12-15-2019

A Systems Perspective on IS User Satisfaction in Digitalized Organizations: Conclusions from Five Case Studies

Sven Laumer
Friedrich-Alexander-Universität, sven.laumer@fau.de

Steven Alter
University of San Francisco, alter@usfca.edu

Christian Maier
University of Bamberg, christian.maier@uni-bamberg.de

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Completed Research Paper

Sven Laumer
Friedrich-Alexander-Universität
Erlangen-Nürnberg
sven.laumer@fau.de

Steven Alter
University of San Francisco
alter@usfca.edu

Christian Maier
University of Bamberg
christian.maier@uni-bamberg.de

Abstract

We present a systems perspective on IS user satisfaction that is more appropriate in digitalized organizations than prominent streams of user satisfaction research from several decades ago that focused largely on voluntary, individual use of IT. We developed this perspective by analyzing five case studies commissioned by managers facing user satisfaction issues in important ISs. Direct quotations from recorded transcripts of 111 interviews from the cases illustrated that IS user satisfaction issues involved much more than the IS itself. Both qualitative and quantitative analysis of the interview data led to the conclusion that IS user satisfaction was formed as work system participants fulfilled responsibilities within work systems that produced product/services for internal and/or external customers. The information systems were integral parts of those work systems. IS users tended to evaluate an IS in relation to the extent to which it helped them perform their work activities and fulfill their responsibilities.

Keywords: User satisfaction, work system theory, technology acceptance, digitalized organization

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Need for a Holistic Approach

An important internal IS at a software vendor encountered serious, long-standing user satisfaction issues despite using widely accepted technology to store and distribute company-generated product information. Widespread user dissatisfaction almost led the organization to terminate the IS. That dissatisfaction could not be explained by variables such as system (technology) quality, information quality, ease-of-use, or usefulness that are highlighted in mainstream user satisfaction and post-adoption research (e.g. Bhattacherjee 2001; DeLone and McLean 2003; Goodhue and Thompson 1995; Rogers 1995; Venkatesh et al. 2003). Management commissioned our case study to produce actionable recommendations, especially since lower satisfaction is linked to lower performance (DeLone and McLean 2003) and higher employee turnover (Maier et al. 2013). We used work system theory (WST, Alter 2013) to analyze 31 recorded interviews. The problem we identified centered on internal coherence and alignment of the entire IT-reliant work system for collecting, storing, and distributing product information. Management recognized the need for a holistic, systemic approach. Adoption of our WST-based recommendations began an improvement path that continued to succeed several years later.

In a similar way we conducted in total five case studies. Analysis of recorded interviews from the five case studies (15, 34, 21, 31, and 10 in the respective settings) showed that the most prominent user satisfaction and post-adoption models ignore many important issues and interactions that practitioners in all five settings associated with IS user satisfaction. We address that limitation of the existing literature by providing a holistic view of IS user satisfaction in digitalized organizations, i.e., organizations in which IT-reliant information systems perform essential functions whose efficiency and effectiveness have direct impacts on the efficiency, effectiveness, and economic success of the organization.

Calls for alternative theoretical approaches. We present our findings at a time when publications in major IS journals are calling for alternatives to the types of variance perspectives that have dominated user satisfaction and post-adoption technology acceptance research for decades. Grover and Lyytinen (2015) discuss limitations of the IS field's dominant "mid-range script" that leads to producing minor variations on theories such as TAM (Davis 1989) and UTAUT (Venkatesh et al. 2003). Among other points, they propose "*permitting IS scholarship that more fluidly accommodates alternative forms of knowledge production.*" (p. 271). In related critiques, Liu et al. 2017; Palvia et al. 2015; Stein et al. 2017 describe a troubling convergence rather than expansion in IS research. Concluding a 5-article dialogue about systems theories in IS, Demetis and Lee (2017, p. 164) say, "*The reality is that the field of information systems as a whole has never seriously entertained systems theory in the first place. We have noted a few individual exceptions like Checkland (2000) and Alter (2001), but there has existed no overall body of literature indicating a systems movement in the field of information systems to which they or others have contributed.*" Along similar lines, Burton-Jones et al. (2015) say, "*Our field's forefathers were systems theorists*" ... "*the systems perspective should be a natural fit for IS because of our interest in systems.*" ... "*but its influence dissipated in the late 1980s as researchers began to focus mainly on the variance perspective.*" That article proposes ways to combine aspects of variance, process, and systems approaches as an antidote for an unnecessary and unproductive tendency toward isolation of different research perspectives. A similar proposal in Ortiz de Guinea and Webster (2017) calls for combining research perspectives through different types of hybrids of variance and process approaches in IS research.

