Characterizing Organizations as Service Systems
Kelly Lyons and Stephen Tracy
University of Toronto, Toronto, Ontario, Canada

Abstract
Over the past 50 years, the service sector has grown in most advanced industrialized economies to be the dominant economic activity. Researchers are working to understand service activities and define scientific concepts and methods of service under an emerging research area called service science. Service is defined as the application of competence and knowledge to create value. Value is realized through interactions and cocreation among service systems. Service systems vary in scope (from individuals to businesses, organizations, governments, and nations) and adapt dynamically and connect to other service systems through value propositions. The service system has been proposed as an abstraction for service science, and yet it is not clear how to characterize a given organization as a service system. In this article, we present a review of literature on service system concepts and define a service system framework developed from the literature that can be used to characterize an organization as a service system. © 2012 Wiley Periodicals, Inc.

Keywords: Service systems; Service science; Framework

1. INTRODUCTION
Service science is an emerging multidisciplinary field concerned with the study of service systems and value cocreation. Service systems are defined as, “dynamic value cocreation configuration[s] of resources, including people, organizations, shared information (language, laws, measures, methods), and technology, all connected internally and externally to other service systems by value propositions.” (Spohrer, Vargo, Caswell, & Maglio, 2008b, p. 5). Many “things” can be viewed as service systems, including “people, corporations, foundations, non-governmental organizations, nonprofits, government agencies, departments in an organization, cities, nations, and even families” (Spohrer, Anderson, Pass, & Ager, 2008, p. 1). The service system has been put forward as the most fundamental abstraction of service science (Maglio, Vargo, Caswell, & Spohrer, 2009). As an abstraction, it can provide researchers with the analytical tools needed to better understand the patterns and behaviors that exist between service providers and service customers. Abstractions enable researchers to build summary representations of a given phenomena, allow us to focus on the characteristics of a concept rather than its definitive values (Medin & Smith, 1984), and “allow seemingly different things to be compared, and... explained in terms of [one] another” (Maglio et al., 2009, p. 396).

The service system concept and definition has the potential to play a critical role in service organizations and even entire economies. However, the definition as presented is abstract, recursive, and includes many disparate kinds of entities as examples (Glushko, 2010). It is not clear how one can apply the current abstract definition to help us understand a given organization as a service system.

In this article, we present a framework and interview tool that can be used to characterize a given organization as a service system according to the abstraction...
concepts presented in the literature and demonstrate how it works to characterize an academic library as a service system. Frameworks are used in a number of ways by scholars and practitioners alike. A framework is used to organize inquiry by helping to identify sets of variables of interest and relationships among them that need to be analyzed (Ostrom, 2011). Frameworks have been proposed to help service science researchers map the domain of service science research (Alter, 2009) and position computer science and information systems research within the domain of service science research (Lyons, 2011).

The Institutional Analysis and Development (IAD) framework has been used to address a variety of policy questions by enabling researchers and policy makers to analyze a given institution (Ostrom, 2011). The IAD framework focuses on actions and resulting patterns of interactions and outcomes and methods for evaluating those outcomes. It can be used to analyze service operations or policy decisions and has been applied in a variety of domains, including service domains by institutional analysts and policy scholars.

In (Alter, 2008), three existing frameworks (the work system framework, the service value chain framework, and the work system life cycle model) are proposed as useful frameworks for understanding and analyzing service systems. These frameworks are meant to be used by business and information technology (IT) professionals to analyze and design service systems by first understanding service systems in terms of work systems.

Our proposed service system framework emerged from an extension literature review of past service science research and is accompanied by an interview instrument that can be used by researchers and practitioners to understand specific organizations in terms of service systems. The goals and expected benefits of our service system framework are multiple. For a single organization, a characterization of it as a service system can enable better understanding of it and help determine subsequent improvements. Using the service system framework to characterize several related organizations can result in a better understanding of classes of service systems and a better sense of how to represent or model organizations as service systems. Finally, the exercise of applying the framework to multiple, noncommon, unique organizations can help critique, shape, and evolve emerging service system definitions and foundations as researchers continue to develop the service system abstraction.

