

Systems Development and Project Management: Corporate Responsibility

9

CHAPTER

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CHAPTER OUTLINE

What's in IT for me?

This chapter provides an overview of how organizations build information systems. As a business student, you need to understand this process because information systems are the underlying foundations of company operations. Your understanding of the principles of building information systems will make you a more valuable employee. You will be able to identify trouble spots early and make suggestions during the design process that will result in a better information systems project—one that satisfies both you and your business.

Building an information system is like constructing a house. You could sit back and let the developers do all the design work, construction, and testing and hope the finished product will satisfy your needs. However, participating in the process helps to guarantee that your needs are not only heard, but also met. It is good business practice to have direct user input steering the development of the finished product. Your knowledge of the systems development process will allow you to participate and ensure you are building flexible enterprise architectures that support not only current business needs, but also future ones.



Getting Your Project on Track

June is the perfect time of year to reflect on the current state of all the key projects that were approved in January. At this stage, you and your management team should have enough data to know if each initiative will successfully meet its objectives. You may already know there are projects in your organization that are not positioned to succeed, yet they still receive funding and staff. When you assess the current state of your projects, do you see any of the following signs:

- Critical issues keep opening up, but they're not getting resolved.
- Project scope is constantly changing.
- The project is consistently behind its plan, despite efforts to get it back on schedule.
- Competing deliverables are distracting your attention.

If all of these signs appear, it may be time to cut your losses and cut the project—or at least radically restructure it. You know better than anyone that throwing good money after the bad will not save the project because it doesn't address the root cause of the project's woes. To determine a course of action, ask yourself the following questions about the project:

- What can be salvaged?
- What can be delivered with the time and budget that are left?
- Do you have the right leadership in place to complete the project successfully?
- Is the plan for the initiative sound and realistic?
- Am I and my management team doing everything we can to support the initiative?

If part of or the entire project can be salvaged and delivered on time and with the remaining budget, if the right leaders are present to steer the project, if the new plan is solid, and if management will continue to support the project, the following four steps will help you regain control and deliver the revised project successfully. These steps are basic blocking and tackling, but the detail behind the plan—and more importantly, the execution and focus the project team brings to the effort—will determine whether the project recovery effort will succeed.

Step One: Assess the Situation

Get as much information about the current state of the project as possible. Use that data to make informed decisions about what needs to happen next. Don't be afraid if, at this stage, there are more questions than answers; that is normal. The key is to ask

the right question to obtain as accurate a picture of the project's status as possible. The following questions address key data points you need to collect:

- How critical is the delivery date?
- What functionality is exactly required by the delivery date?
- What has been completed and what is still outstanding?
- How willing will people be to change scope, dates, and budget?

The last question about change is critical because it touches on the people and political issues that are present in any project and any organization. Even when faced with sure failure, people find it hard to change unless there is a direct benefit to them and their team. For recovery to have a chance, expectations need to change, especially those of the key stakeholders.

When gathering data about the current state of the project, remember to ask the current team for their opinions on what went wrong. It can be easy to ignore their input since they're associated with the current failure. In fact, each individual can provide great insight into why the project arrived in its current state. Reach out to key team members and get their suggestions for correcting the situation.

Step Two: Prepare the Team for Recovery

Everyone involved in the project—from executive management to stakeholders to project team members—needs to accept that the current project is broken and needs to be fixed. They also need to accept that the existing project plan and approach to delivering the project is flawed and needs to be restructured. If they don't accept these facts, they will likely resist the steps needed for recovery.

Once everyone has accepted the need to change course, define realistic expectations for what can be delivered given the current state and time frame. Also establish metrics for success and control of the recovery. If you had metrics at the outset of the project, you may need to establish new ones, or you may simply need to hold yourself and others accountable to them.

Both management and the project manager in charge of the recovery need to develop a supportive environment for team members. Giving them realistic goals and providing them with the needed space, equipment, and training will position them for success.

Finally, take advantage of the new momentum associated with the recovery and involve all the key parties in the status of the project. This involvement will keep everyone focused and engaged. It will assure project team members and stakeholders that they're needed for more than just executing tasks.

Step Three: Develop a Game Plan for Recovery

Think of the recovery as a new project, separate from the old one. This new project requires its own scope of work to make the expectations around what is being delivered and the new criteria for judging success crystal clear. The new scope may require you to determine if you have the right resources on the project team or if you need to re-staff some team members.

Based on the new project scope, the project manager and project team should lay out a clear and realistic road map to achieve the objectives. The main difference in the plan this time is that it must not fail. It will also be under much greater scrutiny by management. Consequently, it will be critical to make sure the milestones are shorter in duration to demonstrate success and to allow for course correction if needed. The shorter milestones will provide valuable data points to determine the health of the project early.

Step Four: Execute the Game Plan

With the new plan in hand, it's time to get down to business. Remember that during execution, it is not just the project team members who are accountable. Everyone from management on down is on the hook. All facets of the project, from environment to support, need to be in sync at all times, and everyone needs to know they are accountable for the project recovery to succeed.

To make sure everyone is on the same page during the recovery, the project communication needs to be clear, informative, and frequent. Clearly define in your communication plan how information will be disseminated, how urgent items will be addressed, and how key decisions will be made.

Given the added level of scrutiny on the plan and the project, being able to provide the latest on the metrics to show the improved control over the project will be key. The data will also allow you to quickly make corrections when any sign of trouble surfaces.

Getting a flailing project back on track is not easy. It requires sustained effort, focus, commitment, and objectivity. During the project recovery there is no time for personal agendas. The ability to see and do what is best for the project is required from every team member.

It is also important to not lose sight of the pressure that everyone is under. Make sure there is a positive focus on people. The team needs to have the ability to bond, release a little steam, and be focused on the task at hand.

When the project has been successfully delivered, celebrate and recognize the effort of each and every team member. Finally, learn from this successful project recovery so that you and your organization can avoid having to recover a project again. Pay attention to the warning signs and act swiftly and decisively to make corrections early in the project's life cycle so that successful delivery is ensured the first time.¹

section 9.1 DEVELOPING ENTERPRISE APPLICATIONS

LEARNING OUTCOMES

- 9.1 Explain the relationship between the systems development life cycle and software development along with the business benefits associated with successful software development.
- 9.2 Describe the seven phases of the systems development life cycle.
- 9.3 Summarize the different software development methodologies.

DEVELOPING SOFTWARE

The multimillion-dollar Nike SCM system failure is legendary as Nike CEO Philip Knight famously stated, “This is what we get for our \$400 million?” Nike partnered with i2 to implement an SCM system that never came to fruition. i2 blamed the failed implementation on the fact that Nike failed to use the vendor’s implementation methodology and templates. Nike blamed the failure on faulty software.²

It is difficult to get an organization to work if its systems do not work. In the information age, software success, or failure, can lead directly to business success, or failure. Companies rely on software to drive business operations and ensure work flows throughout the company. As more and more companies rely on software to operate, so do the business-related consequences of software successes and failures.

The potential advantages of successful software implementations provide firms with significant incentives to manage software development risks. However, an alarmingly high number of software development projects come in late or over budget, and successful projects tend to maintain fewer features and functions than originally specified. Understanding the basics of software development, or the systems development life cycle, will help organizations avoid potential software development pitfalls and ensure that software development efforts are successful.

LO 9.1: Explain the business benefits associated with successful software development.

THE SYSTEMS DEVELOPMENT LIFE CYCLE (SDLC)

The *systems development life cycle (SDLC)* is the overall process for developing information systems, from planning and analysis through implementation and maintenance. The SDLC is the foundation for all systems development methods, and hundreds of different activities are associated with each phase. These activities typically include determining budgets, gathering system requirements, and writing detailed user documentation.

The SDLC begins with a business need, proceeds to an assessment of the functions a system must have to satisfy the need, and ends when the benefits of the system no longer outweigh its maintenance costs. This is why it is referred to as a life cycle. The SDLC is comprised of seven distinct phases: planning, analysis, design, development, testing, implementation, and maintenance (see Figure 9.1).

LO 9.2: Describe the seven phases of the systems development life cycle.

1. **Planning:** The *planning phase* establishes a high-level plan of the intended project and determines project goals. Planning is the first and most critical phase of any systems development effort an organization undertakes, regardless of whether the effort is to develop a system that allows customers to order products online, determine the best logistical structure for warehouses around the world, or develop a strategic information alliance with another organization. Organizations must carefully plan the activities (and determine why they are necessary) to be successful.
2. **Analysis:** In the *analysis phase* the firm analyzes its end-user business requirements and refines project goals into defined functions and operations of the intended system. *Business requirements* are the specific business requests the system must meet to be successful, so the analysis phase is critical. The organization must spend as much time, energy, and resources as necessary to perform it accurately and in detail.

BUSINESS DRIVEN START-UP

Just Ask TED

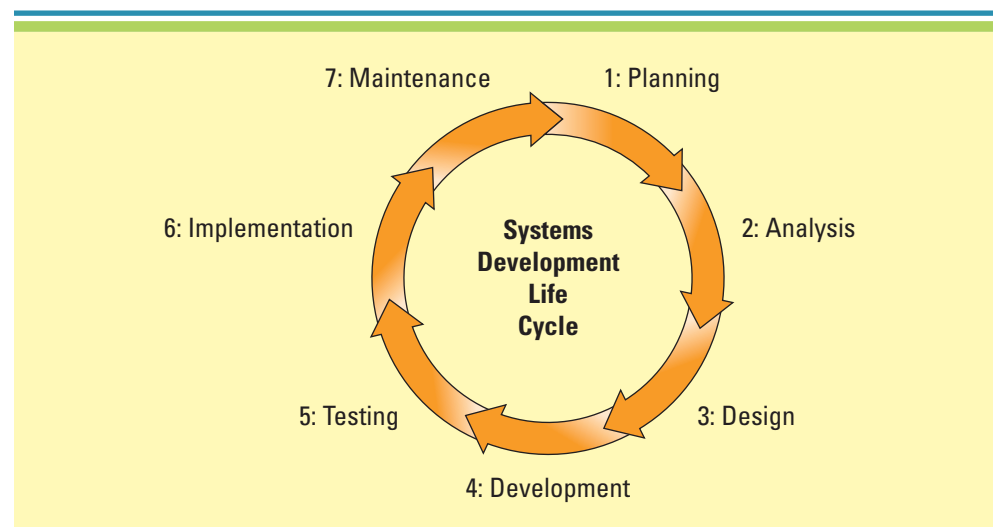
You'll remember this day because it is the day you were introduced to Ted (www.ted.com). TED is a nonprofit devoted to "ideas worth spreading." The company hosts a yearly conference focusing on technology, entertainment, and design (TED). TED gathers the world's innovative minds who are challenged to give the talk of their lives in just 18 minutes. Each talk is posted to the Ted website and includes such famous speakers as:

- Chris Anderson, editor of *Wired* and author of *The Long Tail: Why the Future of Business Is Selling Less of More*.
- Tim Berners-Lee, inventor of the World Wide Web.
- Jeff Bezos, founder of Amazon.com.
- Richard Branson, founder of Virgin.
- Bill Clinton, former president of the United States.
- Peter Diamandis, chairman of the X Prize Foundation.
- Sergey Brin and Larry Page, co-founders of Google.
- Malcolm Gladwell, author of *Blink* and *The Tipping Point*.
- Bill Gates, founder of Microsoft.
- Seth Godin, a marketing guru.
- Steven Levitt, author of *Freakonomics*.³

As you brainstorm your future start-up hoping to become the next Bill Gates or Steve Jobs, how can you use TED to generate ideas? Review the TED website and choose three talks that could help lead to the next great business idea.

FIGURE 9.1

The Systems Development Life Cycle



3. Design: The *design phase* establishes descriptions of the desired features and operations of the system including screen layouts, business rules, process diagrams, pseudo code, and other documentation.

4. Development: The *development phase* takes all the detailed design documents from the design phase and transforms them into the actual system. In this phase the project transitions from preliminary designs to actual physical implementation.

BUSINESS DRIVEN DEBATE

Data must be secure! A computer programming course would teach you that security is a critical component that must be included in every system. Apparently, the employees that developed the new system for the state of Oklahoma were out sick during this important class. The new system mistakenly posted confidential data, including Social Security numbers, for thousands of Oklahoma residents on the state's website. The really unfortunate part of this systems blunder is that the error went unnoticed for more than three years. A programmer found the error when he realized that by changing his Web browser he could redirect his page to the entire database for the state of Oklahoma. To make matters even worse, due to development issues, a hacker could have easily changed all of the data in the database or added false data to elements such as the state's Sexual and Violent Offender Registry.⁴

Why is it important to secure data? What can happen if someone accesses your customer database? What could happen if someone changes the information in your customer database and adds fictitious data? What phases in the systems development life cycle should have found these errors? How could these errors go unnoticed for over three years? Who should be held responsible for the system issues?