A systems perspective on IS user satisfaction. This paper's explanation and justification of a systems perspective on IS user satisfaction extends the existing body of user satisfaction research. Our

analysis pursues the following research question, which emphasizes the types of situations that are increasingly frequent and increasingly important as business becomes more digitalized:

> *RQ: Identify the determinants of IS user satisfaction for information systems that support work systems in organizational settings.*

We pursued that RQ by analyzing five case studies and assuming that IS user satisfaction is an individual level variable based on accumulated personal perceptions (positive, neutral, and/or negative) of experiences with an IS in the context of performing work in organizations.

Organization. The next section provides background clarifying basic concepts related to different approaches to theory (variance, process and systems), WST's work system framework, and prominent streams of research related to user satisfaction. The methodology section explains the coding and analysis of recorded quotations related to user satisfaction of IS users interviewed in five case studies. The presentation of qualitative results is limited to selected quotations illustrating the kinds of issues that practitioners in five digitalized settings associated with IS user satisfaction. A quantitative analysis of coded interview data focuses on the percentage of interviews in each case in which quotations related to positive or negative impacts on IS user satisfaction could be associated directly with elements of the work system framework or its internal fit relationships. The evidence supports a new systems perspective on IS user satisfaction that can help researchers and practitioners visualize and understand key issues.

Background and Literature Review

IS research has focused for decades on topics related to IS user satisfaction. Despite initial concerns about the conceptual consistency and strength of the construct (Melone 1990), the IS user satisfaction construct has become more theoretically grounded, more consistently defined, and more reliably measured (Vaezi et al. 2016). Important products of that body of research include various models and factors related to IS user satisfaction (Ives et al. 1983; Wixom and Todd 2005) as determinants of IS success (DeLone and McLean 1992, 2003; Petter et al. 2008, 2012, 2013). Early formal definitions of IS user satisfaction focused on meanings of "satisfaction" in terms of "needs" and "fulfilment of needs" (Melone 1990), consistent with dictionary definitions such as "fulfilment of one's wishes, expectations, or needs, or the pleasure derived from this". Researchers have moved from that type of definition toward focusing on user experiences and the evaluation of performance as key to satisfaction (Vaezi et al. 2016).

This background section covers three topics: 1) Differences between variance, process, and systems perspectives, 2) the work system perspective, 3) research related to IS user satisfaction. Proceeding in that order allows it to conclude by using a work system perspective to illustrate inherent limitations in traditional approaches used in research related to IS user satisfaction.

Variance, Process, and Systems Perspectives

Almost all of the literature uses either variance or process perspectives to analyze IS user satisfaction.

A variance perspective. Variance-oriented research focuses on correlations between independent and dependent variables in the form of quantitative measures that represent properties of specific entities (e.g. "system quality"). Researchers assume continuity of effect based on assumptions that relationships between the variables are unidirectional and constant (Burton-Jones et al. 2015). Research using a variance perspective tends to define user satisfaction as "a multidimensional attitude towards various aspects of the IS" (Raymond 1985 as cited by Vaezi et al. 2016, p. 504) and views satisfaction as emotional summary judgment as an outcome of use (Oliver 2014; Vaezi et al. 2016). Such research typically focuses on factors such as information, service, or system quality (DeLone and McLean 1992, 2003; Wixom and Todd 2005). Vaezi et al. (2016) provide an overview of the factors discussed in the literature.

A process perspective. A process-oriented perspective on user satisfaction emphasizes sequences of events within a system (Boudreau and Robey 2005; Burton-Jones et al. 2015). This type of research focus on how user satisfaction is formed (Vaezi et al. 2016), i.e., the evaluative process that leads to the satisfaction outcome (Bhattacherjee 2001; Lankton and McKnight 2012). Research has identified

expectations and expectations-disconfirmations processes (Bhattacherjee 2001) and appraisal processes (Beaudry and Pinsonneault 2005; Stein et al. 2015; (Tarafdar et al. 2019); (Maier et al. 2019)) that can lead to a satisfaction response.

Absence of a systems perspective. Little IS research has attempted to determine how IS user satisfaction is related to work experiences as a whole (Vaezi et al. 2016). Instead of a systems perspective, most prior research has adopted a "tool-thinking" approach (Alter 2004) to IS user satisfaction by focusing mainly on use and properties of the IS as though an IS is a tool. Speaking of IS research in general, Demetis and Lee (2017, pp. 164-165) say, "*Apart from the few individual exceptions …, the term "systems" in information systems has been an empty honorific, where the phrase "information systems" is largely interchangeable with "information technology" or even just "the computer"* In contrast, this paper will apply a systems perspective on IS user satisfaction.

