ISO 9000 standards in 1987, just as the European Union (EU) was being formed. The adoption of ISO 9000 standards by the EU led to their widespread adoption throughout the world. [Paul A. Nee, *ISO 9000 in Construction* (Hoboken, NJ: Wiley, 1996), 5.]
8. **Benchmarking** The modern benchmarking process originated at Xerox in the 1980s. Dr. Robert Camp was instrumental in developing and popularizing the benchmarking process. [James L. Heskett, W. Earl Sasser, and Leonard A. Schlesinger, *The Value Profit Chain: Treat Employees Like Customers and Customers Like Employees* (New York: Free Press, 2003), 103.]
9. **Cost-benefit analysis** Cost-benefit analysis was fully developed as a technique by the US Army Corps of Engineers in the 1930s. The technique spread throughout the US federal government, and was integrated into corporate planning after World War II. [Michael Power, *Accounting and Science: Natural Inquiry and Commercial Reason* (Cambridge, MA: Cambridge University Press, 1996), 41.]
10. **Cost of quality (COQ)** This concept was developed and refined in the 1980s as part of the Six Sigma methodology. [William Truscott, *Six Sigma: Continual Improvement for Businesses: A Practical Guide* (Boston, MA: Butterworth-Heinemann, 2003), 26.]
11. **Costs of conformance and nonconformance** These concepts—like other concepts in this chapter, such as the cost of quality—were refined in the 1980s as part of the Six Sigma methodology. [William Truscott, *Six Sigma: Continual Improvement for Businesses: A Practical Guide* (Boston, MA: Butterworth-Heinemann, 2003), 26.]
12. **Marginal analysis** Marginal analysis was used by early economists, such as David Ricardo, and revived as a theory in 1934 by economist Joan Robinson. [Kenneth Ewart Boulding and W. Allen Spivey, *Linear Programming and the Theory of the Firm* (New York: Macmillan, 1960), 2.]

13. **Matrix diagram** This tool was popularized in the 1980s after decades of use. [Jack Stone, "Long-Range Planning: One Formula for Success," *Computerworld*, Oct. 20, 1980, 35.]
14. **Cause-and-effect diagram (fishbone diagram, Ishikawa diagram)** The cause-and-effect diagram is sometimes referred to as the "Ishikawa diagram" because it was developed by Kaoru Ishikawa. ["Cause and Effect Diagram," ASQ Quality Glossary, s.v., accessed October 14, 2008, <http://www.asq.org/glossary/c.html>.]
15. **Histogram** Although the word "histogram" was first coined in 1892, the earliest known histogram appeared in 1786. These tools were well-known and used throughout the nineteenth century. [Yannis Ioannidis, *The History of Histograms (abridged)* (Athens, Greece: University of Athens, 2003), 1.]
16. **Scatter diagram** The scatter diagram, or scatter plot, was invented by Sir Francis Galton in 1908 as part of his research on human heredity. [A. Reza Hoshmand, *Design of Experiments for Agriculture and the Natural Sciences* (Boca Raton, FL: CRC Press, 2006), 269.]
17. **Design of experiments (DOE)** Experimental design has been a central concern of scientists for centuries. The application of scientific methods to management problems was an important part of the revolution in management science after World War II. [Jiju Antony, *Design of Experiments for Engineers and Scientists* (Oxford: Butterworth-Heinemann, 2003), 29.]
18. **Process analysis** While process analysis is an old concept, it has been refined as part of the Six Sigma methodology. [George Eckes, *Six Sigma for Everyone* (Hoboken, NJ: Wiley, 2003), 49.]
19. **Flowchart** The flowchart was first invented by Frank Gilbreth in 1921 to better document processes and was quickly adopted throughout the management industry. It was refined during the 1940s by researchers at Procter & Gamble, as well as by Princeton's John von Neumann. [Mark R. Lehto and James R. Buck, *Introduction to Human Factors and Ergonomics for Engineers* (New York: Lawrence Erlbaum, 2008), 100.]
20. **Control chart** Walter Shewhart came up with the idea of a production control chart in 1924. [Stuart Crainer, *The Management Century: A Critical Review of 20th Century Thought and Practice* (San Francisco: Jossey-Bass, 2000), 82.]
21. **Control limits** Control limits are part of the control chart, invented by Walter Shewhart at Bell Labs in the 1920s. [W. Edwards Deming, *Out of the Crisis: Quality, Productivity, and Competitive Position* (Cambridge, MA: Cambridge University Press, 1986).]
22. **Specification limits** Specification limits have been a standard statistical term for decades. [Society of Quality Control Engineers, *Industrial Quality Control*, vol. 17 (Buffalo, NY: Society of Quality Control Engineers, 1960).]
23. **Rule of seven** This is a statistical rule of thumb—if seven runs of data produce results on the same side of the target value, then the mean is assumed to have changed. [Christopher Chatfield, *Statistics for Technology: A Course in Applied Statistics* (New York: Chapman and Hall, 1983), 301.]
24. **Assignable cause/special cause variation** This concept was first developed in 1924 by the researcher Walter Shewhart. It was later refined in total quality management and Six Sigma. [William C. Johnson and Richard J. Chvala, *Total Quality in Marketing* (Delray Beach, FL: St. Lucie Press, 1996), 43.]
25. **Pareto chart** The Pareto chart or diagram was defined in 1950 by Joseph M. Juran. It is based on the Pareto principle, which was named after the nineteenth-century economist Vilfredo Pareto. ["Pareto Chart," ASQ Quality Glossary, s.v., accessed October 14, 2008, <http://www.asq.org/glossary/p.html>.]

