MIS Quarterly

ISSUES AND OPINIONS

# DIGITAL INNOVATION AS A FUNDAMENTAL AND POWERFUL CONCEPT IN THE INFORMATION SYSTEMS CURRICULUM

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# Appendix A

## A Text Book Assessment: Linkage to Digital Innovation

| Textbook | Ch. # | Title | Content | Related to Digital Innovation? | Assessment of Linkage to Digital Innovation |
|---|---|---|---|---|---|
| Applegate et al. (2008), *Corporate Information Strategy and Management: Text and Cases* | 1 | IT and Strategy | The relationship between IT and business models & strategies | Partially | The effects of IT on business models are relevant, but overall it lacks a specific focus on digital innovation |
| | 2 | IT and Organization | The effect of IT on an organization's capability, coordination, learning, etc. | Partially | Some of the discussions are relevant to how IT can enable innovation in an organization |
| | 3 | Extending the Enterprise | Challenges of IT in enterprise, how IT creates new opportunities, reduces cost, helps gain sustainable competitive advantage | Yes | Concise discussions of the new opportunities that IT enables in an enterprise |
| | 4 | Making the Case for IT | Highlights the importance of IT in organizations | Somewhat | Some discussions touched on digital innovation |
| | 5 | Understanding Internetworking Infrastructure | Networking, Internet infrastructure and management | No | Focus is on technology itself, not how network technology enables innovation |
| | 6 | Assuring Reliable and Secure IT Services | Security, backup, recovery etc. | No | Very detailed discussion of the technology (e.g. security management), but not much on how technology enables innovation |

| Textbook | Ch. # | Title | Content | Related to Digital Innovation? | Assessment of Linkage to Digital Innovation |
|---|---|---|---|---|---|
| Applegate et al. (2008), *Corporate Information Strategy and Management: Text and Cases* | 7 | Managing Diverse IT Infrastructures | The management aspects of IT infrastructure | No | Not an innovation-focused presentation |
| | 8 | Organizing and Leading the IT Function | IT management, governance and functions | Partially | Some of the IT governance discussion and the Enron case are relevant, but the chapter as a whole does not address digital innovation |
| | 9 | Managing IT Outsourcing | Outsourcing | Very little | The part on the new service model is related, but the bulk of the discussion on outsourcing, vendor selection and contract management are not innovation-related |
| | 10 | A Portfolio Approach to IT Projects | IT project management | Very little | Some discussions of project management and system analysis & design are relevant, but much of the discussion lacks an innovation focus |
| Gallaugher (2012), *Information Systems: A Manager's Guide to Harnessing Technology* | 1 | Setting the Stage: Technology and Modern Enterprise | Introduction on how technology is re-shaping business disciplines such as finance, marketing, operations, and IS | Yes | A nice, brief overview on how digital innovation is enabling changes across the board |
| | 2 | Strategy and Technology | Competitive advantage, resource based view, value chain and role of IT | Indirect | IT-enabled value creation and competitive advantage using fairly standard strategy concepts (including traditional competitive analysis and value chain frameworks) |
| | 3 | Zara: Fast Fashion from Savvy Systems | Zara developed an IT SCM infrastructure that allowed them to reduce the design-to-store cycle time for new fashions to several weeks versus the nine month cycle seen at rivals | Yes (core) | Related to IT assimilation, IT strategy, IT for competitive advantage, IT business value |
| | 4 | Netflix in Two Acts | The evolution of the online DVD rental business at Netflix; how Netflix's Cinematch recommendation technique creates value | Yes (core) | Related to digital business transformation, IT-enabled value creation |
| | 5 | Moore's Law: Fast, Cheap Computing and What It Means for the Manager | Moore's Law and its role in IT management | Yes (core) | IT fundamental characteristics |
| | 6 | Understanding Network Effects | The role of the network effects in IT management | Yes (core) | IT fundamental characteristics |
| | 7 | Social Media, Peer production, and Web 2.0 | Various web 2.0 phenomena (blog, wiki, microblog, twitter, crowdsourcing, etc.) | Peripheral | Focus is on emerging IT and what they can enable |
| | 8 | Facebook: Building a Business from the Social Graph | The history and business model of Facebook, its open platform strategy for developers | Yes | IT-enabled development (through open platform) |
| | 9 | Understanding Software: A Primer for Managers | A simple introduction to software components (application software, operating systems, distributed computing etc.) | No | Discusses the technology without a focus on how it enables digital innovation |

| Textbook | Ch. # | Title | Content | Related to Digital Innovation? | Assessment of Linkage to Digital Innovation |
|---|---|---|---|---|---|
| Gallaugher (2012), *Information Systems: A Manager's Guide to Harnessing Technology* | 10 | Software in Flux: Partly Cloudy and Sometimes Free | Open source, cloud computing, SaaS etc. | Marginally | Discusses new ways of developing software, how cloud computing enables lower capital cost investments etc., but little on how they enable digital innovations |
| | 11 | The Data Asset: Databases, Business Intelligence and Competitive Advantage | Data, database, data warehouse, BI | Somewhat | Mainly focuses on the technologies without a clear digital innovation emphasis, but the discussions on using the data asset as a vehicle for digital innovation and the two cases are relevant |
| | 12 | A Manager's Guide to the Internet and Telecommunications | Internet and Telecommunication technologies | No | The focus is on introducing these technologies such as TCP/IP, protocols. Very little on how they enable digital innovation |
| | 13 | Information Security: Barbarians at the Gateway | Security, threats and vulnerabilities | No | A nice, brief introduction to security issues but lacks digital innovation focus |
| | 14 | Google in Three Parts: Search, Online Advertising and Beyond | Google's search technology and online advertising models (adwords, ad network, adsense etc.) and others (e.g. behavioral targeting) | Somewhat | Innovative technologies (search) and business models (online advertising) are discussed |
| Laudon and Laudon (2011), *Management Information Systems* | 1 | IS in Global Business Today | IS as sociotechnical systems, how IS transforms global business | Indirectly | Necessary to define IS, the IS transformation (of global business) is related |
| | 2 | Global E-business and Collaboration | Business process, e-business, collaborative systems | Partially | Understanding business processes is necessary for process innovation, but the material on e-businesses and systems for collaboration is tangential |
| | 3 | Information Systems, Organizations and Strategy | How IS impact organizations and how to use IT for competitive advantage | Yes | Focuses on IT-enabled organizational innovation |
| | 4 | Ethical and Social Issues in IS | Social issues in IS | Remotely | Does not take an explicit innovation perspective |
| | 5 | IT Infrastructure and Emerging Technologies | Components of IT infrastructure, contemporary hardware and software platform trends | Peripheral | Basic understanding of IT infrastructure is necessary to appreciate innovation opportunities |
| | 6 | Foundations of Business Intelligence: Databases and Information Management | Database and using database to manage business | Peripheral | The focus is on the technology itself rather than how database systems, BI etc. enable innovation |
| | 7 | Telecommunications, the Internet and Wireless Technologies | Communication networks, the Internet, wireless technologies (e.g. RFID) | No | Focus is on the communication technology itself |
| | 8 | Securing Information Systems | Information securities | No | No discussion on how security relates to product/process innovation in a firm |
| | 9 | Achieving Operational Excellence and Customer Intimacy: Enterprise Applications | SCM, ERP, CRM, enterprise systems | No | Offers a very brief introduction on these systems but without an innovation orientation |
| | 10 | E-commerce: Digital Markets, Digital Goods | E-commerce and mobile-commerce | Yes | These are IT-enabled new forms of business |
| | 11 | Managing Knowledge | Knowledge management systems | No | Focus is on technology itself |

