courses for experienced projectmanagers





Leading Complex Projects

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THE GEORGE WASHINGTON UNIVERSITY



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CASE STUDY: THE OMEGA PROJECT DISCERNING COMPLEXITY

Assignment

Read the information below individually. Then, as a team, prepare the following deliverables:

- A list of potential project complexities
- A list of project assumptions
- Answers to the questions: "Is the Omega Project a complex project? Why or why not?"

Be prepared to present your deliverables to the entire class.

Excerpt of Speech by Eric Fletcher

Below is an except of a speech given by Eric Fletcher, project manager of Worldwide Chocolates (WWC) Omega Project, during a workshop sponsored by the Association of Applied Project Management.

"In retrospect, the WWC Omega Project was a frustrating, humbling experience. But at its core, the project was incredibly energizing and fun. I learned a lot."

"You must understand," continued Fletcher, "that I was not management's first choice to manage the project. Angie McVie, a project manager in the Information organization, originally was slated to take on the project. She was kicked upstairs to the CIO position, however, when the existing CIO left WWC to 'pursue other interests.'

"At the time, I was working on a couple of small projects when one of my bosses, the CEO, JB Kaufmann, asked me if he could 'borrow' some of my time to help put together an upcoming IT-oriented project.

"Before I describe the project, it might be helpful to give you some background about my company, Worldwide Chocolates, and about the genesis of what would become the Omega Project that we're here to learn about.

"To understand Worldwide Chocolates, it is essential to know something about the person who started it all—JB Kaufmann. His parents are a German soccer star and the daughter of a Venezuelan cacao magnate. He started WWC nearly 20 years ago when he purchased an unused, run-down chocolate factory in the Mission District of San Francisco, California. Up to this point, his career focused mostly on starting up and selling off high-tech-oriented ventures in nearby San Jose. But his real passion was chocolate—making chocolate, selling chocolate, and writing about chocolate.

"So with his old factory, which he completely reconditioned and updated with the latest technological advances, JB set out to make the best Euro/Latin-style fusion chocolates money could buy. Three years later, he released his first batch of chocolate—JB is a very patient man. Now his Venezuelan, cacao-based chocolates are some of the world's finest. They fetch some of the highest prices per pound around the globe!

"But JB didn't stop there. He is an incessant organization developer and builder. His next project was the development of a premier resort and spa, which he built on some land in Napa Valley he had purchased years before.

"Before the resort construction was finished, JB decided that he wanted a way to market and sell his chocolate, so he started Kaufmann Chocolatier, a high-end, boutique-oriented retail store located in the heart of Napa Valley. Another Kaufmann Chocolatier store, on Union Square in downtown San Francisco, opened six months later to wide and wild acclaim. The wave had just started. The Kaufmann Chocolatier concept was so successful that by the end of last year 49 Kaufmann Chocolatier stores were located in every major city of the chocolate-eating world. They all were owned and operated by JB's new corporate entity, Worldwide Chocolates. Because JB's far-flung empire was becoming increasingly difficult to manage in his usual hands-on way, he had already stepped away from the day-to-day operations of WWC by the time the Omega Project was conceived.

"Now, let me shift your attention to the company itself. Worldwide Chocolates is, first and foremost, a serious business. At the time the Omega Project started, JB and a few key managers privately held WWC. But people were starting to talk about an initial offering to bring the company public.

"Beyond all the ownership discussions, WWC is a fascinating place to work. JB had assembled a robust, intricate organization that was—and still is—very well conceived and laid out. But a number of unclear areas at the edges of the organization frustrate many people within the company. One of JB's favorite maxims is 'opportunity lurks in fuzziness.' I'll explain some of the organizational fuzziness in a minute.

"In its simplest form, WWC is made up of four large entities or operating groups."

See the organization chart at the end of the speech excerpt.

"The first group, and the one that started it all, is The Chocolate Factory. The chocolate maker for the prestigious Kaufmann label is Willie Wagner, a former software developer in one of Kaufmann's previous San Jose ventures, whose real

genius turned out to be the rare ability to concoct the cacao-laden, deep brown, yet silky smooth, chocolates for which Kaufmann chocolate making is known.

