Information Systems v11 1st edition Gallaugher Solutions Manual

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Chapter 1
Setting the Stage: Technology and the Modern Enterprise

Chapter Introduction

This chapter provides a general overview of the different ways in which technology has changed the business landscape. It provides information on the young technology entrepreneurs who have started some of the world's most successful technology firms. The chapter also highlights the impact technology has had on various managerial disciplines and provides an overview of the various career opportunities in the field of technology. Lastly, a synopsis is provided of the rest of the material covered in the textbook.

Section 1.1: Tech's Tectonic Shift: Radically Changing Business Landscapes

- Learning Objectives
    - Appreciate how, in recent years, technology has helped bring about radical changes across industries and throughout societies.
    - Understand that the increasingly rapid pace of tech advancement creates both promise and peril, for workers, firms, industries, and societies.
    - Recognize that while tremendous wealth has been created by tech giants, global regulators are now working to curtail their overwhelming power and influence in ways that will alter past competitive advantages.
    - Understand that your career will be filled with constant change, much of it brought about by changing technology. You'll spend the rest of your life learning new technologies and evaluating their impact.

- It's Not the Future, It's Now!
    - **market capitalization (market cap)**: The market cap of a publicly traded firm is its total value. Market cap can be calculated by multiplying the number of a firms shares by its current share price.
    - **R&D**: Research and development—the portion of a firm focused on innovation, typically pioneering advances that will eventually arrive as new products and technologies.

- A Quick Look at AI—the Hottest Topic in Tech and Business
    - **microprocessors**: The part of the computer that executes the instructions of a computer program.
    - **server farms**: A massive network of computer servers running software to coordinate their collective use. Server farms provide the infrastructure backbone to SaaS and hardware cloud efforts, as well as many large-scale Internet services.

- Video Discussion Question: Will ChatGPT Take Your Job?
    - According to a report from Goldman Sachs, what are some of the jobs that are the

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most—and least—at-risk from the rise of AI?
The most at-risk jobs include legal, business, and financial operations, as well as office administration. The jobs that have the least risk include those in production and repair, and cleaning and maintenance jobs.

- What is a possible career path for someone who learns how to use AI tools in order to get the most out of an AI system?
A prompt engineer—they can create efficiency and productivity by entering, designing, or refining prompts or inputs that help guide AI towards the final output.

- Tech: It's at the Center of Your Uncertain Future

- Video Discussion Question: Amazing Invention—This Drone Will Change Everything

  - What are some of the advantages of using a drone versus a car for delivery?
Using a drone can be a lot faster and much more efficient, especially with deliveries that do not weigh much. Drones are all electric and autonomous and use much less energy per delivery.

  - Which country has Zipline been using gliding drones in and for what purpose?
For over six years, Zipline has been using gliding drones in Rwanda to deliver life-saving blood to hospitals.

- Video Discussion Question: Europe's New Big Tech Rules Will Have Greater Impact than U.S. Antitrust Lawsuits: Fmr. FTC Chairman

  - Which six companies did the EU designate as gatekeepers, and how many services will be impacted between them?
Twenty-two services will be impacted between the following six companies: Alphabet, Apple, Amazon, ByteDance, Meta, and Microsoft.

  - What is an example of the interoperability of message platforms that the EU's new rules will lead to?
One example would be WhatsApp, which is an encrypted product (Facebook cannot view those messages because it is private)—with interoperability, this encryption would go away, which would devalue the product. This may mean that there will be a different version of WhatsApp in Europe versus other regions of the world.

Section 1.1: Questions and Exercises

1. Search online and compare profits from Google, Apple, and other leading tech firms with those of major media firms and other nontech industry leaders. How have profits at firms such as Google and Apple changed over the past few years? What do you think is behind such trends? How do these compare with changes in the nontech firms that you chose?

   Answer: Students' answers will vary. This could be a group assignment. Divide the class into groups of three and ask them to compare profits from Google, Apple, and

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other leading tech firms with those of major media firms and nontech industry leaders of their choice. Ask groups to share their findings with the rest of the class.

2. How do recent changes in computing impact consumers? Are these changes good or bad? Explain. How do they impact businesses?

   Answer: Some of the recent changes in computing include the growth of open source software, cloud computing, and software as a service (SaaS). All of these changes have their own advantages and disadvantages for businesses and consumers. Cloud computing and SaaS reduce computing costs and provide greater access to sophisticated high–powered computing, however both have increased security and privacy concerns. Open source software also reduces costs and allows for greater collaboration among programmers but may have quality issues.

3. Serial entrepreneur and venture capitalist Marc Andreessen has written that "software is eating the world," suggesting that software and computing are transforming entire industries and creating disruptive new upstarts. Come to class with examples of firms and industries that have been completely transformed through the use of software.