2. LITERATURE REVIEW OF SERVICE SYSTEM CONCEPTS

Katzan (2008a, p. 2) defines a service system as a “socially constructed collection of service events in which participants exchange beneficial actions through a knowledge-based strategy that captures value from a provider-client relationship.” The emphasis on a knowledge-based strategy for the creation of value signifies the importance of people and the competences of people (such as knowledge and understanding) in a service exchange. Maglio and Spohrer (2008, p. 19) define a service system as a “value cocreation configuration of people, technology, value propositions connecting internal and external service systems, and shared information.” Like Katzan (2008a), there is an emphasis on the role of people and shared information, but they also include cocreation, which generally refers to the active participation and engagement of both a provider and a customer. The customer contributes primarily social competence (behavior and attitude) in the cocreation process and cocreates value for themselves and the service provider (Deist & Winterton, 2005).

Spohrer, Anderson, et al. (2008) propose 10 foundational principles of a service system that are, for all intents and purposes, the fundamental concepts that can be used to understand a service system as an abstraction: resources, entities, access rights, value cocreation interactions, governance interactions, outcomes, stakeholders, measures, networks, and ecology. We address each of these principles below then present our service system framework that was derived from them in Section 30. These 10 foundational principles have also been used to develop a service system ontology in (Mora, Raisinghani, Gelman, & Sicilia, 2011).

2.1. Resources

Resources play a central role in the service system, as they are the things that are exchanged for the purpose of creating value. There are a number of differing definitions and interpretations of resources in the literature. Barile and Polese (2010) define resources as anything with a name that is useful. Vargo and Lusch (2004, p. 2) describe resources as either tangible or intangible “functions of human ingenuity and appraisal.” Operant resources (those that produce effects) are often the core competences or processes of an organization (Vargo & Lusch, 2006). Skills and knowledge are increasingly the most important types of operant resources (Vargo &
Lusch, 2006). Maglio and Spohrer (2008) identify four types of key resources all of which are part of core competences and organization processes: people, technology, organizations, and shared information.

Spohrer, Maglio, Bailey, and Gruhl (2007) highlight three types of shared information: language; laws, and measures. Language provides the means for coordination through shared vocabulary, vernacular, and standard coding, while laws ensure compliance to regulations or policy. Measures are used in a number of ways. Price is one measure that is an agreement between the provider and customer. Measures are also used internally as performance indicators and may be established to seek opportunities for growth and/or innovation or for reasons of transparency and accountability.

Spohrer, Anderson, et al. (2008) propose that all resources can be classified as one of four types: physical with rights, not physical with rights, not physical with no rights, and physical with no rights, where the notion of rights refers to the resource’s freedoms or entitlements to carry out activities. A human is a physical resource with rights, whereas a desktop computer is a physical resource with no rights.

2.2. Access Rights

Barile and Polese (2010) discuss the notion of access rights in relation to resources where access rights refer to the “social norms and legal regulations that determine access and use of resources” (Barile & Polese, 2010, p. 25). They identify four types of access rights that a resource or group of resources may have: owned outright, leased or contracted, shared access, and privileged access. Overall, understanding the access rights of resources within a service system is important as these attributes can influence the system design.

2.3. Entities

Barile and Polese (2010) define entities as resource integrators that enable exchange for the purpose of value cocreation within or between service systems. Spohrer, Anderson, et al. (2008) point out that all service system entities are resources but not all resources are service system entities. Maglio and Spohrer (2008) assert that entities exchange competence through arrangements determined and understood by the value propositions that connect them.

High-level categories of service system entities have been identified, including business, customer, and government entities (Gummesson & Polese, 2009). Katzan (2009) identifies five types of entities, each with its own unique role and contribution to service outcomes: service principal, service producer, service provider, service client or customer, and service object. A service principal is the legally recognized holder or owner of the service system as a whole. The service producer is responsible for back-end production of the service offering (e.g., infrastructure, availability), while the provider is responsible for the application of resources for the benefit of a service customer. A service object, “may be the direct recipient of the result of the service processes” (Katzan, 2009, p. 40).

