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# GLOBAL PROJECT MANAGEMENT HANDBOOK

**Planning, Organizing, and  
Controlling International Projects**

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# CONTENTS

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<b>Contributors</b>	<b>xi</b>
<b>Preface</b>	<b>xiii</b>
<b>Acknowledgments</b>	<b>xv</b>

## **Part 1 State of the Art of Global Project Management 1-1**

### **Chapter 1. The Evolution of Project Management *David I. Cleland and Lewis R. Ireland* 1-3**

---

Introduction	/ 1-4
Types of Evidence for Historical Projects	/ 1-5
Project Charter	/ 1-6
Early Literature on Projects	/ 1-6
Government Literature	/ 1-8
Leading Projects of Antiquity	/ 1-8
Military Campaigns	/ 1-11
Summary of the Results of Historical Projects	/ 1-13
More Modern Projects	/ 1-13
Modern Project Management Practices	/ 1-17
Summary	/ 1-18
Bibliography	/ 1-18

### **Chapter 2. Project Management: A Business Process of the Project-Oriented Company *Roland Gareis* 2-1**

---

Abstract	/ 2-1
The Project: A Social Construct	/ 2-2
Project Management Approaches	/ 2-5
The Project Management Process: An Overview	/ 2-9
Project Management Subprocesses	/ 2-12
Project Marketing: A Project Management Task	/ 2-19
Design of the Business Process "Project Management"	/ 2-21
References	/ 2-25
Bibliography	/ 2-26

### **Chapter 3. The Future of Project Management: Mapping the Dynamics of Project Management Field in Action *Christophe N. Bredillet* 3-1**

---

Abstract	/ 3-1
Project Management: A Knowledge Field not that Clear	/ 3-2
Project Management Field in Action	/ 3-4
Some Noticeable Trends for the Project Management Field	/ 3-17

Conclusion / 3-21  
References / 3-22

---

**Chapter 4. Total Life-Cycle System Management** *James V. Jones* **4-1**

Product Life Cycle / 4-2  
An Example of the TLCSM Concept / 4-5  
Operational Effectiveness ( $O_E$ ) / 4-5  
Operational Availability ( $A_O$ ) / 4-5  
Operation and Maintenance Support Requirements / 4-10  
Cost of Ownership ( $C_O$ ) / 4-12  
Making the Final Decision / 4-15  
Establishing the Capability / 4-15  
Through-Life Cost / 4-16  
TLCSM and Sustainment / 4-16  
Benefits of TLCSM / 4-18

---

**Chapter 5. Developing Multinational Project Teams** *Aaron J. Nurick and Hans J. Thamhain* **5-1**

Managerial Challenges in Multinational Team Environments / 5-2  
A Model for Team Building / 5-6  
Drivers and Barriers of High Team Performance / 5-7  
Keeping the Team Focused / 5-11  
Building High-Performing Global Teams / 5-12  
Recommendations / 5-13  
A Final Note / 5-16  
References / 5-17

---

**Chapter 6. Risk Identification and Assessment for International Construction Projects** *John A. Walewski, G. Edward Gibson, Jr., and Ellsworth F. Vines* **6-1**

Research Objectives / 6-3  
Development of the Ipra Tool / 6-3  
Risk Assessment Workshops / 6-4  
Consistency Test / 6-7  
Application and Use of the Ipra Tool / 6-9  
How to Assess a Project / 6-10  
Philosophy of Use / 6-13  
Conclusions / 6-14  
Risk Management to Improve Project Performance / 6-15  
References / 6-16  
Appendix 6a / 6-17

---

**Chapter 7. Program Management and Project Portfolio Management** *Roland Gareis* **7-1**

Abstract / 7-1  
The Program: A Social Construct / 7-2  
The Program Management Process / 7-3  
Specific Features of Program Management / 7-5

Clusters of Projects and Programs in the Project-Oriented Company / 7-12	
Project Portfolio Management: Overview / 7-13	
Assigning a Project or a Program / 7-14	
Project Portfolio Coordination / 7-17	
Project Networking / 7-21	
Management of Project Chains / 7-23	
Bibliography / 7-24	

## **Part 2 Competency Factors in Project Management 8-1**

### **Chapter 8. Competencies of Project Managers *Lynn Crawford* 8-3**

Understanding Competence / 8-4	
Project Management Competencies / 8-6	
Performance-Based Competency Standards for Project Management / 8-13	
Global Performance-Based Standards for Project Managers / 8-16	
Assessing and Developing Competencies of Project Managers / 8-18	
References / 8-20	

### **Chapter 9. Managing Risks and Uncertainty in Major Projects in the New Global Environment *Roger Miller and Brian Hobbs* 9-1**

The New Global Environment for Large, Complex Projects / 9-2	
Understanding the Dynamics of Major Projects / 9-5	
Management of Risk and Uncertainty / 9-9	
Management of Anticipated Risks / 9-11	
Management of Potential Emergent Risks / 9-12	
Anchoring the Project Into Its Institutional Environment / 9-12	
Creating a Project Concept and Organization to Enhance Governability / 9-13	
Coping with Tradeoffs in the Management of Anticipated and Emergent Risk / 9-14	
Conclusion / 9-15	
References / 9-16	

### **Chapter 10. Managing Human Energy in the Project-Oriented Company *Pernille Eskerod* 10-1**

The Research Project / 10-3	
Empirical Findings Related to Existing Theory / 10-8	
Concluding Remarks / 10-12	
References / 10-12	

### **Chapter 11. Managing Project Management Personnel and their Competencies in the Project-Oriented Company *Martina Huemann* 11-1**

The Profession of Project Manager as a Basis for Competent Project Management Personnel / 11-3	
Processes to Manage Project Management Personnel / 11-8	
Analysis of Project Management Competencies to Further Develop Project Management Personnel / 11-9	
Potential Applications of the Mm-Project Manager Model / 11-13	
References / 11-13	

---

**Chapter 12. Lessons Learned: Rebuilding Iraq in 2004** **12-1**  
**Charles W. “Chick” Keller**

---

Design of the Original Program / 12-1  
 Implementation of the Program / 12-6  
 Program Management Systems and Program Reporting / 12-16  
 Lessons Learned / 12-20  
 Conclusion: Iraqis Need to Rebuild Iraq / 12-23

---

**Chapter 13. Project Critical Success Factors: The Project-Implementation Profile** **13-1**  
**Jeffrey K. Pinto and Dennis P. Slevin**

---

The 10-Factor Model: The Project-Implementation Profile / 13-3  
 Development of the 10-Factor Model / 13-4  
 How the Project-Implementation Profile Works / 13-7  
 Four-Step Process / 13-7  
 Illustrative Example / 13-8  
 Implications of Use of the PIP / 13-10  
 References / 13-10

**Part 3 Management of Global Programs and Projects** **14-1**

---

**Chapter 14. Project Management for Outsourcing Decisions** **14-3**  
**Bopaya Bidanda, Ozlem Arisoy, and Ozlem Arisoy**

---

Project Life Cycle / 14-5  
 Conclusion / 14-20  
 References / 14-22

---

**Chapter 15. Project Quality Management in International Projects** **15-1**  
**Lewis R. Ireland**

---

International Project Quality Characteristics / 15-2  
 Planning for Quality in International Projects / 15-3  
 Specification Practices / 15-4  
 Drawings / 15-4  
 Workmanship and Worker Qualification / 15-5  
 Work Habits / 15-5  
 Training in Quality Practices / 15-6  
 Certification of Capabilities / 15-7  
 Reviewing Partners' Qualifications / 15-7  
 Contractual Relationship / 15-8  
 Stability of a Country's Governing Body / 15-9  
 Taxes and Tariffs / 15-9  
 Planning for International Projects / 15-10  
 Summary / 15-10