   Answer: Students' answers will vary. Examples might include Comcast, Spectrum, Disney, Walmart and many more. Andreesen's article can be found at http://www.wsj.com/articles/SB10001424053111903480904576512250915629460. He also proposed that the next industries to be transformed by software will include education and health care.

4. Venture capitalist Ben Evans, who once worked with Andreessen, has said that "mobile is eating the world." Give examples of how mobile has built billion-dollar industries that wouldn't exist without handheld computing power. How should today's managers be thinking about mobile as an opportunity and a threat?

   Answer: Students' answers may vary. Examples include the growth and success of companies like Meta; China's Baidu, Tencent, Alibaba; India's Micromax; and Africa's Esoko, Sproxil, M-PESA, and Zaad. Mobile can serve as an opportunity for managers via its ability to increase sales and vet and build trust with customers. However, it can also act as a threat due to the way mobile phones and cameras, YouTube, Meta, and Twitter can now so easily reveal ethical lapses and customer service flaws.

5. Make a list of pros and cons of modern AI technology. How is AI transforming modern business environments and society? Which firms, industries, and jobs will be most impacted by this technology?

   Answer: Students' answers may vary. Examples of pros can include life-extending innovation, education improvements, and simplifying boring and monotonous tasks. Examples of cons can include poor data, copyright concerns, misuse of AI by bad actors, AI technologies making biased recommendations that are harmful to women and people of color or providing incorrect answers.

   Data analytics, business intelligence, and so-called machine learning are driving discovery and innovation, redefining modern marketing, and creating a shifting knife-edge of privacy concerns that can shred corporate reputations if mishandled. And the

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pervasiveness of computing has created a set of security and espionage threats unimaginable to the prior generation.

As far as jobs, tech careers will change, but past tech shifts have often accelerated productivity, not eliminated workers. *Business Insider* ranks software developer as the top job for the next decade and another report ranks data and AI jobs as growing 37 percent, with engineering and cloud computing jobs growing 34 percent. It is expected that for nontech jobs, even more tech will be used. Advances in data collection and analytics mean jobs that were once "math-free" are now havens for data collection and analysis—human resources, marketing, advertising. And firms, such as Nvidia, that provide the microprocessors that are used in AI, are becoming overwhelmingly important.

6. How is social media impacting firms, individuals, and society?

   Answer: Students' answers may vary. Social media (Meta, Twitter, etc.) is changing the way individuals communicate with one another as well as the way in which customers and companies communicate. Customers are using social media to broadcast their views on products and services. Firms are harnessing social media for new product ideas and for millions in sales. Social media is also changing the way society, as a whole, interacts. Social media has emerged as a catalyst for global change, with Meta and Twitter playing key organizing roles in uprisings worldwide. While a status update alone won't depose a dictator, technology can capture injustice, broadcast it to the world, disseminate ideas, and rally the far-reaching.

7. What kinds of skills do today's managers need that weren't required a decade ago?
   Answer: Students' answers may vary. Answers should reflect the impact of technology on the manager's skill set. Possible answers might include basic computer skills, project management skills, use of spreadsheets, word processing skills, knowledge of presentation programs, communication tools such as e-mail and instant messaging, conducting teleconferences, social networking, etc. Managers must have a general awareness of technology to be effective consumers of technology.

8. Investigate the role of technology in emerging markets. Come to class with examples to share on how technology is helping fuel economic growth and provide economic opportunity and public good to consumers outside of North America, Europe, and Asia's wealthier nations.

   Answer: Students' answers will vary. Although China started the prior decade largely as a nation unplugged and offline, the nation now has more Internet users than any other country and has spectacularly launched several publicly traded Internet firms including Baidu, Tencent, and Alibaba. Also, India, the world's second most populous nation, has ridden technology to become a global IT powerhouse. India's tech sector has grown from "almost nothing" to a $120 billion industry, expanding even during the recent global recession. Technology has enabled the once almost-exclusively-agrarian nation to become a go-to destination for R&D and engineering across sectors as far-flung as aircraft engine design, medical devices, telecom equipment, and microprocessors. Even in the far reaches of nations in sub-Saharan Africa, fast/cheap tech is becoming an economic lubricant, where the agrarian poor are now empowered with farming info and commodity pricing, raising incomes and lowering the chance of

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exploitation by unscrupulous middlemen.

9. Work with your instructor to identify and implement ways in which your class can leverage social media. For example, you might create a Facebook group where you can share ideas with your classmates, join a service like Threads or Mastodon and create a hashtag for your class, leverage Google Hangouts, create a course wiki, or start a Slack channel. (Refer to Chapter 11 "Social Media, Peer Production, and Leveraging the Crowd" for more on these and other services).