| Textbook | Ch. # | Title | Content | Related to Digital Innovation? | Assessment of Linkage to Digital Innovation |
|---|---|---|---|---|---|
| Laudon and Laudon (2011), *Management Information Systems* | 12 | Enhancing Decision making | Decision making, BI, DSS and GDSS | No | Does not have an innovation orientation |
| | 13 | Building Information Systems | Systems analysis and design | Partially | Does not have a specific innovation focus, but rather, seeks to train business students on systems analysis and design |
| | 14 | Managing Projects | Lifecycle project management | No | The focus is on traditional project management without an explicit innovation orientation |
| | 15 | Managing Global Systems | Organizing international information systems | No | Provides context, but not how IS enables global business |
| Oz (2008), *Management Information Systems* | 1 | Business Information Systems: Overview | Does IT matter, data, information and IS, TPS and beyond, IS in business functions | Peripheral | Has some reference to innovation but that is not the main focus |
| | 2 | Strategic Use of IS | Strategy and competitive advantages, eight initiatives of strategic IS, JetBlue case | Yes | With minor tweaking, this chapter can serve as a good one on digital business model innovation |
| | 3 | Business Functions and Supply Chains | Introduction on individual business functions (from accounting, finance to supply chain management) | No | Not focused on supply chain innovation. |
| | 4 | Business Hardware | Computers, input & output devices, storage | No | The focus is on technology, rather than how IT enables digital innovation |
| | 5 | Business Software | Application software, system software, open source software | No | Focus is on technology itself |
| | 6 | Business Networks and Telecommunications | Network structures and protocols | No | Focus is on technology itself |
| | 7 | Database and Data Warehouse | Database models, relational DBMS, data modeling, data warehouse | No | Focus is on technology itself |
| | 8 | The Web-Enabled Enterprises | HTML, XML, web-enabled businesses, supply chain on the web | Partially | For the most part not related to digital innovation, but how the web technology enables new businesses is relevant |
| | 9 | Challenges in Global IS | Multinational organizations and challenges (e.g. technology, culture etc.) of IS in global business | No | Not an innovation-focused presentation |
| | 10 | Decision Support Systems and Expert Systems | Decision process, DSS, GDSS, ES and GIS | No | It only serves as an overview of different forms of (conventional) IS, not how they enable innovation |
| | 11 | Business Intelligence and Knowledge Management | BI and KM tools | No | Not an innovation-focused presentation |
| | 12 | Systems Planning and Development | Variety of systems development approaches | Slightly | Some of the presentation is related to the development stage of digital innovation |
| | 13 | Choices in System Acquisition | Outsourcing, SaaS, user development application | Slightly | Some of the presentation is related to the development stage of digital innovation |
| | 14 | Risk, Security and Disaster recovery | Security etc. | No | Not an innovation-focused presentation |

### References

Applegate, L., Auston, R., and Soule, D. 2008. *Corporate Information Strategy and Management: Text and Cases* (8th ed.), New York: McGraw-Hill/Irwin.
Gallaugher, J. M. 2012. *Information Systems: A Manager's Guide to Harnessing Technology*, Irvington, NY: Flat World Knowledge.
Laudon, K., and Laudon, J. 2011. *Management Information Systems* (12th ed.), Upper Saddle River, NJ: Prentice Hall.
Oz, E. 2008. *Management Information Systems* (6th ed.), Stamford, CT: Course Technology.

# Appendix B

## Modules for "Information Technology in Business: A Digital Innovation Perspective"

**Note**: In our own core courses, technology topics (infrastructure, applications, emerging technologies) are generally discussed as an adjunct to an innovation-related topic (e.g., part of the discussion of an ERP implementation case is devoted to ensuring students know what ERP is). We sometimes devote a whole class or two to a general discussion of an important emerging technology (e.g. social media analytics), especially if no suitable managerial case can be found that centers on that technology. Also, because few business students become IT specialists, we tend not to address topics related to the management of the IS function in a core course. However, we see two potential approaches to addressing these topics within an innovation framework. One is to include a module on innovation in IT management processes. The second is to include IT management innovations in each module (2–5), and treat innovation in IT management as just another set of digitized process innovations. Alternatively, these topics can be included as stand-alone topics residing outside of the main course framework.

### Module I: Fundamentals of Digital Innovation

**Topics**: Introduction to digital innovation, distinctive IT characteristics, process/product/business model innovation, cycles of digital innovation
**Learning Objectives**: Be able to explain what IS/IT is fundamentally about in business; be able to link past, current, and emerging IT in business to digital innovation; be able to explain the three distinctive characteristics (Moore's Law, digitization, and network effects) and how they relate to digital innovation and affect the value-producing potential of IT; be able to elucidate the digital innovation cycle at the four stages (discovery, development, diffusion, and impact); be able to discern some broad factors affecting the success and failure of digital innovations (e.g., health of the ecosystem); be able to explain firms' strategy, organization, governance and operations from the perspective of digital innovation.
**Candidate Readings**:

| Topic | Article/Case | Source | Description/Relation to Digital Innovation (*italicized*) |
|---|---|---|---|
| Introduction to Digital Innovation | Lecture Note: Learning to Think Like a Digital Innovator | Fichman 2012b | *The Note introduces the topic of Digital Innovation and explains why it is essential for aspiring mangers today to understand digital innovation, and to be able to think like a digital innovator.* |
| | Winning the Race With Ever Smarter Machines | Brynjolfsson and McAfee 2012 | Describes how Moore's Law and pervasive digitalization are allowing machines to do intelligent tasks previously reserved for people (e.g., drive cars, play Jeopardy!).<br>*Makes the argument that these advances serve to expand the range of opportunities available to organizations, and that firms must foster organizational innovation to exploit these opportunities.* |
| | The Discipline of Innovation | Drucker 1998 | Drucker offers his classic view on what innovation is about, the scope of innovation, and factors driving successful innovation.<br>*It provides a foundation for understanding digital innovation.* |
| | Ten IT-Enabled Business Trends for the Decade Ahead | Bughin et al. 2013 | *Describes several business trends enabled by or embodied in emerging digital technology.* |

