

Fundamentals of service science

Paul P. Maglio · Jim Spohrer

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Abstract Service systems are value-co-creation configurations of people, technology, value propositions connecting internal and external service systems, and shared information (e.g., language, laws, measures, and methods). Service science is the study of service systems, aiming to create a basis for systematic service innovation. Service science combines organization and human understanding with business and technological understanding to categorize and explain the many types of service systems that exist as well as how service systems interact and evolve to co-create value. The goal is to apply scientific understanding to advance our ability to design, improve, and scale service systems. To make progress, we think service dominant logic provides just the right perspective, vocabulary, and assumptions on which to build a theory of service systems, their configurations, and their modes of interaction. Simply put, service-dominant logic may be the philosophical foundation of service science, and the service system may be its basic theoretical construct.

Keywords Service science · Service systems · Service-dominant logic

Service innovation is poorly understood (e.g., Gadrey and Gallouj 2002). To remedy this, we and others have been cultivating service science, aiming to create the basis for systematic service innovation (Chesbrough 2005; Monahan et al. 2006; Spohrer and Maglio 2007). Service science would combine organization and human understanding with business and technological understanding to (1) explain

the origins and growth of service systems; (2) solve fundamental problems such as how to invest optimally to improve service productivity and quality; and (3) produce unique service professionals and service scientists (Maglio et al. 2006). In this brief commentary, we explore potential philosophical and theoretical bases for service science.

Service is the application of competences for the benefit of another (Vargo and Lusch 2004). Service depends on division of labor and effective co-creation of value, leading to complementary specialization and comparative advantage among participants (Normann 2001). Before the development of globe-spanning trade and technology networks, service was usually performed in close contact with a client. Today, the more knowledge-intensive and customized the service, the more it depends on client participation and input, whether through clients providing labor, property, or information via organizational or technological value chains (Sampson and Froehle 2006). Following this logic, we define service systems as value-co-creation configurations of people, technology, value propositions connecting internal and external service systems, and shared information (e.g., language, laws, measures, and methods; Spohrer et al. 2007). The smallest service system centers on an individual as he or she interacts with others, and the largest service system comprises the global economy. Cities, city departments, businesses, business departments, nations, and government agencies are all service systems. Every service system is both a provider and client of service that is connected by value propositions in value chains, value networks, or value-creating systems (Normann 2001).

Service science is the study of service systems, which are dynamic value co-creation configurations of resources (people, technology, organizations, and shared information). These four categories of resources are significant

P. P. Maglio (✉) · J. Spohrer
IBM Almaden Research Center,
650 Harry Rd, San Jose, CA 95120, USA
e-mail: pmaglio@almaden.ibm.com

because they include resources with rights (people and organizations), resources as property (technology and shared information), physical entities (people and technology), and socially constructed entities (organizations and shared information). Many disciplines—such as law and economics, organization theory, marketing, operations research, industrial engineering, computer science, service-oriented architecture, web services, multiagent systems, game theory and mechanism design, management of information systems, business strategy, cognitive science, and anthropology—have accumulated knowledge relevant to understanding a service system, each focusing on different aspects of the overall system. For instance, organization theory focuses on structures, rules, and incentives to create effective groups of individuals, and operations research focuses on mathematical models of material and information flows in processing networks to optimize transaction costs and other measures. But to integrate across such a broad range of disciplines, we need a shared perspective and a shared vocabulary. We think Vargo and Lusch's (2004) service-dominant logic might provide just the right perspective, vocabulary, and assumptions on which to build a theory of service systems, their configurations, and their modes of interaction. Simply put, service-dominant logic may be the philosophical foundation of service science, and the service system may be its basic theoretical construct.

For example, we see IBM (and many other companies) shifting from a manufacturing-dominant logic to a service-dominant logic. IBM's services business has grown quickly to dominate revenue, now accounting for more than software and systems revenue combined.¹ Providers, such as IBM, deploy consultants, practitioners, and technologies to help clients transform businesses. To improve and innovate, providers invest in the talent of employees, the support environment employees operate in, the information systems employees use, the partnership networks that complement in-house capabilities and enable service delivery, and technologies to automate service delivery—overall, aiming to raise the competence of the provider side of service systems. Increasing competence is the key to improvement and innovation.

Bringing a broad range of services to market involves specialists in organizational change (human factors), business design (management and economic factors), and technology design and implementation (engineering factors). That is, providing any complex business-to-business service means creating an interdisciplinary effort—incorporating people, technology, value propositions, and shared information—that is matched to each opportunity. Consider

a complex business-to-business service system such as IT outsourcing. An IT outsourcing provider takes over operation and maintenance of client IT investments, aiming to improve efficiency by reducing cost over time, applying unique skills, experience, and capabilities. The size and nature of outsourcing arrangements include large deals in which the provider takes over all IT investments of a client and small deals in which the provider takes over a single function such as help-desk operations. The structure of the deal is captured in a contract, which is jointly created by provider and client. Outsourcing involves many areas of the business (e.g., finance, legal, business operations, IT operations, human resources), and each provides information for the contract, including metrics to be monitored and verified. In this sort of service arrangement, we can see (1) how the client and provider must interact to establish a unique service system, including how information and risk are shared; (2) how individual, organizational, and technological competences come together to create value across the system; and (3) how reliable improvement and innovation are critical in outsourcing, as value depends on efficiency and the ability to scale service systems effectively.

Entities within service systems exchange competence along at least four dimensions: information-sharing, work-sharing, risk-sharing, and goods-sharing. We can classify service systems by the kinds of internal exchanges that dominate. Often, information-sharing dominates in business consulting, work-sharing dominates in outsourcing, risk-sharing dominates in insurance, and goods-sharing dominates in renting. Yet it seems all four dimensions are present to some extent in almost all service systems. And the key to understanding the nature of these sharing arrangements lies in the distribution of competences among entities and the value propositions that connect entities. For instance, a typical value proposition for outsourcing maintains that the provider has the knowledge, equipment, and people to do some work (such as running a helpdesk) more cheaply than the client can alone. In this case, it may make sense for the client to share work with the provider to save money. But effective outsourcing arrangements require intimate information-sharing and substantial risk-sharing between client and provider.

In sum, service is the application of competences for the benefit of others (Vargo and Lusch 2004). Service systems—the basic unit of analysis of service—are value co-creation configurations of people, technology, value propositions connecting internal and external service systems, and shared information (language, laws, measures, and methods; Spohrer et al. 2007). Normatively, service systems engage in knowledge-based interactions to co-create value, meaning that advances in service innovation are only possible when a service system has information about the capabilities and the needs of its clients, its competitors, and itself. Service

¹ See IBM's 2006 Annual Report, available at <http://www.ibm.com/annualreport/2006/>.

science aims to categorize and explain the many types of service systems that exist as well as how service systems interact and evolve to co-create value. Not all interactions between service systems co-create value, and service science seeks to understand the reasons for departures from normative behavior. The ultimate goal is to apply scientific understanding to advance our ability to design, improve, and scale service systems for business and societal purposes (e.g., efficiency, effectiveness, and sustainability). We have only just begun to explore service science, but it already seems to us that service-dominant logic and service systems will be fundamental to service science.

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