   Answer: This can be an in-class activity. Divide the class into different groups and ask each group to come up with at least three ways in which the class, as a whole, can use social media. After every group has presented their ideas, allow students to vote on the idea they like the best and then ask them to actually implement it.

10. Watch the video below, produced by the World Economic Forum. Is artificial intelligence (AI) really intelligence? What makes AI "smarter"? Which nations lead in AI, and why? What advantages does each have? What sort of balance can be struck between fearing AI, regulating AI, and harnessing AI? Give examples of how AI can be used in business. (View the video online at: http://www.youtube.com/embed/Ls1_tqlpMww?rel=0.)

Answer:

- What makes AI "smarter"?
  - Data, so firms with more data have an advantage, nations with more data, as well.
- Which nations lead in AI and why? What advantages does each have?
  - China: Baidu, Tencent, Alibaba. The Chinese government is backing an effort to achieve AI leadership.
  - U.S.: Google, Meta, Amazon, Microsoft. Leads in investment.
  - Kaifu Li ranks these four nations according to number of "leadership" Top AI People:
    - U.S.: 80
    - UK: 15
    - Canada: 15
    - China: 2
  - China has an emerging entrepreneurial culture and an education system that embraces engineering.
  - Chinese firms have more data.
  - Government is putting money behind initiatives.
  - U.S. has advanced research with a longer-term horizon.
- What sort of balance can be struck between fearing AI, regulating AI, and harnessing AI?
  - Students' answers will vary.
  - AI using biased data sets can be "unethical" systems.
- Give examples of how AI can be used in business.
  - Medicine
  - Law enforcement
  - Service robots
  - Many other examples exist; students' answers will vary.

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11. Watch this video on how 3D printing is spurring advances in manufacturing. How are technologies like this poised to influence the economy, society, and the jobs of the future? Work with classmates to brainstorm on ways in which 3D printing can benefit society. View the video online at: http://www.youtube.com/embed/Adl1Sn86ojs?rel=0.

    Answer:
    a. Lower transportation costs
        i. The NASA 3D-printed wrench is a good example of "no transport costs" if the 3D printing raw material is on-site.
    b. Reduce/eliminate inventory
    c. Custom parts can be produced far faster than via conventional methods that may require special tools and machines. This could reduce the number of manufacturing jobs
    d. Other ideas (student responses will vary):
        i. Never be "out of a part" for certain parts that can be printed

    Work with classmates to brainstorm on ways in which 3D printing can benefit society.
    e. Student responses will vary but might include:
        i. Objects are created using AI in ways they could not have been made with conventional techniques.

    New parts designed by AI may be better than a human could create.

12. Research online to investigate how tech firms fared during the pandemic. Which ones benefited? Which struggled, and why? How has tech influenced our lives during the pandemic? Which trends are likely to reshape how consumers and businesses use technologies? Consider how this differs from what may have happened if we did not have a global health crisis.

    Answer: Answers should center on a tech firm's ability and flexibility to pivot, either ramping up services it already offers or creating new ones that fit the needs of an expanding remote workplace. The most obvious success is Zoom itself. In terms of lives, technology has allowed for greater connection and kept many businesses afloat during the pandemic, but it has also shown us its limits. Remote learning alone in K-12 education, for example, has set many students back and created difficulties for families. Students may comment that a successful solution in a remote education trend will likely be a hybrid one—technology that supports in-person learning, not substitutes for it.

13. As this version went to press, the EU was preparing to introduce a sweeping set of regulations impacting Internet and other tech firms. Research what this legislation has done. List the main changes that it has brought about. How has this impacted firms, competition, and profitability? Are other regions outside the EU copying these efforts or creating new ones? If so, give examples.

    Answer: Students' answers will vary. The new tech laws aim to regulate the tech giants and seek to address some of the issues that critics have raised recently—from the negative impact on mental health, to a lack of transparency, to the spread of misinformation/fake products. If firms are not compliant, they can face very big fines. Six companies have been designated as gatekeepers, and except for China's ByteDance, all are U.S. firms. There are numerous changes that this legislation has brought about that students can discuss—some examples of what companies are now required to do

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include giving messaging platforms interoperability (e.g., WhatsApp must remove encryption) and ensuring that on their own platforms, firms are not giving their service preference over a rival (e.g., For Microsoft's customers, the Bing Internet search tool will no longer be the default). These rules have generated big changes for the tech giants in how they serve their customers in Europe because they will have to alter what is offered—the technology experience for customers in Europe will likely be different than for elsewhere in the world. Students can also focus their research on one of the six companies designated as "gatekeepers"—Alphabet, Amazon, Apple, ByteDance, Meta, or Microsoft, and discuss the impacts for that firm.

Students should do additional research into other areas that are following Europe's lead. Australia is one example—the country has introduced legislation to "crack down on multinational tax avoidance" and plans to implement an anti-scam law. Japan and South Korea are two other examples—both are/will be introducing legislation to regulate online platforms.

Section 1.2: It's Your Revolution

- Learning Objectives
    - Name firms across hardware, software, and Internet businesses that were founded by people in their twenties (or younger).
    - Gain strategies and advice to plan your journey if you're interested in starting a startup.
    - Understand the concept of the Startup Accelerator and recognize firms that have gone through Y-Combinator.

- Video Discussion Question: How Canva Made Easy Graphic Design a Billion-Dollar Tech Tool
    - What is Canva's AI strategy?
      Canva's premise was to make design simpler and easier for customers to use, and AI has accelerated that. AI is embedded across all of its visual suite—GenAI can be used to edit photos and design content.

    - What is the Vibe team at Canva?
      One of the goals of Canva was to be a company where people wanted to work. The 70-person team at Canva focuses entirely on creating a vibe, from planning celebrations to team bonding events.

- Video Discussion Question: Scale AI CEO Alexandr Wang on U.S.-China AI race
    - What were your biggest takeaways from this discussion?
      Answers will vary but may include thoughts on the AI race between China and the U.S., the possibilities for generating new data for AI models to use, the potential that users will be willing to pay for increased capabilities in AI models, the future U.S. need for computational capacity and infrastructure, or the future market for AI systems.

- Want to Start a Startup?

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  - **pivoting**: In product development and entrepreneurship, this involves significantly redefining the market, business, and/or product offering.
  - **term sheet**: A legal document that is the agreement between a founding firm and its investors. It defines investment terms, ownership stake, board membership if offered, etc.

- Feature: How to Get into Silicon Valley's $600 Billion Startup School, *The Circuit* with Emily Chang

Section 1.2: Questions and Exercises

1. Look online for lists of young entrepreneurs. How many of these firms are tech firms or heavily rely on technology? Are there any sectors more heavily represented than tech?

   Answer: Students' answers will vary. This can be a group activity. The following article contains a list of young entrepreneurs: The Rich List (http://www.retireat21.com/top-young-entrepreneurs). Ask groups to present their findings with the class.

2. Have you ever thought of starting your own tech-enabled business? Brainstorm with some friends. What kinds of ideas do you think might make a good business?

   Answer: This can be a group activity. Students' responses will vary. The first and most important aspect to realizing a good business idea is to have a vision to take the idea forward through to realization. In order to materialize, adequate funding and capital is also required. Ideas need to be contemporary, novel, and should add value to a customer's expectations.

3. How have the costs of entrepreneurship changed over the past decade? What forces are behind these changes? What does this mean for the future of entrepreneurship?

   Answer: This could be an excellent topic for a group discussion. Possible points of discussion: decline of entry barriers, brick-and-mortar versus online storefronts, impact of open source software on startup costs, opportunity costs of entrepreneurship, failure rates of new businesses, exponential growth of some small-time technology companies. Students could then debate whether such trends are likely to strengthen or weaken in the future.

4. Many universities and regions have competitions for entrepreneurs (e.g., business plan competitions, elevator pitch competitions). Does your school have such a program? What are the criteria for participation? If your school doesn't have one, consider forming such a program.

   Answer: Criteria for participation in entrepreneurship competitions usually consist of the following:

   - Participants' qualifications

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- Team size and composition
- Nature of ventures (for profit versus not for profit)
- Location of the proposed business
- Stage of business
- Faculty sponsor/advisor
- Non-violation of any intellectual property rights
- Eligibility of teams that have already received some form of venture capital financing

Students' answers will vary. This can also be an in-class activity. Divide the class into groups of three and ask them to create a competition for entrepreneurs. A general outline of the competition could include eligibility criteria, judging/assessment criteria, competition procedures (phases, structure of business plan, structure of presentations, etc.), schedule of key dates, and prizes.

5. Research business accelerator programs such as Y Combinator, Techstars, and MassChallenge. Do you have a program like this in your area? What do entrepreneurs get from participating in these programs? What do they give up? Do you think these programs are worth it? Why or why not? Have you ever used a product or service from a firm that has participated in one of these programs?

   Answer: Students' answers will vary. This can be a group activity. Divide the class into groups of three and ask them to find out about business accelerator programs. Ask students to present their findings. Conduct a question-and-answer session at the end of every presentation. Possible questions could include:

   - What do entrepreneurs get from participating in these programs? What do they give up?
   - Do you think these programs are worth it? Why or why not?
   - Have you ever used a product or service from a firm that has participated in one of these programs?

   Participation in these programs would not only keep students informed about the practicality of their ideas but would also give them a fresh insight as to where they stand among others in the same category. Whether such programs are worth attending will depend upon individual perspectives.

6. Explore online for lists of resources for entrepreneurship. Use social media to share these resources with your class.

   Answer: A simple search engine query should throw up a huge list of resources. Entrepreneurship resources can be found at:

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- Kissmetrics' Entrepreneur's Handbook (http://www.lifehack.org/articles/lifehack/20-great-resources-on-entrepreneurship.html)
- Stanford University's Entrepreneurship Corner (http://ecorner.stanford.edu/)
- Entrepreneur (http://www.entrepreneur.com/)

7. Why are we in the "golden age" of technology entrepreneurship? What factors are helping entrepreneurs more rapidly achieve their vision, and with a lower cost?

   Answer: Students' answers will vary.

8. Have any alumni from your institution founded technology firms or risen to positions of prominence in tech-focused careers? If so, work with your professor to invite them to come speak to your class or to student groups on campus. Your career services, university advancement (alumni giving and fundraising), alumni association, and LinkedIn searches may be able to help uncover potential speakers.

   Answer: This can be a group activity. Divide the class into small groups and ask them to identify alumni who have founded technology firms or risen to positions of prominence in tech-focused careers. Each group can be asked to conduct a telephonic or e-mail based interview of the alumni member, and then share the experience in a classroom discussion. Students can take the help of the faculty or alumni association to arrange a talk or seminar.

9. Some instructors may have students work on individual or group projects as part of the class. One option is to plot a startup and justify it based on concepts learned in this textbook and in your course. Work with your instructor to identify judging criteria and pitch your idea to classmates and perhaps others in the university or outside investors, as well.

   Answer: Students' individual or group projects will vary. Students can research some of the leading firms and innovations launched by young entrepreneurs and use the recommendations in the book to help with an idea for their project.

Section 1.3: Geek Up—Tech Is Everywhere and You'll Need It to Thrive

- Learning Objectives
  - Appreciate the degree to which technology has permeated every management discipline.
  - See that tech careers are varied, richly rewarding, and poised for continued growth.
- Finance
- Video Discussion Question: How AI Is Powering the Future of Financial Services, JPMorgan Chase & Co.

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  - What are some areas that AI is being applied to in the financial services industry?
    Some of the areas include: 1) creating safe networks (fraud, sanctioning, fighting crime); 2) data (how to come up with and use data); 3) market (trading); 4) client-side (enhancing the customer experience, marketing); 5) empowering employees; 6) policy and regulations (turning legalese into an executable function); and 7) fairness, bias, ethics, and sustainability.

- Accounting

- Feature: Will AI Replace Accountants?

- Marketing

- Video Discussion Question: Computer-Generated Influencers on Social Media Give a Peek into the Future of Marketing
  - What is the theory of the uncanny valley?
    When a person looks at a sequence of virtual faces, they are comfortable as those faces become more real looking, but only up to a certain point—the point immediately before the faces look 100 percent human is when they start to feel uncomfortable. The "cute to creepy" reaction is what researchers call the uncanny valley.

- Operations

- Video Discussion Question: Google Cloud Manufacturing Operations Solutions
  - What do AI-driven operation optimizations do?
    They accelerate time-to-value for advanced use cases, such as automated quality control, anomaly detection, and predictive maintenance.

  - What are some examples of integrated visualization and analytics tools and what are they used for?
    Tools like Looker, Data Studio, and Grafana make it easy to visualize, monitor, and explore operations, while providing real-time insights.

- Human Resources

- Video Discussion Question: How Companies, Human Resource Departments Are Using AI When Hiring, Plus a Look at Regulation
  - What are some of the statistics for AI use in organizations for hiring?
    Nearly 1 in 4 organizations use AI to support HR activities, and of those, nearly 8 in 10 use it for hiring.

  - Why is there a need for regulation on employers that use AI tools in hiring, and what will these organizations need to do?
    There is inherent bias (race, gender, etc.) that can be built into these AI systems. NYC put through a law that addresses this issue, and as more regulation comes, employers using AI tools for hiring will need to be fully transparent and will be responsible for auditing their systems for any potential bias.

- The Law

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- Video Discussion Question: How CoCounsel's AI Assistant Is Making Lawyers Unstoppable!
  - What are some of the legal-specific skills that CoCounsel has been programmed to do?
    The skills include reviewing documents, legal research, extracting data from contracts, and summarizing large, difficult documents.

- Information Systems Careers

- Video Discussion Question: Generative AI and Programming, Peter Norvig, Director of Research, Google
  - How is automated programming used today?
    It is used in two ways: 1) API lookup (pair programming); and 2) problem solving (solo programming).

  - Discuss the history of software engineering.
    In the 1970s, the hardware was optimized, there was low-level code and simple problems, it was ad hoc, and you were completely on your own. In the 2000s, the programmer was optimized, there was high-level code and complex problems, it was mathematical/logical, and standard methodology was used. In the 2020s (now), the user is assisted, it is dialog (natural language, code, diagrams), there are wicked problems, it is considered a natural science and defined empirically, and executable methodology is used.

- Your Future

Section 1.3: Questions and Exercises

1. Look at *Fortune*'s "Best Companies to Work For" list. How many of these firms are technology firms? Which firm would you like to work for? Is it represented on this list?

   Answer: Students' answers will vary. This could be an in-class activity. The instructor could also first ask students to identify a company they would like to work for. The instructor could then present *Fortune*'s "Best Companies to Work For" list and ask students to identify if their preferred company is listed. The class should identify the sector (technology, manufacturing, healthcare, retailing, etc.) which contains the greatest number of best companies to work for.

2. Look at *Businessweek*'s "Best Places to Start Your Career" list. Is the firm you mentioned above also on this list?

   Answer: Students' answers will vary. As an additional exercise, students could be asked to choose a firm from the list that they would like to work for and to justify their answers.

3. What are you considering studying? What are your short-term and long-term job goals? What role will technology play in that career path? What should you be doing to ensure that you have the skills needed to compete?

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Answer: Students' answers will vary. This could also be an in-class activity. The class could also be divided based on the careers students choose with each student presenting a new idea. To realize a career path, a student needs to understand the meaning of and effort that goes into pursuing the career in question. The student needs to have a clear thought process and adequate information to decide on his or her career path.

4. Which jobs that exist today likely won't exist at the start of the next decade? Based on your best guess on how technology will develop, can you think of jobs and skill sets that will likely emerge as critical five and ten years from now?

   Answer: Students' answers will vary. This can be an in-class activity. Divide the class into groups of three and ask them to think of jobs that won't exist at the start of the next decade and jobs and skill sets that will. Examples: The jobs of drivers of public transport like trains and subways might not exist in the future owing to the development of GPS technology. Robotics might replace several assembly line jobs as well as basic customer facing roles such as those of bank tellers. Genetic engineering, aerospace engineering, and nanotechnology could be some of the jobs of the future.

5. Explore online resources to learn technology on your own, and search for programs that encourage college students. If you are from an underrepresented group in technology (i.e. a woman or minority), search out programs that provide learning and opportunity for those seeking tech careers. Share your resources with your professor via a class wiki, or other mechanism so that you create a common resource everyone can use to #geekup. And tweet what you create using that hashtag!

   Answer: Students' answers will vary. This can also be an in-class activity. Start by asking the class to find others whom they feel may be underrepresented in technology, and to spend a little time searching the Internet to find out what programs are available. Create a class wiki where students can post their findings, and propose they tweet their findings as well.

Section 1.4: Hey, Manager—You'll Need to See beyond the Hype Cycle!

- Learning Objectives
  - Understand the Hype Cycle.
  - Be able to draw the Hype Cycle and identify the various "stages" that it depicts.
  - Recognize that the cycle is essentially a guess, not a scientific or metric-based plot; however, also know that you'll be learning several techniques and frameworks that help you gain a better sense of where a firm is on the Hype Cycle Curve, and whether or not a firm should make investments in a given technology or tech-enabled way of doing business.

- Video Discussion Question: The Hype Cycle
  - What is the ultimate value of the Hype Cycle?
    An objective map is provided, which can provide insight so an organization can

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understand both the opportunities and the risks of an innovation—this can help a firm avoid the following: acquiring something too early or too late, and giving up on something too early or hanging on for too long.

Section 1.4: Questions and Exercises

1. Work with your instructor and split up into teams. Choose a technology that another group isn't using (use an online doc to keep track of which groups are tracking which technologies). Draw a Hype Cycle graph. Research your technology and plot where you think it is on the graph. Explain your estimate to the class.

   Answer: Students' technology choices will all vary. Some examples to choose from can include information technology (software, cybersecurity), communication technology (Internet, wireless), biotechnology (genetic, medical), green technology (environmental, renewable energy), manufacturing technology (3D printing, automation and robotics), and AI (ML, NLP), among others.

2. Related to above, and you *will not* be able to do this until the course is nearly done, keep track of the graph and at the end of the course, update your graph and include key players (specific firms offering the technology) and whether or not they have created resources for competitive advantage. Cite which resources should be necessary for durable advantage, why, and why firms haven't achieved them.

   Answer: Student graphs will all vary depending on the type of technology chosen. Students will have to make sure to research specific firms that offer the technology they choose and keep their graphs updated throughout the course.

Section 1.5: The Pages Ahead

- Learning Objective
  - Understand the structure of this text, the issues and examples that will be introduced, and why they are important.