| Topic | Article/Case | Source | Description/Relation to Digital Innovation (*italicized*) |
|---|---|---|---|
| Distinctive IT Characteristics | Lecture Note: Distinctive IT Characteristics: Implications for Innovation and Value Creation | Fichman 2012a | *The Note elaborates on distinctive characteristics of IT that drive much of the innovation-enabling potential of IT (i.e., Moore's Law, digitization, and network effects)*. |
| | Moore's Law: Fast, Cheap Computing and What it Means for the Manager | Gallaugher 2012, Chapter 5 | This chapter describes Moore's Law and how the price elasticity associated with faster/cheaper technologies opens new markets, creates new opportunities for firms, and can catalyze industry transformation. *In-depth discussion on one distinctive characteristic of IT that drives digital innovation – Moore's Law*. |
| | Understanding Network Effects | Gallaugher 2012, Chapter 6 | This chapter describes network effects (a.k.a. Metcalfe's Law), how products and services are subject to network effects and their impact on innovation and competition. *In-depth discussion on another characteristic of IT that drives digital innovation – network effects*. |
| Product vs. process innovation | Deep Change: How Operational Innovation Can Transform Your Company | Hammer 2004 | This article addresses *process innovation* from the perspective of how it can transform a company. Process innovation (i.e., how a firm's work is done) affects the very essence of a company. It also addresses the factors affecting successful process innovation and the disruptive nature of innovation. *It analyzes the process component of digital innovation* |
| | General Motors OnStar | McCormack and Johnson 2002 | As an example of product innovation, OnStar telematics and infrastructure integrate the GM call center with in-car sensor network and local public safety organization. *Example of digitally infused product (innovation) in the automobile industry*. |
| | How Pixar Fosters Collective Creativity | Catmull 2008 | An exemplar for innovating both products and processes in the animation industry. Pixar pioneered the use of digital animation. It standardizes and commercializes digital animation in its four process technologies: Marionette, Renderman, Ringmaster, and Pixarvision. *Example of both product and process innovation in the animation industry in the digital era*. |
| Innovation Cycles | The Manager's Guide to Innovation Waves | Swanson 2011 | Describes the process by which recurring waves of IT innovation flow through the world of business. *Provides a framework managers can use to make sense of IT innovation waves.* |
| | Impact of Fashion in IT | Wang 2009 | IT innovation resembles the life cycle of fads and fashions in the apparel and entertainment industries. Eight digital innovations such as ASP, ERP, CRM, etc. are examined. *Empirical analysis of the digital innovation cycle.* |
| | Aiming for an Evolutionary Advantage | Hamel and Breen 2007, Chapter 6 | The article discusses how Google constantly innovates to maintain an evolutionary advantage. *It discusses Google's new organization to foster continuous innovation.* |
| Managerial Issues | Investing in IT That Makes a Competitive Difference | McAfee and Brynjolfsson 2008 | An article on how IT investments can make a competitive difference. *How to invest wisely to ensure successful digital innovation.* |
| | Netflix in Two Acts: The Making of an E-Commerce Giant and the Uncertain Future of Atoms to Bits | Gallaugher 2012, Chapter 4 | With its innovative online rental process, Netflix transformed the movie rental industry and used IT-enabled analytical capabilities to its advantage. *Example of digitally enabled analytical capability in Netflix.* |
| | Information Technology and Innovation at Shinsei Bank | Fuller and Upton 2007 | How the implementation of a retail banking system transformed the Shinsei Bank. *Example of digitally transformed business in the banking industry*. |
| | Transforming Ecosystem Relationships in Digital Innovation | Selander et al. 2010 | It describes the ecosystem for IT innovation and how innovation transforms the ecosystem. *Digitally transformed ecosystem*. |
| | Match Your Innovation Strategy to Your Innovation Ecosystem | Adner 2006 | How to adapt a company's innovation strategy to the innovation ecosystem it is embedded in. *Aligning digitally enabled inside innovation with the outside ecosystem*. |

## References


Adner, R. 2006. "Match Your Innovation Strategy to Your Innovation Ecosystem," *Harvard Business Review* (84:4), pp. 98-107.

Bughin, J., Chui, M., and Manyika, J. 2013. "Ten IT-Enabled Business Trends for the Decade Ahead," *McKinsey Quarterly* (http://www.mckinsey.com/insights/high_tech_telecoms_internet/ten_it-enabled_business_trends_for_the_decade_ahead).

Brynjolfsson, E., and McAfee, A. 2012. "Winning the Race with Ever-Smarter Machines," *MIT Sloan Management Review* (53:2), pp. 53-60.

Catmull, E. 2008. "How Pixar Fosters Collective Creativity," *Harvard Business Review* (86:9), pp. 64-72.

Drucker, P. 1998. "The Discipline of Innovation," *Harvard Business Review*.

Fichman, R. 2012a. "Lecture Note: Distinctive IT Characteristics: Implications for Digital Innovation and Value Creation," Boston College (https://www2.bc.edu/~fichman/LN-Distinctive-Characteristics-of-IT.pdf).

Fichman, R. 2012b. "Lecture Note: Learning to Think Like a Digital Innovator," Boston College (https://www2.bc.edu/~fichman/LN-Learning-to-Think.pdf ).

Fuller, V. A., and Upton, D. 2007. "Information Technology and Innovation at Shinsei Bank," Case #9-607-010, Harvard Business School.

Gallaugher, J. M. 2012. *Information Systems: A Manager's Guide to Harnessing Technology*, Irvington, NY: Flat World Knowledge.

Hamel, G., and Breen, B. 2007. *The Future of Management*, Boston: Harvard Business School Press.

Hammer, M. 2004. "Deep Change: How Operational Innovation Can Transform Your Company," *Harvard Business Review* (82:4), pp. 84-93.

McAfee, A., and Brynjolfsson, E. 2008. "Investing in IT That Makes a Competitive Difference," *Harvard Business Review* (86:7/8), pp. 98-107.

McCormack, W., and Johnson, R. J. 2002. "General Motors OnStar," UVA-M-0659, University of Virginia Darden School Foundation, Charlottesville, VA.

Selander, L., Henfridsson, O., and Svahn, F. 2010. "Transforming Ecosystem Relationships in Digital Innovation," in *Proceedings of the 31st International Conference on Information Systems*, St. Louis, MO, December 12-15.

