2   Competing with Information Technology

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CHAPTER OVERVIEW

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Chapter 2: Competing with Information Technology introduces fundamental concepts of competitive advantage through information technology and illustrates major strategic applications of information systems.

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LEARNING OBJECTIVES

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After reading and studying this chapter, you should be able to:

1. Identify several basic competitive strategies and explain how they use information technologies to confront the competitive forces faced by a business.

2. Identify several strategic uses of Internet technologies and give examples of how they can help a business gain competitive advantages.

3. Give examples of how business process reengineering frequently involves the strategic use of Internet technologies.

4. Identify the business value of using Internet technologies to become an agile competitor or form a virtual company.

5. Explain how knowledge management systems can help a business gain strategic advantages.

SUMMARY

• **Strategic Uses of Information Technology.** Information technologies can support many competitive strategies. They can help a business cut costs, differentiate and innovate in its products and services, promote growth, develop alliances, lock in customers and suppliers, create switching costs, raise barriers to entry, and leverage its investment in IT resources. Thus, information technology can help a business gain a competitive advantage in its relationships with customers, suppliers, competitors, new entrants, and producers of substitute products. Refer to Figures 2.3 and 2.5 for summaries of the uses of information technology for strategic advantage.

• **Building a Customer-Focused Business.** A key strategic use of Internet technologies is to build a company that develops its business value by making customer value its strategic focus. Customer-focused companies use Internet, intranet, and extranet e-commerce Web sites and services to keep track of their customers' preferences; to supply products, services, and information anytime or anywhere; and to provide services tailored to the individual needs of the customers.

• **Reengineering Business Processes.** Information technology is a key ingredient in reengineering business operations because it enables radical changes to business processes that dramatically improve their efficiency and effectiveness. Internet technologies can play a major role in supporting innovative changes in the design of workflows, job requirements, and organizational structures in a company.

• **Becoming an Agile Company.** A business can use information technology to help it become an agile company. Then it can prosper in rapidly changing markets with broad product ranges and short model lifetimes in which it must process orders in arbitrary lot sizes; it can also offer its customers customized products while it maintains high volumes of production. An agile company depends heavily on Internet technologies to help it respond to its customers with customized solutions, and to cooperate with its customers, suppliers, and other businesses to bring products to market as rapidly and cost effectively as possible.

• **Creating a Virtual Company.** Forming virtual companies has become an important competitive strategy in today's dynamic global markets. Internet and other information technologies play a key role in providing computing and telecommunications resources to support the communications, coordination, and information flows needed. Managers of a virtual company depend on IT to help them manage a network of people, knowledge, financial, and physical resources provided by many business partners to take advantage of rapidly changing market opportunities.

• **Building a Knowledge-Creating Company.** Lasting competitive advantage today can only come from the innovative use and management of organizational knowledge by knowledge-creating companies and learning organizations. Internet technologies are widely used in knowledge management systems to support the creation and dissemination of business knowledge and its integration into new products, services, and business processes.

KEY TERMS AND CONCEPTS

1. **Agile Company (62):**
   An organization with the ability to profitably operate in a competitive environment of continual and unpredictable changes by adapting quickly to emerging customer preferences and producing high-quality, high-performance, customer-configured products and services.

2. **Business Process Reengineering (58):**
   The fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in cost, quality, speed, and service.

3. **Competitive Forces (46):**
   A business must confront:
   1) rivalry of competitors within its industry
   2) threat of new entrants
   3) threat of substitutes
   4) the bargaining power of customers
   5) the bargaining power of suppliers.

4. **Competitive Strategies (49):**
   A business can develop:
   1) cost leadership
   2) product differentiation
   3) innovation
   4) growth
   5) alliance
   or other strategies to confront its competitive forces.

5. **Create switching costs (52):**
   A strategy designed to increase the cost in time, money, effort, and inconvenience that it would take a customer or supplier to switch its business to a firm's competitors.

6. **Customer value (54):**
   The customer perceives the value or benefit associated with a given transaction or business relationship. Vendors can provide this by recognizing that quality rather than price has become the primary determinant. Vendors must focus on anticipating future needs, responding to customer concerns, and providing top-quality service.

7. **Interenterprise information systems (64):**
   These systems consist of extranets linking suppliers, customers, subcontractors, and competitors together.

8. **Knowledge-Creating Company (66):**
   Also known as "learning organizations", are companies that consistently create new business knowledge, disseminate it widely throughout the company, and quickly build the new knowledge into their products, services, and business processes.

9. **Knowledge Management System (66):**
   An information system that helps manage organizational learning and business know-how. These systems help knowledge workers create, organize, and make available important business knowledge wherever and whenever it's needed.

10. Leverage investment in IT (52):
Developing new products, services, and business processes through the use of new information made possible by investments in information technology.