Section 1.5: Questions and Exercises

1. Which firms do you most admire today? How do these firms use technology? Do you think technology gives them an advantage over rivals? Why or why not?

   Answer: Students' answers will vary. This is a good question to bring in the idea of a sustainable competitive advantage. Google is one firm people admire the most. Google has leveraged technology in a way no other competitor has. By harnessing the power of technology, they have reached a level where they earn as much as all their competitors put together.

2. What areas covered in this book are most exciting? Most intimidating? Which do you think will be most useful?

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Answer: This could be an in-class activity. Ask students to vote on the various chapters of the text they consider to be 'most exciting', 'most intimidating' and 'most useful.' Are there any chapters that are common in two or more categories? If so, discuss why. Students could also have a discussion on the chapters that rank the lowest in the three categories.

Additional Discussion Questions, Activities, and Projects

Section 1.1

1. Research Assignment: Use the Internet to identify the future trends in information technology that could be of strategic importance for businesses. Ask students to submit a 3-page report of their findings.

   Answer: Since online research can yield vast amounts of information, the student's selection will be important. For example, in this article (https://www.zmescience.com/science/the-next-big-things-in-science-ten-years-from-now/) the author lists several trends that are starting to seem very familiar, such as Internet of Things, driverless cars, and 3D printing. However, if the student cites research on the development and manufacturing of graphene, an amazingly light, strong allotrope (form) of carbon and relates this research to potential business applications, that's something new. Students will need to connect a new technology's potential to specific business applications in addition to reporting its existence.

2. Discuss as a Class: Whitney Wolfe Herd founded the online dating app Bumble when she was twenty-five; less than seven years later her firm went public with a valuation of about $7 billion. How does Bumble differentiate its service compared to the other online dating apps? Is Bumble's competitive advantage sustainable? Why or why not?

   Answer: A review in PC Mag https://www.pcmag.com/reviews/bumble states that the format requires women to make the first contact, the app's focus is said to be on relationships rather than hookups, and business networking is also an option. As to the sustainability of its competitive advantage, students should evaluate the business model rather than focus on whether they would use it. Overall, given the diversity of opinions and situations, there seems plenty of room in the dating world to sustain Bumble, especially as people continue to rely on online meetings.

3. Critical Thinking Group Activity: Divide students into groups of 4 to 5 and ask them to debate the privacy and security issues in the digital economy. What advice would they have offered to someone responsible for management and/or governance of the information technology resources?

   Answer: The deliverable here should be a memo or short report to management regarding privacy and security guidelines in the workplace.

4. Group Analysis: Briefly describe the challenges or limitations of relying on data for marketing research insights in the information technology field. This section provides a great opportunity for a group project in which you can identify and articulate the

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problems and challenges facing the cloud computing industry and propose a set of actionable recommendations designed to reduce the risks and challenges that the cloud computing industry presently poses on the environment; and privacy and security of information.

Answer: Groups may need the following background on primary and secondary data for their analysis.

- Data for market research at tech companies comes from primary and secondary sources. Primary data is unique data companies collect and include the following:
    - Focus groups
    - Interviews
    - Observational studies
    - Surveys
    - User testing
- Secondary data has been previously collected and is available for analysis. The data may be published in white papers, market reports, trade journals, newspapers, or websites. Secondary information is relatively easy to collect but you are unable to control how the data was collected or interpreted. While secondary sources can be helpful, you may not be able to find information that is uniquely relevant and valuable to your company. Additionally, the information you find will also be easily discovered by your competitors.

- Primary data will be critical to success when developing a new product or considering how to market an existing one, but there can be issues with the validity of data. For example, if you have a poor interviewer, you might not be able to collect the data needed.

- Groups should also identify that a unique aspect of technology market research is speed. Technology is one of the fastest-paced industries. Your market research must be conducted and analyzed before it is irrelevant. This means that efforts should be planned over weeks rather than months. When the results are in, you will want to act on them quickly before consumer trends change again.

- Finally, they should discuss security issues and risks in light of today's increasingly sophisticated cybercrime.

Section 1.2

1. Research Assignment: What is meant by "social entrepreneurship?" In your own words, describe what social entrepreneurship is, as if explaining them to someone who's never heard of it. Are social entrepreneurship enterprises sustainable? What are some of the key requirements to make social entrepreneurship effective? Conduct an Internet search to find out and write a 2-page report on your findings.

   Answer: See this Duke University/Fuqua School of Business site for a good definition of social entrepreneurship: https://centers.fuqua.duke.edu/case/about/what-is-social-entrepreneurship/. Opinions on sustainability will vary, but the topic will be worth a discussion on the intersection of social responsibility and the tech world. Effectiveness depends on excellent information sources in business and nonprofit. Strategies must be

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well thought out to maximize their social impact.