"The next group is the retail operation, which encompasses all the activities of the retail stores around the globe. Maeve Sigler, a veteran of the luxury retail wars, leads this group with a deft touch. Each of the stores sells, on average, \$2 million worth of chocolate products per year. The number of stores (49 at the time of the project start) is important because once the 50th store is opened, the managers of the retail operations will be allowed to gain a significant ownership share of each new retail store.

"Another major operating entity within the company is the resort group, which includes the operation of the world-class, Michelin Guide-rated San Raphael Restaurant, the Kaufmann Haus Inn, and the Golden Vine Spa. Executive Chef Bobby San Raphael manages San Raphael with exceptional care and culinary flair. Bobby, a graduate of both La Varenne in Paris and the California Culinary Institute, has created a unique Continental/Pacific Rim/Latin American fusion cuisine. Sammie Patton and Jaquelin Jenkins manage the inn and spa, respectively.

"Finally, the support group provides resources to the other three groups to help manage the information, people, communications, and money that keep the whole organization moving. As I mentioned before, Angie McVie is the Chief Information Officer, Katherine Dement manages the People group, and Gerrie Tatum handles money matters. The Communications group, which includes marketing, business development, and WWC's various publications, is the province of Consuela Lopez.

"A Leadership Council, known by everyone in the organization as the LC, attends to the strategic intent of the integrated company. The Leadership Council comprises JB Kaufmann, Willie Wagner, Maeve Sigler, Bobby San Raphael, Angie McVie, Gerrie Tatum, and another member selected from one of the operating groups that rotates on a six-month assignment to get a voice from the other end of the business. These personnel are identified in the organization chart with an asterisk.

"Let me address the organizational fuzziness issue. The space in between the four groups is nebulous. Therefore, it lurks with opportunity. For instance, the three groups of The Chocolate Factory, retail, and resort all have warehousing and storage needs. In addition, each group has an online presence, with Web pages, electronic databases, and other e-business applications. The three groups also have fairly substantial marketing efforts. Is there overlap? You bet! Operating in the organization is always complex, often messy, full of risk, and definitely fun! The Omega Project was born into this world.

"The Omega Project was the result of many market forces converging at the same time. Some of these forces were beneficial to WWC, while others impacted the company negatively. First and foremost, the evolving maturity of the electronic marketplace—e-business—has fundamentally changed the way people learn about and buy fine chocolates. Today, more people research

gourmet chocolates and buy online than ever before. If people can't buy online due to tax and legal restrictions (some states have excessive taxes for chocolate-based purchases, and most states don't allow WWC's Venezuelan cacao to cross their borders), they simply purchase chocolate from local sources. Because WWC's business model did not include selling chocolate through its Web sites (the site was brochureware only) at the time, the company started to see a significant erosion in volume sold and revenue and gross profit generated. Net profits also were sliding as a result of higher operating costs due primarily to rapidly increasing information infrastructure development, implementation, and maintenance costs.

"But WWC also saw huge opportunity in the new market forces. Technological advances made online publications much more sensible and accessible, promising additional high-margin revenue. JB's dream of a customer-accessible, comprehensive, worldwide, fine chocolate sourcing database could now be realistically envisioned and realized. Chocolate and cacao education, a rapidly expanding market niche within the company, also could take advantage of the exploding technology so that the current approach of teaching chocolate education in retail stores could be augmented and enhanced by distance-learning techniques only available through the World Wide Web.

"Were there other relevant market trends? Yes. But none of the others mattered—except the best one of all: More people around the world were buying more chocolate. As JB always said, 'opportunity lurks.' WWC needed to respond, not only to improve company performance, but also to take advantage of new trends, market forces, and technology.

"The Leadership Council met soon after these revelations came to light to determine WWC's response. The output from the LC's deliberations which, by the way, took only two days at an off-site meeting, established five things:

- 1. The project's name (Omega, from the Greek meaning 'the last', as in, if we don't do this project, the organization will cease to exist)
- 2. The project needs description
- 3. The project sponsor group
- 4. An urgency statement
- 5. The project manager"

See the project needs description, sponsorship group, and urgency statement at the end of the speech excerpt.

"The morning after the LC's off-site meeting, I was informed by JB himself that I had been selected to manage the Omega Project. As you can well imagine, upon reading the documentation from the meeting, I nearly panicked. I realized that I had never faced a project of this magnitude before, and I knew I needed a way to get my arms around it quickly."