11. Lock in Customers and Suppliers (50):
A business may lock in customers and suppliers by building valuable relationships with customers or by intimidating managers into accepting a less profitable relationship.

12. Raise Barriers to Entry (52):
An organization may raise barriers to entry by creating technological, financial, or legal requirements that deter competitors from offering similar products or services.

13. Strategic Information System (46):
Strategic information systems are information systems that support or shape an organization's competitive position and strategies.

14. Value Chain (56):
A series of activities with each activity adding value to an organization's products and services.

15. Virtual Company (64):
Also called a virtual corporation or virtual organization, is an organization that uses information technology to link independent people, assets, and ideas.

ANSWERS TO REVIEW QUIZ

Q.	A.	Key Term	Q.	A.	Key Term
1	3	Competitive forces	9	10	Leverage investment in IT
2	4	Competitive strategies	10	2	Business process reengineering
3	12	Raise barriers to entry	11	1	Agile company
4	11	Lock in customers and suppliers	12	15	Virtual company
5	5	Switching costs	13	8	Knowledge-creating company
6	13	Strategic information systems	14	9	Knowledge management system
7	6	Customer value	15	7	Interenterprise information systems
8	14	Value Chain			

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ANSWERS TO DISCUSSION QUESTIONS

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1. Suppose you are a manager being asked to develop computer-based applications to gain a competitive advantage in an important market for your company. What reservations might you have about doing so? Why?

Unless the individual is familiar with the tools and processes involved in developing information technology applications, they will have a high level of apprehension. Reservations would include the fear of being out of one's depth and feelings of helplessness, insecurity, and dependence on others.

The individual may also wonder whether or not an appropriate application might be obtained off the shelf. Off the shelf software, though not easily customizable, generally costs less than custom software development.

Lastly, he or she might also feel concerned about how the software may affect their position within the organization. Change isn't easy, and if it isn't supported at the very top management levels, it may fail due to lack of organizational will, and this failure would look bad on their performance review.

2. How could a business use information technology to increase switching costs and lock in its customers and suppliers? Use business examples to support your answers.

Switching Costs
A business might undertake projects to integrate some of its information systems with its customers' systems in order to provide them with more timely, accurate, and useful information. The business might even provide applications for its customer's use at low or no cost. Customers later considering changing suppliers would lose these benefits. Indeed, the very process of developing these tools will help managers increase their familiarity with their customers and allow them to tune their information resources to their customer's needs. This relationship will further serve to lock in customers.

Examples
For example, Fed Ex provides its customers with package tracking information. Medical supply companies provide hospitals with inventory management and re-ordering systems. Wal-Mart will soon provide small medical practices with reduced cost patient management systems.

3. How could a business leverage its investment in information technology to build strategic IT capabilities that serve as a barrier to new entrants into its markets?

Businesses may leverage its IT platforms by connecting them with their customers and suppliers to provide better communications. Initially, both the company and the customer benefit from the new system. However, as time goes by the customers will tend to integrate these systems into their own core processes thereby becoming dependent on the platform. In the long run, the company's investment in IT results in locking in their customers and suppliers and creating switching costs. The high costs associated with developing these systems serve as barriers to entry for competitors.

4. Refer to the Real World Case on quantifying IT risks and value in the chapter. Why do you think that the "IT as a cost" mindset is so prevalent among organizations? Relate your answer to the discussion about technology as a competitive advantage or a competitive necessity in the chapter.

Mindset
Some elements of IT are much like a utility. In those cases, estimating IT's value is about as difficult as estimating the value of electricity. For example, if an executive uses a computer only to send e-mails, how would you calculate its value? The value would literally depend on the content of the e-mails and the necessity of sending them nearly instantly as opposed to sending a letter via inter-office mail, overnight delivery, or through the post office.

In many ways, it's simply easier to tell a manager what his or her e-mail enabled device will cost his business unit on an annual basis and trust the manager to make the appropriate decision.

5. What strategic role can information play in business process reengineering?

Information plays a critical role in BPR initiatives. First, information about existing operations serves as a baseline for future comparison. Second, as new processes take shape, information in the form of feedback allows managers to evaluate and control these new processes. Lastly, the organization may find ways to repackage this information for its customers' use.

6. How can Internet technologies help a business form strategic alliances with its customers, suppliers, and others?

Information technology can help a business form strategic alliances with its customers, suppliers, and others by enabling communications, collaboration, and information sharing in ways that were never before possible. By virtue of working together online, managers can monitor and automatically capture process metrics, identify bottlenecks, and recommend process improvements within and between organizations.