---

**Chapter 16. Success Factors in Virtual Global Software Projects** **16-1**  
**Dragan Milosevic, And Ozbay, and Sabin Srivannaboon**

---

The Unique World of Global Software Projects / 16-2  
 The Nature of Virtual Global Software Development / 16-5

What Makes Virtual Global Software Projects Different / 16-5  
 System of Success Factors / 16-9  
 Tactical Success Factors / 16-12  
 Conclusion / 16-27  
 References / 16-28

---

**Chapter 17. Managing Global Projects Over a Collaborative Knowledge Framework** *Suhwe Lee* **17-1**

---

The Garden of Eden: The First Project / 17-1  
 Out of Eden / 17-2  
 Global Business and Its Challenges / 17-3  
 Complex Environment and Its Challenges / 17-4  
 Project Management System / 17-6  
 Collaborative Knowledge Framework / 17-6  
 Benefits / 17-14  
 Next Millennium / 17-14  
 Conclusion / 17-15  
 References / 17-16

**Part 4 Management of the Project-Oriented Company** **18-1**

---

**Chapter 18. Management of the Project-Oriented Company** *Roland Gareis* **18-3**

---

Abstract / 18-3  
 The Project-Oriented Company: A Construct / 18-4  
 "Management by Projects" as an Organizational Strategy / 18-4  
 Organizational Structure of the Project-Oriented Company / 18-6  
 Expert Pools, Project Portfolio Group, and Project Management Office / 18-8  
 Specific Business Processes of the Project-Oriented Company / 18-16  
 Integrative Methods of the Project-Oriented Company / 18-17  
 Infrastructures of the Project-Oriented Company / 18-20  
 Cultures of and in the Project-Oriented Company / 18-23  
 References / 18-25

---

**Chapter 19. Project Portfolio Score Card** *Ernst Jankulik and Roland Piff* **19-1**

---

Score Cards in Project-Oriented Organizations / 19-2  
 Further Development of the PPSC / 19-4  
 Case Study / 19-10  
 Benchmarking the Internal Processes / 19-15  
 Conclusion / 19-18  
 References / 19-19

---

**Chapter 20. Partnering in Projects** *J. Rodney Turner* **20-1**

---

Cooperative Working on Projects / 20-2  
 Risk Sharing on Contracts / 20-4  
 Types of Partnering / 20-5  
 Single-Project Partnering / 20-6

Long-Term Partnering / 20-10  
 Cooperative Working with Other forms of Contract / 20-12  
 Concluding Remark / 20-13  
 References / 20-14

---

**Chapter 21. Business Process Management in the Project-Oriented Company** *Roland Gareis and Michael Stummer* **21-1**

---

Abstract / 21-2  
 Business Processes and Organizations for their Fulfilment / 21-2  
 Business Process Management (BPM): An Overview / 21-4  
 Identification and Description of Business Processes in the Project-Oriented Company / 21-7  
 Business Process Management, Project and Program Management / 21-8  
 Business Process Management and Project Portfolio Management / 21-10  
 Organizational Design of the Process- and Project-Oriented Company / 21-12  
 Consequences for Personnel Management in the Process- and Project-Oriented Company / 21-13  
 Maturity Model of the Process- and Project-Oriented Company / 21-14  
 Bibliography / 21-14

**Part 5 National Project Management** **22-1**

---

**Chapter 22. Project Management in Austria: Analysis of the Maturity of Austria as a Project-Oriented Nation** *Roland Gareis and Claudia Gruber* **22-3**

---

Abstract / 22-4  
 The Research Project "Project Orientation (Austria)" / 22-4  
 Maturity Model of the Project-Oriented Company (MM-POC) / 22-6  
 Maturity Model of the Project-Oriented Nation (MM-PON) / 22-7  
 Analyzing and Benchmarking Project-Oriented Companies in Austria / 22-10  
 Maturity of Austria as a Project-Oriented Nation (PON) / 22-18  
 Conclusion / 22-24  
 References / 22-25

---

**Chapter 23. A Brief Insight of Project Management in the Mainland of China** *Chao Dong, K. B. Chuah, and Li Zhai* **23-1**

---

A Close Look at Mainland of China / 23-3  
 Project Management in China / 23-4  
 Project Organizations in China / 23-5  
 Government's Megaprojects / 23-6  
 Projects in other Industries / 23-7  
 Project-Based Software Companies in China / 23-7  
 The Third Eye on Project Management of China / 23-8  
 Empirical Study of Project Management in China / 23-10  
 Implications for Western Project Stakeholders / 23-15  
 Conclusion / 23-17  
 References / 23-18

---

**Chapter 24. Project Management in Australia** *Brian R. Kooyman* **24-1**

---

The Genesis and Development of Project Management in Australia / 24-2  
 Developments in Australian Project Delivery Methods / 24-7  
 Two Major Australian Projects / 24-11

Future Directions for Australian Project Management / 24-20  
Acknowledgments / 24-21  
References / 24-21

---

**Chapter 25. Project Management in Romania**  
***Constanta-Nicoleta Bodea***

**25-1**

---

The Business Environment in Romania: A Short Overview / 25-1  
Romanian Participation in the POS Research Project / 25-8  
Changes in the Maturity of Romania after the POS Project / 25-14  
References / 25-15

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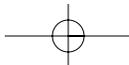
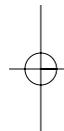
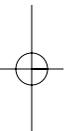
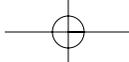
**Chapter 26. Japanese Project Management Practices on  
Global Projects** *Hiroshi Tanaka*

**26-1**

---

A Characteristic Profile of Japanese Project Management / 26-1  
Life Cycle of Capital Projects / 26-2  
Project Management Involvement in Early Project Development Stages / 26-4  
Project Strategy Development / 26-5  
Project Stakeholders, Contracting Formations, and Organizations / 26-5  
Project Management Methods in Global Engineering and Construction Projects / 26-9  
Engineering Management / 26-11  
Global Procurement Management / 26-11  
Management of Multicultural Site Operations / 26-13  
Project Management Involvement in the Operations and Maintenance of Built Facilities / 26-14  
Project ICT Infrastructure Supporting Global Project Management / 26-14

**Index follows Chapter 26**



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# PREFACE

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In the last forty years there has been a tidal wave of interest in project management as a management philosophy to use in dealing with the many *ad hoc* activities found in contemporary organizations. Project management is clearly an idea whose time has come. A substantial body of theory exists in the field, reflecting the wide experience gained by practitioners in many different industries and environments. Project management is recognized as a principal strategy and process to deal with the inevitable change facing organizations. The social, political, economic, technological, and competitive changes underway in the global marketplace require that any organization wishing to survive in the face of such change needs to understand how such change can be managed.

Business organizations in particular are facing awesome challenges in the intensely competitive global marketplace. Quality, productivity, costs, faster commercialization of products and services, cooperative research and development, and the dynamic changes being wrought by the “factory of the future” all can be dealt with through the use of project management philosophies and techniques. Add to these changes the continued erosion of quality to products and services that have to be designed, developed, produced, and marketed in global markets—the importance of a management philosophy to deal with such universal changes becomes apparent.