Worldwide Chocolates Organization Chart



Omega Project Needs Description

To meet the demands of the new marketplace, to maintain (and ultimately to increase) market share, and to restore acceptable profit levels, the LC has decided that WWC will embark upon the Omega Project, which will have the following goals:

- Outsource information technology (IT OS) operations: With so many systems and employees around the world to manage its IT operations, this step is absolutely necessary to reduce WWC operating costs significantly.
- Develop and deploy an enterprise-wide resources management (ERM) system: The current system is ad hoc, and resource capacity is unknown.
- Revise/optimize the corporate Internet (INT) project: The current Web site is a limited information site that allows no interaction. WWC wants to add the following features and functions:

^{*}Members of the Leadership Council

- 1. Make *The Chocolatier*, a quarterly trade publication, available online. This step should provide WWC with a low-cost marketing vehicle and additional advertising revenue with @ links. The goal is to refresh the content daily with contributions from clients and distributors/manufacturers at low or no cost, take interactivity with consumers to a global scale, and provide greater access to potential customers with a multilingual Web site.
- 2. Create a downloadable and palm-type listing of great chocolate products for customers. Include a customizable list of chocolates held by the customer as a feature.
- 3. Provide the capability to buy chocolates online for delivery to areas that legally allow that activity to occur. This action should significantly reduce operating expenses, especially if distributors/manufacturers agree to drop-ship direct to consumers.
- 4. Give consumers access to WWC's anticipated worldwide chocolate database so Web site users can learn more about the world's chocolates, including different chocolate tastes, nuances, and features.
- 5. Take advantage of the latest Blue Nose technology that the perfume industry currently is developing to market and sell its products online. This exciting new idea will enable consumers to use virtual olfactory prototypes with mass spectrometry to "taste" chocolates online before they buy them. The advantages of incorporating this technology could propel WWC to total market dominance.
- Produce reusable or recyclable joint packaging (JP): Set up a joint project with a packaging company to produce reusable or recyclable packaging that will minimize shipping weight, but maximize protection and other positive attributes.
- Develop and optimize a world-class manufacturing and distribution (M&D) network: This application is intended to capture information about the world's significant chocolate-producing areas and manufacturers so that WWC can be involved in the transaction between the ultimate sellers and buyers of chocolate. WWC is taking this action in response to the market trend of cutting out the middleman (distributors and chocolate shops).
- Optimize the corporate facility (CF) programs: WWC is building several regional warehouses and a central warehouse. These buildings must be "dealt with" as part of the project. Some can be sold after completion. Some can be integrated as server farms and data warehousing/backup capability and so on. And some can be used as chocolate warehouses for manufacturers that will not drop-ship.

Implement a chocolate e-learning (EL) and marketing approach using new and innovative technology: This initiative is intended to capitalize on two significant trends: chocolate education and remote learning via the Internet. The current in-classroom curriculum is well attended and should work well online by creating new end users and more knowledgeable customers. WWC also envisions an extension of this capability into the group chocolate-tasting market.

Omega Project Sponsor Group

The following WWC members will comprise the project sponsor group for the Omega Project:

- JB Kaufmann, Chair
- Willie Wagner
- Maeve Sigler
- Bobby San Raphael
- Angie McVie
- Gerrie Tatum

Please see JB for a list of the internal and external resources that you anticipate you will need for this project.

Omega Project Urgency Statement

The Leadership Council has approved the go-ahead for the Omega Project. Through this statement, the Leadership Council communicates its extreme sense of urgency: The Omega Project must be fully functional in four fiscal quarters. Service provider contracts must be firm-fixed-price contracts. The Leadership Council has announced to the worldwide press that the Blue Nose technology for virtual chocolate tasting will be available within the next 12 months.



The Leadership Council recently approved the go-ahead for the Omega Project. This project is absolutely essential for the long-term viability of our company. The goals of this project are as follows:

- Outsource information technology (IT OS) operations: With so many systems and employees around the world to manage its IT operations, this step is absolutely necessary to reduce WWC operating costs significantly.
- Develop and deploy an enterprise-wide resources management (ERM) system: The current system is ad hoc, and resource capacity is unknown.
- Revise/optimize the corporate Internet (INT) project: The current Web site is a limited information site that allows no interaction. WWC wants to add the following features and functions:
 - 1. Make *The Chocolatier*, a quarterly trade publication, available online. This step should provide WWC with a low-cost marketing vehicle and additional advertising revenue with @ links. The goal is to refresh the content daily with contributions from clients and distributors/manufacturers at low or no cost, take interactivity with consumers to a global scale, and provide greater access to potential customers with a multilingual Web site.
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The Omega Project must be fully functional in four fiscal quarters. Service provider contracts must be firm-fixed-price contracts. The Leadership Council has announced to the worldwide press that the Blue Nose technology for virtual chocolate tasting will be available within the next 12 months.