2.4. Service System Interactions

Service system interactions take place between entities. They are defined by the processes involved in the mobilization, exchange, and integration of resources through competence. Barile and Polese (2010) distinguish value cocreation interactions and governance interactions. Value cocreation interactions generally involve a set of processes, either formal or informal, that define the nature of the exchange and establish the prerequisites for value cocreation (Sandström, Edvardsson, Kristensson, & Magnusson 2008). These prerequisites are established by the provider and communicated through a value proposition. The parties exchange something characterized as applied specialized resources (skills and knowledge; Vargo, Lusch, & Morgan, 2006).

Following a cocreation interaction the value realized by a customer is highly dependent on their perception of the service provided in addition to previously established expectations (Katzan, 2008b). Some believe that, in order to understand customer value, one must also consider phenomena related to customer process or activities as they interact with service offerings (Woodruff & Flint, 2006). In addition to customer value, it is also important to consider stakeholder value and value-creating networks in service systems (Mele & Polese, 2011).

In contrast, governance interactions refer to the system interactions that take place as a means to ensure the system is efficient and viable (Barile & Polese, 2010). They may exist to ensure compliance to internal or external policies or regulations, to continuously seek opportunities for growth and innovation, or to serve as a dispute resolution (Spohrer, Anderson, et al., 2008). Governance interactions involve entities, generally
characterize organizations as service systems. Lyons and Tracy

2.5. Outcomes

Service is accomplished through the interaction of entities that seek value cocreation outcomes (Spohrer, Anderson, et al., 2008). Spohrer, Anderson, et al. (2008) propose a basic model for understanding service system outcomes called the interact-serve-propose-agree-realize (ISPAR) model, which identifies 10 possible outcomes: 1) value is realized, 2) the proposal (value proposition) is not understood, 3) the proposal is not agreed to, 4) value is not realized and disputes do not arise, 5) disputes are resolved in a manner that is OK for all stakeholders, 6) disputes are resolved in manner that is not OK for all stakeholders, 7) an interaction is not a service interaction and is welcomed, 8) an unwelcomed nonservice interaction is not criminal, 9) an unwelcomed nonservice interaction is criminal and justice results, 10) an unwelcome nonservice interaction is criminal and justice does not result. Spohrer, Anderson, et al. (2008) argue that the 10 scenarios encompass all the possible outcomes that may result from a service interaction.

2.6. Stakeholders

Stakeholder types typically include shareholders, employees, customers, suppliers, lenders, and society. In service science, the stakeholder concept is seen as a perspective rather than an entity such that a service system entity can maintain multiple stakeholder perspectives (Maglio & Spohrer, 2009). There tend to be four dominant stakeholder perspectives that resonate throughout the service science literature: customer, provider, authority, and competitor (Barile & Polese, 2010).

2.7. Measures

Measures can be viewed as a type of shared information that is exchanged for the purpose of value cocreation, or they can be viewed as part of a governance mechanism. Spohrer, Anderson, et al. (2008) state that there are four primary types of measures: quality, productivity, compliance, and sustainable innovation, and each measure relates to one of the four dominant stakeholder perspectives (customer, provider, authority, and competitor). In their view, quality is evaluated by customers, productivity is evaluated by providers, compliance is evaluated by authorities, and sustainable innovation is evaluated by competitors (Spohrer, Anderson, et al., 2008). They argue that without competitive forces there is often very little motivation or incentive to pursue innovative strategies.

2.8. Networks

Networks play a critical role in value cocreation within and across service systems. Networks are formed through the exchange that takes place between entities that are connected through value propositions (Spohrer, Anderson, et al., 2008). Furthermore, these networks can exist exclusively within a given service system, or they can transcend the system boundaries to connect external entities and resources. Mele and Polese (2011) argue that interactions between service systems create a social network and a technological network that form the basis for a value-creating network that brings increases in stakeholder value. Hsu (2009) believes that service science and network science are interdependent. He asserts that the scientific tools and methods that have been developed in network science can be applied in ways that reveal a great deal about the nature of service systems and the strategies and design requirements needed to optimize them.

2.9. Ecology

The concept of ecology is more characteristic of a group of service systems. Spohrer, Anderson, et al. (2008, p. 9) describe ecology as encompassing the full universe of service system entities and is “characterized both by the diversity of types of service system entities and their relative numbers.” Overall the ecology is composed of the total “population of all types of service system entities” within a service system as well as their relationships and networks (Spohrer & Maglio, 2009). One issue identified as relevant to service system ecologies is the question of how to coordinate and assign prices to offerings in service ecologies (van Dinther, Blau, Conte, & Weinhardt, 2011).

