Essentials of MIS 14th edition Laudon Solutions Manual

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Chapter 1
Business Information Systems in Your Career

Learning Objectives

1-1 Why are information systems so essential for running and managing a business today?
1-2 What exactly is an information system? How does it work? What are its people, organizational, and technology components?
1-3 How will a four-step method for business problem solving help you solve information system-related problems?
1-4 What information systems skills and knowledge are essential for business careers?
1-5 How will MIS help my career?

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Chapter Outline

1-1 *Why are information systems so essential for running and managing a business today?*
- How Information Systems Are Transforming Business
- Key Challenges in Management Information Systems
- Globalization Challenges and Opportunities: A Flattened World
- Business Drivers of Information Systems

1-2 *What exactly is an information system? How does it work? What are its people, organizational, and technology components?*
- What Is an Information System?
- It Isn't Simply Technology: The Role of People and Organizations
- Dimensions of Information Systems

1-3 *How will a four-step method for business problem solving help you solve information system-related problems?*
- The Problem-Solving Approach
- A Model of the Problem-Solving Process
- The Role of Critical Thinking in Problem Solving
- The Connections Between Business Objectives, Problems, and Solutions

1-4 *What information systems skills and knowledge are essential for business careers?*
- How Information Systems Will Affect Business Careers
- Information Systems and Business Careers: Wrap-Up
- How This Book Prepares You for the Future

1-5 *How will MIS help my career?*

Key Terms

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The following alphabetical list identifies the key terms discussed in this chapter. The page number for each key term is provided.

Business model, 09
Business processes, 14
Change management, 20
Computer hardware, 15
Computer literacy, 13
Computer software, 15
Critical thinking, 21
Culture, 14
Data, 11
Data management technology, 15
Extranets, 15
Feedback, 12
Information, 12
Information system (IS), 11
Information systems literacy, 13
Information technology (IT), 11
Information technology (IT) infrastructure, 15
Input, 12
Internet, 15
Intranets, 15
Management information systems (MIS), 13
Network, 15
Networking and telecommunications technology, 15
Output, 12
Processing, 12
World Wide Web, 15

Teaching Suggestions

You are probably meeting in the first class session to introduce yourself, the course, and to meet the students. It is good to get to the classroom early and meet the students as they come in. Learn a few names as the students enter.

After going over any requirements you may have for the course, try to give an overview of the course, stressing that this is not a technical course. Usually, you can't do enough to put non-technical types at ease.

The opening case, "PCL Construction: The New Digital Firm," shows students that even some traditional industries such as construction are now embracing technology as a way to reduce costly delays and improve business processes. Students will become familiar with the idea that many kinds of businesses have had to change the way they operate.

PCL employees are now using mobile devices and digital touch-screen kiosks to access digitized, updated blueprints instead of tracking down paper design documents. These digitized plans allow for much faster revisions, allowing employees to identify and resolve problems quicker in order to keep projects on-time and on-budget.

PCL has also implemented its own proprietary project management system for budgeting, costing, forecasting, subcontractor tracking, production, and reporting. Further, PCL has started moving much of its computing work to the cloud using Microsoft Azure. This allows PCL employees to access information from the cloud at any time while saving money by not having to devote as many on-site resources to hosting the hardware and software.

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Section 1-1: Why are information systems so essential for running and managing a business today?

This section gives students a feel for the importance of information systems in business today and how they have transformed businesses on the world stage. A good discussion of the six important business objectives outlined in this section allows the instructor and students to discuss why businesses have become so dependent on information systems today and the importance of these systems for the survival of a firm. Stress to students that information systems are not a luxury. In most businesses they are the core to survival. This would be a good time to ask students to discuss how their own schools are using information systems to enhance their product offering.

Table 1-1 (Page 7) is a great way to introduce students to much of the new IT jargon that has developed over the last several years. Most of the technologies will be discussed in future chapters. Ask students how much hands-on experience they've had with some of the new business tools as either an employee or a customer.

Globalization is affecting virtually every country in the world. The most striking evidence of this trend is the increasing presence of cell phones in very small villages of Africa. As technology becomes more pervasive and, in some cases easier to use, globalization will continue its steady march. China, Singapore, and Russia are good examples of how globalization has flattened the world. They have become major exporters to other countries, especially industrialized and advanced countries such as the United States and many European countries. Emerging countries, such as Poland, the Ukraine, and Ireland, are excellent examples of increasing globalization.

Ask students to provide examples of truly digital firms (Cisco Systems and Dell Computers), as opposed to those businesses (local mom-and-pop stores or a local doctor's office) that still perform many business processes outside of integrated information systems.

Review the six strategic business objectives: operational excellence; new products, services, and business models; customer and supplier intimacy; improved decision making; competitive advantage; and survival. The rest of the text will continually refer back to these six objectives as reasons why firms should incorporate and integrate business processes with information systems.

Section 1-2: What exactly is an information system? How does it work? What are its people, organizational, and technology components?

This section gives students the facts and definitions that underpin information systems and allow students to knowledgeably discuss information systems. Students do not need the knowledge of a technical person, but they do need to understand the role of information technology and how it must support the organization's business strategy. They must also understand how information technology can be used to help transform a business. Note that the chapter's definitions and terms help prepare students to discuss information systems as an intricate part of business systems. Encourage students to see that technology is subordinate to the organization and its purposes.

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This is also a good place to reinforce the differences between information systems literacy and computer literacy. When asked to describe company information systems, students often depict information systems in terms of technology. It is important to stress that information systems are more than just technology, and that they have management, organization, and technology dimensions. The diagram at the beginning of the chapter can be used to illustrate this point.

Ask students why some companies can achieve much better results using information systems while others cannot. That will help them understand the concept of complementary assets and show that there is much more to building a digital firm than simply buying the latest, greatest hardware and software. It will also help them understand the delicate relationship between technology, management, and organizations' assets.

Interactive Session: Technology: UPS Competes Globally with Information Technology

Case Study Questions

1. **What are the inputs, processing, and outputs of UPS's package tracking system?**

   Inputs: The inputs include package information, customer signature, pickup, delivery, time-card data, current location (while en route), and billing and customer clearance documentation.

   Processing: The data are transmitted to a central computer and stored for retrieval. Data are also reorganized so that they can be tracked by customer account, date, driver, and other criteria.

   Outputs: The outputs include pickup and delivery times, location while en route, and package recipient. The outputs also include various reports, such as all packages for a specific account or a specific driver or route, as well as summary reports for management.

2. **What technologies does UPS use? How are these technologies related to UPS's business strategy?**

   Technologies include handheld computers (DIADs), barcode scanning systems, wired and wireless communications networks, desktop computers, UPS's central computer (large mainframe computers), and storage technology for the package delivery data. UPS also uses telecommunication technologies for transmitting data through pagers and cellular phone networks. The company uses in-house software for tracking packages, calculating fees, maintaining customer accounts, and managing logistics, as well as software to access the World Wide Web.

   UPS has used the same strategy for more than 90 years. Its strategy is to provide the "best service and lowest rates." One of the most visible aspects of technology is the customer's ability to track his/her package via the UPS website. However, technology also enables data to seamlessly flow throughout UPS and helps streamline the workflow at UPS. Thus, the technology described in the scenario enables UPS to be more competitive, efficient, and profitable. The result is an information system solution to the business challenge of providing a high level of service with low prices in the face of mounting competition.

3. **What strategic business objectives do UPS's information systems address?**

   - **Operational excellence:** UPS has maintained leadership in small-package delivery services despite stiff

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competition from FedEx and the U.S. Postal Service by investing heavily in advanced information technology.

- **New products, services, and business models:** In June 2009, UPS launched a new web-based Post-Sales Order Management System (OMS) that manages global service orders and inventory for critical parts fulfillment. The system enables high-tech electronics, aerospace, medical equipment, and other companies anywhere in the world that ship critical parts to quickly assess their critical parts inventory, determine the most optimal routing strategy to meet customer needs, place orders online, and track parts from the warehouse to the end user.

- **Customer and supplier intimacy:** Customers can download and print their own labels using special software provided by UPS or by accessing the UPS website. UPS spends more than $1 billion each year to maintain a high level of customer service while keeping costs low and streamlining its overall operations. UPS also provides tools that enable customers, such Cisco Systems, to embed UPS functions, such as tracking and cost calculations, into their own websites so that they can track shipments without visiting the UPS site.

- **Improved decision making:** Special software creates the most efficient delivery route for each driver that considers traffic, weather conditions, and the location of each stop. UPS estimates its delivery trucks save 28 million miles and burn 3 million fewer gallons of fuel each year as a result of using this technology.

- **Competitive advantage:** UPS is leveraging its decades of expertise managing its own global delivery network to manage logistics and supply chain activities for other companies. Its Supply Chain Solutions division provides a complete bundle of standardized services to subscribing companies at a fraction of what it would cost to build their own systems and infrastructure.

4. What would happen if UPS's information systems were not available?

Arguably, UPS might not be able to compete effectively without technology. If the technology were not available, then UPS would, as it has through most of its history, attempt to provide that information to its customers, but at higher prices. From the customers' perspective, these technologies provide value because they help customers complete their tasks more efficiently. Customers view UPS's technology as value-added services as opposed to increasing the cost of sending packages.

Section 1-3: "How will a four-step method for business problem solving help you solve information system-related problems?

Too often, information systems are thought to be all about hardware and software. Issues that focus on human behavioral aspects of information systems are overlooked or minimized. That can lead to disaster.

After contrasting the technical and behavioral approaches, you should stress to your students that the sociotechnical approach does not ignore the technical but considers it as a part of the organization.

Section 1-4: What information systems skills and knowledge are essential for business careers?

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As an exercise, instructors may wish to have their students surf the internet for job opportunities at Monster.com (www.monster.com) or another employment application site. Divide your class into groups to represent the major functional areas such as finance, accounting, marketing, human resource management, production and operations, information systems, and others. Ask each group to find five jobs being advertised in each of the functional areas. Have them list the required qualifications being requested as they relate to the field of information systems.

Because your students should have access to email, you may want to send them an "MIS Word of the Day." Check out http://www.whatis.com, http://whatis.techtarget.com, or one of the many other online computer terminology dictionaries to locate words and definitions that supplement the Laudon text. Students often enjoy the electronic interactions with their instructor, and the words are yet another way to reinforce learning.

Interactive Session: People: Will Automation Steal Our Jobs?

Case Study Questions

1. How does automating jobs pose an ethical dilemma?

Automating jobs pose an ethical dilemma because it illustrates two sets of competing interests. Companies provide a benefit to the community by providing jobs. However, to be competitive, companies also need to be competitive and automating helps reduce the number of workers needed, especially in manufacturing. According to source from this case, "for every robot per thousand workers, up to six workers lost their jobs and wages fell as much as .75 percent."

Chapter 4 of this text focuses on ethical issues raised by information systems:

Ethics refers to the principles of right and wrong that individuals, acting as free moral agents, use to make choices to guide their behavior. Information systems raise new ethical questions for both individuals and societies because they create opportunities for intense social change and, thus, threaten existing distributions of power, money, rights, and obligations.

1a. Who are the stakeholders? Identify the options that can be taken and the potential consequences of each.

There are several stakeholders involved when discussing the automating of jobs.

- Employees and their families are directly impacted by automation when job losses occur. These individuals have the option to take other jobs that are more difficult to automate, but many replacement jobs consist of low-paying service sector jobs in hotels, restaurants, and nursing homes.

- Shareholders and management are positively impacted where automation helps reduce costs and creates efficiencies. Moving forward, these individuals will identify additional areas where automation can lower costs and improve efficiencies.

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- Highly educated professionals benefit as they help design, develop, and implement automation. These individuals are part of the high-paying beneficiaries of automation, artificial intelligence, and robotics.

- Entire communities are also impacted by automation. In this case, the city of Lakeland in central Florida was ranked as third among metro areas that are most at risk due to automation and artificial intelligence. Unfortunately, communities like Lakeland are potentially impacted like manufacturing cities (i.e., Detroit) that have already been impacted by automation and robotics.

2. If you were the owner of a factory deciding on whether to acquire robots to perform certain tasks, what people, organization, and technology factors would you consider?

Current and future research on which tasks are better preformed with artificial intelligence should be compared to the type of factory I own. The research mentioned in the case examined 964 occupations with each job consisting of 20 to 32 tasks. The results of this research found many jobs and associated tasks that would be better performed by artificial intelligence. However, many jobs remain where humans excel.

The people, organization, and technology factors raise an interesting question in terms of the ethical dilemmas described in question one, and strategy as an organization. If I automate, will other job opportunities arise to help retain displaced employees? What impact will automating have on the community? I would also prioritize tasks that would be best lend themselves to automation. Based on the information provided in this case, the question seems to be focused on the degree I would automate, and not whether to automation is needed.

Section 1-5: How will MIS help my career?

This section addresses how the chapter's elements and information can help in securing a good job as a financial client support and sales assistant. These types of jobs are becoming more popular as information technology becomes more important in the workplace.

Review Questions

1-1 Why are information systems so essential for running and managing a business today?

List and describe six reasons information systems are so important for business today.

Six reasons why information systems are so important for business today include:

1. Operational excellence
2. New products, services, and business models
3. Customer and supplier intimacy
4. Improved decision making
5. Competitive advantage
6. Survival

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Information systems are the foundation for conducting business today. In many industries, survival and even existence without extensive use of IT is inconceivable, and IT plays a critical role in increasing productivity. Although information technology has become more of a commodity, when coupled with complementary changes in organization and management, it can provide the foundation for new products, services, and ways of conducting business that provide firms with a strategic advantage.

Describe the challenges and opportunities of globalization.

Customers no longer need to rely on local businesses for products and services. They can shop 24/7 for virtually anything and have it delivered to their door or desktop. Companies can operate 24/7 from any geographic location around the world. Jobs can just as easily move across the state or across the ocean. Employees must continually develop high-level skills through education and on-the-job experience that cannot be outsourced. Business must avoid markets for goods and services that can be produced offshore much cheaper. The emergence of the internet into a full-blown international communications system has drastically reduced the costs of operating and transacting business on a global scale.

(Learning Objective 1: Why are information systems so essential for running and managing a business today? AACSB: Application of knowledge)

1-2 What exactly is an information system? How does it work? What are its people, organization, and technology components?

List and describe the organizational, people, and technology dimensions of information systems.

- **Organization:** The organization dimension of information systems involves issues such as the organization's hierarchy, functional specialties, business processes, culture, and political interest groups.
- **People:** The management dimension of information systems involves setting organizational strategies, allocating human and financial resources, creating new products and services, and re-creating the organization if necessary.
- **Technology:** The technology dimension consists of computer hardware, software, data management technology, and networking/telecommunications technology.

Define an information system and describe the activities it performs.

The textbook defines an information system as a set of interrelated components that work together to collect, process, store, and disseminate information to support decision making, coordination, control, analysis, and visualization in an organization. In addition to supporting decision making, information systems may also help managers and workers analyze problems, visualize complex subjects, and create new products.

(Learning Objective 2: What is an information system? How does it work? What are its people, organizational, and technology components? AACSB: Application of knowledge)

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Distinguish between data and information and between information systems literacy and computer literacy.

- Data are streams of raw facts representing events occurring in organizations or the physical environment before they have been organized and arranged into a form that people can understand and use.
- Information is data that have been shaped into a form that is meaningful and useful to human beings.
- Information systems literacy is a broad-based understanding of information systems. It includes a behavioral as well as a technical approach to studying information systems.
- In contrast, computer literacy focuses primarily on knowledge of information technology. It is limited to understanding how computer hardware and software works.

Explain how the internet and the World Wide Web are related to the other technology components of information systems.

The internet and World Wide Web have had a tremendous impact on the role information systems play in organizations. These two tools are responsible for the increased connectivity and collaboration within and outside the organization. The internet, World Wide Web, and other technologies have led to the redesign and reshaping of organizations. They have helped transform the organization's structure, scope of operations, reporting and control mechanisms, work practices, workflows, and products and services.

(Learning Objective 2: What is an information system? How does it work? What are its people, organizational and technology components? AACSB: Analytical thinking)

1-3 How will a four-step method for business problem solving help you solve information system-related problems?

List and describe each of the four steps for solving business problems.

- Problem identification involves understanding what kind of problem is being presented—whether it stems from people, organizational, or technology factors or a combination of these.
- Solution design involves designing several alternative solutions to the problem that has been identified.
- Solution evaluation and choice entails selecting the best solution, taking into account its cost, available resources, and skills in the business.
- Implementation entails purchasing or building hardware and software, testing the software, providing employees with training and documentation, managing change as the system is introduced into the organization, and measuring the outcome.

Give some examples of people, organizational, and technology problems found in businesses.

In answering this question students may draw on examples given in Table 1.2.

- **Organization:** In order to understand how a specific business firm uses information systems, you need to know something about the structure, history, and culture of the company. Typical organizational problems include:

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- Poor/outdated business processes (usually inherited from the past)
- Unsupportive culture and attitudes
- Political in-fighting
- Turbulent business environment/changes in the organization's surrounding environment
- Complexity of task
- Inadequate resources

- **People:** Information systems require skilled people to build and maintain them, and they need people who can understand how to use the information in a system to achieve business objectives. Typical people problems include:

  - Lack of employee training
  - Difficulties of evaluating performance
  - Legal and regulatory compliance
  - Work environment
  - Lack of employee support and participation
  - Ergonomics
  - Poor or indecisive management

- **Technology:** Information technology is one of many tools managers use to cope with change. Elements of technology include: computer hardware, computer software, data management technology, networking and telecommunications technology. Other technology elements include the internet, intranets, extranets, and the World Wide Web. Typical technology problems include:

  - Insufficient or aging hardware
  - Outdated software
  - Inadequate database capacity
  - Insufficient telecommunications capacity
  - Incompatibility of old systems with new technology
  - Rapid technological change

Describe the relationship of critical thinking to problem solving.

Critical thinking can be briefly defined as the sustained suspension of judgment with an awareness of multiple perspectives and alternatives. It involves at least four elements:

- Maintaining doubt and suspending judgment. By doubting all solutions at first and refusing to rush to a judgment, you create the necessary mental conditions to take a fresh, creative look at problems, and you keep open the chance to make a creative contribution.
- Being aware of different perspectives. Recognize that business problems have many dimensions and that the same problem can be viewed from different perspectives. You have to decide which major perspectives are useful for viewing a given problem.
- Testing alternatives or modeling solutions to problems and letting experience be the guide. Not all contingencies can be known in advance and much can be learned through experience. Therefore, experiment, gather data, and reassess the problem periodically.
- Being aware of organizational and personal limitations.

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(Learning Objective 3: How will a four-step method for business problem solving help you solve information system-related problems? AACSB: Application of knowledge)

Describe the role of information systems in business problem solving.

Problem solving requires critical thinking in which one suspends judgment to consider multiple perspectives and alternatives. There are a number of reasons why business firms invest in information systems and technologies. Six business objectives of information systems include: operational excellence; new products, services, and business models; customer/supplier intimacy; improved decision making; strategic advantage; and survival. When firms cannot achieve these objectives, they become "challenges" or "problems" that receive attention. Managers and employees who are aware of these challenges often turn to information systems as one of the solutions or the entire solution.

(Learning Objective 3: How will a four-step method for business problem solving help you solve information system-related problems? AACSB: Application of knowledge.)

1-4 What information system skills and knowledge are essential for business careers?

Describe the role of information systems in careers in accounting, finance, marketing, management, and operations management and explain how careers in information systems have been affected by new technologies and outsourcing?

Each of the major business fields requires an understanding of information systems.

Accounting: Accountants need to understand future changes in hardware, software, and network security essential for protecting the integrity of accounting systems along with new technologies for reporting in online and wireless business environments.

Finance: Financial people need to understand future IT changes, financial database systems, and online trading systems for managing investments and cash.

Marketing: Marketing personnel require an understanding of marketing database systems and systems for customer relationship management as well as web-based systems for online sales.

Operations management: These individuals need knowledge of changing hardware, software, and database technologies used in production and services management and an in-depth understanding of how enterprise-wide information systems for production management, supplier management, sales force management, and customer relationship management achieve efficient operations.

Careers in information systems: The individuals clearly need to understand the central role databases play in managing information resources of the firm and how new hardware and software technologies can enhance business performance. They also need skills for leading the design and implementation of new management systems, working with other business professionals to ensure systems meet business objectives, and working with software packages providing new system solutions.

List and describe the information system skills and knowledge that are essential for all business careers.

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Common information systems skills and knowledge for all business careers include an understanding of how information systems help firms achieve major business objectives; an appreciation of the central role of databases; skills in information analysis and business intelligence; sensitivity to the ethical, social, and legal issues raised by systems; and the ability to work with technology specialists and other business professionals in designing and building systems.

(Learning Objective 4: What information system skills and knowledge are essential for business careers? AACSB: Application of knowledge)

Discussion Questions

1-5 What are the implications of globalization when you have to look for a job? What can you do to prepare yourself for competing in a globalized business environment? How would knowledge of information systems help you compete?

Student answers to this question will vary.

1-6 If you were setting up the website for a Major League Baseball team, what people, organizational, and technology issues might you encounter?

Student answers to this question will vary.

1-7 Identify some of the people, organizational, and technology issues that UPS had to address when creating its successful information systems.

Student answers to this question will vary.

Hands-On MIS Projects

This section gives students an opportunity to analyze real world information systems needs and requirements. It provides several exercises you can use to determine if students are grasping the material in the chapter.

Management Decision Problems

1-8 Snyders of Hanover: The financial department uses spreadsheets and manual processes for much of its data gathering and reporting. Assess the impact of this situation on business performance and management decision making.

- Data entry errors from repetitive entry
- No information available on-demand
- Late reporting of critical decision-making information
- Time consuming

(Learning Objective 2: What is an information system? How does it work? What are its people, organizational, and technology components? AACSB: Analytical thinking)

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1-9 Dollar General Corporation: The company wants to keep costs as low as possible, so it does not use an automated method for keeping track of inventory at each store. What decisions have to be made before investing in an information system solution?

- Determine business problems—mismanagement of inventory, too little or too much inventory, no ability to track inventory.
- Lack of information system to manage inventory is actually increasing costs rather than decreasing them.
- What is the exact problem the company wants to solve—reduce costs.

(Learning Objective 1: Why are information systems so essential for running and managing a business today? AACSB: Analytical thinking, Application of knowledge)

Improving Decision Making: Using Databases to Analyze Sales Trends:

Software skills: Database querying and reporting
Business skills: Sales trend analysis

1-10 This exercise helps students understand how they can use database software to produce valuable information from raw data. The solutions provided here were created using the Query Wizard and Report Wizard capabilities of Microsoft Access. Students can, of course, create more sophisticated reports if they wish, but most information can be obtained from simple query and reporting functions. The main challenge is to get students to ask the right questions about the information.

- **Which products should be restocked?**
- **Which stores and sales regions would benefit from a promotional campaign and additional marketing?**
- **Which times of the year should products be offered at full price, and when should discounts be used?**

The answers to the questions can be found in the Microsoft Access File named: *MIS13ch01_solutionfile.mdb*

(Learning Objective 2: What is an information system? How does it work? What are its people, organizational, and technology components?, AACSB: Analytical thinking.)

Improving Decision Making: Using the Internet to Locate Jobs Requiring Information Systems Knowledge

Software skills: Internet-based software
Business skills: Job searching

1-11 In addition to having students research jobs in their chosen career field, it may be quite interesting to have them research jobs in other career fields so they can see that virtually every job and/or career requires information systems skills.

(Learning Objective 4: What information system skills and knowledge are essential for business careers? AACSB: Written and oral communication, Analytical thinking, Reflective thinking, Application of knowledge)

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Collaboration and Teamwork Project

1-12 In MyLab MIS, you will find a Collaboration and Teamwork Project dealing with the concepts in this chapter. You will be able to use Google Drive, Google Docs, Google Sites, Google +, or other open source collaboration tools to complete the assignment.

Business Problem-Solving Case: New Technology at UPS Clashes with Outdated Ways of Working

1-13. Identify the problem faced by UPS. Was it a people problem, an organizational problem, or a management problem? Explain your answer.

The major challenge faced by UPS is staying competitive with new rivals such as Amazon.com and appropriately updating investments in information technology. The problem encompasses problems at the people, organizational, and managerial levels:

- Outdated equipment required more employee 'touch points' at the sorting centers. Each additional 'touch point' introduces additional possibility for error, even with well-qualified workers.
- At the organization level, errors were adding up to missorted packages which can add a day to deliveries, and degrading customer service.
- At the managerial level, managers were working with historical data to make decisions regarding undeliverable packages. With new technology, they now have access to real-time data to help make actual decisions (i.e., staffing) versus estimating.

1-14. Describe the solution to this problem pursued by UPS? Is this a successful solution? Why or why not?

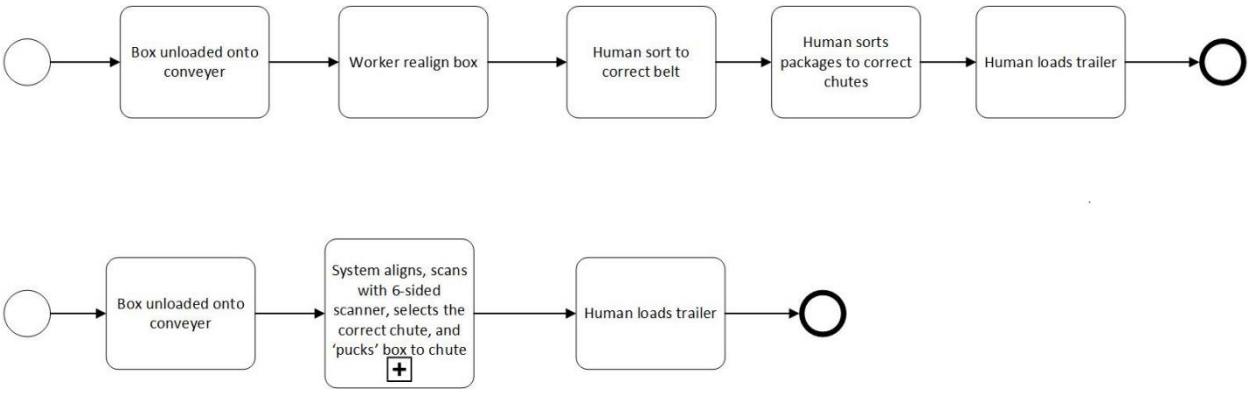
The primary solution being integrated by UPS is the automation of older facilities to reduce the number of human touch points. This investment, including super hubs, can now sort packages 30 percent more efficiently, and with far fewer errors. In another example, an upgraded facility with 750 workers were able to process the same number of packages as an older facility with 1,170 workers. By all accounts, the upgrades have been very successful.

1-15. Diagram the packing sorting process at UPS before and after automation.

Using Business Process Model and Notation (BPMN), the following two diagrams illustrate the packing sorting process before and after automation.

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1-16. How did automated package sorting change operations and decision making at UPS?

The automated package sorting improved operations by requiring fewer human touch points and automating most of the process with the exception unloading and loading boxes onto a trailer. In some instances, new automated facilities provided additional jobs.

Based on IT innovations including Bluetooth enhancements providing real-time information to managers, decisions can be made using actual data rather than historical data requiring estimating. This improvement allows for better allocation of resources and increased efficiency with fewer errors.

(Learning Objective 1: How are information systems transforming business and why are they so essential for running and managing a business today? AACSB: Analytical thinking, Reflective thinking, Application of knowledge)

MyLab MIS

Go to the Assignments section of your MyLab to complete these writing exercises.

1-17 What are the strategic objectives that firms try to achieve by using information systems? For each strategic objective, give an example of how a firm could use information systems to achieve the objective.

View rubrics in MyLab MIS.

1-18 Describe three ways in which information systems are transforming how business is conducted.

View rubrics in MyLab MIS.

For an example illustrating the concepts found in this chapter, view the videos in MyLab MIS.

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Additional Career Resources

The Web offers abundant information resources for researching job openings, skills required to be hirable, industry trends. To search for a job, visit job database Web sites, job hunting sites, and the Web sites of companies in the industry where you are interested. Some of these resources are listed below.

Actively use your college career counseling office. Take advantage of its workshops on resume writing, interviewing, networking. The majority of all job positions today are filled without employer advertising, so networking is especially important in your job search. You will, however, need a resume no matter how you search for a job, and your resume should, if possible, be tailored to each specific job for which you are applying.

Creating Resumes, Cover Letters, and Electronic Resumes

The web now features many sites with tools and instructions for creating cover letters and resumes, including electronic resumes and online portfolios.

Monster.com www.monster.com includes instructions on how to prepare resumes (including searchable resumes) and cover letters along with sample templates.

Collegegrad.com www.collegegrad.com Entry-level job site with tools for preparing resumes as well as searching job postings. Includes resume templates.

Job Hunting Sites for College Graduates

Here are some additional job hunting sites that are particularly useful for college graduates:

www.monster.com
www.collegegrad.com
www.indeed.com
www.careerrookie.com
www.livecareer.com
www.craigslist.com
www.experience.com
www.campuscareercenter.com
www.aftercollege.com
www.aboutjobs.com
www.intershipprograms.com

Helpful Books on Job-Hunting, Resume Preparation, and Interviewing

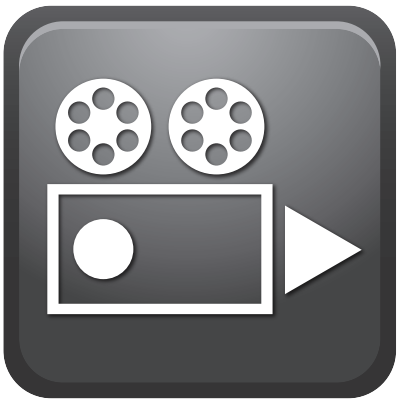
There are hundreds of books and online guides on writing resumes and cover letters, interviewing, and job hunting. Here are a few recommendations.

Martin Yate. *Knock 'em Dead 2018. The Ultimate Job Search Guide*. Adams Media (2017).
Richard N. Bolles. *What Color Is Your Parachute? 2019.* A Practical Manual for Job-Hunters and Career Changers. Ten Speed Press (2018).
Lisa McGrimmon. *The Resume Writing Guide: A Step-by-Step Workbook for Writing a Winning Resume. 2nd Edition* Lisa McGrimmon (2014).

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CHAPTER 1 BUSINESS INFORMATION SYSTEMS IN YOUR CAREER

CASE 1 Business in the Cloud: Facebook, Google, and eBay Data Centers



(a) Facebook Data Center

URL https://www.youtube.com/watch?v=_r97qdyQtlk; L=8:20

(b) Google Data Center Efficiency Best Practices: Power Efficiency

URL http://www.youtube.com/watch?v=voOK-1DLr00; L=10:00

(c) Triton Unveiled

URL https://www.youtube.com/watch?v=HcD47Y-TQQw; L=5:22

SUMMARY Businesses today run on the Internet, and the Internet runs on data centers. Today, data centers might be more accurately called business centers. Data centers drive nearly every aspect of many businesses, especially ones with a significant online presence like Facebook, Google, and eBay. But data centers are significant users of expensive electricity to cool their servers, and they make a significant contribution to pollution and global warming. Cloud data center operators are using a variety of new techniques to become more efficient in their use of electricity.

continued

CASE Consumers of technology constantly demand devices that are smaller, more efficient, and more powerful than the ones they have. But most consumers don't understand the massive back-end infrastructure that powers their "front end" devices, like mobile phones, smartphones, tablets, and desktop computers.

Take, for example, smartphones and tablet computers. iPhones, Androids, iPads, and other tablets represent a trend in all forms of mobile technology towards smaller devices that perform an increasingly large number of functions. But every time a smartphone or tablet user connects to the Internet, places a call, or sends an instant message, it uses power not only on their phone, but at every step of the infrastructure used to perform that function. More often than not, data centers are intimately involved in any Internet-based communication.

In 2020, there were over 7 million data centers of all sizes worldwide. IDC estimates that the number of data centers will eventually decline due to the growth of very large cloud mega-data centers. Because most data centers use air conditioning of one sort or another to keep operating temperatures of microprocessor chips within a safe range, they are significant contributors to pollution and global warming. Many data centers do not practice effective energy management and waste billions of kilowatt hours annually. The growth of cloud computing, in particular streaming of music, television, and movies, is expected to accelerate data center power consumption in the next ten years even as the number of data centers declines.

Data centers are growing not only in number, but also in sheer size. For instance, Facebook has a data center which covers approximately 1.1 million square feet and contains thousands of servers. The cost of running large data centers is a significant component of the overall IT budget of firms. There are two components to the energy cost of data centers: the cost of running the computers, and the cost of cooling them. For this reason, large-scale data center operators are seeking a variety of new ways to cool their servers.

Of all the websites in the world, Google and YouTube may get the most hits per day, but no site can top Facebook as far as raw traffic. Facebook is by far the "stickiest" of the top sites, meaning its users spend more time per visit there, so it's reasonable to argue that no site has a greater need for a robust infrastructure than the social networking giant. With a mind-boggling 2.7 billion monthly active users as of 2020, Facebook faces computing demands that no other company has ever faced. Not only is their site traffic unparalleled, but users are contributing 100s of petabytes of photos and videos on Facebook each day, and that data requires storage.

To manage this demand, Facebook has 17 data centers around the world. They also lease server space across the United States and worldwide. Facebook has chosen locations that allow them to use environmental factors (such as cooling water from

continued

rivers, and cooler northern climates) to reduce the costs of cooling computers, and to minimize their carbon footprint. Each location consumes roughly 30 megawatts of electricity. To ensure 100 percent uptime of the flagship Facebook site, each site has backup power. For example, the Oregon location has 14 diesel generators capable of 3 megawatts apiece in case of a power generation failure.

A widely used method for assessing data center efficiency is Power Usage Effectiveness (PUE). PUE measures the ratio of total facility energy divided by IT equipment energy in watts. IT equipment refers to the computers and hard drives used in the facility. Total facility power would include lighting, and cooling the computer equipment, a major cost. PUE measures the energy used to power and cool a data center. In 2012, a typical data center consumed 2 watts of total facility power to support 1 watt of IT equipment. Today the number is much closer to 1.6 because of changes in IT equipment, and changes in facility power management. The ideal is a PUE of 1, in which case all power was being used to simply operate the IT equipment and no other significant support power for cooling is being used.

Other large tech companies like eBay are developing their own techniques and methods to better evaluate the business impact of their power consumption. The auction giant has revamped the way it views its infrastructure efficiency, using the concept of Digital Service Efficiency (DSE). DSE is like a miles-per-gallon metric used to measure how effectively its power consumption is driving its business. Instead of miles, eBay charts revenue (or other business measure), and instead of gallons, eBay charts kilowatt hours. For instance, eBay is able to understand how many kilowatts it takes to process customer transactions, and what is the carbon emission impact of its data centers. eBay managers chart the efficiency of its data center operations using a dashboard.

Digital Service Efficiency (DSE) helps eBay to see the full cost, business impact, power efficiency (PUE), and environmental impact of customer buy and sell transactions. The dashboard combines PUE with other DSE measures of data center performance. Today, many data centers use both PUE and DSE.

eBay operates one of the largest data center networks in the world, and it has begun to shift from air to water for its data center cooling needs using a new cooling technology from Dell called Triton. In large data centers, temperatures can reach 120 degrees in just two minutes if the cooling system became disabled. At this temperature, processors and hard drives begin to malfunction. The traditional method of using air cooling has become increasingly expensive as data centers continue to grow. eBay has begun reconfiguring its server cooling from air to liquid cooling using water which is a more expensive, but also a far more effective process for removing heat. The company already boasts some of the best power usage effectiveness (PUE) ratings in the industry.

continued

VIDEO CASE QUESTIONS

1. Why does Facebook's data center specialist argue that "The Internet is not a cloud?"
2. What are some of the techniques Facebook uses to cool its data centers?
3. Describe the five methods recommended by Google for reducing power consumption.
4. Based on the Google video, how much of the world's global greenhouse gases are the result of computing?
5. What are some of the benefits of using Dell's Triton water cooling technology?

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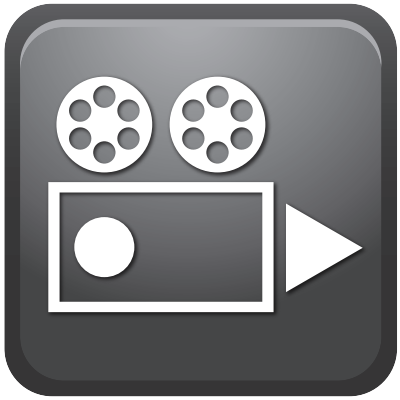
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CHAPTER 1 BUSINESS INFORMATION SYSTEMS IN YOUR CAREER

CASE 2 UPS Global Operations with DIAD and Worldport



(a) UPS Package Flow Technology—DIAD

URL https://www.youtube.com/watch?v=aS97ypMwAgg; L=1:21

(b) DIAD V

URL https://www.youtube.com/watch?v=mPyh1zedjt8; L=3:22

(c) UPS Tour—That's UPS

URL https://www.youtube.com/watch?v=YVLHEN1-jN8; L=4:58

SUMMARY Using smart people and smart technology, in 2019 UPS, the largest package delivery firm in the world, delivered almost 22 million packages daily to 220 countries and territories, requiring the talents of thousands of drivers who are wirelessly connected to UPS main databases. This case describes the information systems and technologies used to manage the flow of UPS packages. At the customer-facing, front end of the process is the UPS DIAD technology platform which drivers use when interacting with customers, both when picking up and dropping off packages. Behind the scenes supporting the drivers is the UPS Worldport Airhub in Louisville, Kentucky, that processes the data generated by DIAD and coordinates the flow of physical packages to their destinations. Although commonly thought of as a package delivery company, UPS is also an information technology company, and an example of a digital firm.

continued

CASE United Parcel Service's global operations are driven by its information systems technology. What UPS can do is largely a function of its information technology investments. Beginning as a local delivery service in 1907, UPS expanded on the West coast initially, reached New York in the 1930s, and went international in the 1970s. Today, UPS delivers almost 22 million packages daily to 220 countries and territories, requiring the talents of thousands of drivers who are wirelessly connected to UPS databases located in seventeen major data centers throughout the world. UPS maintains a fleet of 125,000 delivery vehicles, and over 560 owned or leased aircraft worldwide.

A multiyear, multi-billion-dollar investment in technology has driven the growth of UPS over the last thirty years, beginning in 1990. This investment enabled the development of the DIAD, the Delivery Information Acquisition Device, now in its fifth generation. The DIAD has been a key element in UPS's business technology platform because it connects the drivers to UPS central systems for tracking and delivering packages. UPS was the first firm to use mobile wireless technology for day-to-day operations, and it achieved this distinction twenty years before the iPhone and other smartphones. The DIAD V performs all the functions of the previous models, but adds additional functionality, better hardware and software, resulting in an ergonomically superior fit for drivers, as well as advances in productivity. For customers, the DIAD platform ensures their packages are tracked in real time from pickup to delivery.

DIAD V

The DIAD V takes full advantage of newer consumer technologies with this version's touchscreen, camera, speedy processor, and 1 GB of memory, at half the size of its predecessor.

DIAD V was developed with Honeywell International Inc. and it is the first in the industry to leverage Gobi radio technology that allows instant switching of cellular carriers if one carrier's signal is lost, ensuring the device stays connected to the UPS network throughout the day. The new DIAD V also has a color camera that could be used to enhance proof-of-delivery information. It also has a color display and microprocessor with expanded memory to support driver training and future applications including navigation. For example, the DIAD V could be used to enable maps to help a driver avoid a traffic jam.

Here's a look at the features of the DIAD V:

Roaming: The DIAD V monitors wireless performance and can switch automatically to the strongest carrier signal. The cell connection is vital to the system because it enables continuous reporting to the data center on the progress of packages through the system, and provides customers with instant online access to their package location. The new roaming software also means that UPS can choose to use the least expensive cell service for any given service area assuming signal strength is the same for each carrier.

continued

Touchscreen: The DIAD V has a touchscreen that will likely boost driver productivity. UPS puts the devices through a gauntlet of tests like drops from six feet, heat, cold, and torrential rain that would kill most smartphones.

New Hardware: The DIAD V weighs in at about half the size and weight of the DIAD IV (about 1.5 lbs). It has 1 GB of flash memory, with a micro-SD slot that lets it expand to 32 GB (compared to the older DIAD IV with 128 megabytes of storage). Its 1 GHz processor means it can run much more powerful apps than the previous version, apps that integrate via the wireless connection with server-side systems. That computer power will let UPS offer more personalized services, building on the My Choice service it launched last year, which lets customers create personalized delivery options, such as leaving packages with a particular neighbor if they're not home.

Camera: A small camera of 3 megapixels has been added to the DIAD V although it has not yet been enabled. In the future UPS plans to use the camera to document proof of delivery and the extent of damage to packages. The images are uploaded over the company Wi-Fi networks when the trucks are parked for the night.

Navigation: The DIAD V lets UPS upload the route information a driver needs to go from site to site throughout the day. Like the DIAD IV, the DIAD V has GPS, so UPS knows where the driver is at any time and provides real-time navigation, telling drivers the best way to get to their next destination.

UPS Worldport

The information provided by the mobile DIAD devices is fed into local and regional data centers, and from there to UPS Worldport, the largest automated package handling facility in the world. It is also one of the largest data centers in the United States. Located in Lexington, Kentucky, Worldport occupies over 5 million square feet (about 90 football fields), and can sort over 400,000 packages an hour. UPS started building Worldport in 2000, and has continuously expanded the facility to handle hundreds of thousands of packages generated everyday by customers ordering online. UPS is by far the largest package delivery service for e-commerce packages. Without UPS, it is doubtful that e-commerce could have grown so rapidly.

Outside of FedEx, UPS has no competitors of equal scale and IT sophistication. But this situation could change in the future as Amazon considers developing its own package delivery fleet of trucks, planes, and drones. Uber is considering creating a same-day delivery service using its on-demand services business model, and relying on private contractors who own their own vehicles to deliver packages. And the United States Post Office has extended its traditional package delivery service into a highly automated system with over 140,000 collection boxes, 200,000 vehicles, and 70,000 drivers. USPS already delivers one-third of all the packages delivered in the United States.

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UPS faces a number of challenges keeping up with mobile technology. The pace of technological change is arguably faster now than in the past. It took UPS seven years after deployment of DIAD IV to deploy the DIAD V. If UPS waits this long again, it's possible another competitor will be faster to market with a superior technology platform.

VIDEO CASE QUESTIONS

1. How does the DIAD help drivers deliver packages?
2. What improvements were made in the DIAD V?
3. How many times are packages handled by humans once they reach Worldport? Why is this important?
4. What are "end of runway" facilities?
5. What kinds of information technologies do you see being used by UPS in this video?
6. Why doesn't UPS use much more powerful and smaller smartphones like the iPhone or Android?
7. How does UPS's investment in IT help it achieve the strategic business objectives described in Chapter 1?
8. Why does UPS serve as an example of a "Digital firm" as described in Chapter 1?

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