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Seeking Synergies between Four Views of Service in the IS Field

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ABSTRACT

The term *service* appears in IS in contexts ranging from visible business activities performed for customers through invisible computerized responses to computerized requests deep within IT infrastructures. After distinguishing between rigorous definitions of service and treatment of service as an analytical lens, this paper presents a framework that distinguishes between four lenses for understanding and analyzing services and systems in the IS field. Each lens is directly applicable to many situations, and less applicable elsewhere. This paper summarizes each lens and identifies potential synergies between pairs of lenses. The synergies may help in using secondary lenses to support analyses guided by a primary lens. The range of lenses helps in understanding the range of meanings of service in IS.

Keywords

Service, service system, work system, work system framework, service value chain framework.

SCOPE OF SERVICE INTERESTS IN THE IS FIELD

An editorial in *Information Systems Research*, (Rai and Sambamurthy, 2006) notes research and teaching implications of the widely recognized trend toward a service economy. The context includes efforts by IBM and other technology companies to develop a science of services (Chesbrough and Spohrer, 2006) and degree programs in SSME (service science, manufacturing, and engineering). Their interest is motivated by the increasing economic importance of services, plus the fact that over 50% of the revenue of software companies and almost 40% of the revenue of IT hardware companies come from services. (Wood, 2007) AIS members formed

This paper's goals include comparing different lenses for thinking about services and identifying synergies between those lenses, thereby providing a new direction for describing, analyzing, and designing services and systems. The importance of these goals is clear from the experience of forming an AIS SIG for services at ICIS 2007. Interests of members included such a broad range of topics that it was unclear whether these interests had any meaningful commonality other than the word *service*. The topics included the impact of IT on service economies, human-intensive services for people and organizations, services provided by IT organizations, software as a service, service oriented architecture (SOA), and services computing. Recognition and comparison of different lenses for services would help bring this area into focus.

DEFINING SERVICE

Researchers in marketing, operations, and computer science have discussed and analyzed services from vastly different viewpoints. Although recognizing that "a common definition has not emerged within or across fields," Rai and Sambamurthy (2006) say "there is reasonable triangulation on what services are." ... "in general, the definitions emphasize a simultaneous or near-simultaneous exchange of production and consumption, transformation in the experience and value that customers receive from engagement with providers, and intangibility in that goods are not exchanged."

Their "reasonable triangulation" is open to question because many service situations fit neither their triangulation nor definitions that they cite, which are the first four in Table 1. Consider a contractor repairing a home's damaged foundation. Contrary to the triangulation, production of this service occurs over weeks, whereas consumption may occur over a century. Also, customer value is most directly related to a tangible thing rather than an experience. Similar examples may have motivated Vargo and Lusch (2004b) to argue that four prototypical characteristics often believed to distinguish services from goods – intangibility, inseparability, heterogeneity, and perishability – "(a) do not distinguish services from goods, (b) only have meaning from a manufacturing perspective, and (c) imply inappropriate normative strategies."

Service by people or machines? Defining services in IS adds another wrinkle because services provided by people differ substantially from services provided by computers. Researchers and practitioners in marketing and operations typically assume that services involve human service providers and human service consumers who may use IT while performing or receiving the service. The quality of interactions between service providers and service consumers is often viewed as the essence of service. Accordingly, the provider's thoughtfulness and ability to recognize and respond to the consumer's stated or unstated needs, interests, and concerns is essential for service quality.

Services are "the application of specialized competences (knowledge and skills) through deeds, processes, and performances for the benefit of another entity of the entity itself." (Vargo and Lusch, 2004a).

A service is a change in the condition of a person, or a good belonging to some economic entity, brought about as a result of some other economic entity, with the approval of the first person or economic entity (Hill 1977).

A service is a provider-client interaction that creates and captures value (IBM Research 2004).

A service is a time-perishable, intangible experience performed for a customer acting in the role of a coproducer (Fitzsimmons and Fitzsimmons 2006).

A service is any act or performance that one party can offer to another that is essentially intangible and does not result in the ownership of anything. (Kotler and Keller, 2006)

An article called "Foundations and Implications of a Proposed Unified Services Theory" found one unique characteristic of service: "with service processes, the customer provides significant inputs into the production process." (Sampson and Froehle, 2006)

Table 1: Typical Definitions of Service

In contrast, computer scientists view service in relation to client-server computing, whereby client entities pose unambiguous requests to server entities, which produce unambiguous responses. Client and server process interact through definable IT-based interfaces. Neither can discern unstated needs, interests, concerns, or methods of the other. Statements in *IBM Systems Journal* illustrate this paradigm:

A service "is generally implemented as a course-grained, discoverable software entity that exists as a single instance and interacts with applications and other services through a loosely coupled (often asynchronous), message-based communication model." (Brown et al, 2005)

"The component that consumes business services offered by another business component is oblivious to how the provider created the business service." (Cherbakov et al, 2005)

IS researchers have approached services from both directions. Research about service organizations, service products, the service economy, and customer service mostly concern services involving human providers and human consumers. Even IT-based services such as Internet service provision and online auctions are often viewed as having human providers who provide technical capabilities used by human customers. Current interest in ITIL and COBIT is about managing and controlling IT services provided by IT groups for business organizations. In contrast, other IS research concerns technical and conceptual underpinnings of service-oriented architectures. (e.g., Zhao et al (2007))

Defining service or treating service as analytical viewpoint. Consider two possible approaches to ongoing difficulty in defining services: 1) Continue seeking razor-sharp distinctions between services and non-services. 2) Adopt a simple, dictionary-like definition and treat service as a viewpoint whose connotations and associations are valuable. Economists trying to characterize economies need razor-sharp distinctions between product and service. In contrast, IS practitioners have little need to differentiate between product and service when describing, evaluating, and improving IT applications. For them, service is a mindset whose connotations and associations provide dimensions for evaluation and improvement. The many dimensions of service such as degree of customization, responsiveness to customer needs, and extensiveness of service interactions are important because the goal in using IT is to satisfy customers and perform work efficiently.

Vargo and Lusch (2004a) argue that the distinction between products and services is secondary in marketing as well. One of eight propositions in their “service-dominant logic” (contrasted with “goods-dominant logic” underlying traditional economic thought) is that “goods are distribution mechanisms for service provision.” This idea is consistent with spirit of Levitt’s observation that people who buy quarter inch drills actually want quarter inch holes, whereby the primary issue is customer value regardless of whether it is delivered through goods or services. (Christensen et al, 2005)

Definition of service. We adopt a simple, dictionary-like definition by which the following are all services: performing surgery, installing networks, producing customized software, providing Internet-based search capabilities, accepting orders through an ecommerce web site, building houses, producing televisions, providing leisure opportunities on golf courses, performing legal work, and selling groceries.

Services are acts performed for someone else, including the provision of resources that someone else will use.

This definition covers special cases such as self-service and automated services for people. In self-service, service providers provide resources that are used by customers performing self-service activities. In automated services for people, machines perform the service activities.

In the realm of services computing *another entity* replaces *someone else*.

Services are acts performed by one entity for another, including the provision of resources that another entity will use.

FOUR LENSES FOR UNDERSTANDING SYSTEMIC ACTIVITIES RELATED TO SERVICES

The breadth of service-related interests in IS raises an awkward question about whether these areas actually have any genuine commonality of content or language other than the word *service*, the relevance of IT, and the attention of researchers associated with IS.

This paper uses a 2x2 framework (Figure 1) to explore complementarities between different lenses for understanding and analyzing service in the IS field. The term *lens* is used because each approach in Figure 1 brings a variety of concepts, methods, and connotations. The dimensions in Figure 1 are system emphasis versus service emphasis and sociotechnical versus primarily technical. The first dimension represents differences between thinking of service situations starting from system concepts versus starting from service concepts. Sociotechnical versus primarily technical refers to whether the analysis focuses largely on human actors and activities versus technology and automated activities.

The icons in Figure 1 correspond with four service-related lenses for understanding and analyzing systematic activities in organizations:

- IT-reliant work systems
- Co-creation of value
- Outputs of IT-based tools
- Services computing.

Each lens will be summarized independently. Subsequent sections identify complementarities and synergies between the lenses. Synergy between lens A and lens B exists when applying lens A augments an analysis of systemic activities guided primarily by lens B. The individual lenses and pairwise combinations provide rich and potentially useful approaches for thinking about services in the IS field.