Endnotes

CHAPTER NINE

1. **Responsibility assignment matrix (RAM)** The RAM was first developed by IT project managers in the 1970s; it spread into wider use over the next decade. [M. D. Wadsworth, *Electronic Data Processing Project Management Controls* (New York: Prentice Hall, 1972), 43.]
2. **RACI chart** The RACI chart was invented and popularized in the 1990s. [Jeff R. Greenberg and J. R. Lakeland, *A Methodology for Developing and Deploying Internet and Intranet Solutions* (Upper Saddle River, NJ: Prentice Hall, 1998).]
3. **Organizational breakdown structure** After the work breakdown structure became a common tool in industry during the 1980s, the organizational breakdown structure also became widespread. [Peter W. G. Morris, *The Management of Projects* (London: Telford, 1994), 264.]
4. **Resource breakdown structure** See note 8 for chapter 6.
5. **Recognition and reward systems** This term derives from the total quality management method. [Michael B. Weinstein, *Total Quality Safety Management and Auditing* (West Hartford, CT: CRC Press, 1997).]
6. **Halo effect** This effect was first demonstrated with objective data in 1920 by Edward Thorndike, who was studying the ratings of officers in the US Army. Thorndike's findings were quickly applied to business. [Neil J. Salkind and Kristin Rasmussen, *Encyclopedia of Educational Psychology* (Thousand Oaks, CA: Sage, 2008), 458–59.]
7. **Motivation theory** Modern motivation theory has its roots in the work of pioneering economists such as Adam Smith, who asserted that money was the root of all motivation. Twentieth-century psychologists began developing new concepts as part of modern management theory. [Patrick J. Montana and Bruce H. Charnov, *Management* (Happauge, NY: Barron's, 2000), 238.]
8. **McGregor's theory of X and Y** Douglas McGregor introduced this theory in 1960. He hoped to persuade managers to trust their employees, and, therefore, to act according to Theory Y. [Donald Clark, "A Time Capsule of Training and Learning," accessed October 14, 2008, <http://www.skagit-watershed.org/~donclark/hrd/history/xy.html>.]
9. **Maslow's hierarchy of needs** Abraham Maslow introduced this theory in his 1943 article "A Theory of Human Motivation." While later researchers have questioned Maslow's results, the hierarchy of needs has become accepted wisdom. [Christopher D. Green, "Classics in the History of Psychology," accessed April 16, 2013, <http://psychclassics.yorku.ca/Maslow/motivation.htm>.]
10. **McClelland's theory of needs** David McClelland first developed this theory at Harvard in the 1960s as part of his research into political power and motivation theory. [Ellen Weisbord, Bruce H. Charnov, and Jonathan Lindsey, *Managing People in Today's Law Firm* (Westport, CT: Quorum Books, 1995), 35.]
11. **Herzberg's two-factor theory of motivation** Frederick Herzberg refined this theory in a series of papers between 1959 and 1968. He hoped to help create a new kind of workplace based on employee satisfaction. [Robert B. Denhardt, Janet Vinzant Denhardt, and Maria Pilar Aristeguieta, *Managing Human Behavior in Public and Nonprofit Organizations* (Thousand Oaks, CA: Sage, 2001), 150.]
12. **Forming, storming, norming, performing** Psychologist Bruce Tuckman described the phases of team development as forming, storming, norming, and performing in 1965. He later added a final stage of adjourning, also referred to as mourning. ["Forming, Storming, Norming, and Performing: Helping New Teams Perform Effectively, Quickly," accessed April 16, 2013, http://www.mindtools.com/pages/article/newLDR_86.htm.]
13. **Colocation** In this context, the term dates from the 1990s and the rise of telecommuting. [Donald Reinertsen, *Managing the Design Factory* (New York: Simon & Schuster, 1997).]

