In 2003, Nicholas Carr provocatively asserted that “IT Doesn’t Matter.” As IT had become more pervasive, it had also become commoditized, so the competitive advantage from IT innovation had vanished. Fast forward to 2015. The wide adoption of big data, analytics, cloud computing, social media, mobile, and emerging IT-related innovations such as smart systems, cognitive assistants, and the Internet of Things (IoT) has dynamically changed the competitive landscape. Businesses that intelligently and innovatively apply information technology to create superior business and customer value are pulling away from those that do not. Indeed, it’s becoming increasingly clear that IT-enabled innovation is the core capability that differentiates the winners from the losers. Growing knowledge of ICT design, execution, storage, transmission, and reuse along with the Internet’s evolution is creating opportunities to configure IT into service relationships that create new value. IT-enabled innovations—digital innovations—have great potential to reduce costs, increase efficiency, and improve outcomes.

IT-enabled innovation is a process and the result of a process extending from the technology breakthrough, which is typically a result of basic or proprietary research, application development, testing, deployment, and finally customer use and acceptance. To qualify as truly innovative, new IT applications must successfully achieve that final step: customer value cocreation, adoption, and acceptance. Without customer acceptance, this new technology isn’t an innovation; it’s just a failed product or service that didn’t gain traction.

We’re now well into an era in which significant competitive advantage is achievable from IT-enabled business innovation. This has been our prime motivation for this special issue, which was conceived as a vehicle for understanding some of today’s issues and to look at opportunities for tomorrow. The authors’ contributions in all the articles have implications for IT-enabled innovations that go beyond the immediate application settings on which they report. These articles also showcase the application of an array of research methods, including surveys, experiments, and design science.

**IT-Enabled Services**

This special issue opens with “Big Data and IT-Enabled Services: Ecosystem and Coevolution,” by Bongsug (Kevin) Chae. This article presents a service-oriented and evolutionary view of big data as a case of disruptive IT-enabled innovation. Big data services are the latest example...
of IT-enabled service (IES). Data-focused IESs combine diverse resources such as processing technologies, advanced algorithms, and analytical talent from an ecosystem of market needs, technologies, social actors, and institutions. The author points out that service has increasingly become the main driver for business and economic growth, but IES is different from other types. Chae cites the emergence of big data services as disruptive IT-enabled innovation. The ability to create, acquire, mine, and analyze data lets businesses assess and reinvent themselves. Opportunities lie in finding patterns and relationships for predicting future behaviors and events that can lead to competitive advantage. However, acquiring, storing, processing, and governing massive amounts of data is a rapidly growing challenge. Chae’s research longitudinally explores the big data services ecosystem by analyzing Twitter data to identify important themes and topics.

In “IT-Enabled Information-Intensive Services,” Chie-Hyeon Lim and Kwang-Jae Kim observe that recent innovations in ICT have resulted in the creation of information-intensive services that are highly impactful on service value creation. IT-enabled information-intensive service (IT-IIS) is characterized by the creation of customer value primarily through information interactions rather than physical and interpersonal interactions between providers and customers. Relevant industries include healthcare, telecommunications, education, social networking, and emerging industries such as big data and the IoT. Because IT-IIS isn’t yet a highly researched topic, the article serves to introduce the concept as an example of IES innovation.

Importantly, IT-IIS enables value creation across arbitrary geographical and political barriers subject only to regulatory constraints. Although the article doesn’t mention it, IT-IIS companies in the sharing economy, such as Uber and Airbnb, can operate at the edge or beyond these constraints. It’s difficult for local authorities to regulate the cloud.

Ultimately, the authors apply the IT-IIS concept to case studies on car infotainment and data platform service design, and provide insights for IT’s role as a driver of innovative service design and the potential for redefining existing markets and creating new ones.

**Innovation and the Semantic Web**

The Semantic Web will play an important role in IT-enabled innovation. In the third article, “Semantic Annotation and Classification in Practice,” Oscar Rodriguez Rocha, Iacopo Vagliano, Cristhian Figueroa, Federico Cairo, Giuseppe Futia, Carlo Licciardi, Marco Marengo, and Federico Morando describe TellMeFirst, a Semantic Web application for the classification and enrichment of documents written in English and Italian. The Web’s evolution into a Semantic Web and the increasing amount of data published as linked data present opportunities for annotation and categorization systems that can use these data as semantic knowledge bases. Linked data refers to a method for publishing and interlinking structured data. It’s part of the Semantic Web and essential for its development. TellMeFirst leverages the relationship between Wikipedia and DBpedia as the reference knowledge base. DBpedia extracts structured information from Wikipedia and makes it available on the Web. The TellMeFirst system is presented as an example of IES innovation for enhancing value through a more engaging user experience.