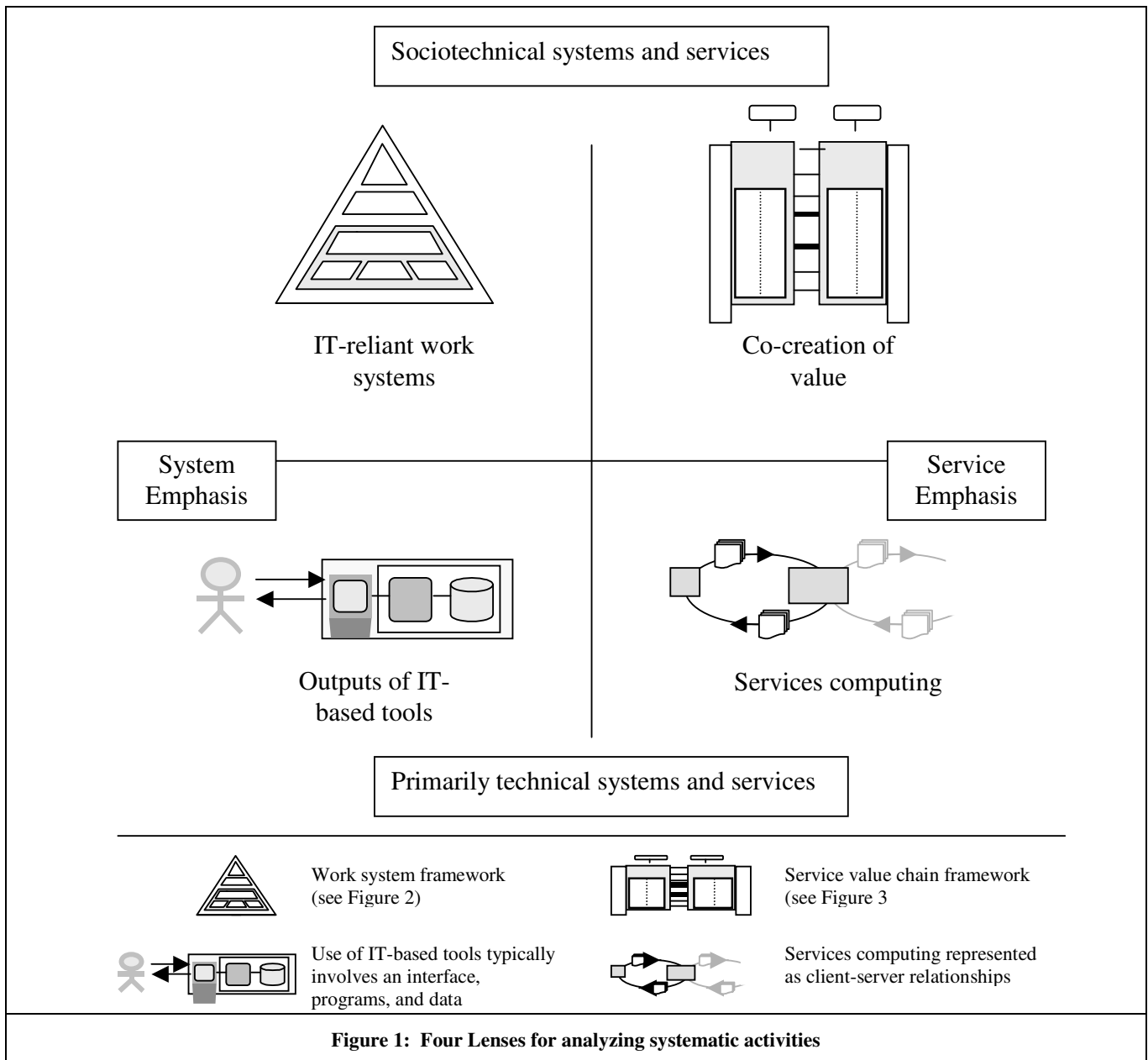
LENS #1: IT-RELIANT WORK SYSTEMS

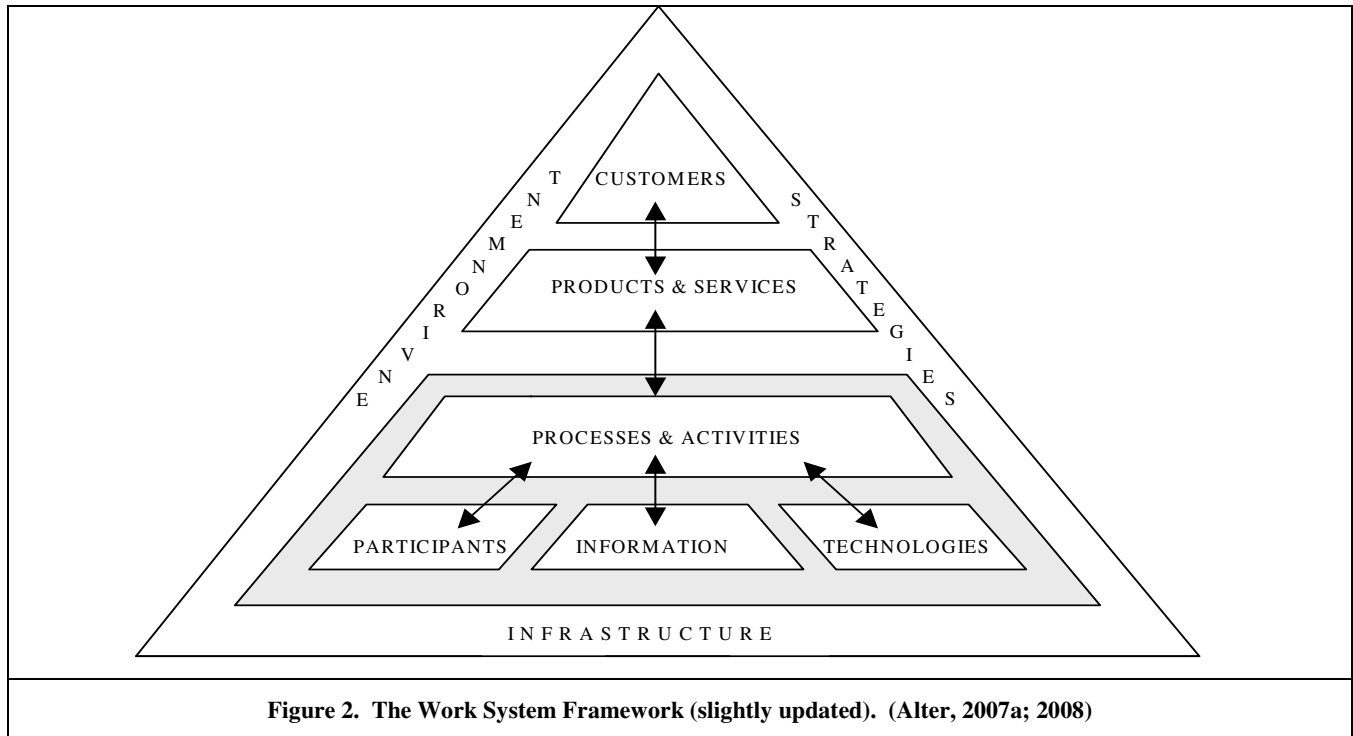
IT-reliant work systems are sociotechnical systems in which human participants and/or machines perform work using information, technology, and other resources to produce products and services for internal or external customers. (Alter, 2003, 2006, 2008). The triangular icon in the upper left of Figure 1 represents the work system framework, which emphasizes business rather than IT concerns and was developed to help business professionals recognize and understand IT-reliant systems in organizations. That framework (Figure 2) identifies nine elements included in even a rudimentary understanding

of a work system. Almost all significant sociotechnical systems in today’s business world are IT-reliant and therefore fall within the scope of the IS field.

The work system framework organizes a large number of concepts related to each of its elements and to work systems as a whole. Those concepts can be combined in many ways for describing, analyzing, and designing systems in organizations. For example, a system’s design involves big picture design choices such degree of structure, level of integration, complexity, rhythm of operation, and treatment of exceptions and errors. (Alter, 2006) Typical systems analysis texts say little or nothing about big picture design choices such as those, in effect assuming that big picture design choices are either irrelevant or relatively obvious to analysts, designers, and their clients.

The use of lens #1 is an organized approach for thinking about services as sociotechnical systems that produce services, defined previously as acts performed for someone else, including the provision of resources that someone else will use. Conversely, all work systems, even those that produce physical things, can be viewed as service systems because they perform processes and activities for others.