7. How could a business use Internet technologies to form a virtual company or become an agile competitor?

Virtual company:
Example: a person or company could use the Internet to acquire customers and then farm out the work to suppliers. A simple example of this can be found managing contractors. A company solicits customers for contract work (customers) and then solicits reliable contractors who can do this work (suppliers). In exchange for a share in the contractor's earnings, the virtual company handles the billing and customer relations. It manages its reputation by monitoring the quality of the contractor's work. High performing contractors retain a larger percentage of their earnings, and low performing contractors are not invited to work on future contracts. Some software vendors now lease (or provide for free) web enabled business software to manage accounting, customer relations management, and office automation tasks (word processing, spreadsheets, calendaring, and e-mail). As a result, a truly virtual company need only a computer connected to the Internet and a web browser. Visit rentacoder.com for a reverse auction site version of this enterprise.

Agile competitor:
In addition to monitoring the marketing for business intelligence, an agile competitor might implement an Internet based system that allows its customers to configure their own products. For example, Dell allows its customers to configure computers to their own specifications to include type of CPU, motherboard, I/O devices, memory, monitor, and more. T-shirt and bumper sticker companies might allow customers to upload their own custom designs or work interactively with their own graphic designers to create a suitable product.

8. Refer to the Real World Case on companies using smartphones in the chapter. Do you think smaller companies like Lloyd's Construction are ready for large-scale implementations of technology in their business? What could they do to prepare for those implementations? Use examples to illustrate your answer.

Small organization benefits – smart phones are simply advanced communications devices with the ability to run simple applications and share information. Small organizations can benefit.

Example: a small law firm consisting of two attorneys, a paralegal, and an assistant could take advantage of smartphone technology. The assistant could use the smartphone to keep the attorney's schedule up to date. The paralegal working out of the office can respond to information requests and send documents, research, and other information to attorneys in court or at a client site.

If a small organization's customers or critical vendors work remotely, then the small organization can still benefit by providing a higher level of connectivity then allowed by ordinary cell phones.

Preparation: any organization large or small planning to implement this (or any) new technology should have one or more clear, short-term objectives in mind. The organization can add additional objectives once the technology is in place and operating correctly. The organization should also plan on thorough user training (if required), and potentially include technology literacy as a hiring requirement. Lastly, but most importantly, top management must fully appreciate the new technology's value and support its implementation. This support may include removing obstacles to implementation such as recalcitrant managers.

9. Information technology can't really give a company a strategic advantage because most competitive advantages don't last more than a few years and soon become strategic necessities that just raise the stakes of the game. Discuss.

Information technology for early innovators can give a company a temporary competitive advantage. Although technology changes at a rapid pace, the first company to gain acceptance stands to capture a substantial market share before its competitors can catch up. Apple's iPod serves as a good example. By the time that other organizations caught up, the Apple had realized a large market share and captured substantial customer loyalty.

On the other hand, competitors can learn from the leader's mistakes at very little cost other than running the risk that their competitor will succeed brilliantly. With these cheaply acquired insights, competitors can introduce their own products into an already primed marketplace and take it over with a superior product and/or a lower price.

10. MIS author and consultant Peter Keen says: "We have learned that it is not technology that creates a competitive edge, but the management process that exploits technology." What does he mean? Do you agree or disagree? Why?

What does it mean? Keen recognizes that buying and installing a new application simply because a competitor has it does little to guarantee its successful application.

Agreed: It takes leadership to foster the organizational changes enabled by new technologies.

ANSWERS TO ANALYSIS EXERCISES

1. **End-User Computing: Skill Assessment**

   Note that students tend to overestimate their computing skills when self-reporting.

a. Word processing: About how many words per minute can you type? Do you use styles to manage document formatting? Have you ever set up your own mail merge template and data source? Have you created your own macros to handle repetitive tasks? Have you ever added branching or looping logic in your macro programs?

Most students feel they are competent at word processing if they can type, save, and print their papers. Today's knowledge workers also use document styles, mail merge, and macros to create shortcuts to repetitive tasks.

b. Spreadsheets: Do you know the order of operations your spreadsheet program uses (what does "_5*2^2- 10" equal)? Do you know how to automatically sort data in a spreadsheet? Do you know how to create graphs and charts from spreadsheet data? Can you build pivot tables from spreadsheet data? Do you know the difference between a relative and a fixed cell reference? Do you know how to use functions in your spreadsheet equations? Do you know how to use the IF function? Have you created your own macros to handle repetitive tasks? Have you ever added branching or looping logic in your macro programs?

Students should be able to calculate the answer to the equation provided without programming it into a spreadsheet. The correct order of operations for this equation is power, multiplication, addition, and the answer is 10. Basic users must understand order of operations, fixed and relative cell references, how to apply functions, and how to create graphs. Intermediate users can use pivot tables to rapidly cross-tabulate data, the IF function to create conditional answers, and create basic macros.

c. Presentations: Have you ever used presentation software to create presentation outlines? Have you added your own multimedia content to a presentation? Do you know how to add charts and graphs from spreadsheet software into your presentations so that they automatically update when the spreadsheet data change?