The general idea of systems perspectives derives from a conviction that the world consists of wholes and interacting parts, not just entities, properties, and events (Bertalanffy 1972; Boulding 1956). "*A systems perspective focuses on wholes, parts, and emergent properties that arise from interactions among parts.*" (Burton-Jones et al. 2015, p. 668). Systems are assumed to exist within other systems and within surrounding environments that affect them. The definition of *system* is elusive. Skyttner (2005) mentions various ideas from systems theorists and concludes, "t*o qualify for the name system, two conditions apart from organization have to be present: continuity of identity and goal directedness.*" (p. 59). A system is not something presented to an observer; rather, it is something to be recognized by an observer. Different observers might perceive different systems in the same situation (Skyttner 2005).

Effective use of systems approaches combines holism with attention to components and their interactions. Compared to a variance or process perspective, a systems perspective enables an understanding how sub-wholes are affected by the whole or vice versa, and whether the relationship between sub-wholes are affected by the embedding whole. It therefore provides an alternative to process and variance perspectives for understanding whether relationships among sub-wholes are affected by the whole itself and how the interactions of sub-wholes shape a phenomenon of interest. It also enables understanding of whether the emergence of a phenomenon hinges on properties of the system as a whole (Burton-Jones et al. 2015).

A Work System Perspective

A system-oriented definition of IS is a first step toward a systems perspective on IS user satisfaction. Our system-oriented definition of IS is based on WST, which can be viewed as a specialization of general systems theory (GST, Boulding 1956; Skyttner 2005) that focuses on WSs in organizations rather than on systems in general. WST consists of three components (Alter 2013): the definition of work system, the work system framework (Figure 1), and the work system life cycle model. Our empirical findings and our new systems perspective on IS user satisfaction are explained based on the first two of the three components of WST. WST is the basis of various versions of the work system method (WSM), a systems analysis method designed to support the needs of business professionals (Alter 2006). WST reflects a systems perspective and defines IS as a special case of a WS.

Definition and nature of work systems. A WS is a system in which human participants and/or machines perform work (processes and activities) using information, technology, and other resources to produce specific product/services for internal or external customers. WSs operate within an external environment that matters, rely on shared human, technical, and informational infrastructures, and may or may not be guided by explicit strategies. An organization can be described as a set of WSs whose operation and interactions maintain the organization and produce its product/services. The concept of WS is a general case whose many special cases including ISs, service systems, supply chains, projects, and totally automated WSs. For example, an IS is a WS most of whose activities are devoted to capturing, storing, retrieving, transmitting, manipulating, and/or displaying information.

This paper focuses on user satisfaction for ISs that support sociotechnical WSs through which businesses operate. Such WSs contain human participants who perform activities within the WS. Activities performed by specific WS participants may or may not use an IS that supports the WS.

Explicitly defining a WS as a system points to an important distinction, especially in a field where "*it is no exaggeration to describe most IS researchers as having used the term 'system' or 'systems' to refer to just about anything that involves electronic information processing*" (Lee 2010, p. 339). WST uses the

term *technology* to refer to technical artifacts that are used by users and that may or may not be treated as systems. For example, a hammer is a technology that is not a system whereas a laptop computer is a technology that can be viewed as a system because it produces outputs by performing data processing activities. It is not helpful to refer to laptops as systems when analyzing WSs and ISs because laptops are being used as tools in those instances. This type of distinction is important because most user satisfaction research and much of the IS discipline seems to treat the term *system* as a synonym of *technology* and often seems to assume that ISs are technologies rather than sociotechnical systems with human participants.

Finally, there are different possible relationships between WSs and ISs that support those WSs. In many instances, the operation of an IS is totally separate from the operation of a WS that it supports. For example, a sales order entry system may produce delivery orders that are accessed and used by an entirely separate delivery WS owned by a different company. In many other instances, the IS is an integral part of the WS that it supports, as happened in one of our five cases involving an IS used for managing, updating, and tracking financial transactions in a banking WS. In the first instance, user satisfaction resembles satisfaction with a technical artifact that is used, such as an automobile or laptop. In the second, it is more like satisfaction with an integral part of a system, such as a company's satisfaction with its own sociotechnical systems. Our case study analysis focuses on five examples of the second type.
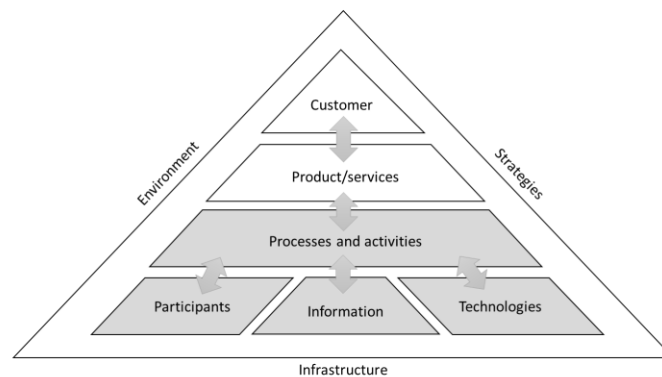