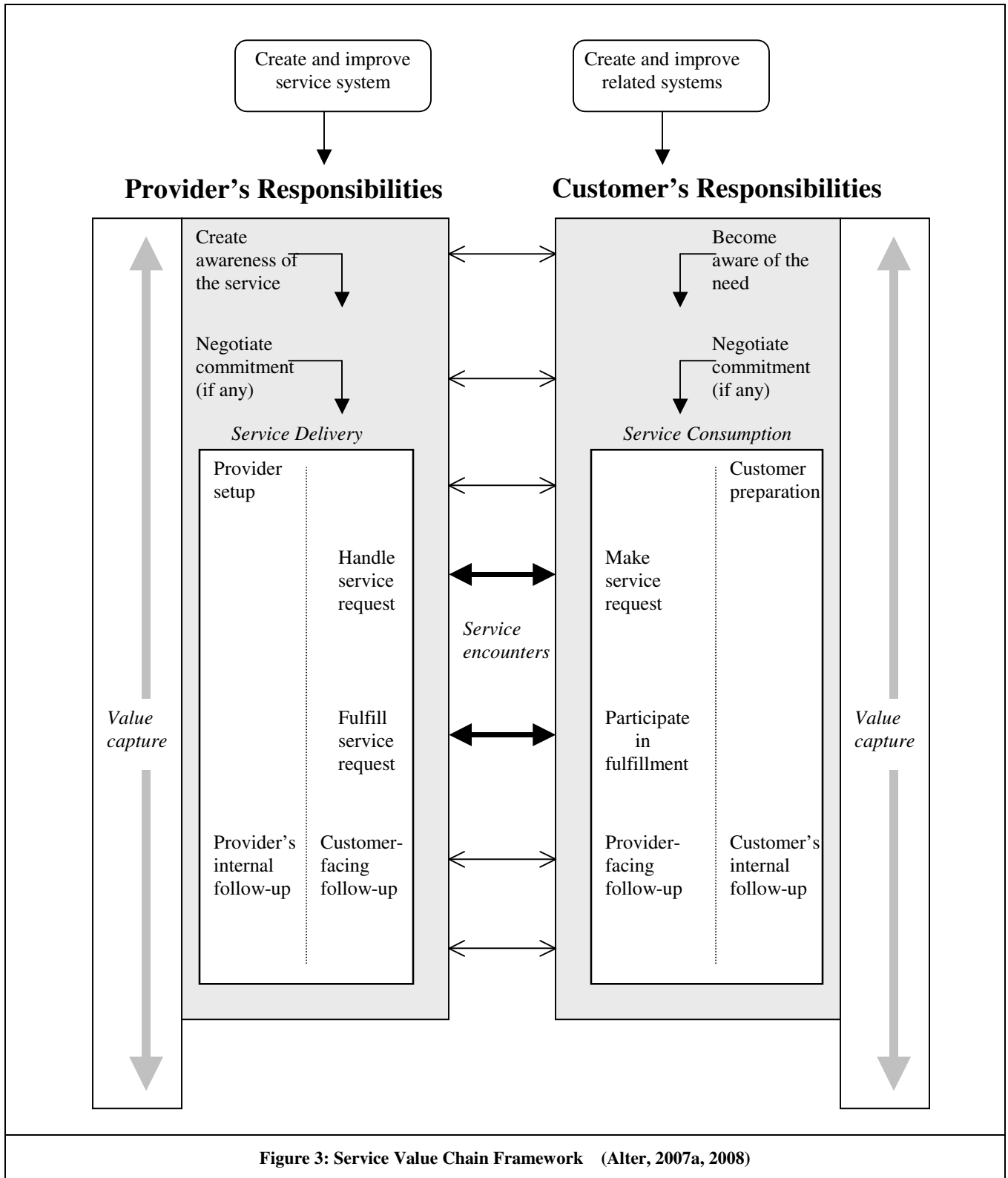




LENS #2: CO-CREATION OF VALUE

The icon in the upper right of Figure 1 represents the service value chain framework (Figure 3), whose two columns represent co-creation of value by human service providers and service consumers. This framework is a generic value chain model that highlights components of services. Its motivation and terminology were discussed in Alter (2007a, 2008). Its form and content incorporate ideas often associated with services, such as:

- **Co-creation of value.** Services involve activities and responsibilities of both service providers and service customers.
- **Internal and external customers.** Basic ideas about services are largely the same regardless of whether services are directed at external or internal customers.
- **Customer experience.** The entire experience of acquiring, receiving, and benefiting from service affects customer satisfaction.
- **Beyond fulfilling a request.** Although fulfillment of service requests is typically viewed as the core of services, activities related to awareness, negotiation, setup, handling of the request, and follow-up impact service quality and satisfaction.
- **Negotiated commitments.** Many service situations involve service delivery based on negotiated commitments under which the service may be requested and delivered repeatedly.
- **Preparation.** Preparation by providers and/or customers prior to instances of service delivery is often essential for service efficiency and effectiveness.
- **Service request.** Each instance of service delivery may include explicit or implicit service requests. Handling of these requests is part of service delivery and often affects customer satisfaction.
- **Front-stage and back-stage.** Services often involve front-stage and back-stage activities by both providers and customers.
- **Follow-up.** Some services require follow-up by providers and/or customers. Follow-up may be related to a single service instance (Was the installation OK?) or to multiple service instances (How responsive is your account manager?).
- **Value capture.** Both customers and providers experience benefits and perceived value as the service is negotiated and produced, and sometimes later.



LENS #3: OUTPUTS OF IT-BASED TOOLS

IT-based tools are technical entities that produce services by responding to user requests. The icon in the lower left of Figure 1 represents a user issuing a command through a user interface and receiving a response. In addition to a user interface, such tools often contain or link to databases.

With Lens #3, the systems of interest are technical tools, and using the system is equivalent to using the tool. (Alter, 2004) Although most systems analysis textbooks mention organizational, personal, and competitive issues, most emphasize a version of lens #3 by focusing primarily on building computerized artifacts that satisfy user requirements. For example, the systems analysis textbook by Dennis et al (2002, pp. 5) says, “The analysis phase answers the questions of who will use the system, what the system will do, and where and when it will be used.” One would not typically speak of using an IT-reliant work system in the same sense.

