



10 Reasons

Service Science

Matters to Universities

By Jim Spohrer, Dianne Fodell, and Wendy Murphy

Higher education is being reshaped little by little every day. Slowly but surely, from the smallest community colleges to the teaching institutions to the most prestigious research universities, a new set of key performance indicators (KPIs) is transforming what excellence means in higher education. For developed and emerging market nations globally, higher education creates both an informed citizenry and a high-skill workforce, but *how* that is achieved is being transformed. What is not changing is the fact that higher education opens up new opportunities in a knowledge-driven global economy. It is what parents want for their children, as well as what professionals want for themselves as lifelong learners with growing career aspirations. So how can institutions compete on the global stage of higher education? Through *service science*, the emerging science that studies value co-creation in complex systems and proven innovation techniques already being used in other industries.

Service science can provide perspective on the forces reshaping higher education today.¹ From online service offerings to self-service technologies to global brands establishing local franchises, these basic forces are transforming whole industries and are being studied by service scientists. Higher education is not the first industry to feel the tug of these forces, nor will it be the last, with finance, health care, and government on the horizon and with retail, media, manufacturing, and agriculture industries well down the road of 21st-century transformation in the age of global sourcing, cloud computing, and the “Internet of Things.” In finance, for example, brilliant hedge-fund entrepreneurs already control sophisticated data centers with faster, better algorithms that can outwit casual day-traders many times a day. New laws and regulations will eventually constrain some of these financial creations; although they help some customers when applied at a small scale, they border on being unsustainable or even unethical at a large scale (e.g., subprime mortgages, shady student-loan practices). Scale matters in service science, and boom-and-bust cycles are one indication that the individuals and institutions of society are on a steep learning curve toward discovering scale effects and how best to control them. Policymakers are learning to replace constants with variables, and this will change everything—as computer scientists and systems scientists already know.

Understanding Service Science

The standard definition of *service* has been revised in the last few decades by disciplines including economics, marketing, operations, industrial and systems engineering, and computer science.² In fact, service is so ubiquitous that it can be a bit hard to define precisely. Nevertheless, for our purposes in this article, service phenomena are observed in everyday life as *the application of knowledge and resources for the benefit of others*. The more that two diverse, resource-rich actors know about each other and the world, the more likely it is

that they can find a way to be greater than the sum of their parts through service-for-service interactions.³ *Service science* is the emerging study of service in society, with a focus on the dynamic configurations of knowledge and resources embodied in or associated with diverse actors—known more precisely as *service system entities*.

Service science studies the dynamic configuration of knowledge and resources in people, businesses, universities, hospitals, cities, states, and nations.

All such actors are capable of service-for-service exchange and can be viewed as interacting entities with knowledge and resources as well as with rights and responsibilities that are governed by norms and laws in a society. In fact, society can be viewed as an ecology of nested, networked entities interconnected and held together by trust in value propositions that apply knowledge and resources for mutual benefits—held together, in fact, by the force of sustainable service-for-service interaction patterns between specialized actors.⁴ Diversity helps these actors learn from each other and ratchet up overall capabilities over time, due to improved technology (infrastructure), skills (individuals), rules (institutions), and goals (shared narratives about quality-of-life aspirations in a culture).

Service science offers a fresh perspective on the challenges faced by higher education.⁵ In a sense, service science is the emerging science of win-win. Diverse stakeholders (students, parents, faculty, deans, mayors, politicians, business owners) interact using traditional value proposition, or win-win means, until—and this is

very important—those value propositions no longer work or are disrupted by alternative arrangements and configurations of actors, knowledge, and resources. Also, mutual benefits or win-win outcomes can be surprisingly challenging to achieve when the value of knowledge and resources possessed by actors is changing and fluctuating at an accelerating pace. For universities, traditional win-win relationships between stakeholders are under stress or are breaking down.

But we are getting ahead of ourselves. Why is service science called *service science* and not something like *geographic knowledge-value science* or *spatial mutual-benefits science* or even simply *win-win science*? The name comes from the rapid growth of scientific approaches to service innovation in business and society and the need for even more of these scientific approaches to address national and global challenges in finance, education, health care, government, and even the environment as a service impacted by human activity.⁶

Business and governments are increasingly focusing on service innovation, in addition to product innovation and process innovation. Several decades ago, many economists suggested that service innovation was the “next big thing”—innovation to improve productivity, quality, and compliance in global service sourcing and provisioning.⁷ For example, recovering from a near-death blow in the early 1990s, IBM found vast growth opportunities in its service businesses as Fortune 2000 companies around the world began to outsource their IT data centers and IT help desks. Apple recovered from its



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mid-1990s quarterly losses to become the most highly valued public company in the world through a string of innovations—the iPod, iPhone, iPad—that progressively transformed information, music, communications, computation, and content as a service.