14. **Expectancy theory** Expectancy theory was developed in 1964 by Victor Vroom of the Yale School of Management to explain the motivations of employees. [Ronald R. Sims, *Managing Organizational Behavior* (Westport, CT: Greenwood Press, 2002), 62.]
15. **Fringe benefits** In 1942, the US War Labor Board approved employee benefits such as health insurance to allow employers to attract new employees. The term “fringe benefit,” first used around this time, took several years to gain wide acceptance. [Nelson Lichtenstein, *Labor’s War at Home: The CIO in World War II* (Cambridge, MA: Cambridge University Press, 1982), 240.]

CHAPTER TEN

1. **Interactive, push, pull communication** These categories have been used in communication theory for decades. More recently they have been popularized by the explosion of the internet and the replacement of early “pull” technologies, such as websites, with “push” technologies, such as RSS feeds and email updates. [National Association of Women Deans, Administrators and Counselors, *Journal of the National Association of Women Deans, Administrators and Counselors* (1958): 61.]
2. **Communication channels** The literal meaning of this term quickly gave rise to a metaphorical use in psychological theory. By the end of the 1960s, this new usage was widespread. [Wiener, Morton, and Mehrabian, Albert. *Language Within Language: Immediacy, a Channel in Verbal Communication*. (New York: Appleton-Century-Crofts, 1968).]
3. **Communication blockers** The term “communication blocker” first appeared in the 1990s in the therapeutic community. It was introduced to project management theory in the early 2000s. [Cornell Cooperative Extension, *Parent-Caregiver Partnerships: Communication Workshops for Parents and Child Care Providers*. (Ithaca, NY: Cornell University, 1992).]
4. **Trend report** The concept of the trend report arose in the scientific management movement of the 1920s; it gained wide popularity in the 1930s because of the planning documents of the New Deal. [National Opinion Research Center, *Do Americans Support Gasoline Rationing? Trend Report Based on Eight Nation-wide Surveys*. (Denver, CO: University of Denver, 1943).]
5. **Forecasting report** The concept of forecasting arose in the nineteenth century in the field of meteorology. It was applied to management by the scientific management movement of the 1920s. [*The Problems of Business Forecasting*, William Persons, ed. (Boston: Houghton Mifflin, 1924).]
6. **Variance report** This is an accounting term; its use in project management dates to the 1970s. [Harold Kerzner, *Project Management: A Systems Approach to Planning, Scheduling, and Controlling* (New York: Van Nostrand Reinhold, 1979), 447.]
7. **Earned value report** Earned value management techniques were first developed and used by the US government in the 1960s. [David I. Cleland and Lewis R. Ireland, *Project Manager’s Portable Handbook* (New York: McGraw-Hill, 2004), 389.]