Project management has truly become “boundaryless”—cutting across disciplines, functions, organizations, and countries. The formation of “strategic alliances” to share project risk, resources, and rewards are becoming commonplace in the management of international businesses. Today, a truly domestic market does not exist; enterprise managers the world over must face the unforgiving global marketplace. Not only is the survival of enterprises at stake, the country’s national and international competitiveness is at stake as well. In the past two decades the global economy has been transformed; vigorous new companies from countries in the Pacific Rim and elsewhere are challenging many of the traditional industries and the way of managing in these industries. The competitive pathway to be followed in the political, economic, and technological conversion of Eastern Europe and Russia to free market economies will be a pathway characterized by the use of project management strategies. The ability to develop and produce products and services faster, at lower costs, with higher quality, and meeting the criteria for both local and international markets have become key performance factors. To remain competitive in the global markets, companies must develop the ability to make incremental improvements in the technology embodied in the products and services to be offered in the markets, as well as in the organizational processes needed to conceptualize, create, design, develop, and produce value that provide total customer satisfaction.

Successful project-oriented companies today are using project management processes to transfer technology from around the world and integrating those processes effectively into their products, services, and organizational processes. Global project management provides a solid foundation of management technology to create products and services that did not previously exist but are needed to remain competitive in the global marketplace.

In the fast evolving field of global project management, there is a critical need to pull together a practice reference to explain the new techniques of the field, provide understanding of the unique nature of global project management, and instill confidence in the user that truly practical global project management philosophies and strategies are available and can

be used. The second edition of this handbook provides that reference source for pragmatic how-to-do-it global project management information, tempered by that bit of theory needed to be consistent with the state-of-the-art of this important discipline. Anyone who wants to learn about global project management is faced with an abundance of published information. The best of this published information, integrated in this handbook and presented in a global and project-oriented perspective, provides a coherent and relevant prescription for the global owner. In a rapidly developing field such as project management, even experienced project “stakeholders” need a source that can help them understand some of the competitive changes in the world that are without precedent.

All project stakeholders—project managers, functional managers, general managers, project team members, support staff, and the many outside organizational units with which the global project manager must deal—will find this handbook useful. Students of project management may use the handbook as a self-study aid, for it has been organized to facilitate an easy and enjoyable learning process. Senior managers can, through a careful perusal of this publication, gain an appreciation, and respect, for what global project management can do to make their enterprises more competitive in the international markets.

This handbook is the result of the cooperative effort of many experts in the field, both in academic and in real world practice. The qualifications of these learned and experienced people are clear from the biographical sketch that is provided on the title page of each chapter. The content of the handbook is broadly designed to be relevant to the general organization contexts in which global project management is found.

Within the global marketplace the time between the creation of inception of a new technology in products and processes is decreasing. Until a few years ago, it took up to ten to twelve years or more for a scientific discovery—even a discovery leading to an incremental advancement of technology in products and processes—to wend its way from the point of origin to commercial use. Today much less time is required; global project management done within the context of concurrent engineering or simultaneous engineering, and though the organizational mechanism of product-process design teams is reducing that time dramatically. Global project management, done within the authority of strategic management, has become a common language for global enterprises to cooperate across organizational, cultural, and national boundaries in seeking mutual objectives and goals. It is to this purpose that the second edition of this *Global Project Management Handbook* is dedicated.

David I. Cleland  
Roland Gareis

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# ACKNOWLEDGMENTS

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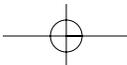
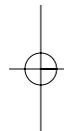
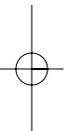
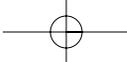
Many people contributed to this handbook. The authors who provided the chapters are an assemblage of experts in the business of global project management. Their contributions reflect a wide range of expertise and viewpoints in this growing and important field of project management. We thank, and are deeply indebted to, these chapter authors.

We thank our graduate students, who in many indirect yet meaningful ways added to the value created by this handbook. Our classroom discussions with these young scholars surfaced many ideas that became integrated into this publication. We also thank our many friends in the project management professional associations for the opportunity to discuss with them the strategy for the development of the handbook. Each of these friends contributed in some way to the substantive content of the book, as well as the intellectual processes needed to pull together this important publication.

We are deeply indebted to Lisa Bopp, who managed the overall development and administration of the handbook. As was to be expected, her professionalism, dedication, and optimism encouraged us during the long period from the book's concept through to its actual publication. We also thank Rachel Borchardt for her assistance in the preparation of the manuscript.

Special thanks to Dr. Bopaya Bidanda, Chairman of the Industrial Engineering Department and Dr. Gerald D. Holder, Dean of the School of Engineering of the University of Pittsburgh, who provided us with the needed resources and environment to pursue the creation and publication of this handbook.

Finally, we hope that the people who use this handbook will find it a useful and timely source for the development of the knowledge, skills, and attitudes needed to compete in the growing field of global project management.



**P · A · R · T · 1****STATE OF THE ART OF  
GLOBAL PROJECT  
MANAGEMENT**

In Chapter 1, David I. Cleland and Lew Ireland show us how project management has evolved over the centuries as an effective way of dealing with (as well as causing) change, from the beginning of projects in antiquity to the early development of literature and management practices in the 1950's. Cleland and Ireland illustrate the continuing impact projects and project management have had on numerous events throughout history by examining the artifacts and literature associated with these events.

In Chapter 2, Roland Gareis introduces project management as a business process of the project-oriented company. Its sub-processes project start, project controlling, project coordination, and project close-down as well as the resolution of a project discontinuity are described. Methods and communication structures for the performance of project management are defined.

In Chapter 3, Christophe Bredillet introduces the reader to the ongoing need for project management research in a field that is rapidly expanding. Current and future trends in the field of project management are discussed, from categorizing project types to integrating supply chain management with learning and knowledge management to the link between strategy and projects. While Chapter 1 demonstrates how far we have come, Bredillet shows us the many areas in which project management could be developed in the future.

In Chapter 4, Jones takes a look at the life cycle of a project, from conception to evaluation, and analyses the way in which projects are typically evaluated, comparing short-term and long-term approaches to evaluation. Factors such as amount of time, budget constraints, and project results are examined, and show how a long-term approach may be the key to successful project evaluation.

Chapter 5 deals with the growth of project teamwork development around the world as a way to complete projects effectively and with minimal expense. Nurick identifies and analyses the key barriers to overcome in order to ensure that a global project partnership will be successful, as well as the key drivers necessary to achieve success. Nurick also offers tips for keeping project team members motivated and productive in their common endeavor.

Chapter 6 discusses the unique difficulties associated with international construction project ventures. The results of research findings are presented, along with an analysis of *International Project Risk Assessment (IPRA)*, a tool useful in assisting projects with assessing risk factors before beginning a project. Walewski provides recommendations on use of the IPRA for international projects.

In Chapter 7, Roland Gareis introduces program management and project portfolio management as specific management processes of the project-oriented company. A program is defined as a temporary organization that requires a specific organizational structure in addition to the organizations of the single projects belonging to the program. The project portfolio as the set of projects held by a project-oriented company at a given point in time is a new object of consideration of the management of the project-oriented company, requiring specific processes and methods.