2. Discuss as a Class: Ask students to critically evaluate a young entrepreneur's decision to be rather aggressive in pursuing her/his dream while in college, dropping out of college, or when working a salaried/wage-earning job.

   Answer: Answers will be subjective because capacities for individual risk-taking will vary. One attitude may well be "go big or go home," and perhaps the class will collectively agree. Yet young entrepreneurs will still need to pay the bills or put up with living in their parents' basements, and often people need to try a full-time job to realize it's not for them. It may also be interesting if a student cites a slightly older entrepreneur (30s rather than 20s) who succeeded after "paying their dues."

3. Interactive Activity: Have students create a competitive positioning (or perceptual) map depicting all the players in a respective technology market (e.g., augmented reality marketspace) that shows how the various brands are positioned relative to one another. Discuss how and why this traditional tool may be an important one for tech entrepreneurs to employ.

   Answer: Perceptual or competitive positioning maps can be applied to the tech industry to develop a fresh marketing strategy (see example here: https://www.learnmarketing.net/perceptualmaps.htm) for existing products or services and, importantly, to identify new opportunities. An entrepreneur can identify gaps in market positioning or see ways to combine, repackage, or shift gears.

Section 1.3

1. Group Activity: Using the case study resource "The Convince & Convert Blog!" (http://www.convinceandconvert.com/category/social-media-case-studies/). Divide the class into groups and ask each group to make a detailed presentation on one of the following cases listed below from the blog:
   - https://www.convinceandconvert.com/social-media-case-studies/5-creative-ways-brands-are-using-snapchat/
   - https://www.convinceandconvert.com/social-media-case-studies/make-the-transition-to-digital/
   - https://www.convinceandconvert.com/social-media-case-studies/unexpected-social-customer-service/
   - https://www.convinceandconvert.com/social-media-case-studies/6-unforgettable-lessons-from-southwest-airlines-social-media-crisis/

   Have each group present the article and either support it with supplemental research on the topic or debate the article with counter arguments.

2. Class Debate: Set up a class debate on what role technology will play in future jobs and careers and whether it will replace humans in the traditional jobs that can be handled by technology. Divide the class into two large groups representing the for and against, and then have them debate.

   Answer:

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For: Lower-level jobs will be replaced with new higher-level jobs that will need to be filled by humans having higher level skills or skills that have not been identified yet.

Against: Automation and AI will take over high to mid-level jobs eventually, displacing the workforce permanently.

Have teams timed on their responses like a traditional debate (whether virtually or in person).

3. Group Activity: Challenge students to develop and articulate a set of actionable strategies they would recommend to technology company or technology management consulting company trainees who are trying to be successful in the company's training program.

   Answer: As neutral third parties, technology management consultants provide unbiased opinions and perspectives on complex business problems and issues related to IT. They often work directly with executive leadership and internal IT project teams to deliver hands-on project management and leadership consulting to include project implementation, execution, and measurement of IT related projects. Developing actionable strategies begins with gaining a deep understanding of a company's specific business goals. Because clients often choose technology consultants with professional education in a relevant field (IT, computer science, or computer engineering), they should be able to demonstrate relevant IT and project management experience. The ability to grow networks and keep up with technology trends are critical skills for the successful technology management consultant.

4. Discuss as a Class: Ask students whether they believe that the jobs/careers of the future have been discovered/are known yet. What role does technology play in the respective individual's career decision? What are the pros and cons to careers with heavy technology use? What careers require a higher level of adaptation to technology?

   Answer: Students' responses will vary.

Additional Resources

Big Think Edge: https://bigthink.com/. Big Think Edge helps individuals and organizations by catalyzing conversation around the topics most critical to 21st century success. Led by the world's foremost experts, our dynamic learning programs are short-form, mobile, and immediately actionable.

The Economist. (2021, April). The future of work. https://www.economist.com/special-report/2021-04-10?utm_source=google&utm_medium=cpc&utm_campaign=a_21futurework&utm_content=work&gclid=Cj0KCQjwsZKJBhC0ARIsAJ96n3VAVglnoQeo3MbX2T2PHbBKNtYR14GS9uoN-rr3iWO0sEpN9M6bd7QaAu6jEALw_wcB&gclsrc=aw.ds

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Ted Talks: https://www.ted.com › talks. TED Talks are influential videos from expert speakers on education, business, science, tech and creativity, with subtitles in 100+ languages.

- https://www.ted.com/talks/david_lais_how_modern_technology_can_make_our_society_more_sustainable
- https://www.ted.com/talks/grant_dillard_the_impact_of_technology_on_communication
- https://www.ted.com/talks/alok_kumar_the_future_of_technology

World Economic Forum. (2020, October, 20). *The Future of Jobs*. https://www.weforum.org/reports/the-future-of-jobs-report-2020

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