Not just businesses but whole nations were being transformed by increased urbanization and knowledge-intensive service growth as measured by economists in national accounts. First the developed and now the developing economies experienced the transformation. In fact today, most economists foresee that in just a few more decades, all nations will likely converge to tertiary (“service”) sector levels of above 70–80 percent of national accounts, measured in terms of labor force, types of firms, and GDP (Gross Domestic Product). Furthermore, the inability to scale—that is, to rapidly shift hundreds of millions of people from the primary sector (agriculture and extractive) to the tertiary sector (knowledge-intensive service)—will be an unconscionable disaster for humanity. Universities have a key role to play.

James Tien, the dean of Engineering at the University of Miami, has noted an 80-20 to 20-80 shift, or “flip,” occurring as a result of the growth of service in national and business accounts. Two decades ago, students who graduated with engineering degrees found 80 percent of their jobs in the manufacturing sector (firms that sell products); today, these graduates are finding 80 percent of their jobs in the service sector (firms that sell financial and technology service offerings or quantitative marketing and global supply chain operations in retail and health care). Just as IBM shifted to service-led revenue growth, traditional manufacturing companies were being “servitized”—for example, offering not jet engines as a product but jet engines as a service (Rolls-Royce’s “power-by-the-hour”). Knowledge-intensive efforts to improve productivity, quality, and compliance were finding the greatest challenges in the realm of service innovation, and new advanced technologies were supporting new business models as part of the service revolution.⁸

Service innovation gives rise to many difficult research questions as well. For example, how can a society improve the productivity, quality, and compliance of finance, education, health care, and government? Service science is already being used to study and explore possible transformations of universities, precisely because universities are such important actors (stakeholders) in the national knowledge economies of today. For example, education as a service system has been re-imagined as a continuous improvement process by service scientists.⁹ Service science studies the win-win value propositions that interconnect business and societal stakeholders. If advanced technologies, in conjunction with new policies, will permit higher productivity, quality, and compliance, then it is likely that new value propositions will emerge to interconnect not only existing stakeholders but new stakeholders (new market possibilities and opportunities) as well.



Ten Reasons

Service science matters to universities for many reasons, but we will elaborate on just ten here.

1. Universities are complex service systems of fundamental importance.

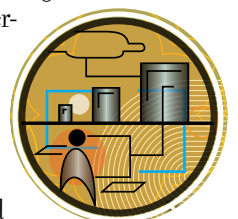
Universities today can be seen as complex, adaptive service systems.¹⁰ Service systems are the fundamental abstraction of service science. Universities are composed of people, buildings, utilities, sports facilities, roads, and land. But universities also manage a system of service systems. Like cities, universities need to manage and provide for housing, transportation, safety, health, food, water, energy, education, and entertainment. All of these systems have a series of interactions, costs, and interdependencies. In addition, universities have a large set of stakeholders: students, parents, employers, insurance companies, financial institutions, and city, state, and federal institutions. Each stakeholder has unique dependen-

cies on the university. And the service providers at the university—faculty, administrators, state governments, food service providers, etc.—are all trying to gain efficiencies, cut costs, and optimize this complex set of service systems.

University service systems require smart people, technology, and business leadership. The quality of life for students depends on the quality of their education and their experiences in college. The quality of life for cities or regions depends on employment, healthy citizens, convenient modes of transportation, access to food and recreation, and the ability to find the right talent to sustain the economy and the livelihood of its citizens. Universities create the pipeline of future workers and are a major employer in a region. They are fundamental to a nation’s success and competitiveness.

2. Disciplines are infusing service innovation concepts into curriculum.

As go the disciplines, so go the universities, and many disciplines are retooling around the concepts of service innovation.¹¹ Economics, marketing, operations, computer science, industrial and systems engineering, design, and communications are changing rapidly with technological advances. The disciplines of communications and marketing have changed inalterably because of social networking, social media, and the Internet. Marketing and operations now include dealing with data, analytics, and optimizing outcomes. People and businesses are more interconnected than ever before, requiring that service science be introduced throughout every academic discipline, including manufacturing. Every business has service components such as CRM, installation services, web services, training, HR, or software as a service. Service science innovation needs to be a part of everyone’s job, as individuals specialize and find markets for their capabilities. Businesses need to be constantly innovating and



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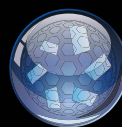
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providing the next service that no one else yet provides. In addition, these services need to employ service science concepts to be profitable and sustainable and to improve customer experiences.