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# CHAPTER 1

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## THE EVOLUTION OF PROJECT MANAGEMENT

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**David I. Cleland is the professor emeritus in the School of Engineering at the University of Pittsburgh. He is the author/editor of 36 books in the fields of project management, engineering management, and manufacturing management. An active member of the Project Management Institute (PMI), he has published numerous articles and handbook chapters and has presented many papers at professional meetings in his field. He has served as a consultant for both national and foreign companies and is recognized as one of the best known members of PMI. He has been described as the "Father of Project Management." He has both a national and international reputation in his field and has been honored for his original and continuing contributions to his disciplines. He is a three-time recipient of the Distinguished Contribution to Project Management Award from the PMI. In 1987 he was elected a fellow of PMI. In 1997 he was honored with the establishment of the David I. Cleland Excellent in Project Management Literature Award sponsored by the PMI.**

**Lewis R. Ireland has more than 30 years of project experience and 16 years of work with quality aspects of projects. He is an executive project management consultant and author of quality and project management books. He served as the 1998 president and chair of the PMI and has served as the president of the American Society for the Advancement of Project Management (*asapm*) since 2003. Dr. Ireland's achievements in volunteer work have been recognized by the PMI through the Distinguished Contribution Award, Person of the Year, and being made a fellow of PMI. He continues to contribute time and energy to the advancement of project management around the world through professional exchanges of information on the practice and theory of project management.**

## INTRODUCTION

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In the early 1970s it was stated in the project management community that “project management is the accidental profession.” This statement has been quoted many times since, with all the implications that a discovery had been made and a new profession had been defined in the late twentieth century. Recognition of project management as a discipline and the use of this management approach have varied over several thousands of years.

The treatment of the subject of projects and project management in this chapter encompasses several thousands of years where evidence exists to demonstrate that projects were used to change and advance societies and that some form of project management was needed to ensure favorable conversion of resources to the benefit of these societies. The selection of examples of projects reported in this chapter is made based on available artifacts, literature, and other evidence reflecting a high degree of understanding and sophistication in effecting change through planned actions.

For centuries, project management has been used in some rudimentary form to *create change or deal with change* in societies. *Change* in a positive sense is caused by the application of management action that results in the consumption of resources to create a desired product, service, or organizational process. *Change* also may be meeting uncertain situations to identify and implement actions to obtain the most favorable outcome. Project management, in whatever form, has been used for centuries to plan for, implement, and meet change.

The general management discipline, although practiced in some form in antiquity, emerged as an explicit discipline in the twentieth century. It was during this period that concepts, philosophies, principles, processes, tools, and techniques began to appear in literature that reflects the intellectual framework found in the management of contemporary organizations. Yet a form of general management existed in antiquity to deal with the need to lead and organize various elements of society.

General management, often described in the context of leadership, was ubiquitous in the past, being the medium by which changes in societies were accomplished. The great leaders of history were “managers,” managing political organizations, countries, explorations, wars, technological and social change, and so forth. The principal challenge to these managers was the need to create change for the better or to deal with the change that affected their societies.

It was the 1950s when project management was formally recognized as a distinct contribution arising from the management discipline. Prior uses of project management had a focus on cost, schedule, and technical performance but lacked the formal definition and embracing of the management concepts and processes in an integrated manner. Since the early 1950s, names and labels have been given to the elements of the project management discipline, helping to facilitate its further development as a profession.

The vocabulary associated with project management has grown from some original definitions. The single term *project* has an origin that dates back several hundreds of years. According to the *Oxford English Dictionary*, the word *project* was first used in the sixteenth century. The following list presents some samples from the second edition of the *Oxford English Dictionary* listed in chronological order from the year 1600 through 1916:

- |           |  |
|-----------|--|
| Year 1600 | “A projecte, conteyninge the State, Order, and Manner of Governments of the University of Cambridge. As it is now to be seen.” |
| Year 1601 | Holland Pliny II 335: “Many other plots and projects there doe renaime of his (Parasius’) drawing. . . .”                      |
| Year 1623 | T. Scot Highw: “All our Projects of draining surrounded grounds. . . .”  |

Year 1863	Geo. Eliot Rhola Proem: “We Florentines were too full of great building projects to carry them all out in stone and marble. . . .”
Year 1916	M. D. Snedden in <i>School and Society</i> 2:420, 1916: “Some of us began using the word ‘project’ to describe a unit of educative work in which the prominent feature was a form of positive and concrete achievement.”

From earliest recorded times, people have worked together toward designing and creating projects. Although the term *project management* did not come into wide use until the 1950s, its history is much longer than the term itself.

This chapter is a step toward acknowledgment and a fuller appreciation of the role that project managers and project teams have played throughout history in the evolution of society. A study of projects of the past would include an assessment of the effectiveness in management of the projects—as well as development of an informal “lessons to be learned” profile in the conceptualization and completion of the projects. As an inventory of these profiles is developed, our knowledge of what to do in managing contemporary projects, as well as what to avoid, adds to our understanding of how project management should be carried out in both the present and the future.

An early form of project management was used to plan for and use the resources needed to deal with change. Only through studying the past can we fully perceive how the world has been changed by projects. A study of these projects helps us to understand how institutions have emerged and survived using a form of project management. Having a knowledge and appreciation of past projects binds us to the present and the future. If we do not learn from the past, we are condemned to make the same mistakes and pay for those mistakes again.

### **TYPES OF EVIDENCE FOR HISTORICAL PROJECTS**

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A review of the results of projects in antiquity reveals evidence about how several historical projects originated and developed. The evidence takes three primary forms:

1. *Artifacts*—something produced by human workmanship, such as a tool, weapon, structure, or substance of archeological or historical interest. Examples include the Great Pyramids and the printing press.
2. *Cultural strategies*—such as found in the arts, beliefs, institutions, and other products of work and thought typical of a society at a particular time. Examples include the English Magna Carta, the U.S. Emancipation Proclamation, and the U.S. Social Security Program.
3. *Literature and documents*—publications and project-related documents that describe project management and how it was used. Examples include books, articles, and editorials that describe projects and the use of project management.

From the period *circa* 1950 to the present time, there is a growing abundance of articles, books, papers, and miscellaneous documentation that can be used to build a contemporary model of project management. For the period prior to 1950 back through antiquity, there is very limited documentation and literature. To understand how project management emerged requires examination of the artifacts and the social, military, technological, political, industrial, and governmental strategies that existed. From study of these areas, we may reach a judgment concerning the role of supporting projects. Then

we can draw conclusions about how the projects were managed and in the process identify any “seeds” of the project management concepts and processes that existed.

## **PROJECT CHARTER**

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A *project charter* describes at a high level what is to be accomplished in a project and delegates authority to the project manager to implement actions required for project completion. It typically grants the project manager or project leader the authority to conduct selected actions while planning, implementing, and completing the project. It may contain details on what is to be done and what may not be done. Statements of mission, objectives, or policies also may be included and accompanied by a budget.

An examination of historical documents that recognized the need for new artifacts or strategies can provide initial insight into how and why the artifacts or strategies evolved. These historical documents usually provide the “strategic need” for the action being considered and in most cases provide for a document similar to a “project charter” to guide the design and execution of the initiative. For example:

- The *Spanish Book of Privileges and Prerogatives* granted to Christopher Columbus, April 20, 1492. This document sets forth the compensation promised to Columbus by Queen Isabel and King Fernando, if Columbus discovered land on his first voyage to the New World.
- The *English Charter to Sir Walter Raleigh*, March 25, 1584. This document, executed by Queen Elizabeth I, granted Sir Walter Raleigh authority to explore and claim lands for England. It also defined the compensation that Raleigh would receive.
- The *United States Congress Act authorizing Lewis and Clark Expedition*, February 28, 1803. This act authorized exploration of the Northwest Territory of the United States to find a land passage to the Pacific Ocean.
- The *United States Homestead Act*, May 20, 1862. This document granted an individual, free of charge, 160 acres of public land if within five years a house was built on the land, a well was dug, 10 acres were plowed, a specific amount of land was fenced, and the individual actually lived there. An individual could claim an additional 160 acres of land if 10 acres were planted and cultivated successfully with trees.
- The *United States Tennessee Valley Act*, May 18, 1933. This law established the Tennessee Valley Authority for the purpose of reforestation, marginal land improvement, flood control, and agricultural and industrial development of an area covering seven states.
- The *English Instructions authorizing the voyages of discovery of Captain James Cook*, August 1768, July 1772, and July 1776. Captain Cook was chartered by the United Kingdom Royal Society to conduct three voyages in search of scientific information and various lands; each voyage was about three years in duration.

## **EARLY LITERATURE ON PROJECTS**

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In all too many cases it will be impossible to find the original documents that established the need for the artifact or strategy. For example, the Great Pyramids of Egypt, the Great Wall of China, the Grand Canal of China, Roman roads, and Roman aqueducts are without

written documentation, but the artifacts remain today in some state. In these cases, descriptions provided in the anthropologic, archeologic, and other historical literature can supply some insight into how and why these projects were accomplished.

Perhaps the earliest publication on the management of projects appeared in 1697, entitled *An Essay Upon Projects*, authored by Daniel Defoe, who had an interesting comment on the building of the Ark:

The building of the Ark by Noah, so far as you will allow it human work, was the first project I read of; and no question seem'd for it, and had he not been set on work by a very peculiar Direction from Heaven, the Good old Man would certainly have been laugh'd out of it, as a most senseless ridiculous project [p. ii].

Some additional comments Defoe made regarding projects include

- “Every new Voyage the Merchant contrives is a Project” (p. 8).
- “After the Fire on London, the contrivance of an Engine to Quench Fires, was a Project the Author was said to get well by, and we have found to be very useful” (p. 25).
- “The project of the Penny-Post, so well known, and still prais'd . . .” (p. 27).
- “And to Dedicate a Book of Projects to a Person who had never concern'd himself to think that way, would be like Music to one that has no Ear” (p. ii).

Defoe identifies in 1697 the dilemma still facing contemporary managers: how to design and implement project management concepts and philosophies.

Mary Parker Follett, writing in 1920, extolled the benefits of teams and participative management and said that leadership comes from ability rather than hierarchy. She advocated empowerment, drawing on the knowledge of workers, and supported the notion of the formation of teams through cross-functions in which a horizontal rather than a vertical authority would foster a freer exchange of knowledge within organizations.

A 1959 article that caught the attention of the growing project management community was authored by Paul Gaddis, entitled “The Project Manager,” and published in the *Harvard Business Review*. It described the role of an individual in an advanced-technology industry who functioned as a focal point for the management of resources being applied to manage ad hoc activities across organizational boundaries.

Another contribution to the emerging theory and practice of project management, entitled “Functional Teamwork,” appeared in the *Harvard Business Review* in 1961, authored by Gerald Fish. He described the growing trend in contemporary organizations toward functional-teamwork approaches in organizational design.

Professor John F. Mee, a noted scholar in the history of management theory and practice, published an article in *Business Horizons* in 1964 that described the characteristics of the “matrix organization.” He described one of the key characteristics of this approach as an organizational system that created a “web of relationships” rather than a line and staff relationship of work performance.

David I. Cleland and William R. King published *Systems Analysis and Project Management* (New York: McGraw-Hill) in 1968. This book was the first scholarly work on project management cast in the context of the emerging “systems approach” in management theory and practice.

Since these landmark documents were published, a host of publications has appeared each year. Amazon.com lists more than 2300 books for sale in 2005, and this number does not include books that are out of print. It is estimated that more than 500 project management books are published each year in the United States in the English

language. This number does not include books on aspects of project management that have other terms in their titles, such as *project manager* and *risk management*.

## **GOVERNMENT LITERATURE**

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In 1964, the U.S. Air Force announced publication of a series of manuals and policies to force consistent management processes over the design and acquisition of major weapons systems. The series changed the relationship between the government and private industry, whereby private industry had to adopt and use the defined practices. The manuals and policies selected to effect management change were part of a series of *Air Force Systems Command Manuals* referred to as the *375 Series*. The six most important of these manuals are

- AFSCM 375-1, Configuration Management*
- AFSCM 375-3, System Program Office Manual*
- AFSCM 375-4, System Program Management*
- AFSCM 375-5, System Engineering Management Procedures*
- AFSCM 375-6, Development Engineering*
- AFSCM 310-1, Management of Contractor Data and Reports*

In addition, other policy and procedure guidelines were published in the form of operating instructions, pamphlets, regulations, and other supporting documentation.

The impact of the 375 Series of guidelines was to introduce changes in the government–defense industry relationship. The impact that these guidelines had on the evolving project management literature was significant in terms of shaping project management in the United States and in countries influenced by the manner in which U.S. project management has been conducted. Much of the early literature of the 1960s and 1970s drew on and reflected the philosophies, concepts, processes, and techniques put forth in the 375 Series. Today, as the project management literature continues to emerge, one can see some of the early seeds of the 375 Series and how these seeds matured.

## **LEADING PROJECTS OF ANTIQUITY**

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One cannot review the history of civilization without concluding that projects on scales both small and epic have been central to the continued evolution of society. Examples of some of the leading people and projects of antiquity that have created change include the following:

### **Prince Henry of Portugal (1394–1460)**

In the early years of the fifteenth century, Prince Henry the Navigator developed and operated what could be called today a *research and development laboratory* located in Sagres, Portugal. The voyages of the discovery that set forth could be considered to be “projects.” These projects of discovery made important conditions to the evolving body of knowledge in cartography, navigation, and shipbuilding. Experiments in shipbuilding produced a new type of ship—the caravel, which made future exploration projects possible.

The caravel, a major improvement over older ships, contributed to the success of Prince Henry's exploration efforts. It was faster and could sail well into the wind with both square sails and a triangular one. At about 65 feet long with a capacity of roughly 130 tons of cargo or supplies, the caravel was more perfectly sized for the type of exploration conducted by Prince Henry.

Each voyage documented discoveries, and each following voyage built on prior work. Each new "project" was a continuation of the process for exploring and assessing the lands of Africa. Ship captains were sent on voyages with questions to be answered, which gave them a specific set of objectives—as with all good projects.

### **The Great Pyramids of Egypt (*circa* 2700 to 2500 B.C.)**

Outside Cairo, Egypt, stand the Great Pyramids at Giza. Some of the characteristics of these projects are as follows:

- The pyramids were national projects.
- The workers were organized into competing teams.
- The workers were motivated through their deep religious belief, and they believed that by building a tomb for their king, they were ensuring his rebirth.
- The workforce was highly organized. Each group of workers was responsible for one part of the pyramid complex.
- A highly developed support force was needed, including a place to feed and house all the workers, as well as the bakers, brewers, butchers, and so on.
- The workers were well treated and well fed and had access to medical care.

The workforce had all the evidence of a highly organized team of motivated individuals—not the typical depiction of slaves being whipped to work. There is little doubt that the project team for each pyramid had a mixture of technical skills and knowledge that represented a sophisticated approach to building the structure.

### **The Great Cathedrals of Europe**

Between 1050 and 1350 in France alone, more than 500 large churches were built, as well as 1000 parish churches, so that there was a church or chapel for every 200 people. In Germany, the Cologne Cathedral, considered by some to be the most perfect specimen of Gothic architecture in the world, undoubtedly took the longest to build. The foundation alone was laid in 1248. By 1417, one of the towers was finished to one-third its present height, but at the time of the Reformation, its roof was still covered with boards. Finally, the cathedral was completed in 1880, more than 630 years after construction first began.