Flawed Development

5. **Testing:** The *testing phase* brings all the project pieces together into a special testing environment to eliminate errors and bugs, and verify that the system meets all the business requirements defined in the analysis phase.
6. **Implementation:** In the *implementation phase* the organization places the system into production so users can begin to perform actual business operations with it.
7. **Maintenance:** Maintaining the system is the final sequential phase of any systems development effort. In the *maintenance phase* the organization performs changes, corrections, additions, and upgrades to ensure the system continues to meet its business goals. This phase continues for the life of the system because the system must change as the business evolves and its needs change, which means conducting constant monitoring, supporting the new system with frequent minor changes (for example, new reports or information capturing), and reviewing the system to be sure it is moving the organization toward its strategic goals.

TRADITIONAL SOFTWARE DEVELOPMENT METHODOLOGY: THE WATERFALL

Today, systems are so large and complex that teams of architects, analysts, developers, testers, and users must work together to create the millions of lines of custom-written code that drive enterprises. For this reason, developers have created a number of different systems development life cycle methodologies. A *methodology* is a set of policies, procedures, standards, processes, practices, tools, techniques, and tasks that people apply to technical and management challenges. Firms use a methodology to manage the deployment of technology with work plans, requirements documents, and test plans, for instance. A formal methodology can include coding standards, code libraries, development practices, and much more.

The oldest and the best known is the *waterfall methodology*, a sequence of phases in which the output of each phase becomes the input for the next (see Figure 9.2). In the SDLC, this means the steps are performed one at a time, in order, from planning through implementation and maintenance. The traditional waterfall method no longer

LO 9.3: Summarize the different software development methodologies.

FIGURE 9.2
The Traditional Waterfall Methodology

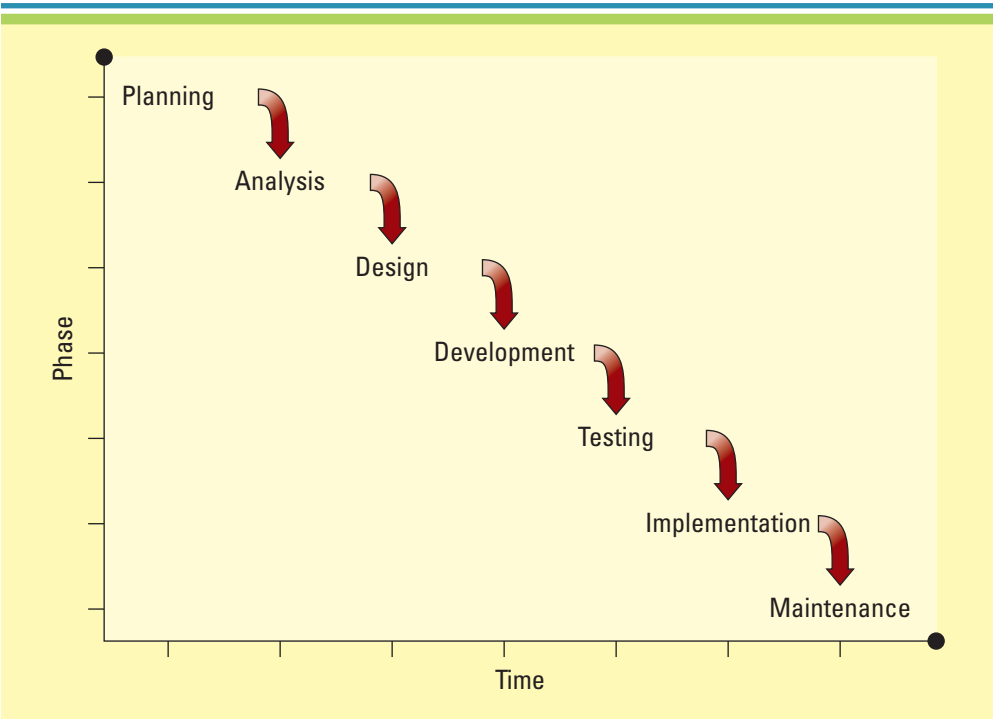


FIGURE 9.3
Disadvantages of the Waterfall Methodology

Issues Related to the Waterfall Methodology	
The business problem	Any flaws in accurately defining and articulating the business problem in terms of what the business users actually require flow onward to the next phase.
The plan	Managing costs, resources, and time constraints is difficult in the waterfall sequence. What happens to the schedule if a programmer quits? How will a schedule delay in a specific phase impact the total cost of the project? Unexpected contingencies may sabotage the plan.
The solution	The waterfall methodology is problematic in that it assumes users can specify all business requirements in advance. Defining the appropriate IT infrastructure that is flexible, scalable, and reliable is a challenge. The final IT infrastructure solution must meet not only current but also future needs in terms of time, cost, feasibility, and flexibility. Vision is inevitably limited at the head of the waterfall.

serves most of today’s development efforts, however; it is inflexible and expensive, and it requires rigid adherence to the sequence of steps. Its success rate is only about 1 in 10. Figure 9.3 explains some issues related to the waterfall methodology.⁵

Today’s business environment is fierce. The desire and need to outsmart and outplay competitors remains intense. Given this drive for success, leaders push internal development teams and external vendors to deliver agreed-upon systems faster and cheaper so they can realize benefits as early as possible. Even so, systems remain large and complex. The traditional waterfall methodology no longer serves as an adequate systems development methodology in most cases. Because this development environment is the norm and not the exception anymore, development teams use a new breed of alternative development methods to achieve their business objectives.

AGILE SOFTWARE DEVELOPMENT METHODOLOGIES

It is common knowledge that the smaller the project, the greater the success rate. The iterative development style is the ultimate in small projects. Basically, *iterative development* consists of a series of tiny projects. It has become the foundation of multiple agile methodologies. Figure 9.4 displays an iterative approach.

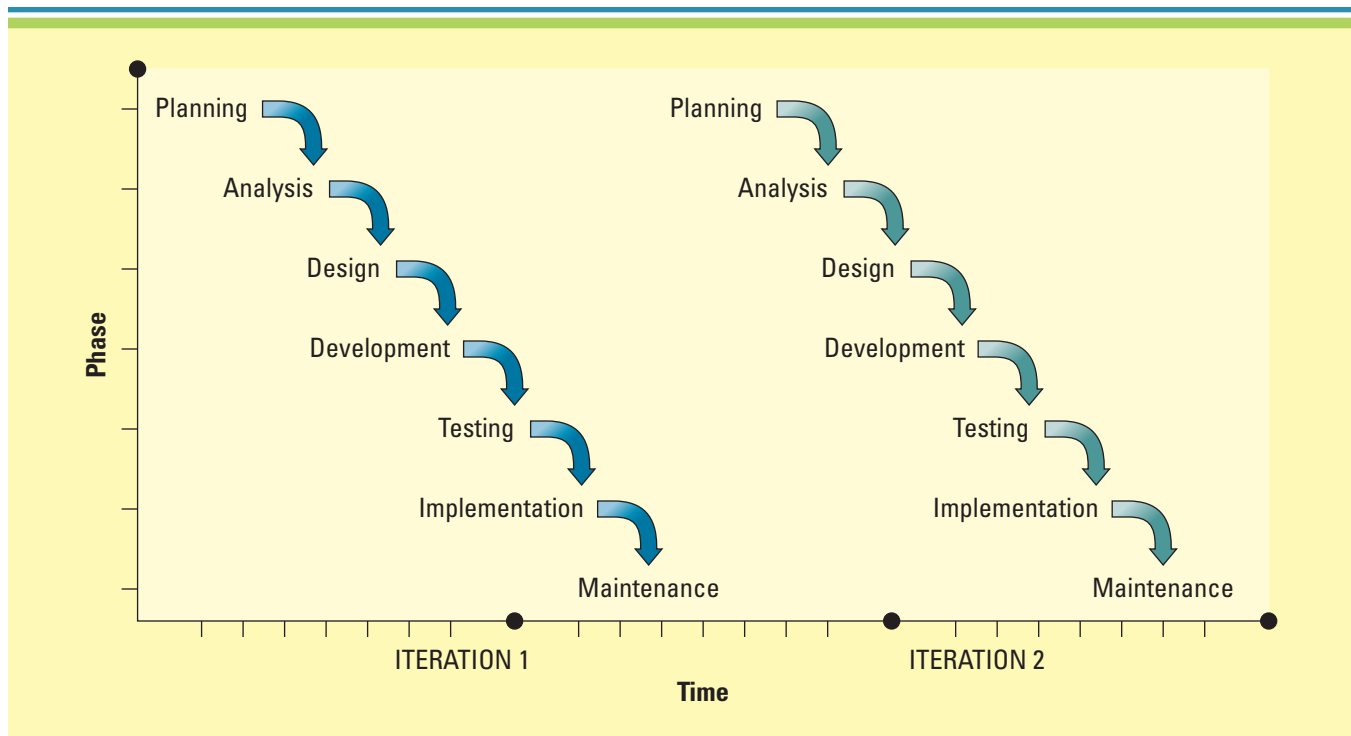


FIGURE 9.4
The Iterative Approach

An **agile methodology** aims for customer satisfaction through early and continuous delivery of useful software components developed by an iterative process using the bare minimum requirements. Agile methodology is what it sounds like: fast and efficient, with lower costs and fewer features. Using agile methods helps refine feasibility and supports the process for getting rapid feedback as functionality is introduced. Developers can adjust as they move along and better clarify unclear requirements.⁶

One key to delivering a successful product or system is to deliver value to users as soon as possible—give them something they want and like early to create buy-in, generate enthusiasm, and, ultimately, reduce scope. Using agile methodologies helps maintain accountability and helps to establish a barometer for the satisfaction of end users. It does no good to accomplish something on time and on budget if it does not satisfy the end user. The primary forms of agile methodologies include:

- Rapid prototyping or rapid application development methodology.
- Extreme programming methodology.
- Rational unified process (RUP) methodology.
- Scrum methodology.

It is important not to get hung up on the names of the methodologies—some are proprietary brand names, others are generally accepted names. It is more important to know how these alternative methodologies are used in today's business environment and the benefits they can deliver.

Rapid Application Development (RAD) Methodology

In response to the faster pace of business, rapid application development has become a popular route for accelerating systems development. **Rapid application development (RAD) methodology** (also called **rapid prototyping**) emphasizes extensive user involvement in the rapid and evolutionary construction of working prototypes of a system, to accelerate the systems development process. Figure 9.5 displays the fundamentals of RAD.

A **prototype** is a smaller-scale representation or working model of the users' requirements or the proposed design for an information system. The prototype is an essential part of the analysis phase when using the RAD methodology.⁷

FIGURE 9.5
Fundamentals of RAD

Fundamentals of RAD
Focus initially on creating a prototype that looks and acts like the desired system.
Actively involve system users in the analysis, design, and development phases.
Accelerate collecting the business requirements through an interactive and iterative construction approach.

Extreme Programming Methodology

Extreme programming (XP) methodology, like other agile methods, breaks a project into four phases, and developers cannot continue to the next phase until the previous phase is complete. The delivery strategy supporting XP is that the quicker the feedback the more improved the results. XP has four basic phases: planning, designing, coding, and testing. Planning can include user interviews, meetings, and small releases. During design, functionality is not added until it is required or needed. During coding, the developers work together soliciting continuous feedback from users, eliminating the communication gap that generally exists between developers and customers. During testing, the test requirements are generated before any code is developed. Extreme programming saves time and produces successful projects by continuously reviewing and revamping needed and unneeded requirements.⁸

Customer satisfaction is the primary reason XP finds success as developers quickly respond to changing business requirements, even late in the life cycle. XP encourages managers, customers, and developers to work together as a team to ensure the delivery of high-quality systems. XP is similar to a puzzle; there are many small pieces and individually the pieces make no sense, but when they are pieced together they can create a new system.

Rational Unified Process (RUP) Methodology

The *rational unified process (RUP) methodology*, owned by IBM, provides a framework for breaking down the development of software into four “gates.” Each gate consists of executable iterations of the software in development. A project stays in a gate waiting for the stakeholder’s analysis, and then it either moves to the next gate or is cancelled. The gates include:⁹

- **Gate one: inception.** This phase ensures all stakeholders have a shared understanding of the proposed system and what it will do.
- **Gate two: elaboration.** This phase expands on the agreed-upon details of the system, including the ability to provide an architecture to support and build it.
- **Gate three: construction.** This phase includes building and developing the product.
- **Gate four: transition.** Primary questions answered in this phase address ownership of the system and training of key personnel.