3. Service science can help universities overcome discipline silos.

Service science requires interdisciplinary skills. Each actor in the service system needs to have knowledge of and an appreciation for the parts of the whole system. Service professionals must have a quadruple combination of skills: business, technology, organizational change, and culture or shared information about values and norms. Yet these are usually taught in four distinct colleges within a university: management, engineering, social sciences, and humanities and the arts. Twenty, thirty, and forty years ago, IBM hired software engineers or computer scientists to develop large-scale applications, operating systems, or middleware to sell to its clients. These individuals worked alone or in teams designing and writing code according to a set of specifications and requirements. Having good, deep computer science skills was enough; having good teaming skills was a bonus. Today, IBM hires application developers as part of its service businesses; an application developer's talent in computer science thus needs to be blended with an understanding of a client's business and culture and of the culture of the client's customers. Today's application developers work on the client's premises: they need to understand the client's business model, pricing model, processes, supply chain, and more.

Service science in universities likewise requires this interdisciplinary set of skills, so that universities can tear down the existing walls that silo knowledge among separate colleges. Faculty need to work together, and degree programs need to span the silos. Students from multiple

disciplines need to work together and appreciate the variety of skills that make services work. Some call this the new liberal arts, and some call this waking up to the elephant in the room.¹²

4. University-based startups are often new types of online service.

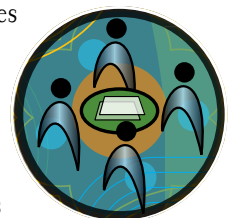
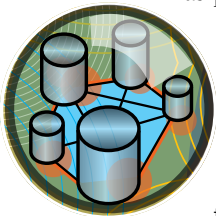
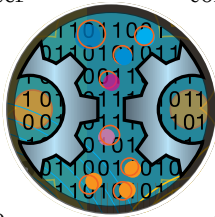
The key performance indicators (KPI) of universities are changing. Increasingly, these KPIs include measures of entrepreneurship among students and the number of startups and regional jobs being created.¹³ Kickstarter (<http://www.kickstarter.com/>) can be viewed as an online crowd-funding service business, catalyzing thousands of other online service businesses. Online student competitions are becoming more common as a way for students to learn and launch their own businesses. For example, students are learning to create apps for smart phones in a growing number of global competitions, often sponsored by industry and judged by members of national academies of science, engineering, and medicine. Yahoo!, Google, Facebook, and more iconic online service businesses were created by university students and in less than a decade were used by millions of customers worldwide. The ability to rapidly scale and use an advertising business model attracts students to experiment with new online service offerings. Rather than creating intellectual property or new technologies and licensing them immediately to big businesses, students and faculty can today create companies that leverage online or 3D printing to create service businesses with real customers. They can then grow these businesses and realize even greater rewards by merging with other small businesses; when they become large enough, they can exit by being acquired by a large business. In fact, large global businesses offer incentives for universities to adopt their platforms, and they help university businesses improve and grow (e.g., IBM Smart Camps).

5. Professional associations are adding service science SIGs.

As disciplines infuse service innovation concepts into curriculum, the professional associations associated with those disciplines are adding special interest groups (SIGs), conferences, and journals related to service science.¹⁴ For example, the Services SIG (SERVSIG) serves American Marketing Association academics who are interested in services research. The journal *IEEE Transactions on Services Computing (TSC)* focuses on research on the algorithmic, mathematical, statistical and computational methods that are central in services computing. The Institute for Operations Research and the Management Sciences (INFORMS) has a Section on Service Science to promote and disseminate research and applications among professionals interested in theory, methodologies, and applications in service science, engineering, and practice and to provide a forum for the exchange of new ideas. The Production and Operation Management Society (POMS) College of Service Operations has held twelve International Research Symposiums on Service Excellence in Management. The IT Service Management Forum (itsMF) is an internationally recognized forum for IT service management professionals worldwide. The Technology Services Industry Association (TSIA) provides benchmarking and research, peer networking and learning opportunities, and certification and awards programs. The growth of service science research is also evidenced by the number of papers presented at conferences such as the annual Frontiers in Service Conference and the biennial Naples Forum on Service, as well as many others.