Each church and chapel was a project that relied on the technology of the day. These artifacts of projects suggest that an early form of project management had to be used to organize the workforce and construct these houses of worship. The positive impact on society because of the churches cannot be estimated in any comparative analysis.

### **The Grand Canal of China (486 B.C. to the present)**

This is the world's oldest and longest canal, far surpassing the next two grand canals of the world: the Suez and Panama Canals. The building of the canal began in 486 B.C. during the

Wu Dynasty. It was extended during the Qi Dynasty and later by Emperor Yangdi during the Sui Dynasty. The canal is 1114 miles long with 24 locks and some 60 bridges. A project is currently underway to extend the Grand Canal to Ningbo—or more than twice its present length to 3100 miles.

This canal has served China for nearly 2500 years and continues to be used as a means of commerce through waterborne transport of goods. The project to construct the canal and its supporting bridges and locks could have been accomplished only through dedicated planning and work effort to achieve its objectives.

### **Noah's Ark**

The designer of the Ark was God Himself. The shape of the ark was that of a rectangular barge with a low draft. Some other specifications include

- Make a roof and finish it to within 18 inches at the top.
- Coat inside and out with pitch.
- The Ark was to be about 437 to 512 feet in length, with a beam of 75 feet.
- The Ark would have an internal volume of 1,515,750 cubic feet.
- There would be only one door to enter and exit.

Historians have speculated that it took 120 years to build the Ark. The size of the project and its end product—the Ark—leave much to the imagination as to how the “project team” acquired the materials and the technology needed to shape and assemble the parts.

### **St. Petersburg, Russia (1703–1713)**

In 1703, Emperor Peter began construction of a new city in the north of Russia, where the Neva River drains Lake Ladoga. The city was built on a myriad of islands, canals, and swamps. Construction conditions were brutal. Nearly 100,000 workers perished in the first year. Within 10 years, St. Petersburg was a city of 35,000 buildings of granite and stone and the capital of the Russian Empire. Today, the city is valued for its historic buildings and contribution to Russian history. Although no longer capital of Russia, it plays an important role in industrial and cultural activities of the people.

### **Tower of Babel**

According to Genesis 11:1-9, a structure was erected in the plain or valley of Shinar. The builders presumed to build an edifice that reached the heavens—symbolizing human self-sufficiency and pride. Historians believe that the myth on which the building of the tower rests may have developed as an attempt to account for the diversity of human language—in the modern thought, an inability to communicate or to fail to understand one another's communication. One might ask if there have been any modern construction projects where a lack of communication among the project stakeholders was a cause for delay or cancellation of the project.

### **Signing of the Magna Carta (1215)**

The Magna Carta is a document that states the basic liberties guaranteed to the English people. The Magna Carta proclaims rights that have become a part of English law and are

now the foundation of the constitution of every English-speaking nation. The Magna Carta, which means “great charter” in Latin, was drawn up by English barons and churchmen, who forced the tyrannical King John to set his seal on it on June 15, 1215. King John’s cruelty and greed united the powerful feudal nobles, the churchmen, and the townspeople against him. While he was waging a disastrous war in France, the leading nobles met secretly and swore to compel him to respect the rights of his subjects. When King John returned from the war, they presented him with a series of demands. King John tried to gather support, but almost all his followers deserted him. At last he met with the nobles and bishops along the south bank of the Thames in a meadow called Runnymede and affixed his seal to the Magna Carta.

### **Empress Catherine the Great of Russia (1729–1796)**

Catherine assumed power in Russia in 1762 after a coup d’état in which she led officers of the Royal Guard. Unlike her husband, she was well loved by the country’s elite and received good press in Europe thanks to her contacts with many figures of the French Enlightenment. Catherine’s court was extremely luxurious. She was the first to move into the newly built Winter Palace. Catherine started a royal art collection, which later was housed in the world-famous Hermitage. Several additional buildings (the Small Hermitage and the Old Hermitage) were commissioned for the growing royal collection of art. The Hermitage Theater was built, and the area around the palace was put in order and built up with the finest houses and palaces.

## ***MILITARY CAMPAIGNS***

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Most, if not all, military campaigns have taken on the characteristics of projects. Military battles and campaigns have objectives and consume resources through planned activities in most cases. The introduction of new weapons that have been developed in a structured form typically gives military leaders some advantage over their adversaries by exploiting a weakness.

These new weapons frequently represent a response to an adversary’s weakness, such as the introduction of body armor on the battlefield to counter sword, knife, and club weapons. The opposition countered with weapons that exploited the openings in the armor, such as under the armpits when a knight would raise a sword to strike. One response was to provide armor under the armpits. Armor was discarded as an advantage when weapons such as guns were able to penetrate the material. Interestingly enough, the modern-day helmet and bulletproof vest have been adopted as a means to stop opposing gunfire.

### **The Battle of Greycy (August 26, 1346)**

Fought on Saturday, August 26, 1346, the Battle of Greycy, France, was the first of several significant battles during which the longbow triumphed over crossbows and armored knights. The French forces in the battle numbered approximately 30,000; English forces numbered 12,000, of which 7000 were archers. The battle line was about 2000 yards wide. The English army occupied the top of a gentle ridge near the town. Each English archer carried two sheaves of arrows into battle. The arrows could be shot

at 250 to 300 yards. The French made 14 to 16 charges against the English lines from the start of the battle at 4:00 P.M. until the end of the battle at midnight. Casualties were estimated to be 5000 for the French knights and Genoese crossbowmen and about 100 for the English.

The Battle of Greycy had political consequences in Europe. From a military hardware perspective, the use of the longbow by the English forces proved superior to the traditional crossbow and mounted-knight strategy of the French. Tactically, the Battle of Greycy established the supremacy of the longbow on the battlefield and gave England standing as a great military power. The longbow was responsible for vast changes in the nature of medieval warfare. It made England the foremost power in Europe during the fourteenth and fifteenth centuries. England won almost every battle fought through a skillful and tactical use of massed archers and men-at-arms. On many occasions, the English troops were outnumbered but still were able to win the battle. It was during King Edward's victory at Caen, on the way to Greycy, that a "mooning" incident occurred. Several hundred Norman soldiers "mooned" the English archers; many of these soldiers paid a painful price for their display!

### Some Significant Projects of the World

A few other projects that have changed the world include

- The Great Wall of China, built in segments over 2000 years, from 221 B.C. to A.D. 1644. It was constructed to keep out foreign invaders.
- The first Trans-Atlantic cable, constructed in three attempts from Valencia Harbor, Ireland, to Trinity Bay, Newfoundland, starting in June 1857 and completed on July 27, 1866.
- Ancient Roman roads, a planned system of public roads around Rome constructed and maintained by the state. The roads were constructed from different materials layered to provide for durability. The roads ranged in width from 8 to 40 feet with ditches for good drainage.
- The first steam engine (1704), built to pump water from mines. This engine used atmospheric pressure to power the thrust of the piston (by cooling the steam to create a vacuum). Later versions used steam to power the thrust of the piston.
- The Coliseum of Rome, constructed in the first century. The Coliseum was constructed to a height of 160 feet and could seat about 50,000 spectators. Its purpose was for games of entertainment.
- The catacombs of Alexandria, Egypt (second century A.D.), are the graves of a single family. These catacombs, opposite of the Great Pyramids of Egypt, are more than 100 feet below ground at their lowest point.
- The dikes of Holland, started in the thirteenth century. The dikes of Holland are a form of water management system that recovers land. The levees and dams retain the water while windmills pump excess water out. This represents recovery and use of more than 160,000 hectares of land.
- The Siberian Transcontinental Railroad (1891–1905). This railroad was built to link Moscow with Vladivostok in the east—a distance of some 6000 miles. This commercial link aided in transporting materials in both directions.
- The railroad from Buenos Aires to Valparaiso, (1910–1982). This 156-mile railroad rose to a height of 10,500 feet in the Andes Mountain Range to transport passengers

- and freight over winding tracks and through long tunnels between Argentina and Chile.
- The exploratory journeys of Ponce de Leon (1540–1621) resulted in the discovery and claiming of Florida for Spain. Ponce de Leon accompanied Columbus on his second voyage to America in 1593 and stayed in the Dominican Republic as its governor.