**Innovation and Cocreation with Social Media**

In “Enhancing Cocreation Using Social Media,” Shitalkumar Halale, G.R. Gangadharan, and Lorna Uden propose a conceptual framework that explores the use of social media for cocreating value by combining process and element views. They present two case studies from IBM and SAP, demonstrating that human and technological aspects must be considered in the cocreation of value using social media. From the technological aspect, investment in social networking infrastructure and supporting technologies is important. However, it’s also important to involve both internal and external stakeholders to establish better interaction with employees and external stakeholders, including customers spanning organizations; create an environment for idea generation and sharing with feedback loops; encourage the likelihood of developing several communities of individuals sharing innovative ideas; experience engagement and collaboration; understand employees’ perceptions about organizational attributes such as structure, culture, leadership, and organizational values; and understand employees’ behavior, needs, and
More IT-Enabled Service Innovations

James C. Spohrer

The mission of ISSIP.org (pronounced I-Zip, for the International Society of Service Innovation Professionals) is to promote service innovations for our interconnected world. One approach to service innovation is to augment and scale the performance of people with cognitive assistants for all occupations in smarter service systems. The cost of developing cognitive systems is at an inflection point as a result of growing access to cognition as a service in the cloud and on mobile devices. Cognition as a service creates opportunities for service providers with respect to augmenting the capabilities of employees, customers, and other ecosystem partners. For example, applications of IBM’s Watson Services on Bluemix can assist doctors, nurses, and other caregivers, patients and their families, as well as insurance providers, local pharmacies, and other ecosystem partners. In this sidebar, I examine the following research and policy questions:

• How can the development of cognitive assistants for all occupations in smart service systems be made more rigorous, scientific, and cost effective?1
• What policies can both stimulate investment in the use of cognitive assistants and ensure robust demand for workers across the spectrum of skills?
• What are the best ways to organize mixed initiative teamwork in human-agent collectives (HACs)?2
• What policies can ensure high levels of competence and responsibility in individuals and organizations, and avoid systemic brittleness and concerns about cyberattacks on infrastructure, as the use of and reliance on cognitive systems grows in society?

The ABCs of Cognitive Environments

IBM researcher Dario Gil1 created the video “The ABCs of Cognitive Environments” to explain the new era of computing we’ve entered in the 21st century. Computing technologies have helped people overcome physical, social, and productivity limitations, and cognitive complexity limitations will be next. People struggle with long calculations, of course, but we also struggle with information overload, cognitive bias, and errors, even in pattern-recognition tasks for which we’re highly evolved. Big data and probabilistic reasoning are other areas in which machines can complement and augment human capabilities. This represents a new symbiosis of human-machines in which we collaborate and complement each others’ capabilities in more and more natural bidirectional interactions. “Cog,” or cognitive agents, and software services will become increasingly abundant.

Human-Agent Collectives

HACs2 can be thought of as a new type of socio-technical system in which humans and smart software (agents) engage in flexible, bidirectional relationships and interactions. Depending on the context, either people or the software will take the lead in a natural way, as we often do with other people on a team during a collaboration that requires different skills and expertise to be brought to bear at different times. HACs already exist in cars and on smartphones as travel aids for navigation to locations and stops along the way for food, lodging, or other services. HACs are being developed for disaster-response situations as well, where sensing and information integration can assist diverse organizations as well as first responders on the ground. These close-knit partnerships of people, organizations, and systems require flexible autonomy as well as coordinated action to be effective.

Innovation from an IT Capability Perspective

In the final article of this special issue, “Business Innovation and Differentiation: Maturing the IT Capability,” Marian Carcary, Eileen Doherty, and Clare Thornley argue that the complex and disruptive nature of technology-driven business innovation and the pervasiveness of IT’s role in this process dictate the strategic imperative for the effective use of IT. Employing technological advances alone isn’t sufficient. The gap between the need for IT to deliver, its ability to deliver, and the pace and manner by which it can deliver needs to be closed. They observe that IT-enabled business value results from harnessing technological advances to help organizations innovate and differentiate. The creation of competitive
advantage depends on developing the IT capability to deploy and exploit technological advances. To this end, the authors propose the IT Capability Maturity Framework (IT-CMF) as a capability approach to help organizations realize the innovation potential from IT.

IT is a key enabler of business innovation. Its impact on businesses in every industry has never been greater. Indeed, it’s rare to find a product or service that isn’t touched, or enabled, by IT in some manner. IT is a key source of innovations that drive growth. Emerging service innovations, smart services, and cognitive assistants are a few of the most recent developments in IT-enabled innovations. Charlie Bess, an HP Fellow and chief technologist for its Application Business Services Americas, discusses emerging service innovations in a video at http://youtu.be/4xBRNW20-I (see also his blog at www.hp.com/go/tntb, and https://www.linkedin.com/in/cebess). The “More IT-Enabled

References

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Guest Editors’ Introduction

Service Innovations” sidebar covers cognitive and smarter service systems; more is available at www.youtube.com/watch?v=ONfSIaDQEYs.

Acknowledgments

We know the importance of having to start somewhere to get new ideas moving, and of finding the appropriate collaborators to make initial steps and advances in new knowledge possible. We thank editor in chief San Murugesan for the vision he shared with us and for getting the discussion rolling. This issue received several submissions which underwent a three-cycle “review and revise” process before we were able to select the final articles. We would especially like to acknowledge the anonymous reviewers who so generously offered their time, effort, and helpful insights for us to make these hard choices and for helping us develop the final product. Finally, we thank the authors whose work was accepted and those whose research we weren’t able to publish in this edition. We hope the reviewers’ comments will strengthen their future success. We look forward to the “next generation” of IT submissions to IEEE IT Professional, and hope that future authors will build on the foundations that we’ve established here.

References


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