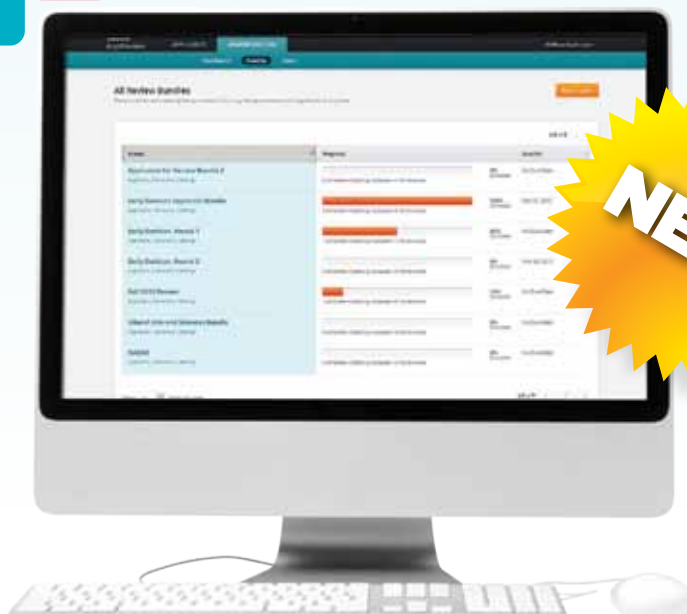
6. Cities, home to most universities, are complex service systems.

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land area of cities.¹⁵ Nevertheless, universities are vital to local economies and frequently are listed in the top 10 percent of largest employers of knowledge-workers in a region. Universities with hospitals or medical centers are often the largest employer in a city.¹⁶ Some “university towns” include students on governing bodies of the cities. Universities model a city’s complex system of service systems; as mentioned earlier, both have to deal with residents, transportation, energy, food, water, finance, and health care. Universities can help cities improve operations by experimenting with new or improved services on their campus systems. Universities can be living laboratories for making city improvements by conducting research and experiments on the interaction of service systems—for example, on how transportation modes (walking, biking, bus, car) affect student (citizen) health and obesity or on how water and energy can be conserved to save money, reduce waste, increase productivity, and improve health. What works well for the university will likely work well for the city. Students working on these service systems at their university will make an exceptional future workforce for their cities.



7. Service failures can be costly and can derail the careers of students.

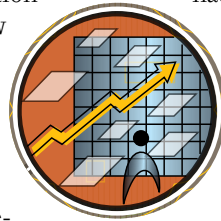
Student loan debt may be the next debt bubble to disrupt the U.S. economy and, through interconnected financial service systems, wreak havoc on global markets.¹⁷ Sometimes service offerings are complex and do not lead to mutual benefits but, rather, are more of a trap for the unwary. Financial service failures can lead to debt burdens that diminish future opportunities for students and families. Health service failures can lead to endless paperwork, or debt burdens, and worse. Government service failures can trap future generations with unreasonable levels of debt as deficit spend-



ing bales out failed service systems. It behooves us all to make service systems work better, realizing mutual benefits for all. The view of a global knowledge economy as an ecology of evolving interconnected species (service system entities) is an increasingly important perspective for citizens of all nations. The ecology evolves as entities improve existing service offerings, create new service offerings, and reconfigure the ecology through acquisitions, divestitures, partnering, and entrepreneurial activities that create new types of service system species.

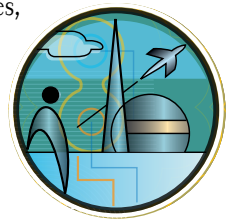
8. Service science can help universities move up in rankings.

Nearly every service system can find a ranking in which it is number one, and this is probably true of university rankings as well.¹⁸ Some of these rankings may become future KPIs used in university rankings globally—for example, the number of startups initiated each year, the number of start-ups that are self-sustaining and/or growing after five years, and the number of regional and global jobs created by university-based start-ups in the last decade.¹⁹ IBM has relationships with more than 500 universities that are working on service science curriculum and research. Service science is still relatively new, and since it spans disciplines, industries, and service systems, the service science landscape is broad and the leadership opportunities are wide open. A service-delivery center in an emerging market nation can create thousands of new high-tech jobs in just a few years, requiring local service science, analytics and big data, cloud computing, and other skills. These service-delivery centers depend on close relationships with local universities and are often the spark needed to develop both infrastructure and skills for university-based entrepreneurial activities.