Students should be able to prepare presentation outlines that include graphics imported from or linked to spreadsheet applications. Advanced users will be able to include audio and video elements into their presentations as well as set slide timing to automate stand-alone or kiosk presentations.

d. Database: Have you ever imported data into a database from a text file? Have you ever written queries to sort or filter data stored in a database table? Have you built reports to format your data for output? Have you built forms to aid in manual data entry? Have you built functions or programs to manipulate data stored in database tables?

Most students will have very little database experience. Yet, managers can take great advantage of a database system's built-in report generating features. To do this, users need basic table design, data import, and query writing skills. Intermediate desktop database users will have basic form design skills.

2. **Marketing: Competitive Intelligence: Strategic Marketing**

    Note: encourage students to use the Internet and your institution's career services department to gather information for this assignment. A Lexis/Nexis search of current periodicals, if available, will also significantly aid in this search. Encourage students to directly interview recruiters. Encourage classroom discussion about the various information systems used and the value of the information found.

a. Product: Which business majors are presently in greatest demand by employers? Use entry-level salaries as the primary indicator for demand.

    Answers to this question will depend on the year, region, and major researched.

b. Product: Which colleges or universities in your region pose the greatest competitive threat to students with your major?

    Answers to this question will depend on the year, region, and major researched.

c. Price: What is the average salary for entry-level employees in your major and geographic region? Is salary your top concern? Why or why not?

    Answers to this question will depend on the year, region, and major researched. Place-bound students should logically rate geography as more important. Consider suggesting that students weigh the opportunities their first job creates higher than their initial salary.

d. Place: Which areas of the country are currently experiencing the greatest employment growth?

    Answers to this question will depend on the year, region, and major researched.

e. Promotion: What is your marketing plan? Describe how you plan to get your name and qualifications in front of prospective employers. How can the Internet help you get noticed?

    Many institutions offer a resume publishing service for their students. The Internet also offers students with the unprecedented ability to self-publish. Students can use this ability to publish their own resumes and CVs. Students may also use this ability to publish portfolios of their work. Such portfolios might include sample programs, original research or analysis, or graphic documentation of their projects or significant professional activities.

    The Internet has opened the doors to virtually all applicants. As a result, on-line applications and job search sites do little to help an applicant get noticed. Personal contacts still rate highly in effective job search strategies. To that end, consider encouraging students to develop and maintain personal address books for their professional business contacts. These contacts should include peers in the business school, professors, recruiters, and people who can serve as personal references.

    This might be a good time to emphasis the negative impact the Internet can have on a job applicant's prospects. Students often publish unflattering information about themselves on Facebook, MySpace, Twitter, and other social network sites where prospective employers may find it. Encourage students to "Google" themselves, see information is readily available to employers, and attempt to mitigate the damage, if any.

3. Competing Against Free: Wikipedia Faces Down Encyclopedia Britannica

a. How does the Wikimedia Foundation meet the criteria for an agile company?

The various Wiki-related knowledge bases accommodate hundreds of languages. It provides numerous articles that can be updated in seconds. It also provides a tool through which users can *request* articles. This local customization and ability to quickly correct, improve, or add information makes the Wiki Foundation extremely agile.

b. How does the Wikimedia Foundation meet the criteria for a virtual company?

At present, the Wiki Foundation provides information on-line only. It has no storefront. What's more, contributors do so from their own homes and offices around the world. Wikimedia has only a few dozen employees on its payroll, and they primarily manage its hardware, software, public relations, legal matters, and facilities. Several hundred thousand more people actively contribute to its various projects.

c. How does the Wikimedia Foundation meet the criteria for a knowledge-creating organization?

Not only does the Wikimedia Foundation produce readily editable information through very powerful editing tools, but it uses these same tools to arbitrate disputes and publish and revise policy. In short, any user can publish a policy change recommendation – or edit a policy directly. These edits prompt vigorous discussion and revision as participants reach consensus. Not only are current policies available for review, but so are all previous policy versions and related discussions.

d. How would you recommend that Encyclopedia Britannica adapt to this new threat?

One obvious approach would merge the OED methodology with Wikipedia's to produce a hybrid. This approach is not without precedent. The *Oxford English Dictionary* was originally created in the 19th century through voluntary submissions processed by professional editors. *Wikipedia* accepts any submission and instantly publishes them, no matter how inaccurate or ridiculous, in hopes that others will find and correct accidental or deliberate errors. Indeed, the *Encyclopedia Britannica* plans to merge both the OED and the Wikipedia approaches and create the means for readers to update old articles or contribute new ones while first subjecting these contributions to professional editorial review[1]. The venerable encyclopedia needs to act quickly as other online competitors have already adopted this very model. [2]

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[1] http://arstechnica.com/web/news/2009/01/britannica-to-grind-wikipedia-beneath-its-heel-woth-small-moves-toward-openness.ars
[2] http://arstechnica.com/old/content/2007/02/citizendium.ars

4. **Knowledge Management: Knowing What You Know**

Product Websites
Exchange and Domino are the leading, proprietary e-mail and groupware vendors. WorkSite is one of the most sophisticated and widely adopted 3-tier, web-based applications available.