The Leadership Council hereby appoints Eric Fletcher as manager of the Omega Project. Eric has the full authority of the Leadership Council to plan and implement this project. The LC expects each of you to provide Eric with your full cooperation.









READING 1 AN INTRODUCTION TO COMPLEXITY SCIENCE AS IT RELATES TO PROJECT MANAGEMENT

Foreword

The science of complexity is boundless. It crosses all the borders of tradition. It applies to fields as diverse as topology, economics, physics, and biology. And it asks people to examine long-held beliefs about the systems they manage, their understanding about how those system parts relate to each other, how information flows through the system, and the need for cooperation among the parts.

Complexity science has been around for over 20 years and many of the principles of complexity science have been tried and adapted in companies over the last few years.

Project management is a unique competency that requires specialized skills in integration, scope, time, cost, quality, human resources, communication, risk, and procurement management. Project managers are challenged with managing many or all of these areas *in relation to each other*. Historically, project managers have attempted to manage challenging projects by using control-oriented techniques that are executed in a rigid, top-down hierarchical structure emphasizing compliance, conformity, and adherence. The problems faced by traditional project managers are magnified in complex projects because there are too many variables to identify. If a person cannot identify them, how can they be scheduled? How would one cost them? How would one define the scope?

These are the nonlinear factors that occur on every project and cause projects to suffer from scope creep. Yet, a traditional solution has been to apply a linear approach to estimating project schedule and budget. Project managers disregard the other factors because they are unrealistic or too difficult to quantify, but they are factors that occur on every project and on all the tasks.

Project managers learn that they limit their potential outcomes by limiting their choices or options from the science of complexity. Complexity science concepts can be applied to project management to improve performance by enhancing

choices to deal with dilemmas of complex project management. These concepts can enhance a project manager's ability to manage project dilemmas.

Complex Projects

Large-scale projects are among the most important and consistently mismanaged endeavors in modern society. Large-scale projects include the design and construction of civil works and infrastructure (bridges, tunnels, power plants, and telecommunication networks), military systems (aircraft, ships, and weapons systems), and new products in every industry (software, automobiles, semiconductor chip design, and wafer construction).

Projects of all types routinely experience cost overruns, delays, and quality problems. Cooper and Mullen examined a sample of large civilian and military projects (averaging 130,000 person hours of planned work over about a year for the civilian projects and 170,000 hours of planned work on the military projects). They found commercial projects cost 140 percent of the original estimates and took 190 percent as long as originally scheduled, while defense projects cost 310 percent of the original estimates and took 460 percent as long to complete.

Delays, cost overruns, and quality problems in commercial new product development can kill a company, particularly in high-velocity industries such as software and high technology.

—John D. Sterman, "Business Dynamics: Systems Thinking and Modeling for a Complex World" Journal of the Operational Research Society

The Past as Prelude

Where did our ideas about managing originate? Are the ideas still valid in the modern enterprise?

As managers we are confronted with increasingly complex projects. Additional factors of reduced resources and an emphasis on speed-to-market add more pressure. Why are these efforts failing or less than optimal? The answer is that many organizations and project managers are not examining projects and practices periodically with a view toward renewal or self-improvement.

Managerial positions were created to manage the new factories created as a result of the Industrial Revolution. But the lack of management expertise caused factory owners to seek advice and guidance from outside experts and philosophers. The work of three philosophers played particularly important roles in shaping management thinking that is prevalent to this day.

The first of these was Rene Descartes, a mathematician and philosopher who is famous for the concept of reductionism. Reductionism is the idea that to better understand something; you must break it down into component parts. If you understand the parts, then you understand the whole. The second was Sir Isaac Newton whose ideas about the mechanistic universe extended the theories of Descartes and gave us the concepts of serial linkage and machine-like organizational structures. Lastly, Adam Smith wrote *Wealth of Nations*, advocating a "division of labor" as a method of control and efficiency. The ideas of these three thinkers helped established the management techniques used during and after the Industrial Revolution.