Because RUP is an iterative methodology, the user can reject the product and force the developers to go back to gate one. RUP helps developers avoid reinventing the wheel and focuses on rapidly adding or removing reusable chunks of processes addressing common problems.

Scrum Methodology

Another agile methodology, *scrum methodology*, uses small teams to produce small pieces of software using a series of “sprints,” or 30-day intervals, to achieve an appointed goal. In rugby, a scrum is a team pack and everyone in the pack works together to move the ball down the field. In scrum methodology, each day ends or begins with a stand-up meeting to monitor and control the development effort.

BUSINESS DRIVEN ETHICS AND SECURITY

Unexpected situations happen all the time, and the more you plan for them the better prepared you'll be when developing software. Your employees will get into accidents, contract viruses and diseases, and other life issues. All of these scenarios lead to unplanned absenteeism, which can throw your project plan into a tailspin. What can happen to a project when a key employee suddenly quits or is forced to go on short-term disability? When reviewing all the different SDLC methodologies, which one offers the greatest flexibility for unplanned employee downtime? If you could choose when your employee was absent, which phase in the SDLC would be the safest for your project to still continue and achieve success? What can you do to ensure you are preparing for unplanned absenteeism on your project plan?

Planning for the Unexpected

DEVELOPING SUCCESSFUL SOFTWARE

Developing projects within budget and on time is challenging. The primary reasons for project failure include:

- Unclear or missing business requirements.
- Skipping SDLC phases.
- Changing technology.
- The cost of finding errors.

Unclear or Missing Business Requirements

The most common reason systems fail is because the business requirements are either missing or incorrectly gathered during the analysis phase. The business requirements drive the entire system. If they are not accurate or complete, the system will not be successful.

Skipping Phases

The first thing individuals tend to do when a project falls behind schedule is to start skipping phases in the SDLC. For example, if a project is three weeks behind in the development phase, the project manager might decide to cut testing from six weeks to three weeks. Obviously, it is impossible to perform all the testing in half the time. Failing to test the system will lead to unfound errors, and chances are high that the system will fail. It is critical that an organization perform all phases in the SDLC during every project. Skipping any of the phases is sure to lead to system failure.

Changing Technology

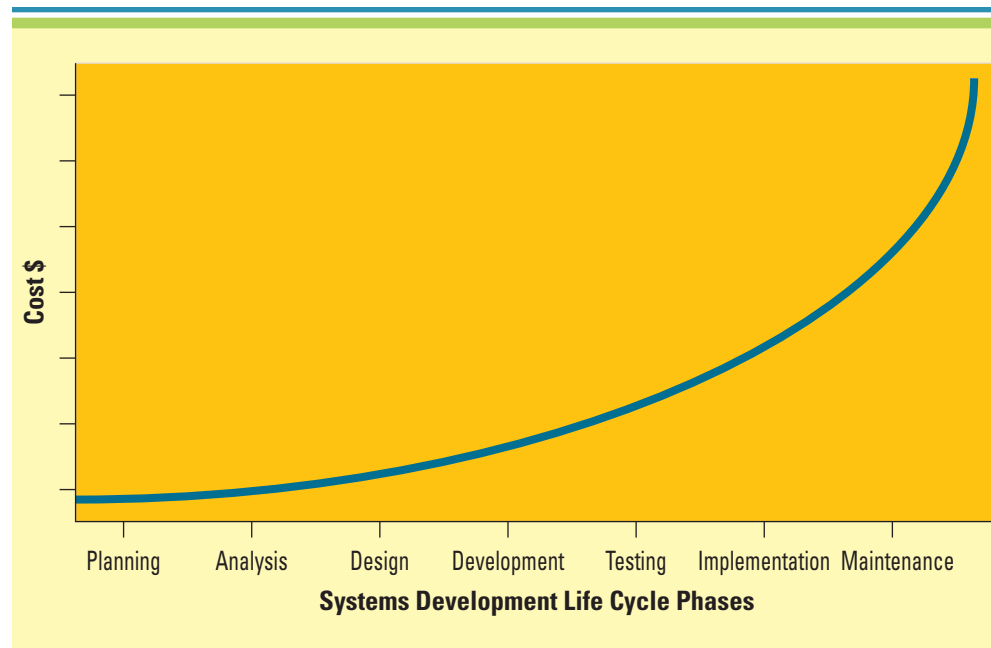
Many real-world projects have hundreds of business requirements, take years to complete, and cost millions of dollars. As Moore's Law states, technology changes at an incredibly fast pace; therefore, it is possible to have to revise an entire project plan in the middle of a project as a result of a change in technology. Technology changes so fast that it is almost impossible to deliver an information system without feeling the pain of changing technology.

The Cost of Finding Errors in the SDLC

It is important to discuss the relationship between the SDLC and the cost for the organization to fix errors. An error found during the analysis and design phase is relatively

FIGURE 9.6

The Cost of Fixing Errors



inexpensive to fix. All that is typically required is a change to a Word document. However, exactly the same error found during the testing or implementation phase is going to cost the organization an enormous amount to fix because it has to change the actual system. Figure 9.6 displays how the cost to fix an error grows exponentially the later the error is found in the SDLC.

section 9.2 PROJECT MANAGEMENT

LEARNING OUTCOMES

- 9.4** Explain project management, the triple constraint, and project stakeholder and executive sponsor's roles in choosing strategic projects.
- 9.5** Explain how project stakeholder's choose strategic projects.
- 9.6** Describe the two primary diagrams most frequently used in project planning.
- 9.7** Identify the three primary areas a project manager must focus on managing to ensure success.
- 9.8** Explain the three different types of outsourcing along with their benefits and challenges.

LO 9.4: Explain project management, the triple constraint, and the project stakeholder's and executive sponsor's roles in choosing strategic projects.

MANAGING SOFTWARE DEVELOPMENT PROJECTS

No one would think of building an office complex by turning loose 100 different construction teams to build 100 different rooms with no single blueprint or agreed-upon vision of the completed structure. Yet this is precisely the situation in which many large organizations find themselves when managing information technology projects. Organizations routinely overschedule their resources (human and otherwise), develop redundant projects, and damage profitability by investing in nonstrategic efforts that do not contribute to the organization's bottom line. Business leaders face a rapidly moving and unforgiving global marketplace that will force them to use every possible tool to sustain competitiveness; project management is one of those tools.

The **Project Management Institute (PMI)** develops procedures and concepts necessary to support the profession of project management (www.pmi.org). PMI defines a

project as a temporary activity a company undertakes to create a unique product, service, or result. **Project management** is the application of knowledge, skills, tools, and techniques to project activities to meet project requirements. A **project manager** is an individual who is an expert in project planning and management, defines and develops the project plan, and tracks the plan to ensure the project is completed on time and on budget. The project manager is the person responsible for executing the entire project. Project management terms all managers should know and understand include:

- **Project deliverables** are any measurable, tangible, verifiable outcome, result, or item that is produced to complete a project or part of a project. Examples of project deliverables include design documents, testing scripts, and requirements documents.¹⁰
- **Project milestones** represent key dates when a certain group of activities must be performed. For example, completing the planning phase might be a project milestone. If a project milestone is missed, then chances are the project is experiencing problems.¹¹
- **Project management office (PMO)** is an internal department that oversees all organizational projects. This group must formalize and professionalize project management expertise and leadership. One of the primary initiatives of the PMO is to educate the organization on techniques and procedures necessary to run successful projects.¹²

The Triple Constraint

Figure 9.7 displays the relationships between the three primary and interdependent variables in any project—time, cost, and scope. All projects are limited in some way by these three constraints. The Project Management Institute calls the framework for evaluating these competing demands *the triple constraint*.

The relationship between these variables is such that if any one changes, at least one other is likely to be affected. For example, moving up a project's finish date could mean either increasing costs to hire more staff or decreasing the scope to eliminate features or functions. Increasing a project's scope to include additional customer requests could extend the project's time to completion or increase the project's cost—or both—to accommodate the changes. Project quality is affected by the project manager's ability to balance these competing demands. High-quality projects deliver the agreed upon product or service on time and on budget. Project management is the science of making intelligent trade-offs between time, cost, and scope. Benjamin Franklin's timeless advice—*by failing to prepare, you prepare to fail*—applies to many of today's software development projects.

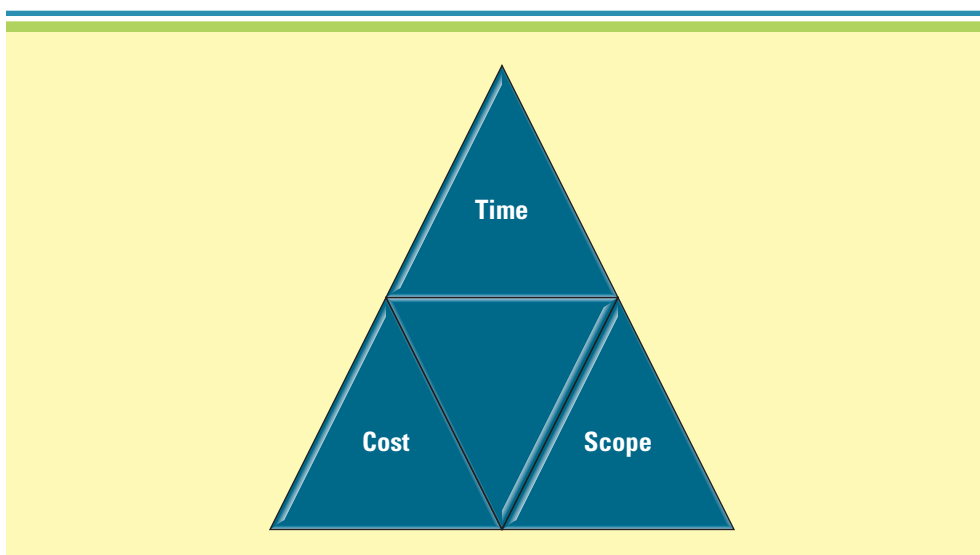


FIGURE 9.7
Project Management
Interdependent Variables

Project Participants

Project stakeholders are individuals and organizations actively involved in the project or whose interests might be affected as a result of project execution or project completion. Stakeholders, such as the CFO, also can exert influence over the project's objectives and outcomes. It is important for all stakeholders to understand the business objective of the project—once again, it is about getting the big picture. Stakeholders measure projects based on such factors as customer satisfaction, increased revenue, or decreased cost.

The project management team must identify stakeholders, determine their requirements and expectations, and, to the extent possible, manage their influence in relationship to the requirements to ensure a successful project. While all stakeholders are important, one stands out as having the most impact on the success or failure of a project. That person is the executive sponsor. PMI defines the **executive sponsor** as the person or group who provides the financial resources for the project. Research has shown that the leadership strength of the executive sponsor has more to do with the success or failure of a project than any other critical success factor. In fact, the executive sponsor should be accountable to the project team for much more than the financial backing. The executive sponsor communicates up the chain on behalf of the project, supports the project manager by championing the project to others sharing the vision and benefit of the successfully completed project, and demonstrates the commitment and accountability necessary to survive a project! If a team has a hands-off sponsor who merely reviews invoices and inquires as to the status of a project, then that project surely is in trouble from the start.

Another part of the equation is influence. If the executive sponsor has influence, he or she can use that influence to gain and direct essential resources needed to accomplish the project. A highly connected executive sponsor could mean the difference between success and failure. The executive sponsor should be committed to use his or her influence to ensure the health of the project.

Most business managers are not project managers; however, all managers will be part of a project team. Therefore, future managers need to understand how a business manages its project and how the culture supports the effort. The art and science of project management must coordinate numerous activities, as shown in Figure 9.8. Project managers perform many of them, and the remainder of this section focuses on four:

1. Choosing strategic projects.
2. Understanding project planning.
3. Managing projects.
4. Outsourcing projects.

LO 9.5: Explain how project stakeholder's choose strategic projects.

CHOOSING STRATEGIC PROJECTS

One of the most difficult decisions managers make is identifying the projects in which to invest time, energy, and resources. An organization must choose *what* it wants to do—justifying it, defining it, and listing expected results—and *how* to do it, including project approach, project schedule, and analysis of project risks. The following are techniques managers use to determine which projects to work on that best fit the goals of the business.

- **Focus on organizational goals:** Projects that address organizational goals tend to have a higher success rate since they are important across the entire organization.
- **Categorize business priorities:** There are a range of categories for grouping projects to determine priority. For example, a business could categorize its projects in terms of challenges or opportunities. It is often easier to obtain approval for projects that address challenges because without fixing the issues the company could incur financial losses.
- **Perform financial analysis:** A number of different financial analysis techniques can be performed to help determine a project's priority, such as return on investment. These financial analysis techniques help determine the organization's financial expectations for the project.