Exchange[3]
Domino[4]
WorkSite[5]

a. What steps might a manager take to encourage his or her employees to use the organization's knowledge management system?

Managers might consider any or all of the following:

- Train employees about how to use knowledge management tools.
- Provide practical demonstrations of how these tools immediately benefit the employee and also the organization.
- Recognize and reward early technology adopters.
- Ensure that managers lead the way in usage.

b. Should managers set minimum quotas for system usage for each employee? Why or why not?

Yes.
Some workers need a good flogging from time to time.

No.
If managers "keep score" in this way, then employees can figure out how to inflate their scores. For example, an employee can spend a few minutes each morning opening and closing various items in a knowledge management system while not actually benefiting from the activity. Managers should spend their time trying to find out *why* employees aren't using the system and correcting those problems. The problems may stem from lack of training, poor application design, or lack of usefulness. Managers can correct many of these problems themselves rather than blame their subordinates.

c. Aside from setting employee usage quotas, how might an organization benefit from knowledge management system usage statistics?

Managers should primarily reflect on the processes affecting the numbers. They should ask themselves several questions:

- Have my employees received sufficient training?
- Have I adequately demonstrated the tool's usefulness?
- Has the tool been adequately promoted?
- Could developers or content managers improve the tools in some fashion?
- Is the tool sufficiently accessible?
- Is the tool truly useful?
- How can I measure the impact on productivity that the adoption of these tools will presumably bring about?

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[3] http://www.microsoft.com/exchange/
[4] http://www-01.ibm.com/software/lotus/
[5] http://www.interwoven.com/components/pagenext.jsp?topic=PRODUCT::WORKSITE

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ANSWERS TO REAL WORLD CASES

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RWC 1: How to Win Friends and Influence Business People
Case Study Questions

1. By changing the way his group talks about IT investments, CIO Tim Schaefer is trying to change the way the rest of the company sees IT. Why do you think this is necessary? What would be the prevailing mindset about IT in his company, such that he needs to do something about it? Provide some examples of how IT may be regarded in this organization.

Necessity
It's important for IT to speak and understand the language or languages of the businesses they support. In Northwestern Mutual Life's case, the business speaks in the language of investments, returns, and risk. Using a common language helps reduce barriers to communication between IT and the business unit.

Prevailing attitude
The prevailing attitude had been that IT operated in its own, separate, alternative reality. IT had its own language and "special knowledge".

Perception examples
Schaefer used words such as "separate", "different", "black box", and "special knowledge" to describe how Northwestern Mutual Life perceived his organization. Schaefer wanted the business to perceive his organization in terms of assets with values, returns, and risks – terms with which the business managers were familiar.

2. Chip Gliedman of Forrester Research breaks down IT risks into implementation and impact considerations. Why do you think these are so difficult to manage? What makes IT investments different from investments in other areas of a company?

Management difficulty
IT projects are difficult and the terms "implementation" and "impact" cover all project lifecycle aspects except maintenance. IT implementations pose their own special challenges because they frequently involve new and unproven technologies. IT impact also poses significant challenges because they may require both cultural and personal changes. Such changes aren't easy. For example, millions of people complain vociferously every time Facebook™ changes its user interface. Changing communications flows, job requirements, and reward systems invoke even stronger reactions. It's this human element that makes managing impact so challenging.

Difference
The main difference between the impact of a significant IT project and building a new manufacturing plant, for example, is that management isn't demanding people change their behavior when they build a new plant. Sure, they may be dealing with new tools and manufacturing processes, but with a major new IT system, job descriptions, communications, authority, and compensation models may all change. In short, IT projects are more likely to "move the cheese" for people who have devoted ten or twenty years toward achieving what they thought had been a fixed goal. Unlike the 70's when factory automation resulted in increased productivity and massive layoffs, the IT revolution has had a similar effect on mid-level management. The important difference is that mid-level managers are in a position to passively resist unwelcome changes, and this is something IT managers must constantly and diligently guard against.

3. **Do you agree with the notion that IT investments can be treated in the same manner as financial investments, and similarly quantified by putting a dollar value to them? Why or why not? Would your answer change depending on the type of IT investment under consideration?**

   Yes
   Cost, benefit, risk analysis typically provide enough information to make an informed business investment decision in many cases.

   No
   Larger projects demand business managers consider the competitive and regulatory environments as well as the organization's strategic plans when evaluating potential IT investments. These extend beyond the simple costs and risks associated with a new project, and they are notoriously difficult to quantify.