Swanson, E. B. 2011. "The Manager's Guide to Innovation Waves," *Sloan Management Review* (53:2), pp. 75-83.

Wang, P. 2009. "The Surprising Impact of Impact of Fashions in Information Technology," *Sloan Management Review* (51:4), pp. 15-16.


## Module II: Digital Innovation at the Discovery Stage

**Topics**: Identification of innovation opportunities, invention, and selection.

**Learning Objectives**: Be equipped with the skills to identify digital innovation opportunities; grasp the essence of successful discovery; be able to explain when and how to invent or select; have good IT knowledge to enable the discovery of digital innovation opportunities; be able to describe the essence of building a discovery-ready organization; keep abreast of emerging digital technologies and identify opportunities enabled by them.

**Candidate Readings**:

| Topic | Article/Case | Source | Description/Relation to Digital Innovation |
|---|---|---|---|
| Identify Innovation Opportunity | Innovation Democracy | Melymuka 2004 | Whirlpool implemented an intranet infrastructure tool called the Innovation E-space to help ordinary employees throughout the firm become product innovators. The tool helps employees manage the evolution of their ideas from initial insight generation to (potentially) product development and manufacturing. *It discusses how Whirlpool adopts digital innovation to discover new opportunities.* |
| | Zara: IT for Fast Fashion | McAfee et al. 2004 | How Zara uses its IT SCM infrastructure to rapidly sense-and-respond to changes in consumer tastes and discover opportunities for fast-fashion innovation. *It discusses how Zara achieves fast discovery and response to new fashions through digital innovation.* |
| Invent or Select | Business Intelligence Software At SYSCO | McAfee and Wagonfeld 2004 | This HBS Case focuses on SYSCO's choice between inventing or buying BI software. Innovation enabled by the BI system includes identifying new customers, generating cross-selling opportunities and predicting future demand. *It discusses SYSCO's emphasis on achieving higher firm capabilities through IT in discovering new business opportunities.* |

| Topic | Article/Case | Source | Description/Relation to Digital Innovation |
|---|---|---|---|
| Various Innovation Strategies (open vs. closed, etc.) | Connect and Develop: Inside Proctor & Gamble's New Model for Innovation | Huston and Sakkab 2006 | P&G offers a "Connect + Develop" platform that enables it to solicit business ideas from a network of affiliated partners and the general public, resulting in increased R&D efficiency and an increase in new product success rates. *A classic success story of P&G in revamping its R&D process through digital innovation*. |
| | Harnessing the Power of the Crowds with Corporate Social Networking tools: How IBM Does It | Majchrzak et al. 2008 | IBM harnesses the power of crowds with corporate social networking tools. *It discusses a new business model—crowdsourcing—that is enabled by web 2.0 technologies.* |
| | Social Media, Production, and Web 2.0 | Gallaugher 2012, Chapter 7 | Gallaugher discusses how to use social media and Web 2.0 for peer production, including the discovery of new ideas. *It provides an overview of social media-enabled innovations.* |
| Building Innovation capabilities | Harrah's Entertainment, Inc. | Lal 2001 | Harrah's adopted a new strategy which emphasized database marketing powered by its WiNet datawarehouse and the analytical capability enabled by WiNet. This DBM enabled discovery of the best marketing programs and tactics to support their new loyalty program. *A widely cited success story on an analytics-driven business that eventually inspired thorough (digital) innovation in the gambling industry.* |
| Opportunities enabled by Emerging IT | Ten Emerging Technologies | Namterme and Cole 2013 | This article describes emerging information technologies including social media, cloud computing, etc. *It discusses opportunities enabled by emerging IT.* |
| Managerial Issues | How to Design Smart Business Experiments | Davenport 2009 | Davenport discusses how to design experiments to enable a firm to discover innovation opportunities. *It discusses digital innovation through experimentation to explore new opportunities.* |
| | Enterprise 2.0: New Collaborative Tools for Your Organization's Toughest Challenges | McAfee 2009 | McAfee shows how using Web 2.0 technologies as a knowledge management platform can help a firm to identify new opportunities. *It discusses web 2.0 - enabled innovation for new opportunity exploration.* |

## References


Davenport, T. H. 2009. "How to Design Smart Business Experiments," in *Harvard Business Review* (87:1), pp. 68-76.

Gallaugher, J. M. 2012. *Information Systems: A Manager's Guide to Harnessing Technology*, Irvington, NY: Flat World Knowledge.

Huston, L.,and Sakkab, N. 2006. "Connect and Develop: Inside Proctor & Gamble's New Model for Innovation," *Harvard Business Review*, pp. 58-66.

Lal, R. 2004. "Harrah's Entertainment, Inc.," Case #9-502-011, Harvard Business School.

Majchrzak, A., Cherbakov, L., and Ives, B. 2009. "Harnessing the Power of the Crowds with Corporate Social Network Tools: How IBM Does It," *MIS Quarterly Executive* (8:2), pp. 103-108.

McAfee, A. 2009. *Enterprise 2.0: New Collaborative Tools for Your Organization's Toughest Challenges*, Boston: Harvard Business School Publishing.

McAfee, A., Sjoman, A., and Dessain, V. 1985. "Zara: IT for Fast Fashion," Case #9-604-081, Harvard Business School.

McAfee, A., and Wagonfeld, A. B. 2004. " Business Intelligence Software at SYSCO," Case #9-604-080, Harvard Business School.

Melymuka, K. 2004. "Innovation Democracy," *Computerworld* (38:7), pp. 31-32.

Namterme, P., and Cole, M. 2013. "Accenture Technology Vision 2013: Every Business is a Digital Business," Accenture PLC (http://www.accenture.com/SiteCollectionDocuments/PDF/Accenture-Technology-Vision-2013.pdf).