“Use of IT-based tools” is a dominant metaphor in the IS field. The IS field searches for the determinants of IT usage (e.g., the technology acceptance model (TAM)) and the impacts of IT usage on people, organizations, and business performance. The controversy surrounding “IT Doesn’t Matter” (Carr, 2003) is closely related because its basic argument concerns whether IT investment generates better business results.

LENS #4: SERVICES COMPUTING

Services computing is organized and described around client programs or devices that request services from server programs or devices. The requests and responses are formal messages. The icon for services computing in Figure 1 starts with a request sent from the client to the server, which may request information from other devices in the background. Eventually the server provides the requested data or confirms that the request was carried out (as in printing).

Service-oriented architecture (SOA) applies services computing as a programming architecture that builds applications from software services that are self-contained and are unaware of the context or state of other services. The message-based loose coupling between services facilitates building software systems from software modules that convert defined inputs into defined outputs used by other modules that may have been programmed at different times for different purposes. Often touted as promoting organizational flexibility, SOA facilitates the use of legacy software in conjunction with newer software developed according to current programming practices.

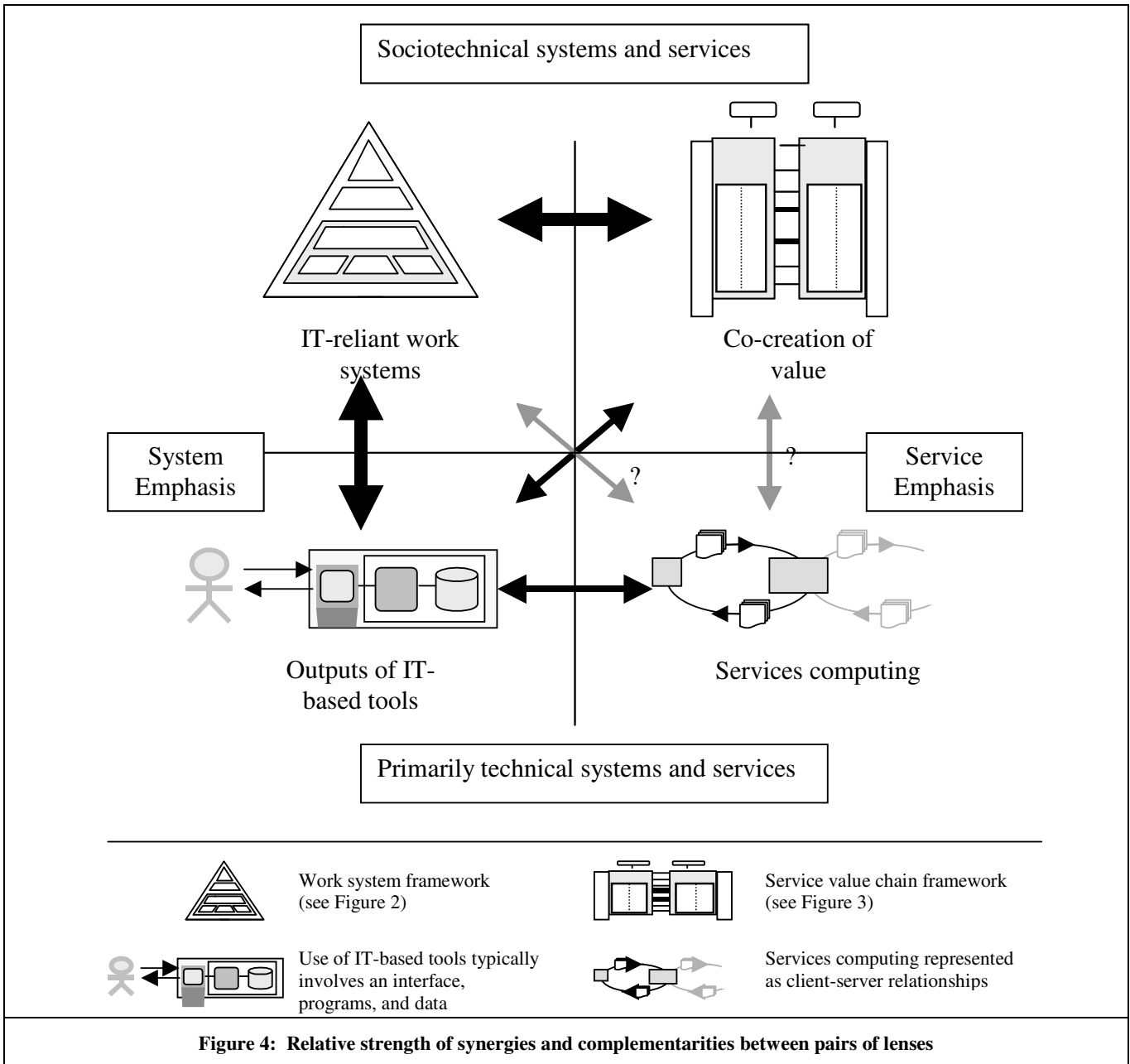
The structure of lens #4 superficially resembles lens #2. For example, Figure 1 in zur Muehlen et al (2005), which concerns web services choreography standards, represents inter-organizational process integration as occurring through messages (analogous to service interactions) between two organizations (analogous to provider and consumer), each having both private and public processes (back-stage and front-stage). Despite the structural similarity, lenses #2 and #4 differ substantially in context and terminology. For example, a description of IBM’s “business architecture for a service-oriented enterprise” (Nayak et al, 2007) refers to services being “exposed” through a catalog, “discovered” by searching a catalog, and invoked (automatically) only if a service agreement exists. Typical business professionals would not use such terms to describe service provision by human providers for human customers.