   Change
   A project's scale and scope should affect how much effort managers put into evaluating a particular IT investment proposal. Small, high value projects should consume minimal management time.

Real World Activities
1. **Do you agree with the approach and metrics used by Northwestern Mutual to value their IT investments?**

   Agree
   Business leaders need to make informed decisions. This can best be done using familiar terms.

   Disagree
   Some projects are simply too small or too urgent to bog down with overly detailed analysis. In short, "if we know we have to do it anyway, why bother with a cost/benefit analysis?"

2. **Can you think of alternative ways, and how those might stack up against those discussed in the case? Break into small groups with your classmates to discuss the pros and cons of alternative approaches to valuing the impacts of IT in a company.**

   General approach
   The approach in this case involves providing information to business leaders using vocabulary they understand. I would recommend changing the vocabulary to suit the audience, though I wouldn't change the actual information provided. For example, the military thinks in terms of "actionable intelligence", "force multipliers", and "targets". Law firms think in terms of "matters", "due diligence", and "opposing parties".

   Approach – IT centric
   This approach places IT at the organization's core, where IT leaders make all the key IT-related decisions. Organizations following this approach will likely have a CEO with a strong IT or accounting background. American Airlines in the 1980's comes to mind, and they dominated their industry for two decades and remain out of bankruptcy even today.

   Approach – Business centric
   IT leaders provide IT cost and risk information to business leaders who then make all project selection decisions. This approach places IT as a "cost center" and business leaders negotiate amongst themselves how to allocate their investment budget. Business leaders take responsibility for valuing a project beyond the cost/risk information provided by IT. IT managers often have to beg to get funding for IT infrastructure projects that don't directly support any one specific business leader.

   Approach – Decentralized
   With this approach, there is no central IT organization. Business leaders are free to acquire what they need, when they need it so long as it falls within their budget. This approach places the least demand on project valuation. Accountability simply falls on the business leader to produce results.

Valuing
When evaluating the legs on a three legged stool, how does one "value" an individual leg? Without any one of the three legs, the stool will fall. Likewise, a bank, an airline, an investment firm, and most businesses, would simply fail, some within the day, should their IT systems completely fail. To value a new project, managers must estimate the impact the project will have on the business – increased sales, for example. On a more challenging note, however, managers must also determine what would happen to their business should they *not* implement a particular project. Will they find themselves in violation of a law? Will they see their market leadership and market share decline? How are they to determine the rate of decline when so much also depends on the actions of their competitors?

3. Go online and search for examples of IT projects that have been successful, as well as those that have failed. Make a list of the different factors that seem to influence the outcome of these implementations. Can you group them into the categories discussed in the case? Which seem to be the most important? Prepare a presentation to share your findings.

Examples
Atwood, Jeff. *"The Long, Dismal History of Software Project Failure"*[6]

Factors
For a long list, search on: software project failure reasons

Categories
As provided in the case study:
- Implementation
- Impact

However, there are numerous ways to categorize IT projects.

Most important factor
In this author's opinion, the most important factor in software project failure is the lack of industry experience. IT managers with the most experience within the industry they support better understand the risks and are better able to communicate these risks to their management counterparts.

Student opinions can and should vary.

RWC 2: For Companies Both Big and Small

Case Study Questions
1. In which ways do smartphones help these companies be more profitable? To what extent are improvements in performance coming from revenue increases or cost reductions? Provide several examples from the case.

Profitability:
- Reduced time it takes to close a purchasing deal
- Reduced inventory levels
- Increased customer satisfaction
- Increased employee satisfaction
- Reduced service call time and costs

Improvement source:
Performance improvements primarily stem primarily from cost savings. However, we might also infer revenue increases from satisfied customers and fewer lost opportunities.

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[6] http://www.codinghorror.com/blog/2006/05/the-long-dismal-history-of-software-project-failure.html

Examples:

Better communications enable improved field support with fewer personnel required to fix a problem and the reduced time it takes to close a service call

Better communications reduced the time it takes to close procurement deals. This has resolved in lower inventory levels and reduced inventory holding costs. We could also infer that this results in fewer lost sales opportunities and better purchasing terms, too.

Improved employee satisfaction – employees have access to the resources they need to do good work.

Improved customer satisfaction – service calls are resolved more quickly thus reducing the impact on their business.

2. **The companies described in the case encountered a fair amount of resistance from employees when introducing smartphone technologies. Why do you think this happened? What could companies do to improve the reception of these initiatives? Develop two alternative propositions.**

Employee resistance - CPS: management could not visualize the value these devices would provide.

Employee resistance – Lloyd's Construction: employees were not technically savvy and required significant training. Though not directly mentioned, the case also implied that employees may have resisted these devices because they performed like workplace monitoring tools.

Resistance causes – CPS: without first-hand experience or a clear vision, it's easy for management to discount the benefits and magnify the risks.