In its time, machine-age management practices served their purpose well. However, these practices consider the worker to be essentially utilitarian. But workers have become better educated, more socially aware, and exposed to more information, making this utilitarian view unviable. In the modern project environment, workers often generate solutions to complex problems. In large, complex projects, the need for worker input and commitment becomes even more important. Many theorists suggest that the internal workers' commitment is critical for success on a typical project and is mandatory for success on a large, complex project. Though technical know-how is an admired trait of many project managers, it is difficult for project managers to have the technical subject matter expertise for all aspects of complex projects. Some project teams also may not possess the technical expertise necessary to create full and detailed project plans.

The Future in Present Form

The nature of many of today's projects and much of our work in the information age is increasingly dynamic and complex. Projects and business processes have many—

- Interested and participating parties
- Technical variables
- Geographic and cultural diversity issues
- Economic variables
- Time variables
- Legal variables

In an effort to deal with dynamics and complexity, managers have resorted to increased control, rules, competition, and other Newtonian concepts that have proven to be ineffective or of limited value. To manage complexity effectively, managers must understand complex systems and how they affect projects, products, and processes.

Complex systems can be defined in many different ways based on the definer's environment.

A complex project may have hundreds of staff resources and hundreds or even thousands of work packages to manage. This does not count the management of customer relationships, internal organizational rules and standards, and other internal and external issues. A *limited span of control and unity of command make a complex project a very difficult environment*. Each participating party on the project is an independent agent whose support and compliance is needed. Effective complexity management requires a mental model and approach that—

Discards old concepts of command and control

- Enhances relationships among the stakeholders through communication and cooperation
- Emphasizes the important role of leadership
- Combines standard project management practices with unique practices required to manage the complex environment

Questions to Ponder

- How does complexity science challenge traditional methods of project management?
- Why do large-scale projects consistently finish behind schedule, over budget, and outside specifications?
- Why are the philosophies of Rene Descartes, Isaac Newton, and Adam Smith no longer sufficient for contemporary project management?





Reading 2 ESI'S COMPLEX PROJECT MODEL[™]

It is important to note that the concepts that follow form a framework. When thinking about the application of complexity theory to project management, it is helpful to think about the science of meteorology. Meteorologists define weather patterns and probable weather results, but they cannot precisely predict tornado or hurricane landfalls. Complexity concepts affect all projects, but their effects are shaped by the uniqueness of the project variables because no two projects are exactly alike. But even with those obstacles, ESI's Complex Project Model[™] will increase the likelihood of successful management on any complex project.

ESI's Complex Project Model[™] has four components:

- 1. *Knowledge of Complexity:* The science that helps people understand the interactions that occur on a project
- 2. **Communication:** The methods of communication, critical information that must be transferred, and the essentials of feedback
- 3. **Project Management:** Application of the disciplines and competencies required to manage complex projects
- 4. *Leadership:* The role of the project manager in guiding and managing the project and related interactions

The ESI model for managing complex projects is shown in Figure 1. The effective management of complex projects requires the engagement of *all* the component parts of the diagram. Each part reinforces and supports the others. The assumptions in designing the model are as follows:

- It is a departure from typical models because it sets a mental framework, but is not process oriented or flow oriented.
- Each complex project possesses its own unique elements and remedies. Just as complex projects are highly interrelated, so is the model for the effective management of those projects. A person cannot manage complex projects effectively without representation of all the parts in the model.
- Leadership is the heart of the model.



Figure 1: ESI's Complex Project Model™

Knowledge of Complexity

The first element in dealing effectively with a complex project is knowledge of complexity. Reading 1 introduced you to this body of knowledge.

Communication

Effective communication is one of the major tools project managers can use to address the intricacies of complexity. Communication, then, is the second element of ESI's Complex Project Model[™].

A common practice in the machine age was to communicate with a need-to-know approach. In the modern era, however, project members and stakeholders must have a solid understanding of corporate and project issues. Corporations that study troubled projects know that projects do not generally fail because of technical problems.

The project manager and the project team's task is to-

- Ensure uniform and consistent performance
- Develop a communication system that promotes establishment of healthy boundaries and enables information sharing and collaboration

Communication in the complex environment cannot be haphazardly conducted. It must be the result of a well-conceived plan. The plan should address the following concerns:

- With whom must there be communication?
- What information needs to be transferred?
- Are there unique needs (language, cultural, geographic, interoperability, and so on) that should be incorporated into the plan?