## *Module III: Digital Innovation at the Development Stage*

**Topics**: Developing ideas into usable innovations, packaging versus configuration.
**Learning Objectives**: Master the fundamentals of developing digital innovations; be able to explain the essentials of packaging product innovations and configuring process innovations; learn to decide, based on the business context, the best options for developing IT platforms (open versus closed innovation, outsourcing, open source, experiments, etc.); be able to discuss the related organizational (and technical) issues to ensure successful development of innovation; have good knowledge on the related basic IT knowledge for developing digital innovation.
**Candidate Readings**:

| Topic | Article/Case | Source | Description/Relation to Digital Innovation |
|---|---|---|---|
| Development | Information Technology and Innovation at Shinsei Bank | Fuller and Upton 2007 | Shinsei developed a retail banking enterprise system to innovate its banking process. Several innovative processes included customer service-oriented marketing strategy (free 24-hour ATMs, Internet banking, longer hours), and distinctive service operations (e.g., "cashless" tellers that do no transactions directly, but instead help customers do their own transactions). *It offers an example of developing an IT-driven banking process and packaging IT into online banking.* |
| Packaging | Building Watson: It's Not So Elementary, My Dear! | Shih 2012 | The case illustrates the major design decisions IBM made, and the development challenges they encountered, in developing a system capable of answering general natural language questions in real time, one that plays the Jeopardy! game show at the level of human champions. *It provides a nice illustration of the challenges companies face in developing a radical digital innovation, and gives students the chance to evaluate the novel project management tactics IBM used to overcome those challenges.* |
| | Enterprise IT at CISCO | McAfee et al. 2004 | The case illustrates the challenges associated with developing a centralized enterprise system after a decade of decentralized planning and project funding. It raises issues about change management, centralized planning, IT prioritization and resource allocation, enterprise cooperation, and project funding. *It discusses the process of developing enterprise-wide system.* |
| Configuring | Competing on Analytics | Davenport 2006 | Davenport's influential article on how to develop analytical capability for firms. *In-depth analysis on innovating firms through developing digitally-enabled analytical capabilities.* |
| | Zara: IT For Fast Fashion | McAfee et al. 2004 | Zara developed an IT SCM infrastructure that allowed them to reduce the design-to-store cycle time for new fashions to several weeks versus the nine month cycle seen at rivals. *Zara's success story in developing an innovative digitized SCM.* |
| New IT platforms | What's Your Google Strategy? | Hagiu and Yoffie 2009 | *How to utilize the platform offered by Google to innovate your own business.* |
| | Peer Production, Crowdsourcing at Threadless | Charkin 2008 | The customer is the company. *Threadless involves customers at the development stage of innovation.* |
| | Facebook: Building a Business from the Social Graph | Gallaugher 2012, Chapter 8 | *How to develop new IT artifacts (e.g. social gaming) based on the new platform provided by the popular social network.* |
| Managerial Issues | Options Thinking in IT Project Management | Fichman et al. 2005 | A real options view on project management. This requires managers to learn what kinds of options can be embedded in IT investments. *It offers a real-options perspective on developing IT systems to innovate a business.* |
| | The Four Ways IT Is Revolutionizing Innovation | Hopkins 2010 | An interview with Erik Brynjolfsson on how IT changes the way innovation works. IT enables firms to revolutionize innovation. *A thought-provoking article on the managerial issues of digital innovation.* |

## References

Charkin, M. 2008. "The Customer Is the Company," *Inc. Magazine* (http://www.inc.com/magazine/20080601/the-customer-is-the-company.html).

Davenport, T. H. 2006. "Competing on Analytics," *Harvard Business Review* (84:1), pp. 150-151.

Fichman, R., Keil, M., and Tiwana, A. 2005. "Options Thinking in IT Project Management," *California Management Review* (47:2), pp. 74-100.

Fuller, V. A., and Upton, D. 2007. "Information Technology and Innovation at Shinsei Bank," Case #9-607-010, Harvard Business School.

Gallaugher, J. M. 2012. *Information Systems: A Manager's Guide to Harnessing Technology*, Irvington, NY: Flat World Knowledge.

Hagiu, A., and Yoffie, D. B. 2009. "What's Your Google Strategy?," *Harvard Business Review*.

Hopkins, M. S. 2010. "Four Ways IT is Revolutionizing Innovation: Interview with Erik Brynjolfsson," *Sloan Management Review* (51:3), pp. 51-56.

McAfee, A., McFarlan, F. W., and Wagonfeld, A. B. 2004. "Enterprise IT at CISCO," Case #605-015, Harvard Business School.

McAfee, A., Sjoman, A., and Dessain, V. 1985. "Zara: IT for Fast Fashion," Case #9-604-081, Harvard Business School.

Shih, W. 2012. "Building Watson: Not So Elementary, My Dear!," Case # 9-612-017, Harvard Business School.

## Module IV: Digital Innovation at the Diffusion Stage

**Topics**: Deployment and assimilation of innovation.

**Learning Objectives**: Master the fundamentals to ensure the successful diffusion and assimilation of digital innovations; be able to explain the individual, organizational, and societal factors affecting successful deployment of IT innovation; grasp the knowledge necessary to ensure successful assimilation of process innovations; learn about various business decisions on how to appropriately adjust processes, operations, and management (e.g. governance) at the diffusion stage; be able to identify the new diffusion patterns in the Web 2.0 era; be able to avoid the common pitfalls at the diffusion stage.

**Candidate Readings**:

| Topic | Article/Case | Source | Description/Relation to Digital Innovation |
|---|---|---|---|
| IT adoption and diffusion | Lecture Note: Tools and Tactics for Analyzing Diffusion Trajectories | Fichman 2012b | *Discusses the factors affecting IT adoption and diffusion and how to analyze them.* |
| | ITC e-Choupal Initiative | Upton and Staats 2008 | ITC developed and deployed (to thousands of villages) a solar powered, satellite-linked e-commerce workstation that allowed farmers to make informed choices about farming practices, to discover where to go to get a good price for their crops, and (eventually) to conduct e-commerce transactions.<br>*It discusses the challenges (and some success) of the rural Indian villagers in adopting the ITC eChoupal system.* |
| | BP's Office of the Chief Technology officer: Driving Open Innovation Through an Advocate Team | Wolcott and Lippitz 2008 | In the early 2000s, British Petroleum launched the office of the Chief Technology Officer with a relatively small staff and budget. The purpose of the new unit was to help transform IT from being a cost reducer to also being a driver of business innovation.<br>*The case illustrates a number of principles and tactics (e.g., for environmental scanning, identifying opportunities, enlisting the help of the external ecosystem partners, motivating internal champions) to help drive digital innovation adoption and diffusion in a large multinational.* |
| IT deployment and assimilation | Lecture Note: Digital Innovation Deployment: Barriers and Tactics | Fichman 2012a | *Discusses the barriers that can impede the implementation of digital innovations in organizations, and tactics for overcoming those barriers.* |
| | Rich-Con Steel | McAfee 1999 | It shows how an ill-planned, forced implementation eventually led to the demise of Rich-Con steel.<br>*A classical failure story of process innovation implementation.* |
| | Information Technology and Innovation at Shinsei Bank | Fuller and Upton 2007 | *It illustrates how a new enterprise system is adopted and assimilated through the retail bank.* |

| Topic | Article/Case | Source | Description/Relation to Digital Innovation |
|---|---|---|---|
| Emerging IT | Mt Auburn Hospital: Physician Order Entry | McAfee et al. 2002 | Hospital administrators are confronted with the question of whether to implement a complex new Physician Order Entry System to help address the problem of adverse drug events arising from medical errors, and if so, how. *Provides an occasion to analyze the likely barriers to IT innovation implementation, and to identify tactics for overcoming those barriers.* |
| | Cisco Systems: Implementing ERP | Austin et al. 1998 | It shows how a number of factors need to be considered in implementing enterprise systems, including organization structure, culture, legacy systems, datawarehouse in use, etc. *The complex ERP implementation at Cisco is illustrated.* |
| | Peer Production, Social Media, and Web 2.0 | Gallaugher 2012, Chapter 7 | *The penetration and diffusion of social media across individuals and businesses are discussed.* |
| Managerial Issues | The Dark Side of Customer Analytics | Davenport and Harris 2007 | Issues such as privacy, legality and ethics are discussed in the context of a fictitious grocery store and an insurance company. *It highlights the non-business challenges that may hamper the adoption of promising IT innovations such as new business analytics tools.* |
| | Cooperation and Compatibility: How to Approach Standards Setting | Shapiro and Varian 1999, Chapter 8 | Standards change the nature of competition and affect the positions of complementors, incumbents, and innovators. It explores tactics in the formal standard setting process, including building alliances and advocating open standards. *It discusses the role of standards in affecting the adoption, diffusion and implementation of digital innovations.* |

## References


Austin, R. D., Nolan, R. L., and Cotteleer, M. J. 1998. "Cisco Systems: Implementing ERP," Case #699-022, Harvard Business School.

Davenport, T. H., and Harris, J. G. 2007. "The Dark Side of Customer Analytics," *Harvard Business Review*, May, pp. 37-48.

Fichman, R. 2012a. "Lecture Note: Digital Innovation Deployment: Barriers and Tactics," Boston College (https://www2.bc.edu/~fichman/LN-Digital-Innovation-Deployment.pdf).

Fichman, R. 2012b. "Lecture Note: Tools and Tactics for Analyzing Diffusion Trajectories," Boston College (https://www2.bc.edu/~fichman/LN-Diffusion-Trajectories.pdf).

Gallaugher, J. M. 2012. *Information Systems: A Manager's Guide to Harnessing Technology*, Irvington, NY: Flat World Knowledge.

McAfee, A. 1999. "Rich-Con Steel," Case #9-699-133, Harvard Business School.

Shapiro, C., and Varian, H. R. 1999. *Information Rules: A Strategic Guide to the Network Economy*, Boston: Harvard Business School Press.

Upton, D. M., and Staats, B. R. 2008. "Radically Simple IT," *Harvard Business Review* (86:3), pp. 118-124.

Wolcott, R. C., and Lippitz, M. J. 2008. "BP's Office of the Chief Technology Officer: Driving Open Innovation through an Advocate Team," Case 5-2080254, Kellogg School of Management, Northwestern University.


## Module V: Digital Innovation at the Impact Stage

**Topics**: Value appropriation and transformation.

**Learning Objectives**: Be able to describe the process of creating and realizing value from digital innovations; be able to measure the success of innovations; be able to evaluate the impact of innovation on the whole ecosystem; be able to discuss the importance of continuously transforming the organization to be ready for the next innovation; be able to discuss non-economic values, such as privacy and ethics; be able to explain value appropriation from the perspective of different stakeholders; be able to discern the factors that foster/hinder value appropriation (e.g. Intellectual Property, IT governance); have good knowledge of the related IT for value appropriation.

**Candidate Readings**:

| Topic | Article/Case | Source | Description/Relation to Digital Innovation |
|---|---|---|---|
| Value Appropriation | Lecture Note: Digital Innovation Value Maximization | Fichman 2012 | *This note addresses the value appropriation of IT, factors affecting IT business value, etc.* |
| | Value Creation: Can Hulu Save Traditional TV? | Salter 2009 | Kilar, CEO of Hulu.com, sets out to create value from traditional TV: a new and better way to watch TV shows. The goal is to make Hulu the online authority on TV videos.<br>*It discusses value creation through digital innovation (e.g. customized advertising) in the TV industry*. |
| | Virgin Mobile USA: Pricing for the Very First Time | McGovern 2007 | In an industry characterized by high customer dissatisfaction and churn rate, Virgin Mobile attempts a bold strategy to cater to targeted customers (14–24 year olds).<br>*A case on realizing value by employing IT to target customers.* |
| Value Transformation | ITC e-Choupal Initiative | Upton and Fuller 2008 | eChoupal reengineered the soybean export supply chain in India using digital technology and incentives for various players.<br>*It discusses how IT (the eChoupal system) transformed the antiquated supply chain and re-distributed value along the supply chain.* |
| Emerging IT | Stakeholder Value (How to Jump Start The Clean-Tech Economy?) | Johnson and Sukewicz 2009 | The transformation from a fossil-fuel economy to clean-tech economy is being led by Silicon valley venture capitalists, who have pumped more than $20 billion into clean technology startups. However, clean tech can be disruptive and various stakeholders value it differently. The article provides a transformation framework that focuses on the whole rather than the parts.<br>*It discusses how to use clean-technology to increase values for various stakeholders.* |
| Managerial Issues | Ethics: How RFID and I Got Personal? | Graafstra 2007 | How does human implantation of RFID change the life of individuals? While it gives doctors, patients real time access to critical information, it raises ethical, religious, and social issues.<br>*It discusses the impediments of value realization when applying new IT.* |
| | The Starbucks Case | Moon and Quelch 2008 | Starbucks tried to add value through innovation, offering Wi-Fi services and selling its own music. A leaked memo by founder Howard Schultz indicated that "stores no longer have the soul of the past...the warm feeling of a neighborhood store."<br>*It discusses how traditional values are affected by new innovations.* |
| | A Matrixed Approach to Designing IT Governance | Weill and Ross 2005 | IT governance affects the outcome of IT innovation and can be assessed by determining how well it enables IT to deliver on four objectives: cost-effectiveness, asset utilization, business growth and business flexibility.<br>*It addresses IT governance issues that are key to realize value from digital innovation*. |

## *References*


Fichman, R. 2012. "Lecture Note: Digital Innovation Value Maximization," Boston College (https://www2.bc.edu/~fichman/LN-Innovation-Value.pdf).

Graafstra, A. 2007. "How Radio-Frequency Identification and I Got Personal," *IEEE Spectrum* (http://spectrum.ieee.org/computing/hardware/hands-on).

Johnson, M. W., and Suskewicz, J. 2009. "How to Jump-Start the Clean-Tech Economy," *Harvard Business Review* (87:11), pp. 52-60.

McGovern, G. 2007. "Virgin Mobile USA: Pricing for the Very First Time," Case #9-504-028, Harvard Business School.