BUSINESS DRIVEN MIS

Google is scanning all or parts of the book collections of the University of Michigan, Harvard University, Stanford University, the New York Public Library, and Oxford University as part of its Google Print Library Project with the intent of making all of the copyrighted material free and searchable on Google. Of course many authors and publishers are furious with Google, claiming copyright infringement. According to Google, scanning books will help make out-of-print books accessible as customers can find, read, and print books directly from the website and will actually generate sales by giving customers the ability to buy books online.

Do you view Google's Print Library Project as a violation of copyright laws? Of all the projects Google can afford to tackle, why would the company choose one that directly violates copyright laws? If all books were available for free on Google, what would happen to the publishing industry? As you prioritize projects for your business, what types of competitive information will you want to view before choosing projects? What do you think the future of the book publishing industry will look like based on Google's radical new website? If you owned a publishing business, what could you do to combat Google's book project?¹³

Google Books Project

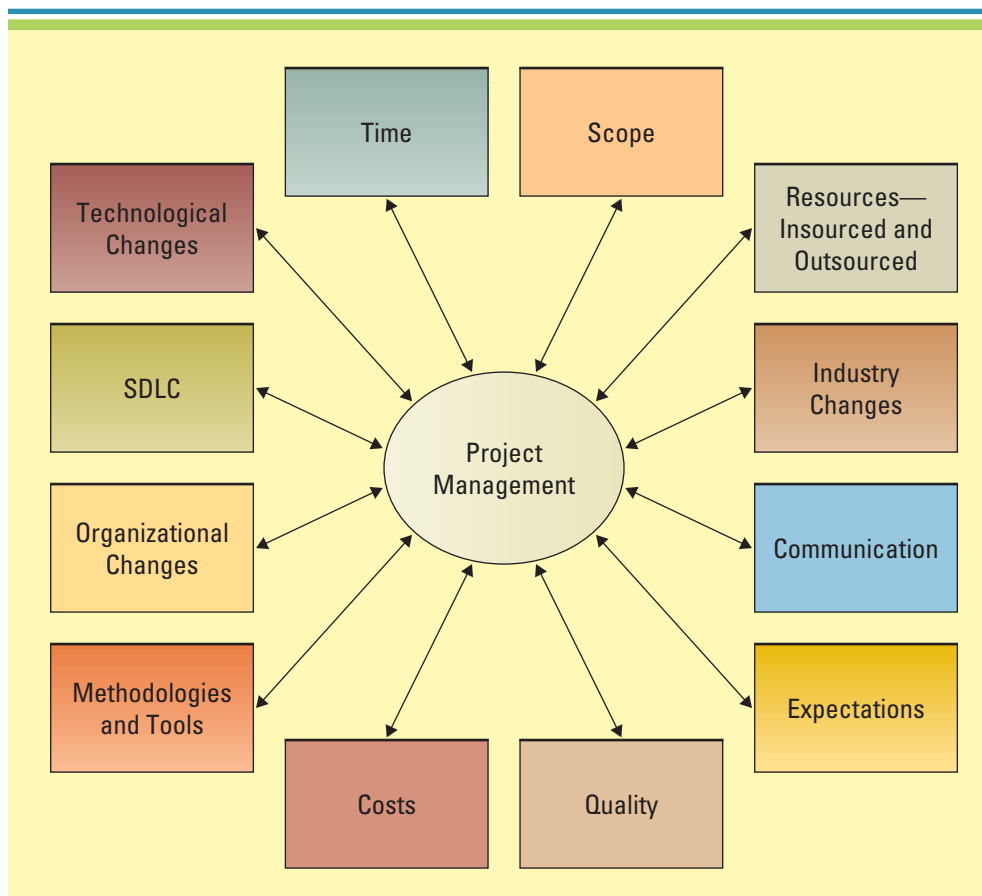


FIGURE 9.8
Project Management Roles

UNDERSTANDING PROJECT PLANNING

Once an organization has selected strategic projects and identified its project manager, it is time to build the critical component—the project plan. Many project professionals believe a solid project begins with documentation that includes a project charter, a scope statement, and the project management plan. A **project charter** is a document issued by the project initiator or sponsor that formally authorizes the start of a project and provides the project manager with the authority to apply organizational resources to project activities. In short, this means someone has stepped up to pay for and support the project. A project charter typically includes several elements.

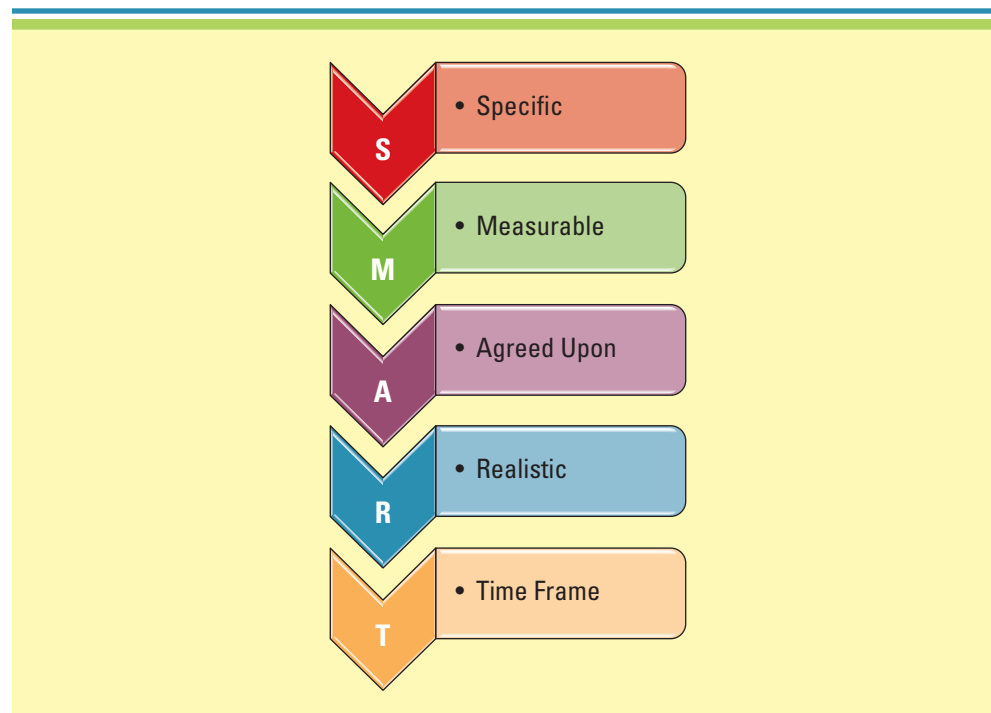
- The **project scope statement** links the project to the organization's overall business goals. It describes the business need (the problem the project will solve) and the justification, requirements, and current boundaries for the project. It defines the work that must be completed to deliver the product with the specified features and functions, and it includes constraints, assumptions, and requirements—all components necessary for developing accurate cost estimates.
- **Project objectives** are quantifiable criteria that must be met for the project to be considered a success.
- **Project constraints** are specific factors that can limit options. They include budget, delivery dates, available skilled resources, and organizational policies.
- **Project assumptions** are factors considered to be true, real, or certain without proof or demonstration. Examples include hours in a workweek or time of year the work will be performed.¹⁴

The project objectives are among the most important areas to define because they are essentially the major elements of the project. When an organization achieves the project objectives, it has accomplished the major goals of the project and the project scope is satisfied. Project objectives must include metrics so that the project's success can be measured. The metrics can include cost, schedule, and quality metrics. Figure 9.9 lists the SMART criteria—useful reminders about how to ensure the project has created understandable and measurable objectives.

The **project plan** is a formal, approved document that manages and controls project execution. The project plan should include a description of the project scope, a list of activities, a schedule, time estimates, cost estimates, risk factors, resources, assignments,

FIGURE 9.9

SMART Criteria for Successful Objective Creation



and responsibilities. In addition to these basic components, most project professionals also include contingency plans, review and communications strategies, and a **kill switch**—a trigger that enables a project manager to close the project before completion.

A good project plan should include estimates for revenue and strategic necessities. It also should include measurement and reporting methods and details as to how top leadership will engage in the project. It also informs stakeholders of the benefits of the project and justifies the investment, commitment, and risk of the project as it relates to the overall mission of the organization.

Managers need to continuously monitor projects to measure their success. If a project is failing, the manager must cancel the project and save the company any further project costs. Canceling a project is not necessarily a failure as much as it is successful resource management as it frees resources that can be used on other projects that are more valuable to the firm.

The most important part of the plan is communication. The project manager must communicate the plan to every member of the project team and to any key stakeholders and executives. The project plan must also include any project assumptions and be detailed enough to guide the execution of the project. A key to achieving project success is earning consensus and buy-in from all key stakeholders. By including key stakeholders in project plan development, the project manager allows them to have ownership of the plan. This often translates to greater commitment, which in turn results in enhanced motivation and productivity. The two primary diagrams most frequently used in project planning are PERT and Gantt charts.

A **PERT (Program Evaluation and Review Technique) chart** is a graphical network model that depicts a project's tasks and the relationships between them. A **dependency** is a logical relationship that exists between the project tasks, or between a project task and a milestone. PERT charts define dependency between project tasks before those tasks are scheduled (see Figure 9.10). The boxes in Figure 9.10 represent project tasks, and the project manager can adjust the contents of the boxes to display various project attributes such as schedule and actual start and finish times. The arrows indicate that a task depends on the start or the completion of a different task. The **critical path**

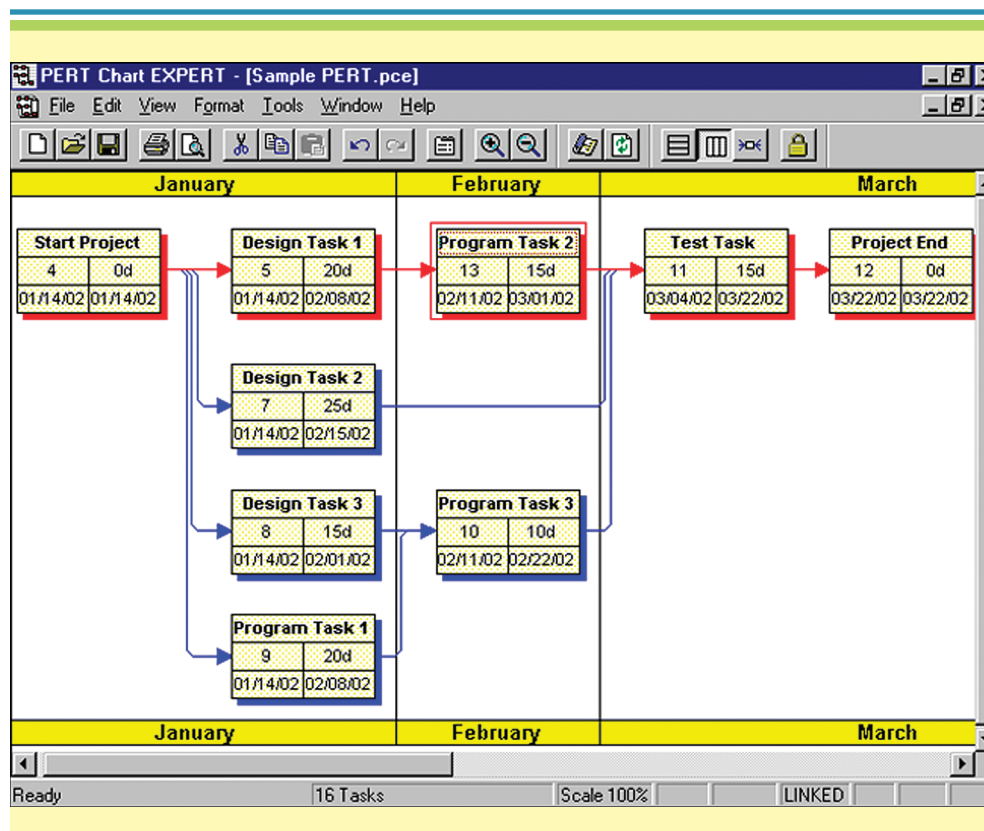


FIGURE 9.10
PERT Chart Expert, a PERT
Chart Example

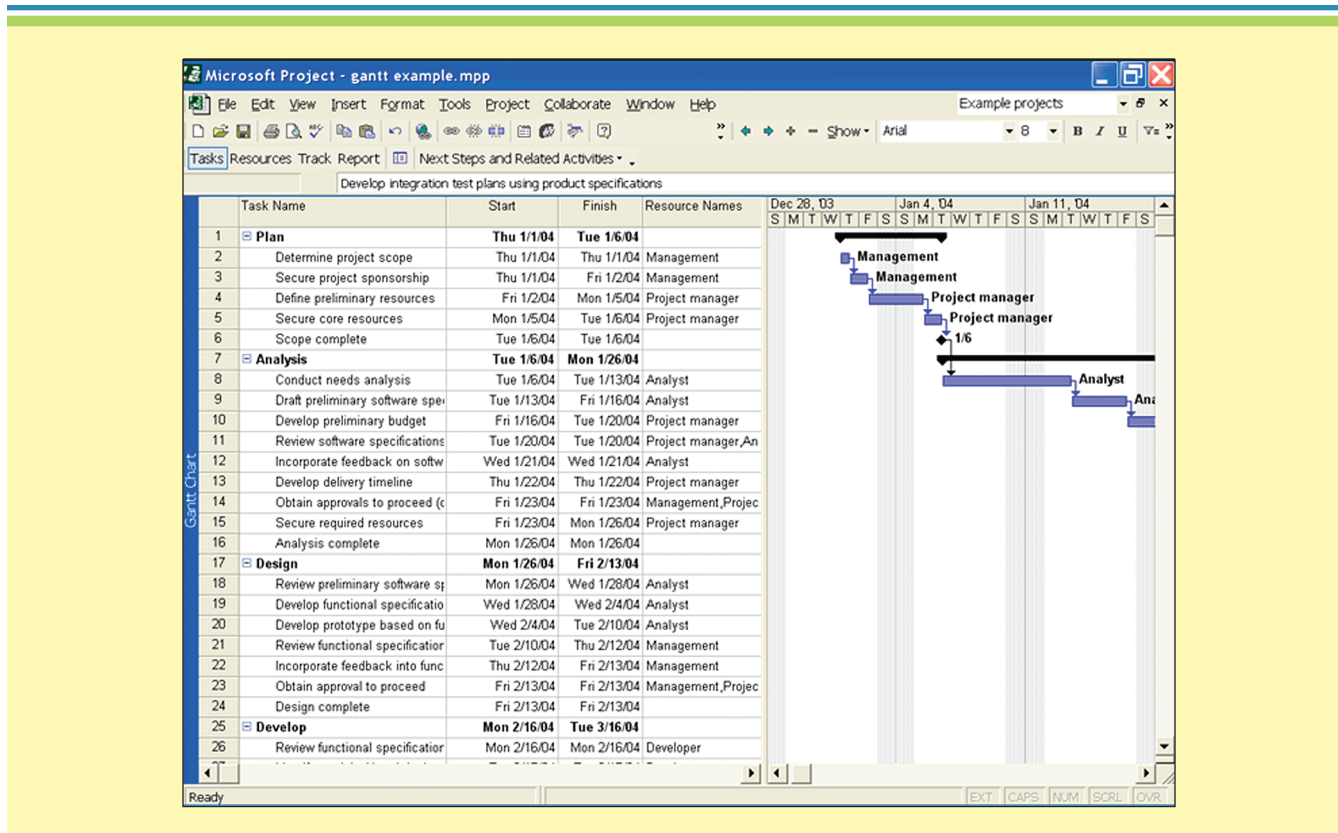


FIGURE 9.11

Microsoft Project, a Gantt Chart Example

estimates the shortest path through the project ensuring all critical tasks are completed from start to finish. The red line in Figure 9.10 displays the critical path for the project.

A **Gantt chart** is a simple bar chart that lists project tasks vertically against the project's time frame, listed horizontally. A Gantt chart works well for representing the project schedule. It also shows actual progress of tasks against the planned duration. Figure 9.11 displays a software development project using a Gantt chart.

MANAGING PROJECTS

LO 9.7: Identify the three primary areas a project manager must focus on to ensure success.

A project manager can, of course, bring enormous benefits to an organization such as reduced project expense, high company morale, and quicker time to market. A competent project manager sets the correct expectations early in the project with achievable milestones. Managing a project includes:

- Identifying requirements.
- Establishing clear and achievable objectives.
- Balancing the competing demands of quality, scope, time, and cost.
- Adapting the specifications, plans, and approach to the different concerns and expectations of the various stakeholders.

When a project manager has a good grasp of the business operations, he or she can improve critical communication among the designers, developers, user community, and top leadership. An experienced project manager should be able to minimize scope and create a better estimate. He or she knows how to say no without creating controversy. And a good project manager should have learned that a happy stakeholder is one who is underpromised and overdelivered! A project manager must focus on managing three primary areas to ensure success:

1. People
2. Communications
3. Change

Managing People

Managing people is among the most challenging efforts a project manager undertakes. Resolving conflicts within the team and balancing the needs of the project with the personal and professional needs of the team are two of the project manager's critical goals. Because project managers are often the client's main (and sometimes sole) contact person during the project, communication, negotiation, marketing, and salesmanship are just as important to the project manager as financial and analytical acumen. Many times, the people management side of project management makes the difference in pulling off a successful project.

Managing Communications

While many companies develop unique project management frameworks based on familiar project management standards, all agree that communication is the key to excellent project management. This is quite easy to state, but not so easy to accomplish! It is extremely helpful if a project manager plans what and how he or she will communicate as a formal part of the project management plan called a *communications plan*. A project manager distributes timely, accurate, and meaningful information regarding project objectives, including the schedule, cost, scope, quality, and status of each. The project manager also shares small wins as the project progresses, informs others of needed corrections, makes requests for additional resources, and keeps all stakeholders informed of the project schedule.

Another important aspect of a project management communications plan is to provide a method for continually obtaining and monitoring feedback from and for all stakeholders. This is not to say that a project manager needs to spend countless hours answering every email and responding to every question posed. Rather, the manager should develop a method for asking for specific feedback as part of the plan and responding to it in a timely, organized manner. Team members remain closest to the project and should be encouraged to share open and honest feedback. It is the project manager's role and responsibility to foster an environment of trust so that members feel safe to contribute their knowledge and ideas—even if it means relaying bad news or offering an opposing viewpoint.

Managing Change

Successful organizations and successful people learn to anticipate and react appropriately to change. Change comes in many forms from an environmental crisis to a labor shortage and can include:

- A misunderstanding or missing business requirement in the project scope.
- A new government regulation or law that requires changes to business processes.
- Mergers, acquisitions, or new business partnerships.
- An emerging technology.
- User change in business requirements for additional functionality.
- Resource constraints such as budget cuts or personal cutbacks.

Change management offers procedures and policies managers can use to help manage change during system development. A **change management system** includes a collection of procedures to document a change request and identifies the expected impact associated with the change. Most change management systems require that a change request form be initiated by one or more project stakeholders (systems owners, users, customers, developers). Ideally, these change requests are considered by a **change control board (CCB)** that is responsible for approving or rejecting all change requests. The CCB's composition typically includes a representative from each business area that has a stake in the project. The CCB's decision to accept or reject each change is based on an impact analysis of the change. For example, if one department wants to implement a change to the software that will increase both deployment time and cost, then the other business owners need to agree that the change is valid and that it warrants the extended time frame and increased budget.

BUSINESS DRIVEN INNOVATION

\$7,500 Steak Dinner

The next time one of your employees submits an expense report, you might want to think twice as a number of websites offer phony documentation individuals can use to help cheat on their taxes, expense reports, or even spouses. Here are a few you should be aware of:

- **Customreceipts.com:** This website can print a fake ATM receipt. Why would people want a fake ATM receipt? To impress others with their massive balances of course!
- **Alibi Network:** This website can create you a customized excuse, such as an emergency phone call giving you a reason to leave that boring meeting, or a false invitation to a corporate or business event so an unfaithful partner can give physical proof of a false destination and location.
- **The Restaurant Maloney & Porcelli's:** This innovative, yet highly unethical, restaurant started a website that allows its customers to enter an amount for a meal and it generates fake receipts adding up to the cost of the meal.¹⁵

All these systems were created by software developers. If you were asked to participate in one of these website development efforts, what would you do? Who do you think should be held liable for unethical websites—the employee or the host of the website? Now that you know about the existence of these types of websites, how will you manage your employees? What would you do to an employee who was using one of these services? How can a project manager combat these types of issues without wasting enormous amounts of time and energy?

Change is an opportunity, not a threat. Realizing that change is the norm rather than the exception will help an organization stay ahead. Becoming a change leader and accepting the inevitability of change can help ensure that an organization can survive and even thrive in times of change.

LO 9.8: Explain the three different types of outsourcing along with their benefits and challenges.

OUTSOURCING PROJECTS

In the high-speed global business environment, an organization needs to increase profits, grow market share, and reduce costs. Two basic options are available to organizations wishing to develop and maintain their information systems—in-sourcing or outsourcing.

In-sourcing (in-house development) uses the professional expertise within an organization to develop and maintain its information technology systems. In-sourcing has been instrumental in creating a viable supply of IT professionals and in creating a better quality workforce combining both technical and business skills.

Outsourcing is an arrangement by which one organization provides a service or services for another organization that chooses not to perform them in-house. In some cases, the entire MIS department is outsourced, including planning and business analysis as well as the design, development, and maintenance of equipment and projects. Figure 9.12 displays the most common departments companies outsource. Outsourcing can range from a large contract under which an organization such as IBM manages all MIS services for another company, to hiring contractors and temporary staff on an individual basis. Common reasons companies outsource include:

- **Core competencies.** Many companies have recently begun to consider outsourcing as a way to acquire best-practices and the business process expertise of highly skilled

technology resources for a low cost. Technology is advancing at such an accelerated rate that companies often lack the technical resources required to keep current.

- **Financial savings.** It is far cheaper to hire people in China and India than pay the required salaries for similar labor in the United States.
- **Rapid growth.** Firms must get their products to market quickly and still be able to react to market changes. By taking advantage of outsourcing, an organization can acquire the resources required to speed up operations or scale to new demand levels.
- **The Internet and globalization.** The pervasive nature of the Internet has made more people comfortable with outsourcing abroad as India, China, and the United States become virtual neighbors.

Outsourcing MIS enables organizations to keep up with market and technology advances—with less strain on human and financial resources and more assurance that the IT infrastructure will keep pace with evolving business priorities (see Figure 9.13). The three forms of outsourcing options available for a project are:

1. **Onshore outsourcing**—engaging another company within the same country for services.
2. **Nearshore outsourcing**—contracting an outsourcing arrangement with a company in a nearby country. Often this country will share a border with the native country.
3. **Offshore outsourcing**—using organizations from developing countries to write code and develop systems. In offshore outsourcing the country is geographically far away.

Since the mid-1990s, major U.S. companies have been sending significant portions of their software development work offshore—primarily to vendors in India, but also to vendors in China, eastern Europe (including Russia), Ireland, Israel, and the Philippines. The big selling point for offshore outsourcing is inexpensive but good work. The overseas counterpart to an American programmer who earns as much as \$63,000 per year is paid as little as \$5,000 per year (see Figure 9.14). Developing countries in Asia and South Africa offer some outsourcing services but are challenged by language



FIGURE 9.12

Departments Commonly Outsourced by Organizations

FIGURE 9.13
Outsourcing Models

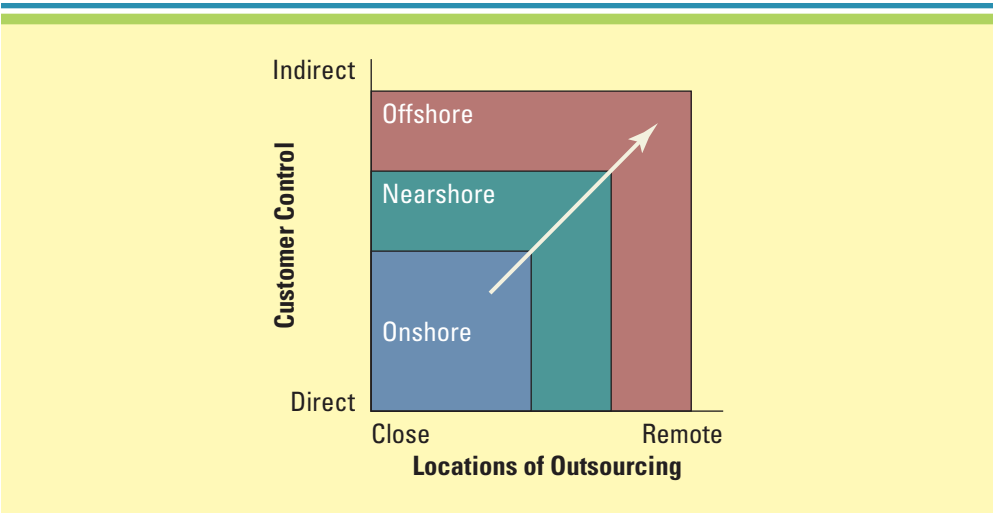


FIGURE 9.14
Typical Salary Ranges for
Computer Programmers

Source: From Edward Yourdon, *Death March*, 2nd edition, © 2004. Reproduced by permission of Pearson Education, Inc., Upper Saddle River, New Jersey.