- How often must planned communication occur?
- What are the guidelines for communication?
- What are the specific contact methods?

Communication is the first half of the information process—managing the information is the second half.

Information can be communicated either formally or informally, but both need to be captured and managed. A formal system for gathering, integrating, and distributing critical project information is called the project management information system (PMIS). A project office or a project assistant normally manages the PMIS database. Corporate standards or standard operating procedures usually determine the type of information that is collected and reported. The information collected is usually specific to a business area, but is consistent across projects. It is good project management practice to recognize that large, complex projects will generate volumes of information and data, and that a coherent approach to information and data management is critical to the project's success. The PMIS typically will define what information is required to be reported to the project's critical stakeholders.

Project Management

Managers of complex projects must do more than know about complexity science and have effective communication skills; they also must know the basics of project management and be able to create project plans that take that complexity into consideration. Managers of complex projects must—

- Define a project structure that enables the accomplishment of the vision and project charter or contract
- Help the project team achieve the triple constraint while encouraging interaction and emergence
- Establish a well-defined plan that functions as an "area of order" (the "area of order" is the plans, procedures, policies, and guidance defining and setting up the project for success)

Restrictive or control-oriented approaches are ineffective in the complex environment. The chart below contrasts the machine-age management techniques to those recommended for effective complexity management.

Machine Age	Complexity Management
Conflict/control	Collaboration/decentralized control
Impersonal view	Inclusive view
Rules dominate	Principles guide
Inflexible boundaries	Flexible/open boundaries
Strict barriers	Deemphasized barriers
Dictatorial leader	Supportive leader style
Structurally serial	Serial and circular
Competition	Parts working in collaboration and sharing

Complex projects should be built around the organizational, work, and product breakdown structures best suited to the particular project.

Project management tools and methods that emphasize positive deviance, emergence, and self-organization should be built into the complex project plan. The challenge is mapping the various methodologies into each other in a unique, mutually reinforcing manner. They need to be unique to maintain clear communications and to avoid ambiguities. Working this way requires substantial communication, which builds the team and encourages collaboration.

Change management and risk management are key elements of complex project plans. The complex management plan should also contain strategies for influencing various agents throughout the project life cycle to maximize leverage.

Leadership

The key element in the complex project management environment is leadership. Leadership is an art. There is no recipe.

For the most part, complex project management tools are no different than the tools used for any other project. The difference is that the project manager must possess a different knowledge base and a strong leadership capability. In truth, the major difference between managing complex projects and other projects lies in the leadership component; as projects become larger or more complex (or both), the degree of success is directly proportional to the project manager's leadership capability.

Complex projects place special demands on managers. The project manager must have knowledge of—

- Technology
- Project management
- The organization for which he or she works
- The customer organization
- The marketplace

- Competitors
- People who work on the project
- Complexity science

Expertise in all these areas is important. Wisdom and experience, however, are even more critical.

What is the difference between management and leadership? Harvard Business School's John Kotter, a popular lecturer and writer on organizational dynamics, believes management and leadership have distinctly different goals and that different behaviors are needed for each. Complex projects—more than any others—challenge our own beliefs and paradigms. ESI's Complex Project Model[™] examines behaviors that are appropriate for the unique characteristics of complex projects.

When the machine-age and the assembly-line mentalities were popular, the Newtonian mental model and military hierarchy of command and control resulted in organizations that were described as tightly linked and fine-tuned. Too often, managers of complex projects desire to have their projects described in this way. But the nature of complex projects demands a different structure. The Newtonian model was based on the pursuit of reliance, stability, and predictability. Complex projects are described in very different terms. They are often described as living organisms that are evolving and changing and are more fluid. Unpredictability, instability, uncertainty about the future, vast amounts of information, and the changing workforce mandate specific behaviors for success.

The role of the leader, as defined by Kotter, is more consistent with the behaviors necessary for complex projects. It is important to state, however, that as one examines complexity, behaviors become apparent. In the table on page 4, words such as *supportive*, *collaboration*, *principles guide*, *inclusive*, *open*, *decentralized*, and *sharing* form a pattern of behavior different than those ascribed for a machine-age organization. It would be helpful to contrast this understanding to the behaviors described by Kotter.