CHAPTER ELEVEN

1. **Risk management** The concept of risk management exploded out of the insurance industry to become nearly universal in management theory during the 1960s. [U.S. Department of Agriculture, *Farmers’ Bulletin No. 2137: Insurance Facts for Farmers* (Washington, D.C.: U.S. Government Printing Office, 1967), 3.]
2. **Risk response** This idea came into widespread use as the discipline of risk management moved from insurance to general management. [Lindon J. Robison and Garth Carman. “Aggregate Risk Response Models and Market Equilibrium,” in *Risk Management in Agriculture: Behavioral, Managerial and Policy Issues* (Champaign, Ill.: University of Illinois Press, 1979), 139.]

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3. **Root cause analysis** Root cause analysis was first developed in the 1950s by the US Department of Energy to investigate industrial (and specifically nuclear) accidents. The methodology was refined by the health-care field, and became popular in management science in the 1980s. [B. S. Dhillon, *Reliability Technology, Human Error, and Quality in Health Care* (Boca Raton, FL: CRC Press, 2008), 45.]
4. **Strengths, weaknesses, opportunities, and threats (SWOT) analysis** SWOT analysis was developed by Albert Humphrey of Stanford University to improve long-range planning techniques. Humphrey and his colleagues introduced SWOT in 1964, and the first prototype project using SWOT was completed in 1973. [Regina Fazio Maruca, *The Way We Work: An Encyclopedia of Business Culture* (Westport, CT: Greenwood Press, 2008), 244.]
5. **Risk register** The concept of the risk register began in the United Kingdom as a medical tool in the 1960s; it was later adopted as a project management tool. [Fred Grundy, *The New Public Health: An Introduction to Personal Health and the Welfare Services for Health Visitors, Social Workers and Midwives* (London: H. K. Lewis, 1968), 63.]
6. **Qualitative risk analysis** In its simplest form—thinking carefully about the risks of any project—qualitative risk analysis is as old as civilization. In its modern sense, qualitative risk analysis and the related terms in this chapter have been developed over the last few decades; the term itself first appeared in the 1970s. [Tom Kendrick, *Identifying and Managing Project Risk: Essential Tools for Failure-Proofing Your Project* (New York: AMACOM, 2003), 165.]
7. **Probability and impact matrix** This tool was devised by researcher D. C. Hague in 1984. [Sui Pheng Low, *Marketing Research in the Global Construction Industry* (Singapore: Singapore University Press, 1993).]
8. **Quantitative risk analysis** As the concept of risk management moved from insurance to general management, the idea of quantitative risk management moved with it. [Mohammed Gahin, *A Theory of Pure Risk Management in the Business Firm*. (Madison, WI: University of Wisconsin Press, 1966), 214.]
9. **Sensitivity analysis** Originally an engineering term, sensitivity analysis entered management theory in the 1960s. [Rajko Tomovic, *Sensitivity Analysis of Dynamic Systems* (New York: McGraw-Hill, 1963).]
10. **Tornado diagram** Introduced in the 1980s, the tornado diagram became a popular management tool in the 1990s. [Robert M. Oliver and J. Q. Smith, *Influence Diagrams, Belief Nets, and Decision Analysis* (New York: Wiley, 1990).]
11. **Decision tree** This concept is very old—an excellent early example is the system invented by Carl Linnaeus in the 1730s to classify species by kingdom, phylum, and class. [Michael J. A. Berry and Gordon Linoff, *Data Mining Techniques for Marketing, Sales, and Customer Relationship Management*, 2nd ed. (Indianapolis, IN: Wiley, 2004), 166.]
12. **Pure (insurable) risk** This term was invented in Britain in the nineteenth century, as the first modern insurance companies were taking shape. [J. M. Ross, ed., *The Globe Encyclopaedia of Universal Information* (Edinburgh, UK: Grange, 1877), 507.]
13. **Residual risks** Residual risk was defined as a business term during the scientific management movement after World War I. By 1922, it was familiar to many managers and business owners. [Fred Emerson Clark, *Principles of Marketing* (New York: Macmillan, 1922), 361.]
14. **Risk trigger** This term was in general use by 1980. [United States House of Representatives, *Oversight Hearing on the Child Labor Provisions of the Fair Labor Standards Act* (Washington, DC: US General Printing Office, 1980).]