3. THE SERVICE SYSTEM FRAMEWORK

Based on the concepts presented above, a framework to describe an abstract service system was developed (see Figure 1). To apply this abstract framework to a specific organization, we designed a corresponding interview questionnaire (Appendix) that can be posed to people within that organization. In the next section, we demonstrate how the framework and questionnaire
was used to characterize an academic library as a service system.

### 3.1. Applying the Framework to an Academic Library

Using the service system framework and questionnaire, we interviewed two senior library administrators to produce a description of an academic library as a service system. It is important to define the boundaries of the given service system. The library is situated within one faculty in the university and connects to the larger university library system. Organizationally, it exists within the faculty’s Information Services (IS) department, which provides IT services in addition to library services. We define the service system boundary to include services of the library but not those of the IT portion of the IS department. Table 1 provides a high-level characterization of the library as a service system. It is not exhaustive but gives a sense of how the service system concepts apply to the library. Specific and unique aspects of the academic library are further highlighted below.

#### 3.1.1. Resources

In addition to technology, people, and shared information resources, our application of the framework revealed that a key library resource is space and the configuration of that space to support service interactions, including the way the desks and computers are placed in the library and the positioning of individual and group study spaces. Virtual space available on IT servers is also a resource of the library. Furthermore, application of our framework indicated that the differentiation between conceptual and physical resources in the library can be blurred. Collection items are part of the physical resources, but the conceptual ideas within the books are also considered valuable resources.

#### 3.1.2. Access Rights

Some resources in the library service system do not neatly fit into the service system categories of owned, leased, shared, or privileged access but instead are considered open access. Furthermore, part of a value proposition the library has with its stakeholders and...
TABLE 1. Characterization of an Academic Library as a Service System

<table>
<thead>
<tr>
<th>Concepts</th>
<th>Academic Library</th>
</tr>
</thead>
</table>
| Resources | Physical: staff, students, faculty members, space, books/collections, classrooms, desks, computers, shelves  
Conceptual: website, digital content, information (library staff are also information resources), reference  
knowledge, ideas, catalogs, policies  
Measures: feedback from clients (survey), usage statistics |
| Access rights | Open access material, owned (furniture, equipment, books, some policies), leased (equipment, loaned books), shared access (objects in partner libraries, some policies), privileged access (material made available for students in a class) |
| Entities | Principal: the faculty in which the library exists  
Producer: publishers, e-resource providers, library staff  
Provider: university library, faculty members, university  
Clients: faculty members, students, staff, alumni, wider community  
Object: courses materials, research project results |
| Stakeholders | Customer: students, faculty members, community (alumni, employers)  
Provider: the library, faculty members, university, university library, publishers, database providers, library associations  
Authority: faculty members, university, university library, committee, associations  
Competitor: other universities, libraries for staff and students, other groups for budget and space, other libraries for users  
Change driven by client feedback, change in curriculum, change in research direction of faculty members, library associations’ policies, faculty/university priorities |
| Interactions | Value cocreation interactions: reference service interactions, course support, instructional service interactions, IT support service interactions, research support, use of space, equipment, collection  
Governance interactions: staff contracts, providers of materials, other libraries, the faculty and the university, producing front desk schedule, collecting stats for library associations and internal use |
| Networks | Internal: staff, faculty members, students, classes, faculty, university  
External: universities, external libraries, library associations |
| Outcomes | Value realized: ideas, conversations, projects, prototypes, use of space, items borrowed, workshops  
Information resources: course resources, knowledge in papers  
Usage statistics are produced and provided to the university library and to library associations |
| Ecology | Taking a holistic approach; providing a learning environment so that ideas and practices can be developed |

clients is that they are responsible for the ways in which resources are accessed according to copyright and ownership laws. The library plays a stewardship role for certain kinds of collection resources.