SYNERGIES AND COMPLEMENTARITIES BETWEEN THE LENSES

Each of the four lenses is valuable in many situations, and each has layers that cannot be mentioned in this brief paper. Where sociotechnical issues are important, service analysts and researchers should use variants on lenses #1 and #2. Where the primary issues concern is the operation of IT-based tools or development of software, the two primarily technical lenses are more relevant.

The richness of each approach can provide value beyond simply serving as the primary lens for an analysis. It is worth considering whether each might be applied for additional perspective and insight when any of the others guides an analysis.

The arrows between pairs of lenses in Figure 4 show that strong complementarities and synergies between the two sociotechnical lenses and between the two system-oriented lenses are readily apparent. Synergies between two other pairs seem possible but have less potential. Synergies between the other two pairs seem questionable.



SYNERGIES BETWEEN THE SOCIOTECHNICAL LENSES

Lens #1, IT-reliant work systems, notes that work systems produce products and services but says nothing specific about service. Lens #2, co-creation of value, focuses on generic processes related to services, service interactions, back-stage and front-stage, and value capture, thereby reflecting typical situations in which service providers negotiate and provide services for service consumers. It makes no explicit reference to most of the elements of a work system.

Using lens #1 to complement lens #2 by thinking of a service process as an IT-reliant work system brings a wealth of concepts and analysis tools. Thinking about participants, information, technology, processes and activities, and environment typically raises many important issues for understanding any service situation. The secondary layers beneath the work system framework provide many additional ideas that may be useful, such as work system principles, different types of work system changes, work system metrics, risk factors, stumbling blocks, and analysis techniques related to work systems. (Alter, 2006)

Implicitly or explicitly, discussions of services often address customer-centricity, which can be increased or decreased through decisions related to various work system elements. For example, a work system's customer-centricity might be increased by customizing the products and services it produces, by changing its processes to accentuate co-creation, and by using customer information more effectively. (Alter, 2007b)

Conversely, concepts in lens #2 provide ways to augment lens #1. First, focusing on value co-creation raises the issue of whether an analysis based on lens #1 tends to emphasize a service provider's view and deemphasize the consumer or customer's activities and responsibilities. The generic service steps in lens #2 are a reminder that topics such as negotiation, preparation, requests, and follow up might be overlooked accidentally. However, if customer responsibilities are unimportant in the analysis, emphasizing co-creation could increase complexity unnecessarily.

Articulation between the lenses can occur at different levels. For example, the entire service value chain for a particular service might be viewed and analyzed as a single work system. Alternatively, different subsystems in Figure 3 (such as provider or customer preparation) might be analyzed as separate work systems.

SYNERGY BETWEEN SYSTEM-ORIENTED LENSES

Lenses #1 and #3 both take a system viewpoint. With lens #1, the system is an IT-reliant work system. With lens #3, the system is a tool whose outputs are conveyed through a user interface. With lens #1, people and/or machines in the system do the work. With lens #3, people called users use systems as tools.

The synergy between these two lenses is based on topics that the other tends to deemphasize. Users of lens #1 focus more on how work system participants perform activities, while deemphasizing issues related to user interfaces, tool capabilities, and tool structure. Use of lens #3 makes it more likely that tool issues will be addressed. The potential value of using lens #3 in conjunction with lens #1 increases when more of the work is done by machines rather than people. With the trend toward automated business processes and automated decision-making, a lens that emphasizes the use of IT-based tools becomes more valuable. In totally automated work systems, machines do all of the work and participants move to the infrastructure that supports the work system. Concepts and methods related to the other work system elements remain relevant, however.