15. **Reserves (contingency)** The concept of contingency reserve has been used in creating business and government budgets for over a century. It was popularized during the scientific management movement of the 1920s. [Actuarial Society of America, *Transactions* (New York: Actuarial Society of America, 1907), 109.]
16. **Risk thresholds** The concept of a risk threshold became widely popular as a business term in the 1960s. It originated as a medical term and spread into business through engineering. [Max H. O'Connell, *Aircraft Noise* (Brooks City, TX: US Air Force School of Aerospace Medicine, 1960), 2.]
17. **Risk audits** This concept was first used for managing serious problems such as epidemics and disasters. The concept spread in the 1990s to apply to project management. [Alan E. Boyle, *Environmental Regulation and Economic Growth* (Oxford: Oxford University Press, 1994), 42.]

CHAPTER TWELVE

1. **Procurement management** Procurement management as a discipline dates to the 1930s, when the federal government massively increased spending and began organizing a number of large, long-term projects. [Michael C. Loulakis, ed., *Design-Build for the Public Sector* (New York: Aspen, 2003), 61.]
2. **Bid and procurement documents** These terms have been in general use since the 1930s, having originated in federal government contracts. The massive expansion of the federal government in the 1930s due to the Great Depression and the outbreak of World War II required the creation of new terms and processes to manage large contracts. [U.S. Interior Department, *Interior Department Appropriation Bill for 1940* (Washington, D.C.: U.S. Government Printing Office, 1940), 125.]
3. **RFP, IFB, RFQ** These terms were first used in the nineteenth century. The US government pioneered procurement law, with the first such law in 1795. Corporations adopted many later refinements of procurement by the US federal government. [Margaret M. Worthington, Louis P. Goldsman, and Frank M. Alston, *Contracting with the Federal Government* (New York: Wiley, 1998), 1.]
4. **Make-or-buy analysis** This process relies heavily on the research of consultant Michael Porter, who introduced analytical tools for make-or-buy analysis in the 1980s. [Chris Argyris, Derek F. Channon, and Cary L. Cooper, *The Concise Blackwell Encyclopedia of Management* (Malden, MA: Blackwell Business, 1998), 681.]
5. **Fixed-price, time and material, cost-reimbursable contracts** Contract law has distinguished between these types of contracts for a long time—the term “fixed-price contract” appears in legal documents from 1845. These contract types were defined by the US government in the late nineteenth century to streamline military procurement. [US Office of the Federal Register, *Code of Federal Regulations* (Washington, DC: US National Archives, 1901), 15.]
6. **Fixed-price with economic price adjustment (FPEPA)** Introduced in government contracting in the late 1980s, this term quickly entered use in private procurement in the 1990s. [John J. Marciniak, *Encyclopedia of Software Engineering*, vol. 1, *Acquisitions–Outsourcing* (New York: Wiley, 1994).]
7. **Target price, sharing ratio, ceiling price** The use of these standard terms was popularized by the RFPs issued by the US government after World War II. [A. Michael Agapos, *Government-Industry and Defense: Economics and Administration* (Tuscaloosa, AL: University of Alabama Press, 1975), 164.]
8. **Sharing ratio** See note 7.
9. **Ceiling price** See note 7.
10. **Point of total assumption (PTA)** The term “total assumption” has a long history, having been used in government contracts and debates since the nineteenth century. “Point of total assumption” is a newer term that was introduced by the US government. [John W. Langford, *Logistics: Principles and Applications* (New York: McGraw-Hill, 2007), 207.]