Moon, Y. E., and Quelch, J. 2003. "Starbucks: Delivering Customer Service," Case #504-016, Harvard Business School.

Salter, C. 2009. "Can Hulu Save Traditional TV?," *Fast Company* (http://www.fastcompany.com/1400882/can-hulu-save-traditional-tv).

Upton, D., and Fuller, V. A. 2003. "ITC eChoupal Initiative," Case #9-604-016, Harvard Business School.

Weill, P., and Ross, J. 2005. "A Matrixed Approach to Designing IT Governance," *MIT Sloan Management Review* (46:2), pp. 26-34.

# Appendix C

## A 15-Week Sample Syllabus

### Course Title: "Information Technology in Business: A Digital Innovation Perspective"

### *Course Description*

Information technology (IT) permeates the strategy, structure and operations of modern enterprises. Today, IT forms a key foundation of most business innovations, including both novel products and revamped organizational processes. In fact, IT projects now account for half of all capital spending in the U.S. At the firm level, IT has become a major generator of business value, especially for organizations with the right set of resources and capabilities to exploit it. At the economy level, the marked acceleration in worker productivity in the U.S. in the last 20 years can be attributed to the cumulative effects of heavy IT investments begun in the 1990s. IT is transforming the way we live and work, how companies are organized, and the structure of entire industries. Thus, it is increasingly essential that managers become fluent with IT, both to become more astute individual observers and users of the technology, and to become more effective leaders of innovative business initiatives that are increasingly IT-enabled.

In this course, students will obtain a broad overview of IT fundamentals, key emerging technologies, and IT managerial frameworks, with an emphasis on how IT enables organizational innovation. Through a combination of readings, case studies, lectures and team projects, students will gain an appreciation for the transformative effects of IT on businesses, industries, and society, and will develop the ability to identify new opportunities presented by IT, and to manage the challenges associated with conceiving, justifying, and implementing IT-based initiatives.

The course is designed for students with various backgrounds; the class does not require any technical skills or prerequisite courses on IT, organizations, or innovation.

**Textbook:**
John Gallagher's free online book *Information Systems: A Manager's Guide to Harnessing Technology*, V1.4, August 2012 (available for downloading at http://catalog.flatworldknowledge.com/catalog/editions/gallaugher_1-4-information-systems-a-manager-s-guide-to-harnessing-technology-1-4).

**Schedule**

| Week | Modules | Topics | Readings/Assignments |
|---|---|---|---|
| 1 | Over view of Digital Innovation | Class overview. | • Read syllabus<br>• Read "Lecture Note: Learning to Think Like a Digital Innovator" (Fichman 2012e).<br>• Read "Winning the Race with Ever Smarter Machines" (Brynjolfsson and McAfee 2011)<br>• Optional: "Ten IT-Enabled Business Trends for the Decade Ahead" (Bughin et al. 2013) |
| 2 | | Distinctive characteristics of IT: Moore's Law, digitization (information goods), and network effect. | • Read "Lecture Note: Distinctive IT Characteristics" (Fichman 2012d)<br>• Read Gallaugher Chapter 5 on Moore's Law<br>• Read Gallaugher Chapter 6 on Network Effects<br>• **Assignment**: Network Effect Game |
| 3 | | Strategy and IT in organization, product vs. process innovation, emerging IT (web 2.0) enabled innovation, discuss the Pixar case. | • Read Gallaugher Chapter 7 on Social Media and Web 2.0<br>• Read Gallaugher Chapter 2 on Strategy and IT<br>• Read Pixar Case (Afuah 2009, Case #5)<br>• Skim "The Four Ways IT Is Revolutionizing Innovation" (Hopkins 2010)<br>• Skim "What's Your Social Media Strategy?" (Wilson et al. 2011) |

| Week | Modules | Topics | Readings/Assignments |
|---|---|---|---|
| 4 | Digital Innovation Discovery | IT-enabled innovation at the discovery stage, identification of innovation opportunities, invention and selection in organizations. Discuss the Zara case, discuss Google's flat organization to embrace new discoveries. | • Read Gallaugher Chapter 3: Zara - Fast Fashion from Savvy Systems<br>• Read Chapter 6, "Aiming for Evolutionary Advantage" (Hamel and Breen 2007) |
| 5 | | Innovation strategy (open vs.closed), P&G case on open innovation, Whirlpool innovation case. | • Read P&G Connect+Develop Case (Huston and Sakkab 2006)<br>• Skim Whirlpool Innovation (Link 2) |
| 6 | | Emerging discovery models, Crowdsourcing (Dell Ideastorm, Zhubajie, Crowdspring, Threadless). | • Read Case on Dell's Ideastorm (Di Gangi et al. 2010)<br>• Crowdsourcing Research Zhubajie vs. Crowdspring<br>• Skim Threadless (Afuah 2009, #4 and Link 2) |
| 7 | Digital Innovation Development | Developing ideas into usable innovations; packaging.<br>Infrastructures necessary for development, discuss General OnStar case, Shinsei bank case. | • Read General Motor OnStar Case (Farris et al. 2000)<br>• Skim Shinsei Bank (Fuller and Upton 2007)<br>• Read Gallaugher Chapter 11 on Data Assets |
| 8 | | Configuring, analytics-driven development, business analytics, developing analytical capabilities, discuss Capital One, competing on analytics, Harrah's case. | • EBay Experiment, HBR11<br>• Skim Competing on Analytics (Davenport 2006)<br>• Capital One (Hann, Bill Kahn)<br>• Harrah's Case (Lal 2002) |
| 9 | | Platform based development, discuss Apple and Facebook platform for developers, platforms competition, two-sided markets, special topic on social mobile gaming development (Shengda and Tencent). | • Read Gallaugher Chapter 7 on Social Media<br>• Read Gallaugher Chapter 8 on Facebook<br>• Discuss Platform Competition Between Shengda and Tencent<br>• **Assignment**: Two-Sided Market Game |
| 10 | Digital Innovation Diffusion | Deployment and assimilation. Discuss eChoupal case vs. China's Project of bringing supermarket to villages | • Read "Lecture Note: Tools and Tactics for Analyzing Digital Innovation Trajectories" (Fichman 2012a)<br>• Read "ITC e-Choupal Initiative" (Upton and Fuller 2008)<br>• Introduction of China Commerce Bureau's Project "Bringing Supermarket to Villages" |
| 11 | | Implementation and assimilation, discuss Rich-Con Steel (orTektronix ERP implementation, or CICSO ERP). | • Read "Lecture Note: Digital Innovation Deployment: Barriers and Tactics" (Fichman 2012b)<br>• Read Rich-Con Steel (McAfee 1999) |
| 12 | | Adoption of emerging technologies (Social media adoption), special topics on healthcare information system adoption. | • Read "How Large U.S. Companies Can Use Twitter and other Social Media to Gain Business Value" (Culnan et al. 2010)<br>• Discuss EMR Adoption (Agarwal et al. 2010) or other papers |
| 13 | Digital Innovation Impact | Value Appropriation, discuss the Netflix case on value creation with online DVD rental, discuss Hulu. | • Read Lecture Note: Digital Innovation Value Maximization (Fichman 2012c)<br>• Skim Gallaugher Chapter 4 on Netflix, Blockbuster and Redbox<br>• Read Netflix Case (Afuah 2009, Case #3)<br>• Read Value Creation At Hulu TV (Link 3) |
| 14 | | Business change and transformation, discuss Ericsson's success story on business transformation with ERP, value creation in Virgin Mobile, societal transformation, IT governance to embrace value. | • Read Inside Ericsson IT Enabled Change (Iveroth 2010)<br>• Skim Virgin Mobile Case (McGovern 2007)<br>• Read IT Governance (Weill and Ross 2005) |
| 15 | | Issues with IT value creation, Starbucks reverse IT-created value, Rich-gets richer in recommendation systems, RFID got personal, ethics/privacy/security/piracy. | • Skim HBS Starbuck's Case (Moon and Quelch 2008)<br>• Research on Recommendation Systems (Diversity vs. Accuracy)<br>• RFID Got Personal (Graafstra 2007) |