9. Service science can contribute to good industry-university relations and interactions.

One of the greatest misconceptions about service science and service logic is that they deal only with so-called service businesses or direct provider-to-customer service interactions.²⁰ All businesses and governments have service components. Industry interaction with faculty and students opens up opportunities for innovation and provides universities with real-world challenges that make studying much more exciting for students. We used to think of service businesses as having human-to-human interaction, but with the enormous use and acceptance of smart phones, we are seeing innovations in applications as a service and the web as a service. These are very exciting times for entrepreneurs in universities, in businesses, and in cities. Students are the future workforce, the future entrepreneurs, the future innovators. The more practical experience they have with business and industry, the faster their contributions will be for making our world a better place to live.



10. Service science can help all universities improve their service excellence “game.”

Over three decades ago, Arizona State University’s Center for Service Excellence was one of the pioneers in research and executive education related to service science; recently the Center completed an analysis of research priorities in service science.²¹ Harvard also had great pioneers, as did the University of Maryland and the Nordic School of Service Research.²² As more disciplines have come to adopt service innovation concepts as part of their standard curriculum, other universities have emerged as pioneers in aspects of service science related to research, education, practice, and policy-making. The growing number of service science conferences and professional association SIGs makes it easy to attend a



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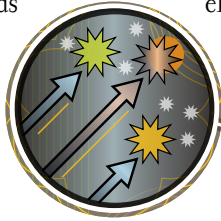
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service science symposium and see how service science is expanding and improving every year. Hundreds of new research projects and papers are added each year, with many being presented at the Frontiers in Service Conference or the Naples Forum on Service, to name just two. Although those who have pioneered in service science continue to innovate and add to the body of knowledge, more innovators and entrepreneurs are needed to continue this expansion, which will never be complete.



versity innovation ecosystem. Universities as institutions have improved by co-elevating the capabilities of other stakeholders—from students who become job-seekers to faculty whose teaching or research changed the world, to local businesses looking for growth, to mayors working to improve quality-of-life for citizens, to immigrant students and faculty looking for new skills and new opportunities. Regarding careers, universities help ensure that students have the opportunity to learn disciplinary and professional skills that will prepare them for higher-value careers. Regarding teaching, universities sustain and challenge top teaching faculty to improve their skills and help more students learn. Regarding research, universities support top research faculty in conducting basic and applied research that changes the way we think about and

live in our world. Regarding regionalism, universities provide the brainpower and fresh young minds needed to improve all aspects of local quality-of-life. Regarding credentials, universities empower deans to sculpt their schools of higher education to better serve the changing needs of society, including future students and faculty. Regarding entrepreneurship, universities provide staff to help faculty and students capitalize on their best ideas and turn those ideas into business or societal innovations that create real benefits for others. Regarding citizenship, universities help ensure that students have a safe place to learn critical thinking skills that prepare them to be informed citizens. Regarding opportunity, universities are local pillars and global beacons of what is possible when we improve our capabilities and learn to apply them so that people of all races, religions, and national origins

Conclusion

The observant reader will see that our ten reasons why service science matters to universities loosely correspond to civic and academic responsibilities. Diverse stakeholders make up the uni-

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can study and work together. Regarding culture, universities are often the homes of local galleries, museums, and concert halls that encourage the liberal arts and humanities and enrich our lives with beauty and passion in music, dance, and so much more. Regarding change, universities have always provided and today continue to provide safe haven for intellectuals and diverse revolutionaries, for those who think differently and dream of future possibilities.

Service science is not simply about the measures of productivity (providers), quality (customers), compliance (authorities), and innovation (competitors). It is also about understanding how regional ecosystems improve measures of innovativeness, equity, sustainability, and resilience. This involves a search for the forces (value propositions and governance mechanisms) and the actors (individuals and institutions) that will improve our understanding of what makes us human. By attracting and supporting the best and brightest minds, universities have let the knowledge genie out of the bottle. Universities, together with their cities and local businesses and social sector enterprises, are essential institutions in the global knowledge economy.²³ In the words of George Bernard Shaw, history is a race between education and catastrophe. Either humanity will develop and learn service science rapidly, thereby bending the curve under our collective control, or the curve will bend and transform us. ■

Notes

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