Resistance causes – Lloyds Construction: the case does not explicitly state that Lloyd's employees likely have very low levels of formal education. However, students can reasonably infer this from their job titles. It's also against human nature to welcome new restrictions on one's freedom.

Potential solutions: given the successes experienced by both CPS and Lloyd's Constructions, students should learn from their example:
- Implement small, low cost, low risk pilot projects to demonstrate the technology's value
- Provide a full range of employee training programs
- Employ a parallel implementation strategy to give employees time to learn the new systems while minimizing the impact of any failures

Other feasible recommendations:
- Adjust the employee evaluation system to include a section on technology use
- Adjust the compensation system so employees benefit from cost savings
- Provide "coaches" or "mentors" in addition to a help-desk during implementation
- Advertise/recognize early successes

3. **CPS Energy and Lloyd's Construction used smartphones to make existing processes more efficient. How could they have used the technology to create new products and services for their customers? Include at least one recommendation for each organization.**

The main point of this question is "how", but students may well focus on "what" instead. On the "how" side, both organizations may create new products by providing their customers with access to these systems. This access may take the form of "read" access. FedEx installed a "read" access system for its customers. This system allowed customers to track a package's delivery status. These organizations may also provide read/write access. Example applications might include order entry, account management, or even collaborative interaction.

CPS Energy might consider making its experts (or just their expertise) available online. This would enable their customers to attempt to solve their own problems or escalate a request to CPS' own experts. These experts could then access and assess the request's entire history. This may allow them to help solve the problem online or at least better prepare for the onsite service call.

Lloyd's work is done on a project by project basis. Lloyd's could use their systems to provide their general contractor (the contractor responsible for managing all the individual contractors) with project status information (site surveys, various permits, etc), schedule coordination, and expense reporting. These systems might also be used to demonstrate compliance with local and federal regulations such as hazmat handling or equal opportunity employment directives.

Real World Activities
1.   In addition to the companies featured in the case, others like FedEx and UPS, which have large mobile workforces, heavily use mobile communication technologies. What other companies could benefit from these innovations?

Search Terms: "mobile workforce automation" + "case studies"

A few examples:
  - Full service car rental agencies such as Alamo, Avis, Hertz, and National.
  - Utility companies (meter readers)
  - The trucking industry (any shipping and delivery company)
  - The U.S. Census bureau
  - Onsite market researchers
  - Hospitals

2.   Go online and research uses of smartphones in industries different from the ones reviewed here. Prepare a report to share your findings.

Search Terms: "mobile workforce automation" + "case studies"

3.   Use the Internet to research the latest technological developments in smartphones, and discuss how those could be used by companies to deliver value to customers and shareholders.

Search Terms: "smartphone" + "case studies".
Searching a news aggregator like Google News would provide the most current developments.[7]

Current developments include:
  - Security and mobile banking
  - Mobile journalism's impact
  - Android O/S
  - Competitor/product analysis

RWC 3: Wachovia and Others: Trading Securities at the Speed of Light

Case Study Questions
1.   What competitive advantages can the companies described in the case derive from the use of faster technology and co-location of servers with the exchanges? Which would you say are sustainable, and which ones temporary or easily imitable? Justify your answer.

Competitive advantage: faster technology and co-location enable faster transactions. Fast transaction speeds enable algorithm based trading. Algorithm based trading allows traders to take advantage of minute, fleeting price anomalies.

Sustainable advantages: since high speed transactions require co-location, this advantage might be sustainable assuming limited capacity to co-locate.

Temporary Advantages: the algorithms themselves might be imitable or their effects might be mitigated by competitor's countermeasures.

[7] For example http://news.google.com/

2. Tony Bishop of Wachovia stated that "Competitive advantage comes from your math, your workflow and your processes through your systems." Referring to what you have learned in this chapter, develop opposing viewpoints as to the role of IT, if any, in the development of competitive advantage. Use examples from the case to support your positions.

Technology enables faster and more efficient workflows, and organizations may derive competitive advantage from these. In some cases, technology alone applied to an existing business process can also provide competitive advantages. For example, simply co-locating servers helped speed up transactions.

3. What companies in industries other than securities trading could benefit from technologies that focus on reducing transaction processing times? Provide several examples.

Examples:
- Airline reservations systems
- Check clearing
- Credit card transaction processing
- Telecommunications switching and routing
- Weather modeling and forecasting
- Massive Multiplayer Online Role-Playing Game providers (MMORPG)

Real World Activities

1. Most of the discussion in the case was done from the perspective of the trading firms and the value that these technologies add to them and their customer. However, the case also mentions actions taken by stock exchanges to improve their transaction processing and turn these needs into a revenue-generating asset. Research what recent technologies have been implemented by major stock exchanges such as NYSE and NASDAQ and prepare a report detailing what benefits have occurred as a result.