Country	Salary Range Per Year
China	\$5,000–\$9,000
India	6,000–10,000
Philippines	6,500–11,000
Russia	7,000–13,000
Ireland	21,000–28,000
Canada	25,000–50,000
United States	60,000–90,000

difference, inadequate telecommunication equipment, and regulatory obstacles. India is the largest offshore marketplace because it promotes English along with a technologically advanced population. Infosys, NIIT, Satyam, TCS, and Wipro are among the biggest Indian outsourcing service providers, each of which has a large presence in the United States.¹⁶

Outsourcing Benefits

The many benefits associated with outsourcing include:

- Increased quality and efficiency of business processes.
- Reduced operating expenses for head count and exposure to risk for large capital investments.
- Access to outsourcing service provider’s expertise, economies of scale, best practices, and advanced technologies.
- Increased flexibility for faster response to market changes and less time to market for new products or services.

Outsourcing Challenges

Outsourcing comes with several challenges. These arguments are valid and should be considered when a company is thinking about outsourcing. Many challenges can be avoided with proper research. The challenges include:

- **Length of contract.** Most companies look at outsourcing as a long-term solution with a time period of several years. Training and transferring resources around the globe is difficult and expensive, hence most companies pursuing offshore

BUSINESS DRIVEN GLOBALIZATION

DUI in a Golf Cart

Swedish police stopped Bill Murray and charged him with drunk driving when he attempted to drive his golf cart around the city. A golf cart hits top speed at three miles per hour and although it might seem odd that you can be issued a DUI for driving one, many countries have laws against such practices. A few other culture blunders you want to avoid include:

- One American company learned that the name of the cooking oil they were marketing translated into “jackass oil” in Spanish.
- A deodorant marketing campaign displayed images of a strong courageous man washing his dog. The campaign failed in Islamic countries where dogs are considered unclean.
- A sports equipment company packaged golf balls in groups of four for sales throughout Japan. Sales plummeted because the word *four* pronounced in Japanese sounds the same as the word *death* and items packaged in fours are considered unlucky.¹⁷

Companies that are expanding globally are looking for opportunities, not problems. Yet local laws and procedures that come into play when setting up shop abroad—everything from hiring and firing to tax filings—can be a mine-field. What types of culture, language, and legal issues should a company expect to encounter when dealing with outsourcing to another country? What can a company do to mitigate these risks?

outsourcing contract for multiple years of service. A few of the challenges facing the length of the contract include:

1. It can be difficult to break the contract.
 2. Forecasting business needs for the next several years is challenging and the contract might not meet future business needs.
 3. Re-creating an internal MIS department if the outsource provider fails is costly and challenging.
- **Threat to competitive advantage.** Many businesses view MIS as a competitive advantage and view outsourcing as a threat because the outsourcer could share the company’s trade secrets.
 - **Loss of confidentiality.** Information on pricing, products, sales, and customers can be a competitive asset and often critical for business success. Outsourcing could place confidential information in the wrong hands. Although confidentiality clauses contained in the contracts are supposed to protect the company, the potential risk and costs of a breach must be analyzed.

Every type of organization in business today relies on software to operate and solve complex problems or create exciting opportunities. Software built correctly can support nimble organizations and transform with them as they and their businesses transform. Software that effectively meets employee needs will help an organization become more productive and enhance decision making. Software that does not meet employee needs might have a damaging effect on productivity and can even cause a business to fail. Employee involvement in software development, along with the right implementation, is critical to the success of an organization.

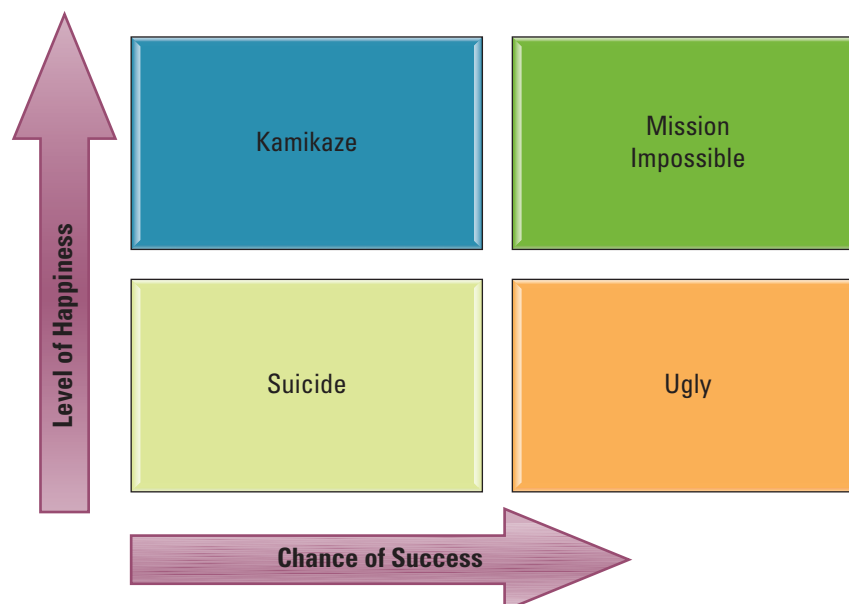
BUSINESS DRIVEN DISCUSSION

Death March

Edward Yourdon's book *Death March* describes the complete software developer's guide to surviving "mission impossible" projects. MIS projects are challenging, and project managers are expected to achieve the impossible by pulling off a successful project even when pitted against impossible challenges. In *Death March*, infamous software developer Edward Yourdon presents his project classification displayed here. Yourdon measures projects based on the level of pain and chances for success.

- **Mission Impossible Project:** This project has a great chance of success and your hard work will pay off as you find happiness and joy in the work. For example, this is the type of project where you work all day and night for a year and become the project hero as you complete the mission impossible and reap a giant promotion as your reward.
- **Ugly Project:** This project has a high chance of success but is very painful and offers little happiness. For example, you work day and night to install a new accounting system and although successful, you hate accounting and dislike the company and its products.
- **Kamikaze Project:** This is a project that has little chance of success but you are so passionate about the content that you find great happiness working on the project. For example, you are asked to build a website to support a cancer foundation, a cause near to your heart, but the company is nonprofit and doesn't have any funds to help buy the software you need to get everything working. You patch the system together and implement many manual work-arounds just to keep the system functioning.
- **Suicide Project:** This project has no chance of success and offers you nothing but pain. This is the equivalent of your worst nightmare project. Word of caution, avoid suicide projects!¹⁸

Analyze your school and work projects and find a project that would fit in each box. What could you have done differently on your suicide project to ensure its success? What can you do to avoid being placed on a suicide project? Given the choice, which type of project would you choose to work on and why?



Learning Outcome 9.1: Explain the business benefits associated with successful software development.

Software development uses the systems development life cycle to create software. The benefits associated with successful software development include increase in revenues, repair to brand reputation, limited liabilities, and increase in productivity

Learning Outcome 9.2: Describe the seven phases of the systems development life cycle.

The seven phases in the SDLC are:

- Planning—involves establishing a high-level plan of the intended project and determining project goals.
- Analysis—involves analyzing end-user business requirements and refining project goals into defined functions and operations of the intended system.
- Design—involves describing the desired features and operations of the system including screen layouts, business rules, process diagrams, pseudo code, and other documentation.
- Development—involves taking all of the detailed design documents from the design phase and transforming them into the actual system.
- Testing—involves bringing all the project pieces together into a special testing environment to test for errors, bugs, and interoperability and verify that the system meets all of the business requirements defined in the analysis phase.
- Implementation—involves placing the system into production so users can begin to perform actual business operations with the system.
- Maintenance—involves performing changes, corrections, additions, and upgrades to ensure the system continues to meet the business goals.

Learning Outcome 9.3: Summarize the different software development methodologies.

There are a number of different software development methodologies including:

- Agile methodology aims for customer satisfaction through early and continuous delivery of useful software components developed by an iterative process with a design point that uses the bare minimum requirements.
- Waterfall methodology follows an activity-based process in which each phase in the SDLC is performed sequentially from planning through implementation and maintenance.
- Rapid application development methodology (RAD) emphasizes extensive user involvement in the rapid and evolutionary construction of working prototypes of a system to accelerate the systems development process.
- Extreme programming (XP) methodology breaks a project into tiny phases, and developers cannot continue on to the next phase until the first phase is complete.
- Rational unified process (RUP) provides a framework for breaking down the development of software into four gates.
- Scrum uses small teams to produce small pieces of deliverable software using sprints, or 30-day intervals, to achieve an appointed goal.

Learning Outcome 9.4: Explain project management and the role the triple constraints play when managing a project.

A project is a temporary or short-term endeavor undertaken to create a unique product, service, or result, such as developing a custom ecommerce site or merging databases. Project management is the application of knowledge, skills, tools, and techniques to project activities to meet project requirements. A project manager is an individual who is an expert in project planning and management, defines and develops the project plan, and tracks the plan to ensure the project is completed on time and on budget.

The triple constraints are scope, resources, and time. These three components are interdependent, and if you change one the others must change. The three primary activities performed by a project manager include choosing strategic projects, setting the project scope, and managing resources and maintaining the project plan.

Learning Outcome 9.5: Describe the project stakeholder's and executive sponsor's roles in choosing strategic projects.

Project stakeholders are individuals and organizations actively involved in the project or whose interests might be affected as a result of project execution or project completion. While all stakeholders are important, one stands out as having the most impact on the success or failure of a project. That person is the executive sponsor or the person or group who provides the financial resources for the project. Techniques for choosing strategic projects include focusing on organizational goals, categorizing projects, or performing a financial analysis.

Learning Outcome 9.6: Describe the two primary diagrams most frequently used in project planning.

A PERT (Program Evaluation and Review Technique) chart is a graphical network model that depicts a project's tasks and the relationships between those tasks. A dependency is a logical relationship that exists between the project tasks, or between a project task and a milestone. A Gantt chart is a simple bar chart that depicts project tasks against a calendar. In a Gantt chart, tasks are listed vertically and the project's time frame is listed horizontally. A Gantt chart works well for representing the project schedule. It also shows actual progress of tasks against the planned duration.

Learning Outcome 9.7: Identify the three primary areas a project manager must focus on managing to ensure success.

The three primary areas a project manager must focus on managing to ensure success are managing people, communications, and change.

Learning Outcome 9.8: Explain the three different types of outsourcing along with their benefits and challenges.

- Onshore outsourcing—engaging another company within the same country for services.
- Nearshore outsourcing—contracting an outsourcing arrangement with a company in a nearby country.
- Offshore outsourcing—using organizations from developing countries to write code and develop systems.

The many benefits associated with outsourcing include increased quality and efficiency of a process, service, or function; reduction of operating expenses and exposure to risks involved with large capital investments; and access to outsourcing service provider's expertise, economies of scale, best practices, and advanced technologies. Outsourcing comes with several challenges including length of contracts, losing competitive advantages, and risking a breach of confidential information.

OPENING CASE QUESTIONS

1. **Knowledge:** List the signs for assessing if a current project is experiencing issues.
2. **Comprehension:** Identify the options a project manager can follow if a project is not meeting its success criteria.
3. **Application:** Illustrate the triple constraints role in a project.
4. **Analysis:** Analyze the four steps to recovering a project and determine which one is the most critical.
5. **Synthesis:** Propose how you would develop a game plan to recover a project.
6. **Evaluate:** Argue for or against the following statement: “Throwing good money after bad will not save a project.”

KEY TERMS

Agile methodology, 339	Kill switch, 347	Project management office (PMO), 343
Analysis phase, 335	Maintenance phase, 337	Project manager, 343
Business requirement, 335	Methodology, 337	Project milestones, 343
Change control board (CCB), 349	Nearshore outsourcing, 351	Project objective, 346
Change management, 349	Offshore outsourcing, 351	Project plan, 346
Change management system, 349	Onshore outsourcing, 351	Project scope statement, 346
Critical path, 347	Outsourcing, 350	Project stakeholder, 344
Dependency, 347	PERT (Program Evaluation and Review Technique) chart, 347	Prototype, 339
Design phase, 336	Planning phase, 335	Rapid application development (RAD) methodology (also called rapid prototyping), 339
Development phase, 336	Project, 343	Rational unified process (RUP) methodology, 340
Executive sponsor, 344	Project assumption, 346	Scrum methodology, 340
Extreme programming (XP) methodology, 340	Project charter, 346	Systems development life cycle (SDLC), 335
Gantt chart, 348	Project constraint, 346	Testing phase, 337
Implementation phase, 337	Project deliverable, 343	Waterfall methodology, 337
In-sourcing (in-house development), 350	Project management, 343	
Iterative development, 338	Project Management Institute (PMI), 342	

REVIEW QUESTIONS

1. What role does project management play in the systems development effort?
2. What role does the project manager play in determining a project's success?
3. Why would a project require an executive sponsor?
4. Which phase in the systems development life cycle is the most important?
5. If you had to skip a phase during the development of a system, which phase would it be and why?
6. Which phase in the systems development life cycle contains the most risk? Be sure to explain your answer.

7. Which project management methodology would you choose to run your software development project?
8. If you started on a new software development project and the project plan was using the waterfall methodology, would you remain on the project? What could you do to better prepare your project for success?
9. What is change management and why is it important for a manager to plan for change?
10. Why should end users be involved in the systems development effort?
11. Why would a project manager use Gantt and PERT charts?
12. Why are gathering business requirements a challenge for most projects?
13. What are the different types of outsourcing available for a project?
14. What are the risks associated with outsourcing?
15. How can scope creep and feature creep kill a project?

CLOSING CASE ONE

Disaster at Denver International Airport

One good way to learn how to develop successful systems is to review past failures. One of the most infamous system failures is Denver International Airport's (DIA) baggage system. When the automated baggage system design for DIA was introduced, it was hailed as the savior of modern airport design. The design relied on a network of 300 computers to route bags and 4,000 cars to carry luggage across 21 miles of track. Laser scanners were to read bar-coded luggage tags, while advanced scanners tracked the movement of toboggan-like baggage carts.

When DIA finally opened its doors for reporters to witness its revolutionary baggage handling system, the scene was rather unpleasant. Bags were chewed up, lost, and misrouted in what has since become a legendary systems nightmare.

One of the biggest mistakes made in the baggage handling system fiasco was that not enough time was allowed to properly develop the system. In the beginning of the project, DIA assumed it was the responsibility of individual airlines to find their own way of moving the baggage from the plane to the baggage claim area. The automated baggage system was not involved in the initial planning of the DIA project. By the time the DIA developers decided to create an integrated baggage system, the time frame for designing and implementing such a complex and huge system was not possible.

Another common mistake that occurred during the project was that the airlines kept changing their business requirements. This caused numerous issues, including the implementation of power supplies that were not properly updated for the revised system design, which caused overloaded motors and mechanical failures. Besides the power supply design problem, the optical sensors did not read the bar codes correctly, causing issues with baggage routing.

Finally, BAE, the company that designed and implemented the automated baggage system for DIA, had never created a baggage system of this size before. BAE had created a similar system in an airport in Munich, Germany, where the scope was much smaller. Essentially, the baggage system had an inadequate IT infrastructure because it was designed for a much smaller system.

DIA simply could not open without a functional baggage system so the city had no choice but to delay the opening date for more than 16 months, costing taxpayers roughly \$1 million per day, which totaled around \$500 million.¹⁹

Questions

1. One problem with DIA's baggage system was inadequate testing. Why is testing important to a project's success? Why do so many projects decide to skip testing?
2. Evaluate the different systems development methodologies. Which one would have most significantly increased the chances of the project's success?
3. How could more time spent in the analysis and design phase have saved Colorado taxpayers hundreds of millions of dollars?
4. Why could BAE not take an existing IT infrastructure and simply increase its scale and expect it to work?

CLOSING CASE TWO

Reducing Ambiguity in Business Requirements

The main reason projects fail is bad business requirements. Business requirements are considered “bad” because of ambiguity or insufficient involvement of end users during analysis and design.

A requirement is unambiguous if it has the same interpretation for all parties. Different interpretations by different participants will usually result in unmet expectations. Here is an example of an ambiguous requirement and an example of an unambiguous requirement:

Ambiguous requirement: The financial report must show profits in local and U.S. currencies.

Unambiguous requirement: The financial report must show profits in local and U.S. currencies using the exchange rate printed in *The Wall Street Journal* for the last business day of the period being reported.

Ambiguity is impossible to prevent completely because it is introduced into requirements in natural ways. For example:

- Requirements can contain technical implications that are obvious to the IT developers but not to the customers.
- Requirements can contain business implications that are obvious to the customer but not to the IT developers.
- Requirements may contain everyday words whose meanings are “obvious” to everyone, yet different for everyone.
- Requirements are reflections of detailed explanations that may have included multiple events, multiple perspectives, verbal rephrasing, emotion, iterative refinement, selective emphasis, and body language—none of which are captured in the written statements.

Tips for Reviewing Business Requirements

When reviewing business requirements always look for the following words to help dramatically reduce ambiguity:

- *And* and *or* have well-defined meanings and ought to be completely unambiguous, yet they are often understood only informally and interpreted inconsistently. For example, consider the statement “The alarm must ring if button T is pressed and if button F is pressed.” This statement may be intended to mean that to ring the alarm, both buttons must be pressed or it may be intended to mean that either one can be pressed. A statement like this should never appear in a requirement because the potential for misinterpretation is too great. A preferable approach is to be very explicit, for example, “The alarm must ring if both buttons T and F are pressed simultaneously. The alarm should not ring in any other circumstance.”

- *Always* might really mean “most of the time,” in which case it should be made more explicit. For example, the statement “We always run reports A and B together” could be challenged with “In other words, there is never any circumstance where you would run A without B and B without A?” If you build a system with an “always” requirement, then you are actually building the system to never run report A without report B. If a user suddenly wants report B without report A, you will need to make significant system changes.
- *Never* might mean rarely, in which case it should be made more explicit. For example, the statement “We never run reports A and B in the same month” could be challenged with, “So that means that if I see that A has been run, I can be absolutely certain that no one will want to run B.” Again, if you build a system that supports a “never” requirement, then the system users can never perform that requirement. For example, the system would never allow a user to run reports A and B in the same month, no matter what the circumstances.
- Boundary conditions are statements about the line between true and false and do and do not. These statements may or may not be meant to include end points. For example, “We want to use method X when there are up to 10 pages, but method Y otherwise.” If you were building this system, would you include page 10 in method X or in method Y? The answer to this question will vary causing an ambiguous business requirement.²⁰

Questions

1. Why are ambiguous business requirements the leading cause of system development failures?
2. Why do the words *and* and *or* tend to lead to ambiguous requirements?
3. Research the Web and determine other reasons for “bad” business requirements.
4. What is wrong with the following business requirement: “The system must support employee birthdays because every employee always has a birthday every year.”

CRITICAL BUSINESS THINKING

1. Selecting a Systems Development Methodology

Exus Incorporated is an international billing outsourcing company. Exus currently has revenues of \$5 billion, more than 3,500 employees, and operations on every continent. You have recently been hired as the CIO. Your first task is to increase the software development project success rate, which is currently at 20 percent. To ensure that future software development projects are successful, you want to standardize the systems development methodology across the entire enterprise. Currently, each project determines which methodology it uses to develop software.

Create a report detailing three system development methodologies that were covered in this text. Compare each of these methodologies to the traditional waterfall approach. Finally, recommend which methodology you want to implement as your organizational standard. Be sure to highlight any potential roadblocks you might encounter when implementing the new standard methodology.

2. Understanding Project Failure

You are the director of project management for Stello, a global manufacturer of high-end writing instruments. The company sells to primarily high-end customers, and the average price for one of its fine writing instruments is about \$350. You are currently implementing

a new customer relationship management system, and you want to do everything you can to ensure a successful systems development effort. Create a document summarizing the primary reasons why this project could fail, along with your strategy to eliminate the possibility of system development failure on your project.

3. Missing Phases in the Systems Development Life Cycle

Hello Inc. is a large concierge service for executives operating in Chicago, San Francisco, and New York. The company performs all kinds of services from dog walking to airport transportation. Your manager, Dan Martello, wants to skip the testing phase during the company's financial ERP implementation. He feels that because the system came from a vendor, it should work correctly. Draft a memo explaining the importance of following the SDLC and the ramifications to the business if the financial system is not tested.

4. Refusing to Sign Off

You are the primary client on a large extranet development project. After carefully reviewing the requirements definition document, you are positive that there are missing, ambiguous, inaccurate, and unclear requirements. The project manager is pressuring you for your sign-off because he has already received sign-off from five of your co-workers. If you fail to sign off on the requirements, you are going to put the entire project at risk because the time frame is nonnegotiable. What would you do? Why?

5. Saving Failing Systems

Crik Candle Company manufactures low-end candles for restaurants. The company generates more than \$40 million in annual revenues and has more than 300 employees. You are in the middle of a large multimillion-dollar supply chain management implementation. Your project manager has just come to you with the information that the project might fail for the following reasons:

- Several business requirements were incorrect and the scope has to be doubled.
- Three developers recently quit.
- The deadline has been moved up a month.

Develop a list of options that your company can follow to ensure the project remains on schedule and within budget.

6. Explaining Project Management

Prime Time Inc. is a large consulting company that specializes in outsourcing people with project management capabilities and skills. You are in the middle of an interview for a job with Prime Time. The manager performing the interview asks you to explain why managing a project plan is critical to a project's success. The manager also wants you to explain scope creep and feature creep and your tactics for managing them on a project. Finally, the manager wants you to elaborate on your strategies for delivering successful projects and reducing risks.

7. Applying Project Management Techniques

You have been hired by a medium-sized airline company, Sun Best. Sun Best currently flies more than 300 routes in the East. The company is experiencing tremendous issues coordinating its 3,500 pilots, 7,000 flight attendants, and 2,000 daily flights. Determine how Sun Best could use a Gantt chart to help it coordinate pilots, flight attendants, and daily flights. Using Excel, create a sample Gantt chart highlighting the different types of activities and resources Sun Best could track with the tool.

BUILD YOUR OWN BUSINESS

1. Your business is undertaking many new and exciting initiatives to boost growth, including employee blogs, customer wikis, and implementation of a new time and attendance system. Time and attendance software is critical to the business because it can ensure you have the right employees, at the right place, at the right time, which can increase sales. You never want to find yourself understaffed during busy times and overstaffed during slow times. Also, accurately accounting for employees' time is crucial to effectively analyzing labor expenses, which are the largest operating expense your business incurs. Conveniently, time and attendance solution providers, time clock manufacturers, and software development companies are developing high-quality affordable products. You have decided to replace the manual employee tracking system your grandfather implemented in the 1950s. You have a highly technical employee, Nick Zele, who has offered to build the system for you and ensures you it is a simple build. You could also purchase one of the many off-the-shelf applications and have an outsourcing firm customize the application for your business. What are the pros and cons of using an employee to build you a custom system? What are the pros and cons of purchasing an off-the-shelf time and attendance application and outsourcing custom development? How will your older employees feel about the new system and what can you do to ensure a smooth transition?
2. You have decided to implement a new payroll system for your business. Review the following business requirements and highlight any potential issues.
 - All employees must have a unique employee ID.
 - The system must track employee hours worked based on employee's last name.
 - Employees must be scheduled to work a minimum of eight hours per day.
 - Employee payroll is calculated by multiplying the employee's hours worked by \$7.25.
 - Managers must be scheduled to work morning shifts.
 - Employees cannot be scheduled to work more than eight hours per day.
 - Servers cannot be scheduled to work morning, afternoon, or evening shifts.
 - The system must allow managers to change and delete employees from the system.
3. You are in the middle of implementing a new system at your business. Your project team is failing for the following three reasons: (1) The project is using the traditional waterfall methodology; (2) the SDLC was not followed and the developers decided to skip the testing phase; (3) a project plan was developed during the analysis phase, but the old project manager never updated or followed the plan and never updated the business requirements. Detail your strategy for getting your project back on track.

APPLY YOUR KNOWLEDGE BUSINESS PROJECTS

PROJECT I Methods Behind Methodologies

Signatures Inc. specializes in producing personalized products such as coffee mugs and pens with company logos. The company generates more than \$40 million in annual revenues and has more than 300 employees. The company is in the middle of a large multimillion-dollar SCM implementation, and it has just hired your project management outsourcing firm to take over the project management efforts.

Project Focus

On your first day, your team is told that the project is failing for the following reasons:

- The project is using the traditional waterfall methodology.
- The SDLC was not followed and the developers decided to skip the testing phase.
- A project plan was developed during the analysis phase, but the old project manager never updated or followed the plan.

Determine what your first steps would be to get this project back on track.

PROJECT II The Travel Store

The Travel Store is facing a dilemma as it tripled in size over the past three years and finds its online sales escalating beyond a billion dollars. The company is having a hard time continuing with operations as its business processes can't scale to meet the new demand. In the past six months, sales and profits have dropped and the stock price is plummeting.