Link 1: Whirlpool's innovation democracy http://www.computerworld.com/s/article/90207/Innovation_Democracy
Link 2: Threadless, the customer is the company. http://www.inc.com/magazine/20080601/the-customer-is-the-company.html
Link 3: Can Hulu save traditional TV? By Chuck Salter, 2009 http://www.fastcompany.com/magazine/140/the-unlikely-mogul.html

**Grading**

| | | |
|---|---|---|
| Class presentations and discussions | Individual grade | 15% |
| Two short case analyses | Individual grade | 20% |
| Two small economics games | Group grade | 15% |
| Project 1 | Group grade | 20% |
| Term project or final exam | Individual grade | 30% |
| TOTAL | | 100% |

## References


Afuah, A. 2009. "Case 5: Pixar Changes the Rules of the Game," in *Strategic Innovation: New Game Strategies for Competitive Advantage*, New York: Routledge.

Agarwal, R., Guodong, G., DesRoches, C., and Jha, A. K. 2010. "Research Commentary—The Digital Transformation of Healthcare: Current Status and the Road Ahead," *Information Systems Research* (21:4), pp. 796-809.

Brynjolfsson, E., and McAfee, A. 2012. "Winning the Race with Ever-Smarter Machines," *MIT Sloan Management Review* (53:2), pp. 53-60.

Bughin, J., Chui, M., and Manyika, J. 2013. "Ten IT-Enabled Business Trends for the Decade Ahead," *McKinsey Quarterly* (http://www.mckinsey.com/insights/high_tech_telecoms_internet/ten_it-enabled_business_trends_for_the_decade_ahead).

Culnan, M. J., McHugh, P. J., and Zubillaga, J. I. 2010. "How Large U.S. Companies Can Use Twitter and Other Social Media to Gain Business Value," *MIS Quarterly Executive* (9:4), pp. 243-259.

Davenport, T. H. 2006. "Competing on Analytics," *Harvard Business Review* (84:1), pp. 150-151.

DiGangi, P. M., Wasko, M. M., and Hooker, R. F. 2010. "Getting Customers' Ideas to Work for You: Learning from Dell How to Succeed with Online Innovation Communities," *MIS Quarterly Executive* (9:4), pp. 213-228.

Fichman, R. 2012a. "Lecture Note: Tools and Tactics for Analyzing Digital Innovation Trajectories," Boston College (https://www2.bc.edu/~fichman/LN-Diffusion-Trajectories.pdf).

Fichman, R. 2012b. "Lecture Note: Distinctive IT Characteristics: Implications for Digital Innovation and Value Creation," Boston College (https://www2.bc.edu/~fichman/LN-Distinctive-Characteristics-of-IT.pdf).

Fichman, R. 2012c. "Lecture Note: Digital Innovation Deployment: Barriers and Tactics," Boston College (https://www2.bc.edu/~fichman/LN-Digital-Innovation-Deployment.pdf).

Fichman, R. 2012d. "Lecture Note: Digital Innovation Value Maximization," Boston College (https://www2.bc.edu/~fichman/LN-Innovation-Value.pdf).

Fichman, R. 2012e. "Lecture Note: Learning to Think Like a Digital Innovator," Boston College (https://www2.bc.edu/~fichman/LN-Learning-to-Think.pdf ).

Fuller, V. A., and Upton, D. 2007. "Information Technology and Innovation at Shinsei Bank," Case #9-607-010, Harvard Business School.

Gallaugher, J. M. 2012. *Information Systems: A Manager's Guide to Harnessing Technology*, Irvington, NY: Flat World Knowledge.

Graafstra, A. 2007. "How Radio-Frequency Identification and I Got Personal," *IEEE Spectrum* (http://spectrum.ieee.org/computing/hardware/hands-on).

Hamel, G., and Breen, B. 2007. *The Future of Management*, Boston: Harvard Business School Press.

Hopkins, M. S. 2010. "The Four Ways IT Is Revolutionizing Innovation," *MIT Sloan Management Review* (51:3), pp. 51-56.

Huston, L.,and Sakkab, N. 2006. "Connect and Develop: Inside Proctor & Gamble's New Model for Innovation," *Harvard Business Review*, pp. 58-66.

Iveroth, E. 2010. "Inside Ericsson: A Framework for the Practice of Leading Global IT-Enabled Change," *California Management Review* (53:1), pp. 136-153.

Lal, R. 2004. "Harrah's Entertainment, Inc.," Case #9-502-011, Harvard Business School.

McAfee, A. 1999. "Rich-Con Steel," Case #9-699-133, Harvard Business School.

McGovern, G. 2007. "Virgin Mobile USA: Pricing for the Very First Time," Case #9-504-028, Harvard Business School.

Moon, Y. E., and Quelch, J. 2003. "Starbucks: Delivering Customer Service," Case #504-016, Harvard Business School.

Upton, D., and Fuller, V. A. 2003. "ITC eChoupal Initiative," Case #9-604-016, Harvard Business School.

Weill, P., and Ross, J. 2005. "A Matrixed Approach to Designing IT Governance," *MIT Sloan Management Review* (46:2), pp. 26-34.

Wilson, J. H., Guinan, P. J., Parise, S., and Weinberg, B. D. 2011. "What's Your Social Media Stratetgy?," *Harvard Business Review* (89:4), pp. 23-26.