Note: Because NYSE and NASDAQ are such common terms within articles about technology (and many others), general web searches including the terms NYSE or NASDAQ yield useless results. Suggest to your students that they first identify each organization's CIO and then search for that CIO by name.

NYSE
Technologies: complex event processing.

Benefits: this capability further enables algorithm based trading by increasing speed and data volume.

NASDAQ:
Technologies: Virtual data center.

Benefits: Reduce seven data centers down to two resulting in significant cost savings.

2.   The technologies described in the case represent an example of how different barriers to the flow of goods and information are being overcome by the use of IT. Break into small groups and select an industry other than the one described in the case and brainstorm what barriers to commerce you see there and how IT may help to do away with them.

Barriers to commerce fall into several categories:

- Lack of communication
- Uncertainty (risk/trust)
- Lack of security
- Lack of privacy
- Lack of IT infrastructure
- Lack of IT skills
- Cost

With these barriers in mind, students should be able to select an industry, evaluate one of the barriers noted above, and prepare their report.

RWC 4: IT Leaders: Reinventing IT as a Strategic Business Partner
Case Study Questions

1.   What are the business and political challenges that are likely to occur as a result of the transformation of IT from a support activity to a partner role? Use examples from the case to illustrate your answer.

Business challenges:
- Measuring how IT is valued within the organization. This means a focus on the value chain. Though traditional ROI methods may not work.
- Analysts must learn business processes. Spending at least three days "in the field" each year helps familiarize analysts with the process.
- Maintaining relevancy.

Political challenges:
- Dramatic structural change must overcome internal resistance, "inertia", or "tension"
- Filtering out bad ideas
- Determining the new role boundaries.

2.   What implications does this shift in the strategic outlook of IT have for traditional IT workers and for the educational institutions that train them? How does this change the emphasis on what knowledge and skills the IT person of the future should have?

Implications for traditional IT workers:
- IT workers should expect change as part of their work environment. Even their company name, department name, or job title may change every few years.
- IT workers should expect and even demand continuing education as a part of their job.
- IT workers need to understand the "bigger picture" as it relates to their job.

Implications for educational institutions:
- While computer science departments can focus on the mathematics of the machine, information systems departments need to ensure their students gain both the technical and the business skills necessary to design, develop, and maintain business applications.
- Business schools should not view students as one-time customers and long-term donors but rather as long-term customers whose active academic participation also makes a significant contribution to the institution. University administration should not think just in terms of degrees but also in incremental *certifications*.

New emphasis: IT workers should have strong project management and business skills. While technologies may change, the *principles* by which an organization effectively learns and adapts will remain fairly constant.

3. To what extent do you agree with the idea that technology is embedded in just about everything a company does? Provide examples, other than those included in the case, of recent product introductions that could not have been possible without heavy reliance on IT.

Agree: as a minimum, technology is effectively embedded in the production and distribution of a product. Consider road-side vegetable stands. Farmers use satellite imagery, GPS systems, and computers to determine how to maximize crop yields. The roadside vegetable stand may operate with only a cardboard sign, cashbox, and card table, but there's rocket science in those greens.

Recent product examples:
- iPhone4, Droid X
- Google Earth; Street View
- 4G networks

Real World Activities

1. Search the Internet to find information about other firms that have transformed their IT organizations and the role that the CIO plays in the governance structure of the organization. What benefits have they been able to derive from these changes? Prepare a report and present your findings to your class.

Note: CIO.com provides an excellent source of current articles about transformational IT and a variety of IT management issues, initiatives, successes, and failures.

Example: The CIA. CIO Al Tarasiuk has organized an overhaul of the CIA's information technology. The overhaul included: [8]

- Aligning IT with overall strategy
- Agile project management
- Incorporating Web 2.0 technologies
- Improved governance
- Improved information sharing
- Improved collaboration

Challenges included:
- The need for absolute security
- Overcoming organizational culture
- Lack of user sophistication (at least 5 years behind corporate counterparts)

Keys to success:
- Top management support (Gen. Hayden)
- Direct involvement from each directorate
- CIO's authority to make decisions when no consensus exists
- Close contact between intelligence analysts and developers
- A resilient IT staff – accustomed to change

The results have included:
- Reducing information silos (enabling greater sharing)
- Cost savings by virtualizing over 1,000 servers.
- Increased success rate in delivering applications

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[8] http://www.cio.com/article/441116/Inside_the_CIA_s_Extreme_Technology_Makeover_Part_1

2. Consider the virtual reality technologies employed by Procter & Gamble and described in this case. Break into small groups and brainstorm applications of these types of technologies for companies in industries other than those reviewed in the case.

Potential applications:

- Architecture: human traffic flow analysis
- Civil engineering: infrastructure analysis
- Health care: emergency room design analysis
- IT: infrastructure design and analysis