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11. **Statement of work** The first clearly defined statement of work in the modern sense was published in 1908 by the US government, which issued requirements for an airplane prototype to be purchased by the US Army. [Michael G. Martin, *Delivering Product Excellence with the Statement of Work* (Vienna, VA: Management Concepts, 2003), 4.]
12. **Source selection criteria** This term entered government contracts in the 1960s and spread into private sector procurement in the 1970s. [Frederick M. Scherer, *The Weapons Acquisition Process: Economic Incentives* (Boston: Harvard University Press, 1964).]
13. **Bidder conferences** These conferences became common after the concept was introduced at the 1959 conference of the American Society for Quality Control. [American Society for Quality Control, *National Convention Transactions, 1959* (Milwaukee, WI: American Society for Quality Control, 1959), 438.]
14. **Weighting system** The concept of a weighting system has a long history in economics. The application of this term to project management, and specifically to contracting, is fairly recent. [Michael Greer, *The Project Manager's Partner: A Step-by-Step Guide to Project Management* (Amherst, MA: Human Resource Development Press, 2001), 108.]
15. **Contract change control system** When the concept of change control was introduced in the 1970s, it was quickly adapted for use with contracts, since many of the companies that used change control for IT projects were also government contractors. [Philip A. Metzger, *Managing a Programming Project* (New York: Prentice-Hall, 1973), 84.]

CHAPTER THIRTEEN

1. **Brainstorming/brain writing** The term “brainstorm” was coined in the nineteenth century and first used as a verb in the 1920s. An ad agency in the 1930s was the first to hold a “brainstorming session,” and the idea became a standard part of business management in the mid-1950s. [Metcalf, Allan and Barnhart, David K., *America in So Many Words: Words That Have Shaped America* (New York: Houghton Mifflin Harcourt, 1997), 221.]
2. **Power/interest grid** Researchers Kevan Scholes and Gerry Johnson created the power/interest grid to help managers assess the engagement and strength of project stakeholders. [Gerry Johnson and Kevan Scholes, *Exploring Corporate Strategy*, 3rd ed. (New York: Prentice Hall, 1993), 184.]
3. **Stakeholder cube** The concept of the power/interest grid quickly took hold in the 1990s and was expanded into the stakeholder cube to take into account a third variable, attitude. [*GIS Applications in Natural Resources 2* (New York: GIS World Books, 1996), 52.]
4. **Salience model** Although the salience model has been used in the social sciences since the 1970s, the application of this model to project stakeholders was developed in 1997 by Mitchell, Agle, and Wood. [Ronald K. Mitchell, Bradley R. Agle and Donna J. Woo, “Toward a Theory of Stakeholder Identification and Salience: Defining the Principle of Who and What Really Counts,” *The Academy of Management Review* 22, no. 4 (Oct. 1997): 853–86.]
5. **Stakeholder engagement assessment matrix** The stakeholder engagement matrix was developed in 1991 by a team of researchers at the Academy of Management. [Grant T. Savage, Timothy W. Nix, Carlton J. Whitehead, and John D. Blair, “Strategies for Assessing and Managing Organizational Stakeholders,” *The Executive* 5, no. 2 (May 1991): 61–75.]

CHAPTER FOURTEEN

1. **Fair use doctrine** This is a doctrine in US law that allows limited use of copyrighted materials. For more information, see the Fair Use web page maintained by the US Copyright Office: <http://www.copyright.gov/fls/fl102.html>.

2. **Ethnocentrism** The term was coined in 1906 by the American anthropologist William Graham Sumner. He argued that scientists had to recognize and see past ethnocentrism to effectively observe the world. Over the last century, the concept has been explored intensively. [James William Neuliep, *Intercultural Communication: A Contextual Approach* (Los Angeles: Sage, 2009), 183.]
3. **Culture shock** This term was coined by the anthropologist Kalervo Oberg to describe the disorientation of young anthropologists thrust into the new and often radically different cultures they studied. He first presented the term in a speech in 1954, and it became widely known after its re-publication in 1960. [Kalervo Oberg, "Cultural Shock: Adjustment to New Cultural Environments," *Practical Anthropology* 7 (1960): 177–82.]