In the opposite direction, the core of current practice in systems analysis seems to assume that the goal is to build precisely specified software-based tools. Explicit inclusion of work system ideas from lens #1 potentially enriches the analysis and helps in understanding that better tools address only part of work system problems, which often involve issues such as inappropriate processes, inadequate information, inadequate training and knowledge, and inadequate attention to customers.

POSSIBLE SYNERGY BETWEEN PRIMARILY TECHNICAL LENSES

Lenses #3 and #4 both assume that entities (users or programs, respectively) use an interface to make requests to server entities that perform a set of functions and provide a response. These lenses are sufficiently similar that they may lack interesting complementarities other than the human user in #3 versus the machine client in #4. Clarification of the content of the lenses and links between them is a worthwhile challenge for future work.

POSSIBLE SYNERGY BETWEEN CO-CREATION OF VALUE AND OUTPUTS OF IT-BASED TOOLS

The co-creation of value (lens #2) often involves the use of IT-based tools (lens #3). Consequently, the analysis of a service value chain, even when the human participants are not included, may lead to useful insights about which tools and tool characteristics are likely to be effective or ineffective. Similar issues would emerge in more depth, however, if the steps related to value co-creation are viewed as IT-reliant work systems rather than steps that happen to use IT. Use of lens #3 rather than #1 in conjunction with #2 would tend to omit many concepts and issues that would emerge if lens #1 were applied instead.

LACK OF SYNERGY BETWEEN VALUE CO-CREATION AND SERVICES COMPUTING

Although value co-creation and services computing are both on the services side of Figure 1, thinking of services delivered by people in terms of services computing adds little or no insight. The services computing view assumes that software services are loosely coupled, that they respond only to rigorously defined requests in particular formats, and that the client and server are mutually unaware of each other's state. In contrast, the sociotechnical view emphasizes the quality of service interactions between people, the importance of empathy, and the importance of understanding customer status and needs. A

sociotechnical analysis based on value co-creation typically pays scant attention to the internal structure of software that supports various steps.

LACK OF SYNERGY BETWEEN IT-RELIANT WORK SYSTEMS AND SERVICES COMPUTING

The relationship between lenses #1 and #4 seems even weaker. Lens #1 incorporates the richness and variability of human activity. Lens #4 is based on the predictability inherent in providing rigorously specified requests and automatically producing rigorously specified responses.

CONCLUSIONS

Applicability to services in the IS field. Each of the lenses is relevant to many types of services in the IS field, as illustrated with two examples:

Software as a service (SaaS) can be approached from all four viewpoints:

- as an IT-reliant work system in which the customer's staff performs its work using software hosted by the vendor
- as value co-creation involving the vendor and its customer
- as a situation involving services provided as outputs of IT-based tools
- as a situation in which services computing is used (or not used) in the architecture of the SaaS offering.

Similarly, ITIL and COBIT can be understood:

- as a number of IT-reliant work systems that produce services
- as numerous instances of value co-creation involving an IT group and the organization being served
- as a number of situations involving services provided at least partly as outputs of IT-based tools
- as a number of situations in which services computing is used (or not used) for providing desired IT services.

Relevance to these and other service-related topics in the IS field implies that exploration of synergies and complementarities between different service-related lenses has potential value.

Limitations. Many points in this paper were stated briefly due to the word limit. Nonetheless, several limitations would be apparent even with fuller explanations. First, four specific lenses were presented. Other lenses might have generated different observations. In addition, the two primarily technical lenses are less clear than the two sociotechnical lenses, which were articulated clearly in previously published frameworks. As is apparent from examples such as Umaphy and Puro (2007), the current terminology of services computing is in flux, as is the relationship between services computing and IT-based tools that people use. Fuller articulation of ideas in both areas would make it possible to explain and contrast lenses #3 and #4 more clearly. It is possible that the clarifications could develop from ongoing research about applying speech act theory, e.g., Dietz (2007), which is also based on formal requests and responses.

Next steps. This paper's introduction to synergies and complementarities between four lenses for understanding and analyzing services is the core of a larger analysis of the structure of the IS field. Beyond the scope of this paper are parts of a larger framework that includes and extends Figure 1. Above the two sociotechnical lenses are additional lenses related to entire organizations, different types of value creation (e.g., Stabell and Fjeldstad (1998)), the competitive structure of industries (e.g., Porter (1985)), and the structure of economic exchange (e.g., Vargo and Lusch, 2004a). Below the two primarily technical lenses are additional lenses related to software suites and service-oriented architectures, enterprises, and infrastructures that could span regions, nations, or the entire globe.

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