3.1.3. Interactions

Another unique feature identified by applying our framework is the way in which students (clients) interact with staff through what would be deemed governance interactions in service system literature. Students working on a paper or project come up with service innovations and ideas that can be implemented in the library then interact with staff make those improvements. We also discovered that service interactions in the library primarily take place face-to-face; however, value is sometimes not realized until later when students make use of knowledge gained through those interactions in writing their papers.

3.1.4. Outcomes

We discovered that in a library setting, knowledge is an outcome that often results from a service interaction. Clients can bring information and make use of library resources (staff, information, technology) to cocreate knowledge outcomes.

4. CONCLUSIONS AND FUTURE WORK

In this article, we presented a framework and corresponding interview guide for characterizing an organization as a service system. Our service system
framework was developed from an examination of service science literature. This contrasts others that have been adapted from existing frameworks for use with service systems (Alter, 2008; Ostrom, 2011). Table 2 compares our framework with two other frameworks according to several criteria.

Strengths of our framework include the fact that it identifies variables and relationships among the variables that are specific to service science concepts rather than trying to define service systems according to sets of variables and frameworks that were identified for other purposes. As such, our service system framework can be used to characterize classes of service systems and can be applied to nontraditional, understudied service systems such as nonprofit and public sector service systems. The main weakness of our framework is that it has not been thoroughly tested and applied in a broad set of contexts. Future work includes applying the framework to multiple organizations and classes of organizations, further developing the framework and creating additional tools that can facilitate the collection of information about organizations.

As a first step, we demonstrated how our framework can be applied to an academic library and produced a characterization of the library as a service system. This characterization can be used to help stakeholders better understand the library’s service capabilities. Furthermore, the unique features of the library that were identified can be used to broaden existing service system definitions.

ACKNOWLEDGMENTS

We wish to thank G. Parrish for early contributions to the background research. Anonymous referee comments greatly improved the presentation and content of this paper. Funding was provided by a Canadian National Sciences and Engineering Research Council Discovery Grant.

APPENDIX

INTERVIEW GUIDE

Letters in square brackets correspond to top levels of the Framework in Figure 1:

Q1[A] Describe your service system in your own words. Q2[A,F,H] List and describe the various service offerings found within your system. Q3[C,B] List the types of resources that may be found within your service system, and for each, indicate whether it is operant or operand, conceptual or physical, generated internally or externally, and whether it is owned outright, leased outright, shared or privileged access. Q4[A] Describe dynamic aspects of your service system. In what ways does your service system evolve? What forces, entities, or features of your service system enable or constrain evolutionary change. Q5[A] In what directions do you think your service system will go in the future? Do you see their service system growing and providing services to a greater number of people or organizations? If so, what plans are in place to reach this goal? Q6[E,I] What policies, practices, or measures are in place to explore opportunities for innovative or transformative growth? Q7[D,G] Describe the organizational structure(s) that their service system works within. Q8[E] Describe stakeholders and discuss stakeholder perspectives in your service system. Q9[D,E] Discuss competition in the context of your organization. Can individuals opt for a different
service provider or simply choose not to use your organization? How has competition altered your service model, if at all. Q10 [C] Discuss any legal constraints of your service system. Q11 [E,H] Are any material goods produced in the context of their service systems and if so, how do these material goods fit in to the exchange of services? Q12 [F] Describe the key service processes and interactions in your service system. Q13 [E,H] Discuss the forms of exchange that take place in those interactions. Q14 [G] Describe what kinds of systems have been acquired or created to facilitate the exchange. Are they IT systems? Are there other kinds of systems that are connected to your service system, internally and externally. What values or benefits define these connections? How is this value judged? Are there costs or risks associated with these connections? Q16 [C,E,F,H] Consider how value is judged in your service system and the possible frames of reference for judging that value. Consider in what other ways the people or organizations involved in your service system define value. In what ways is value cocreated by more than one service system or entity. Q17 [D,E] Indicate which kinds of service interactions currently exist within your system: B2B, B2C, B2G, G2C, G2G, C2C. Q18 [E,G,I] Based on the kinds of service interactions identified in the previous question, describe which organizational, business, or governmental entities your organization cooperates with and how this fits within your overall service model. Q19 Did the above questions make sense? Was it clear what was meant by a service system? Suggest any changes to interview questions.

References