Managers	Leaders	
Plan and budget	Set direction	
Organize and staff	Align people	
Control and solve problems	Motivate	

These concepts, which may appear radical to some, cannot be effectively employed in isolation. They are tools of connectivity as much as they are tools for activity. After a person has learned them, he or she must undertake an effort to ensure that project personnel and key stakeholders receive the necessary training. These concepts **do not** replace the old Newtonian concepts; they complement them. These are new tools at the project manager's disposal. Understanding them takes time and effort. Organizations as diverse as Citibank[®], the U.S. Army, Motorola[®], IBM[®], American Express[®], and many others are using these concepts. You can too—knowing about them is the first step.

To effectively govern complex projects, managers should encourage adaptive behavior by-

- Regulating the balance between disequilibrium and equilibrium
- Focusing on interactions and relationships between the various structures and systems
- Promoting self-similarity among the agents
- Communicating progress and setbacks from the perspective of your own values
- Communicating and promoting various methods and tools





































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	Con	clusions		
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EXERCISE APPLYING PROJECT COMPLEXITY KNOWLEDGE AND SKILLS

Assignment

The following questions represent an excerpt from ESI's Complexity Indicator™ Tool. Answer the questions and tally your numerical score.

Be prepared to explain to the entire class the complexity level of your project and at least two actions you plan to take to deal with the project's complexity.

TOOL ESI's Complexity Indicator™

To use this tool, complete the following steps:



Read questions 1 through 10 in the General Project section, and respond to the best of your ability and knowledge.



B

Tally scores for each question response to obtain total score.

Determine project complexity level from total score.

Read questions 1 through 10, and respond to the best of your ability and knowledge.

General Project

These questions apply to any project in any phase. Based on your knowledge, choose the best response for each question and circle the number adjacent to your choice.

1. Project Team Size

How many team members are involved in the project?

- 1. Fewer than 15
- 3. 16 to 45
- 5. More than 45 or unknown

2. Work Package Interdependence

How many interdependencies exist between project work packages?

- 1. Fewer than 20
- 3. 20 to 100
- 5. More than 100 or unknown

3. Project System Nonlinearity

The potential for unintended consequences arising from management action during the project is—

- 1. Low
- 3. Medium
- 5. High

4. Project Risk Level

The risk level of the project is-

- 1. Low
- 3. Medium
- 5. High

5. Technology

To what degree will the project employ new, emerging, or rapidly changing technology to deliver results?

- 1. Very little
- 3. Some
- 5. A great deal

6. Team Location

What percentage of the time will the project teams be working in multiple locations to deliver project results?

- 1. Little of the time
- 3. Some of the time
- 5. Most of the time

7. Deliverables Destination

To how many destinations will the project products or services be delivered?

- 1. One or two destinations
- 3. A few destinations
- 5. Many destinations

8. Project Manager Experience

What is the project managers' experience in managing this type of project?

- 1. High
- 3. Medium
- 5. Low

9. Project Sponsor/Customer Commitment

Is the project sponsor/customer (group) committed to the project and its' purpose and outcomes?

- 1. Yes
- 3. Maybe
- 5. No or unknown

10. Time/Cost Constraints

Time or cost (or both) constraints are-

- 1. Mostly known and realistic
- 3. Somewhat unknown or unrealistic
- 5. Mostly unknown or unrealistic

2 Determine the score for each question and tally them for the total score.

Transfer the number of your responses from Steps 1 and 2a or 2b in the column below. Add the numbers in the score column to obtain the total score.

Question Number	Question Description	Response Number	
GENERAL PROJECT			
1	Project Team Size		
2	Work Package Interdependence		
3	Project System Nonlinearity		
4	Project Risk Level		
5	Technology		
6	Team Location		
7	Deliverables Destination		
8	Project Manager Experience		
9	Project Sponsor/Customer Commitment		
10	Time/Cost Constraints		

Total Score:



Go to Step 3 to determine the complexity level of your project.

B Determine project complexity level from total score.

Project complexity level: Look up your total score on the table below to determine the complexity level for your project. Then enter this level into the box following the table.

Total Score		Project Complexity Level	
From	То	Froject Complexity Level	
1	19	1—Simple	
20	39	2—Complicated	
40	59	3—Low Complexity	
60	79	4—Moderate Complexity	
80	100	5—High Complexity	

Project Complexity Level:



