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COURSE
82401A

Emerging Technologies, Information, and Data Analytics

Modern business is being reshaped by a wave of new technologies, and accounting professionals need to understand what's driving that change. This course introduces emerging technologies transforming today's organizations, explores how information flows and creates value in a digital environment, and provides a foundation in data analytics. Whether you're looking to modernize your practice or better advise clients, this course gives you the conceptual grounding to engage confidently with technology-driven change.

CREDIT HOURS 2 | FIELD OF STUDY BUSINESS | EXAM QUESTIONS 10

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Assignment

- Study the full course materials included here.
- Complete the review questions after each chapter.
- Answer 10 final exam questions.
- Final exam is scored immediately, 70% or better passes.
- Certificate of completion is available in your account.
- Failed exams can be retaken free of charge.

Course Objectives

- Recall the reasons why many IT projects fail.
- Recognize an organization's most costly and valuable asset.
- Recall the characteristics of the various methods available to save large amounts of data.

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Chapter 1: INTRODUCTION TO EMERGING TECHNOLOGIES

Chapter Objective

After completing this chapter, you should be able to:

- Recall the reasons why many IT projects fail.

Netflix versus Blockbuster – The Original Disruption

Blockbuster, in its prime, had a stronghold on the U.S. video rental industry. It had brick-and-mortar stores in 2,800 locations worldwide in 1992 and 9,000 stores at its peak. Two years later, Viacom purchased Blockbuster for $84 million. During the 1990s, a Blockbuster store offered the latest releases and classic movie hits for the entire family in most neighborhoods. Besides revenue from rentals, Blockbuster also made significant income from late fees.

When Netflix arrived on the scene with a subscription-based DVD rental business in 1997, Blockbuster did not see it as a worthy competitor. Netflix, known today for its streaming service, started renting out DVDs. For a monthly fee, subscribers entered a wish list of movies they wished to view, and Netflix sent the customer their first two DVDs. When the customer finished with the video, they sent the DVD back to Netflix, which would, in turn, send a different DVD from the subscriber's wish list. A subscriber could keep any DVD for as long as they wanted, thus eliminating the pressure to return a movie on time to avoid costly late fees.

Netflix infiltrated this market by utilizing technology to provide what the customer wanted – reasonably priced, convenient entertainment. Their model also eliminated late fees, which were the customers' least favorite feature of Blockbuster. As of January 2021, Netflix was worth over $230 billion, whereas in 2022, Blockbuster had one remaining store, in Bend, Oregon.

Netflix is considered to be one of the first companies to use the internet to reach customers and completely change the entertainment business. While the concept may seem relatively simple today, the change in the home entertainment business was revolutionary and started a new trend of digital disruption by changing an entire industry.

Blockbuster CEO Jim Keyes stated in an interview in 2008, "Neither Redbox nor Netflix is even on the radar screen in terms of competition."[1] Looking back, maybe they should have been.

IMPACT OF EMERGING TECHNOLOGY

The past decade has seen significant technical advances leading to a flurry of new technologies. Technology implementation and management traditionally required technical skills possessed by information technology (IT) professionals. Historically, automating a process required heavy coding and the specialized technical skills of an IT professional. However, today, the addition of new end-user tools, combined with better processing speeds, has put technology in the hands of the end-user. For example, robotic process automation (RPA) software enables nontechnical users to automate basic processes without significant technical knowledge. Consequently, the developments in software and hardware tools have made it easy for nontechnical users in all areas of the organization to be active participants in using technology. The increased dependence on technology, not only for communication, collaboration, recordkeeping, and decision-making but also for improving efficiency, increasing profitability, creating a competitive advantage, and innovating new products and services, makes understanding emerging technologies critical for all business professionals.

The proliferation of emerging technologies is disrupting organizations and industries more than ever. A period of rapid technological change generally disrupts how businesses operate and what services and products they offer. For many, the term disruption has a negative connotation. However, disruption can bring new opportunities for those who anticipate and embrace the change. Gartner defines digital disruption as "the effect that changes the fundamental expectations and behaviors in a culture, market, industry or process through digital capabilities."[2] Digital disruption often leads to new products and services and possibly new industries. An existing business that does not adapt and take advantage of new developments can be left behind and become the Blockbuster of the current generation. With a strategic mindset, companies can create a competitive advantage, even with minor technological changes. Early examples of disruption included cars replacing horses, telephones replacing telegraphs, and online reference sites replacing traditional encyclopedias. Recent advances in technology have already transformed several industries. Consider these examples:

- One of the largest taxi companies does not own any vehicles (Uber).
- One of the largest accommodation providers does not own any real estate (Airbnb).
- One of the largest retailers does not hold any inventory (Alibaba).

When managers think about increasing productivity, exploring new revenue models, moving into untapped markets, or cutting the cost of operations, they revert to technological solutions. Often, people think that technology can solve the problems they face in a company. Today's managers are more likely to embrace technology because they are familiar with and dependent on smart devices, such as smartphones, watches, TVs, and virtual assistant technologies. However, using technology will not always solve the problems facing a company but will always increase the risks to the

company if not properly managed. For example, during an English professional football game, the automated technology did not notify match officials to award a goal. Players and the goalpost blocked all goal line cameras, preventing unobstructed tracking of the ball into the goal. The lack of a clear view by the cameras cost one team a point and determined the outcome of the championship match.[3] Even though this technology worked properly in 9,000 previous games, one failure was detrimental to one team. Therefore, organizations must consider these isolated risks as they weigh new technology options.

Many organizations chase the latest technology without considering the long-term implications, functionality, risks, and threats, thus picking the wrong solution for the wrong task in the short and long terms. Therefore, when adopting, implementing, and using technology, managers must do their due diligence to understand which technologies would help their organization thrive in changing markets while minimizing threats.

When selecting technology, organizations must keep the users in mind. Individuals will only use the technology if they find it easy to use and valuable. For example, a customer service manager may consider using chatbots to support customer service inquiries, focusing on the benefit of cost savings while increasing productivity. However, if the chatbot is not implemented correctly, it may frustrate customers and increase customer dissatisfaction. It will also increase the costs of resolving issues and complicate maintaining the company's image and reputation.

Technologies, such as artificial intelligence, in manufacturing, procurement, and sales generation, can increase companies' productivity. However, using artificial intelligence can also increase risks to the company if management ignores ethical issues. This technology may also increase vulnerability to cyberattacks and other security risks.

Marketing professionals use advanced analytics techniques by gathering data from new sources to gain insights into their customers. However, not understanding the process and tools may lead to bias and inaccurate interpretation of data, leading to bad decisions. Consequently, a better understanding of technological advances will help managers determine the right solution for the right task and manage the associated risks.

Business managers and external stakeholders, such as auditors and regulators, need a broad understanding of technologies and how they are used in organizations to provide insights into financial information. To provide assurance of financial statements, auditors must understand whether the client organization accurately captured, processed, analyzed, and reported the data. Suppose data is collected and analyzed using emerging technologies. In that case, auditors need to understand how technology influences the processing of data when collecting evidence. They also need to evaluate critically the outputs generated using technology. Further, regulators need to know how emerging technologies, such as blockchain, may impact the capital market and provide

oversight and guidance over organizations to protect the investors and maintain fair, orderly, and efficient markets.

This course is designed to help nontechnical business professionals navigate the complex and changing world of new technologies. All business professionals will benefit from foundational knowledge of many of the disruptive technologies available today. By understanding each technology's functionality, risks, and benefits, professionals can help make better-informed decisions when selecting and managing technologies. In this course, you will find:

- A single source of information for a variety of emerging technologies.
- A nontechnical explanation of the functionality of a given emerging technology.
- Examples and use cases to help relate technical topics to a specific business context.
- A discussion on challenges, issues, and concerns related to the management and governance of a particular technology.
- Discussions on how disruptive technologies will impact business operations.

This book will help professionals understand the complexity involved in making decisions on technology adoption, implementation, management, governance, compliance, and reporting, and hence, be active and informed technology participants in their organizations.

IT GOVERNANCE

Knight Capital Americas LLC was a financial services firm with its primary operations on the execution of market trades. Before Knight's collapse, it was the largest trader of U.S. equities. However, that abruptly stopped in 2012, when a system failure caused the firm to incur $440 million in trading losses in 45 minutes. Within two days, its market capitalization fell by approximately 80%.[4]

Since Knight was engaged in high-volume stock trades, it relied heavily on technology to process the transactions. Two months before the incident, Knight's CEO, Thomas Joyce, commented, "Our data centers are some of the largest and most reliable in the industry. We spend tens of millions of dollars every year making our technology platform better, faster, and more reliable."[5]

On August 12, 2012, an error in one of the eight trading servers allowed the continued generation of trade orders without tracking which orders were completed. In short, the system created multiple trade orders when it should have only created one. The system sent 97 messages to employees, signaling an error in the trading system. However, the employees ignored the messages for over an hour. When a team responded to examine the situation, they operated without documentation on how to proceed. During this time, the server continued to generate trade orders en masse. A large number of trades affected stock prices, leading the New York Stock Exchange to stop trading affected stocks.

After the incident, the Securities and Exchange Commission (SEC) showed that Knight did not have proper risk management controls or supervision in place. The lack of controls led to both system failure and delayed detection. The company did not have adequate systems for testing and review. In 2013 the SEC fined Knight $12 million for not having controls in place for deployment and inadequate guidelines for how to respond.[6]

The story about Knight Capital Americas LLC exemplifies how system issues can negatively impact not only an organization's operations and financial performance but also the capital markets. Therefore, business managers, auditors, and regulators must consider whether proper oversight and controls have been established around technology to prevent, detect, and correct mistakes.

Governance in a corporation includes overseeing the business operations and the mechanisms used to control and hold the organization and its people accountable. Information technology governance is one component of corporate governance. However, because of the dependence on IT for business operations today, this single component has become not only the most significant subset of corporate governance but also the most complex.

The COBIT (Control Objectives for Information and Related Technologies) framework defines enterprise governance of information technology as the process by which

> the board that oversees the definition and implementation of processes, structures and relational mechanisms in the organization that enable both business and IT people to execute their responsibilities in support of business/IT alignment and the creation of business value from I&T-enabled business investments.[7]

Information technology enables organizations to create value for their stakeholders, increase productivity and efficiency in operations, innovate new products and services, and serve new and niche markets, which leads to improved financial performance. As a result, managers are increasingly interested in adopting emerging technologies.

However, proper governance and management of IT risks and resources are particularly crucial when considering emerging technologies because of the uncertainties surrounding them and the novelty of the technologies. An organization takes risks each time it introduces a new system, but the risk is greater if the technology is unfamiliar to IT management and those in the company. Therefore, organizations must provide oversight over IT and be proactive in their IT management to ensure long-term success. These practices can help ensure that the organization can fulfill its mission and achieve its strategic goals.

Several governance frameworks and guidelines are available for managers to ensure that the systems and IT processes keep the company's assets safe and secure and minimize interruptions to business operations. The Appendix provides brief descriptions of several governance and assurance

frameworks available. Good governance practices enable organizations to prioritize IT spending through budgetary controls and to align spending to support their strategic objectives. Governance practices help manage IT applications, infrastructure, and architecture and mitigate and control potential threats. These practices also help organizations to comply with regulations, manage and control third-party IT services, and support and maintain IT assets and resources. Governance and management of the entire information technology will create a competitive advantage for the organization by aligning IT with the business strategy. We look at several aspects of IT risks next.

IT Risks

Every business activity has some form of risk associated with it. Risk, by definition, is uncertainty. Risks can lead to negative or positive outcomes. Potential adverse outcomes are considered threats or events that may jeopardize an organization from achieving its objectives. In an organization, we want to mitigate adverse outcomes while increasing the positive effects. For example, when an organization decides to implement a new enterprise resource planning (ERP) system, the company is taking a risk. However, this decision can also lead to increased productivity, making it worthwhile to take the risk.

On the other hand, the centralized nature of the system can also increase cybersecurity vulnerability, which is a negative outcome. IT risks can stem from external sources, such as cybercriminals and third-party vendors, and internal sources, such as employees and various IT components. Every IT component at every level of the organization can increase IT threats. Table 1.1 shows some typical IT risks and an example of a negative consequence associated with different IT components. Management should take extra care to mitigate these risks, especially when considering emerging technologies. In subsequent chapters, we discuss risks specific to a particular technology. Keeping these risks in mind can help organizations select the appropriate governance practices to optimize (reduce threats and create value) the risk to the organization.