Project Focus

The Travel Store is determined to take quick and decisive action to restore profitability and improve its credibility in the marketplace. One of its top priorities is to overhaul its inventory management system in an effort to create optimal levels of inventory to support sales demand. This would prevent higher-volume stores from running out of key sale items while also ensuring that lower-sales stores would not be burdened with excess inventory that could be moved only at closeout prices. The company would like to outsource this function but is worried about the challenges of transferring the responsibility of this important business function, as well as the issues surrounding confidentiality, and scope definition. List the competitive advantages outsourcing could give to The Travel Store, along with recommendations for addressing the company's outsourcing concerns.

PROJECT III GEM Athletic Center

First Information Corporation is a large consulting company that specializes in systems analysis and design. The company has more than 2,000 employees, and first-quarter revenues reached \$15 million. The company prides itself on maintaining an 85 percent success rate for all project implementations. The primary reason attributed to the unusually high project success rate is the company's ability to define accurate, complete, and high-quality business requirements.

The GEM Athletic Center located in Cleveland, Ohio, is interested in implementing a new payroll system. The current payroll process is manual and takes three employees two days each month to complete. The GEM Athletic Center does not have an IT department and is outsourcing the entire procurement, customization, and installation of the new payroll system to First Information Corporation.

Project Focus

You have been working for First Information for a little over one month. Your team has just been assigned the GEM Athletic Center project, and your first task is to define the initial business requirements for the development of the new payroll system.

- a. Review the testimony of three current GEM Athletic Center accounting employees who detail the current payroll process along with their wish list for the new system. Figure 9.15 presents the testimonies of Maggie Cleaver, Anne Logan, and Jim Poulos.
- b. Review Closing Case Two, "Reducing Ambiguity in Business Requirements" and highlight several techniques you can use to develop solid business requirements.
- c. After careful analysis, create a report detailing the business requirements for the new system. Be sure to list any assumptions, issues, or questions in your document.

FIGURE 9.15
Employee Testimonies

Jim Poulos, Director of Sales
Each week I have to review all of the new memberships sold in our club. Each of my seven sales representatives receives \$50 from a new sale for the initiation fee. They also receive 10 percent of the type of membership sold. Membership types include: ■ Adult, \$450/month ■ Youth, \$300/month ■ Family, \$750/month ■ Senior, \$300/month Each sales representative is also paid \$4.50/hour and receives a 25 percent bonus for working overtime and holidays. If the sales representative sells over 200 percent of expected sales they receive an additional 25 percent bonus on their commissions. If the membership is sold during a promotion, the commission rate decreases. The payroll department uses time sheets to track my sales representatives' hourly pay. I have to sign all time sheets once they are completed by the payroll department. I check my sales representatives' schedule to validate the times on the employee time sheets. I then have to submit a separate listing of each employee and their corresponding commissions for initiation fees and memberships sold. I track all of my sales representatives' vacation and sick time. If they are over their vacation or sick time, I have them sign a form stating that if they quit they will pay back all negative vacation or sick time. I would like a system that can automatically calculate commissions and be able to handle sales forecasting and "what if" analysis on my sales representatives' commission rates. I would like to be able to walk up to my sales representatives and tell them that if they sell four more family memberships and one adult they will receive their bonus. I would also like to be able to design promotions for our best customers. These types of things would really help boost sales at our club.
Maggie Cleaver, Payroll Manager
The first thing I do each week is collect the time sheets. I review each time sheet to ensure the employee punched in and out correctly. If the employee forgot to clock out, I contact that person's director to find the time that the employee should have clocked out. I then calculate all regular hours, overtime hours, and holiday hours and total these on the time sheet. I also track sick time and vacation time and total these on the time sheet. Once completed, I send the time sheet to the directors of each department for approval. When I receive the signed time sheets back, I begin to calculate payments. First, I calculate regular pay, then overtime pay, and finally holiday pay. I then add in the sales representatives' commissions, which I receive from the director of sales. I then calculate payment amounts for aerobics instructors because they are paid by class, not by hour. I receive the aerobics class schedule from the fitness coordinator. I then total the entire pay and send a sheet with payment amounts to my co-worker Anne, who calculates taxes. I then calculate all sick time and vacation time and track this in a separate document. I then print labels that state each employee's name, department, and the pay period. I place the labels on a new time sheet, which is returned to the employee punch clock. I would like a system that automatically tracks employee sick time and vacation time. I would also like a system that can automatically calculate regular pay, overtime pay, and holiday pay. I don't know if there is a system that can validate employee time sheets, but if there is that would be great.
Anne Logan, Tax Manager
I receive the payment amounts from Maggie. I then calculate all city, state, and federal taxes. I also deduct health benefits and retirement plan benefits. I then cut the check to the employee and the corresponding checks for the taxes to the government. I manually calculate W2s and all quarterly taxes. I'm also responsible for correcting personal information such as a change of address. I'm also responsible for cutting checks if an incorrect amount was issued. I also track amounts owed by employees that have gone over their sick time or vacation time. I also generate checks for all salaried employees. The part of my job that takes the longest is correlating the total cash debit for all checks and the total amount calculated for all checks. It's amazing how many times these two figures do not match, which indicates that a check was written for the wrong amount. I would like a system that determines taxes automatically, along with quarterly tax filing statements. I would also like a system that can perform audits.

PROJECT IV Confusing Coffee

Business requirements are the detailed set of business requests that any new system must meet to be successful. A sample business requirement might state, “The system must track all customer sales by product, region, and sales representative.” This requirement states what the system must do from the business perspective, giving no details or information on how the system is going to meet this requirement.

Project Focus

You have been hired to build an employee payroll system for a new coffee shop. Review the following business requirements and highlight any potential issues.

- All employees must have a unique employee ID.
- The system must track employee hours worked based on employee’s last name.
- Employees must be scheduled to work a minimum of eight hours per day.
- Employee payroll is calculated by multiplying the employee’s hours worked by \$7.25.
- Managers must be scheduled to work morning shifts.
- Employees cannot be scheduled to work more than eight hours per day.
- Servers cannot be scheduled to work morning, afternoon, or evening shifts.
- The system must allow managers to change and delete employees from the system.

PROJECT V Picking Projects

You are a project management contractor attempting to contract work at a large telecommunications company, Hex Incorporated. Your interview with Debbie Fernandez, the senior vice president of IT, went smoothly. The last thing she wants to see from you before she makes her final hiring decision is a prioritized list of the following projects. You are sure to land the job if Fernandez is satisfied with your prioritization.

Project Focus

Create a report prioritizing the following projects and be sure to include the business justifications for your prioritization.

- Upgrade accounting system.
- Develop employee vacation tracking system.
- Enhance employee intranet.
- Cleanse and scrub data warehouse information.
- Performance-test all hardware to ensure 20 percent growth scalability.
- Implement changes to employee benefits system.
- Develop backup and recovery strategy.
- Implement supply chain management system.
- Upgrade customer relationship management system.
- Build executive information system for CEO.

PROJECT VI Keeping Time

Time Keepers Inc. is a small firm that specializes in project management consulting. You are a senior project manager, and you have recently been assigned to the Tahiti Tanning Lotion account. The Tahiti Tanning Lotion company is currently experiencing a 10 percent success rate (90 percent failure rate) on all internal IT projects. Your first assignment is to analyze one of the current project plans being used to develop a new CRM system (see Figure 9.16).

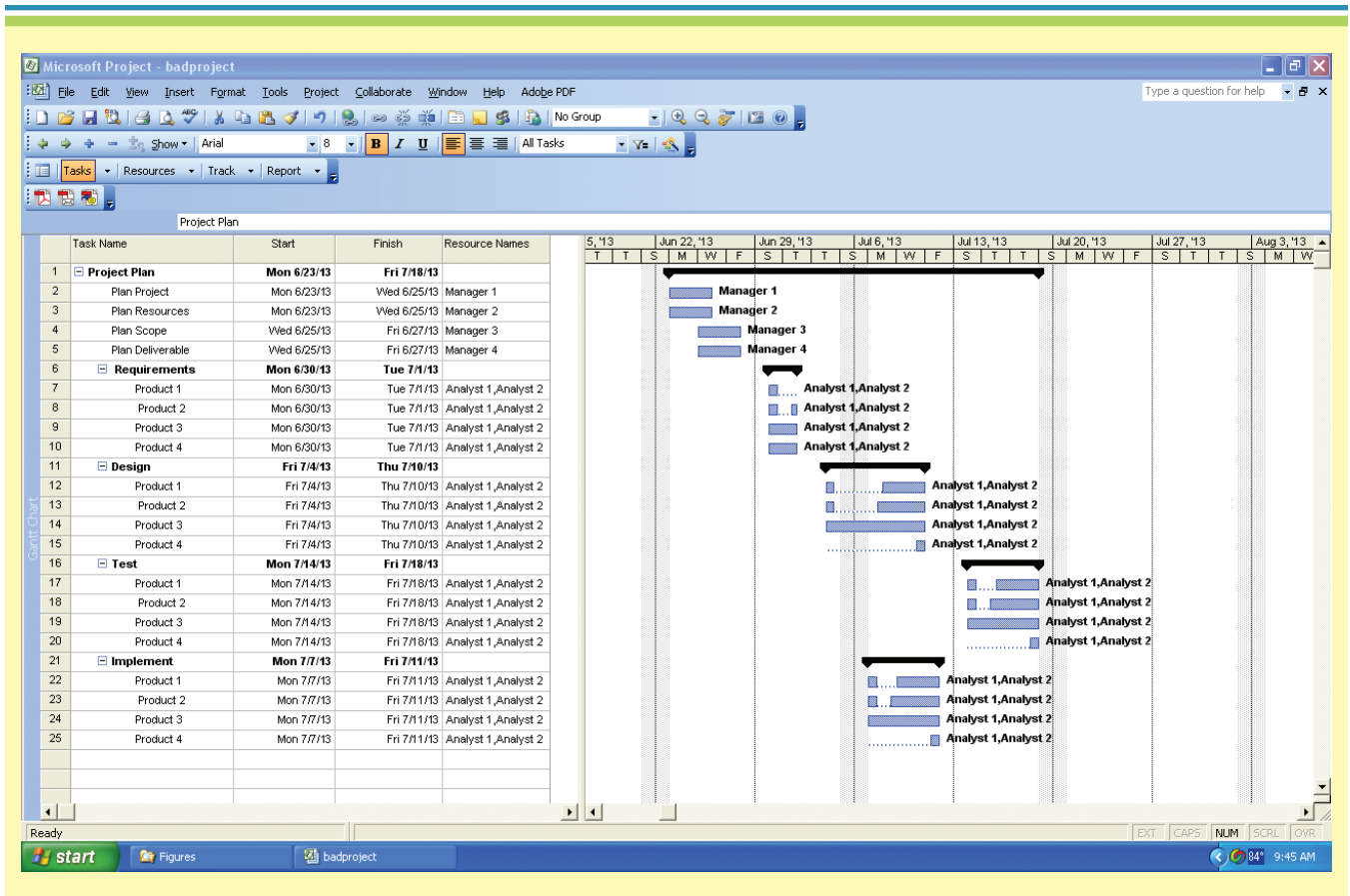


FIGURE 9.16
CRM Project Plan

Project Focus

Review the project plan and create a document listing the numerous errors in the plan. Be sure to also provide suggestions on how to fix the errors.

AYK APPLICATION PROJECTS

If you are looking for Excel projects to incorporate into your class, try any of the following after reading this chapter.

Project Number	Project Name	Project Type	Plug-In	Focus Area	Project Level	Skill Set	Page Number
9	Security Analysis	Excel	T3	Filtering Data	Intermediate	Conditional Formatting, Autofilter, Subtotal	AYK.7
10	Gathering Data	Excel	T3	Data Analysis	Intermediate	Conditional Formatting	AYK.8
11	Scanner System	Excel	T2	Strategic Analysis	Intermediate	Formulas	AYK.8
12	Competitive Pricing	Excel	T2	Profit Maximization	Intermediate	Formulas	AYK.9
13	Adequate Acquisitions	Excel	T2	Break Even Analysis	Intermediate	Formulas	AYK.9
15	Assessing the Value of Information	Excel	T3	Data Analysis	Intermediate	PivotTable	AYK.10
16	Growth, Trends, and Forecasts	Excel	T2, T3	Data Forecasting	Advanced	Average, Trend, Growth	AYK.11
18	Formatting Grades	Excel	T3	Data Analysis	Advanced	If, LookUp	AYK.12
22	Turnover Rates	Excel	T3	Data Mining	Advanced	PivotTable	AYK.12
23	Vital Information	Excel	T3	Data Mining	Advanced	PivotTable	AYK.15
24	Breaking Even	Excel	T4	Business Analysis	Advanced	Goal Seek	AYK.16
25	Profit Scenario	Excel	T4	Sales Analysis	Advanced	Scenario Manager	AYK.16