### ***SUMMARY OF THE RESULTS OF HISTORICAL PROJECTS***

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Projects of the past have been challenging and have contributed to the well-being of millions of people by creating changes that advanced society. In some instances, the project was a response to a situation such as a natural disaster that threatened lives. Change through making the best use of resources is project management. The resulting benefits throughout history have been delivered in the form of new or enhanced projects, valuable services, and improved organizational processes.

Projects have ranged in length throughout antiquity from perhaps a single day to hundreds of years. A battle fought in a single day could change the future of generations. Some of the effects of projects include

- Change or reactions to change
- New or enhanced products, services, or organizational processes
- Varied degrees of risk and uncertainty
- Benefits and/or destructive results
- Modest to spectacular results
- Creation of something that did not exist previously
- Integrated results into the strategic or operational initiatives of the owner
- Social progress (or lack of progress)

### ***MORE MODERN PROJECTS***

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#### **Lewis and Clark Expedition (1803–1806)**

In 1801, President Jefferson long had an interest in exploration of the western area of America leading to the Pacific. What helped to prompt Jefferson to dispatch the first American exploration to the Pacific was the publication of a small book detailing the first British expedition to reach the Pacific from Canada in the late eighteenth century. Rival Canadian competitors in the fur trade, the Hudson Bay Company and the Northwest Company were striving to dominate the fur trade in what now is western Canada and the western United States. In one of the trading posts in what is now Alberta, Canada, Alexander Mackenzie, a member of the Northwest Company began to consider how far it might be to the Pacific coast, which had been explored by James Cook, George Vancouver, and other English seamen. Mackenzie followed the river named for him, and the river took him to the shores of the Arctic Ocean. In a journey in 1792, he had better success by following the Peace River and its tributaries, reaching the Continental Divide. From the western slope of the Rockies, he struck the upper reaches of the Fraser River, hoping that it would lead him to the coast. He found that the canyons of the Fraser River

were impossible to traverse. Following some suggestions made by a group of Indians, he set out on an overland journey and reached the coast of British Columbia in July 1793. It was another eight years before he published a full account of the journey. A year later, Thomas Jefferson received a copy in the United States.

An American captain, Robert Gray, had already found the Columbia River. It was a massive river that Jefferson believed must reach inland to the Rockies. He believed that if Americans could travel up the Missouri River and reach the Columbia from the east, they might find what MacKenzie had missed: an effective water route from the American heartland to the Pacific coast and the markets of Asia. Apparently the fact that the Missouri River flowed through territory not belonging to America did not bother Jefferson.

The prize that Jefferson sought was a practical route to the Pacific. The U.S. Congress could sponsor such a journey. The earliest assessment of cost for the journey was \$2500 for equipment and provisions, including gifts for the Indians. During the spring and summer of 1803, Jefferson and Lewis worked feverishly to get the expedition under way.

In the charter given to Lewis, Jefferson stated that the mission was to find “the most direct and practicable water communication across the continent for the purposes of commerce” and to ensure that the U.S. Government received accurate information about it. Jefferson also instructed Lewis and Clark to take careful note of the latitude and longitude of all remarkable points between them from the Missouri River and the coast of the Pacific Ocean. Jefferson had another assignment for Lewis and Clark—to be Jefferson’s roving ambassador to the western Indians. Lewis and Clark were to compile as much information as they could about the Indian nations through the lands in which they passed. They were instructed to meet with Indian leaders and make them acquainted with our wish to be friendly and useful to them.

It is widely known by the project management community that a project has to have a strong sponsor—an individual or organization that justifies the project, sets a time schedule, establishes the technical objectives, and provides resources is essential. This is what was done in the planning for the Lewis and Clark expedition.

### **The Suez Canal (1859–1869)**

The Suez Canal is one of the wonders of the nineteenth century. It was a French initiative, designed by a Frenchman, financed by Frenchmen, and opened up by a French symbol of power. French entrepreneur Ferdinand de Lesseps led the Suez Canal effort. The canal ended up being one of the strengths of British imperial power.

During the campaign of Napoleon in Egypt in the late eighteenth century, the French had seen the commercial and military possibilities of linking the Mediterranean and Red seas. One man, a diplomat in the French Foreign Service, saw his career eroding in the diplomatic service. His personal life was saddened by the loss of his wife and one of his children. He dedicated himself to a one-man canal-building campaign from 1853 until 1869 and was obsessed with the building of the Suez Canal.

He convinced the Egyptians that the building of the canal would prove that they still had the potential to be a powerful force in world affairs. To the French he said that the canal would offer a grand example of their national capability more than wars and revolutions. Rich Frenchmen invested in his company. Unfortunately, he was considered to be somewhat of a crackpot in other countries. In England, British leaders trashed his plans. A spokesman in England called it “among the many bubble schemes that from time to time have been put on gullible capitalists.” Whether this trashing was a reflection of British stupidity, a lack of foresight by British leaders, or a subtle cunning on the part of the British leaders is not known.

The Franco-Egyptian feat of engineering was advantageous to the British, who were the most skeptical. Britain's ocean links to India would benefit most from a canal. Before the canal opened, it had taken at least 113 days for a steamship to sail the 6000 miles from London to Calcutta via the Cape of Good Hope. The canal cut the distance by a third under the terms of the concession obtained by Lesseps, whose company had the clearance to dig a channel across the arid Suez Isthmus, a distance of 100 miles, and to operate it for 99 years. The Egyptian government would receive 15 percent of the profits, the founders 10 percent, and the shareholders the rest.

Experience with modern major construction projects indicates that they cost at least twice the amount stated in the prospectus and that the expected revenues usually are about half of what is projected. In the Suez Canal there were additional reasons for cost overruns. A huge labor force would have to be obtained from the Egyptian peasantry. In addition, there were major problems in cutting the canal through its pathway in arid land.

### **The Panama Canal (1870–1914)**

The Panama Canal, often called the “big ditch,” was started by a French company in 1870. The company ultimately went into bankruptcy. The technical challenges were part of the problems faced by the French company, but perhaps the greatest problem was one of health. Malaria plagued the workers and many died within weeks of arriving in Panama. The French company sold its interest in the Panama Canal to the United States in 1903. The United States, under the political leadership of President Teddy Roosevelt, started working on the Panama Canal and finally finished it in 1914. The canal was the biggest and most costly venture that Americans had ever tried outside their borders.

The Panama Canal was a vast, unprecedented feat of engineering, political intrigue, and logistic challenge. Apart from wars, it represented the largest, most costly single effort ever before mounted and held the world's attention over a span of 40 years.

### **Transcontinental Railroad, Omaha, Nebraska, to Sacramento, California (1862–1869)**

In the United States in the mid-1800s, a project was initiated to join the continent of North America by railroad. The two biggest corporations in America, the Central Pacific and the Union Pacific railroads, had armies of men at work building separate railroad lines. This project was an epic of logistics, organization, and endurance. When the two railroads were joined in Promontory, Utah, a single transportation system became operational from the east coast to the west coast of the United States.

Completion of this project linked the east and west coasts of the United States through a rail system to conduct commerce. Between Omaha and Sacramento, there were few towns on the path to benefit from the commerce. The railroad, however, provided the incentive to build communities both to service the system and to use it.

### **The Pennsylvania Turnpike (1935–1940)**

Building the Pennsylvania Turnpike in the late 1930s is an example of the early use of project management in the United States. The Pennsylvania Turnpike opened on October 1, 1940, and was completed on time and within budget. Moreover, it attained its objective as an innovative means for improving highway systems.

The initial turnpike was envisioned as a four-lane road extending from just east of Pittsburgh to Carlisle—a distance of 160 miles—using the right of way for a planned railroad. The turnpike incorporated the latest design features to accommodate modern travel, such as no road or rail crossings, gentle curves and slopes, and 10 service plazas for travelers. This turnpike set the example for roadways in the future and subsequently was incorporated into the overall system of major highways.

### **The Manhattan Project (1942–1945)**

The Manhattan Project for the development and delivery of the atomic bomb had a major impact on the strategy for winning World War II by the United States and its allies. General Leslie R. Groves was appointed as the project manager for the development, production, and delivery of the atomic bomb, which, although devastating to Japan, is credited with saving the lives of thousands of American military personnel.

The Manhattan Project was a complex arrangement of participants in Chicago, Illinois, Oak Ridge, Tennessee, and Los Alamos, New Mexico. The technical challenge to harness the atom required the work of many scientists working under the direction of a military man, General Groves. In addition, the requirement for security and administration of the various participants posed an additional burden on the project manager.

### **The Normandy Invasion (June 6, 1944)**

Operation Overlord was the largest military seaborne and airborne invasion of World War II. Planning for the invasion began in the summer of 1942, with detailed planning nearly completed by late 1943. Revision and updating of the plan continued until June 1944, when the invasion took place. This planning encompassed a massive assembly of human resources, war materials, air and sea transport, and logistic support. Significant Allied (Britain, Canada, France, Greece, The Netherlands, Norway, Poland, and the United States) military forces and resources were gathered in Britain. The initial sea assault from landing ships and craft was on a five-division front between the French Orne River and the Cotentin Peninsula. Airborne forces parachuted behind German lines to capture critical lines of communication and resupply routes.

The seaborne region was divided into five landing beaches (code named from west to east Utah, Omaha, Gold, Juno, and Sword). The overall battle itself, however, would be decided by the abilities of the Allies to reinforce their initially weak beachhead by sea as compared with the easier movement of German reinforcements by land.

On June 5, 1944, thousands of ships and craft from the Allies put to sea and gathered in assembly areas southeast of the Isle of Wight. Airborne forces assembled at key airfields in anticipation of parachuting into France. After overrunning the German beach defense, the Allies rapidly expanded the individual beachheads and reinforced the beach assault forces with new troops, munitions, and supplies. By July 25, the Allies were strong enough to launch Operation Cobra to begin the liberation of France.

In a larger sense, the successful Allied landing in France was a psychological blow to the German occupation of Europe. The invasion challenged the ability of the German to control western Europe, dramatically increased partisan activity and heartened the morale of all the people in Europe fighting against Nazi tyranny. The balance of power on the continent, already weakened by a Soviet offensive into Poland, was tipped in favor of the Allies. From the breakout at Normandy, the Allies would begin the drive into Germany, leading to surrender of the Nazi regime on May 7, 1945.

### The Internet (August 1962)

The creation and building of the Internet was not a monolithic project. Rather, it was a patchwork of individual and organizational contributions pieced together through the years. It was an immense integration of much solitary effort and cooperative work. It came into being where knowledge and competency resided in thousands of uncelebrated places—laboratories, classrooms, offices, social gatherings, and so forth—where people knowledgeable in computers and telephone lines got together and tried to improve communication among themselves.

Professor and innovator J. C. R. Lickrider played a role much akin to a “virtual project manager,” throwing out ideas and concepts to fertile minds that worked informally together to create a means of communication that led to the World Wide Web and other supporting technologies and protocols that are known today as the Internet. [A fascinating summary description of the evolution of the Internet can be found in James Tobin, “The Internet,” Chapter 8 in *Great Project* (New York: Free Press, 2001).]

## MODERN PROJECT MANAGEMENT PRACTICES

### Project Management Today

Project management has evolved over the centuries from a rudimentary form of managing projects to a sophisticated process that has been defined in literature as well as being promoted by major professional associations around the world—namely, the Project Management Institute (PMI) and its chapters, the International Project Management Association (IPMA) with its national associations, the Japanese Project Management Forum, and the Australian Institute of Project Management. These organizations have defined project management for their members in bodies of knowledge and competence baselines.

The PMI, for example, has nine areas of focus for project management that define the categories of its recognized body of knowledge. These categories are shown in Table 1.1.

These areas have been developed over time and through the experiences of project practitioners. The PMI has been developing and evolving its body of knowledge since 1983—nearly 25 years—for use by its members.

The IPMA, headquartered in Zurich, Switzerland, and its national associations have a body of knowledge (referred to as a *competence baseline*) that describes the topics that are important for their planning and implementation of project management. Table 1.2 lists topics that the IPMA uses to define and describe its body of knowledge.

**TABLE 1.1 PMI Categories of Project Management**

Project time management
Project cost management
Project quality management
Project scope management
Project risk management
Project procurement management
Project quality management
Project human resources management
Project integration management

**TABLE 1.2 IPMA Competence Elements**

1. Technical competences	2. Behavioral competences	3. Contextual competences
1.1 Project management success	2.1 Leadership	3.1 Project orientation
1.2 Interested parties	2.2 Engagement	3.2 Program orientation
1.3 Project requirements & objectives	2.3 Self-control	3.3 Portfolio orientation
1.4 Risk & opportunity	2.4 Assertiveness	3.4 Project, program, & portfolio implementation
1.5 Quality	2.5 Relaxation	3.5 Permanent organization
1.6 Project organization	2.6 Openness	3.6 Business
1.7 Teamwork	2.7 Creativity	3.7 Systems, products & technology
1.8 Problem resolutions	2.8 Results orientation	3.8 Personnel management
1.9 Project structures	2.9 Efficiency	3.9 Health, security, safety & environment
1.10 Scope & deliverables	2.10 Consultation	3.10 Finance
1.11 Time & product phases	2.11 Negotiation	3.11 Legal
1.12 Resources	2.12 Conflict & crisis	
1.13 Cost & finance	2.13 Reliability	
1.14 Procurement & contract	2.14 Values appreciations	
1.15 Changes	2.15 Ethics	
1.16 Control & reports		
1.17 Information & documentation		
1.18 Communication		
1.19 Start-up		
1.20 Close-out		

## **SUMMARY**

Project management has evolved over many centuries of use. It was not until the 1950s that the literature began to reflect the evolving theory and practice of this discipline. An early rudimentary form of project management was used over the centuries in the creation of artifacts and cultural enhancements in world societies.

This chapter makes a contribution to the literature on how project management has evolved to become the principal means for dealing with change in modern organizations. Project management has a rich heritage throughout its development of artifacts and cultural enhancements in the world of antiquity.

This chapter will be a landmark contribution to the birth and growth of project management discipline. It will raise a greater awareness of the project management profession and its place in history.

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