Figure 1. Work system framework (Alter, 2013)

Work system framework. WST's work system framework in Figure 1 identifies nine elements of a basic management understanding of a WS. A basic understanding includes knowledge about the WS's internal and external customers, the product/services it produces and the environment within which the WS operates (such as organizational culture, competitive situation, and regulations). Each of the nine elements is associated with one of following three general categories that will be applied in our analysis:

- **Customer-focused concerns**. Customers and product/services may be partially inside and partially outside because customers often participate in activities within the WS (e.g., in service situations) and because product/services take shape within the work system.
- **Internal operational concerns**. Four core elements of the WS framework, processes and activities, participants, information, and technologies, are usually viewed as within the WS.
- **Contextual concerns**. Environment, infrastructure, and strategies are viewed as largely outside the WS but often have effects within the WS. Environment is the organizational, cultural, political, competitive, technical and regulatory milieu within which it operates. Infrastructure includes human, information, and technical resources shared with other WSs. Strategies include relevant organization, business ecosystem, department, and WS strategies.

The two-headed arrows inside the framework represent the importance of fit between specific pairs of elements. For example, one of those arrows says that participants should be appropriate for processes and activities and vice versa. In a broader sense, fit between participants and processes and activities makes it easier to support the overarching goals of the WS. Four of the five fit relationships in the WS framework link to *processes and activities*. In contrast, there are no arrows between information and participant or between technology and participant even though some participants may not understand certain information or may not like certain technology. The assumed centrality of *processes and activities* implies

that fit between technology and processes and activities is usually more important than fit between technology and participants, particularly when structured processes and activities dictate mandatory usage.

The WS framework's 9 elements and the 5 fit relationships denoted by arrows provide 14 categories (Table 1) that we used for categorizing quotations related to IS user satisfaction. Each quotation that was related to IS user satisfaction in the 111 interviews was assigned to one of the 14 categories, thereby providing a straightforward basis for a quantitative analysis of the implications of our interview data. Table 2 will show how the same categories can be used to visualize the focus of three major streams of research.

Related to one of the six core elements of the work system framework	Related to internal fit between pairs of elements in the work system framework	Related to one of the three contextual elements of the work system framework
1) Customer (for customers of the work system system)	7) Fit between customers and product/services	12) Fit with environment
2) Product/services	8) Fit between product/services and processes and activities	13) Fit with strategy
3) Processes and activities		14) Fit with infrastructure
4) Participants	9) Fit between participants and processes and activities	
5) Information	10) Fit between information and processes and activities	
6) Technologies	11) Fit between technology and processes and activities	

Table 1. 14 WST categories used for classifying quotations related to IS user satisfaction

Technology Acceptance, Post-Adoption, and User Satisfaction Research

A great deal of IS research has addressed the broad and highly significant realm of technology acceptance and user satisfaction. Published results of many hundreds of research projects in that realm have been summarized and analyzed by literature review articles such as Furneaux 2012; Petter et al. 2012; Tojib et al. 2008; Williams et al. 2009. Those review articles generally focus on one or another of the most established streams of research in this realm: post-adoption technology acceptance, user satisfaction, and task-technology fit. Table 2 shows the main independent and dependent variables in each research stream along with one or two seminal references. It uses dark shading to highlight the parts of the WS framework that are emphasized in each research stream.

Technology acceptance and post-adoption research. One of the most cited models is the technology acceptance model (TAM) (Davis 1989; Davis et al. 1989), which uses two variables, perceived usefulness and ease of use, to explain technology acceptance in terms of intention to use and use behavior. Various extensions of TAM (see e.g. Venkatesh and Davis 2000) led to the unified theory of acceptance and use of technology (UTAUT, Venkatesh et al. 2003). UTAUT says that effort expectancy, performance expectancy, social influence, and facilitating conditions influence intention to use and use, and further that the strength of these effects is influenced by individual characteristics such as age, gender, and experience. Both TAM and UTAUT apply the initial adoption of a technology. Post-acceptance models such as Bhattacherjee (2001) expectation-confirmation model extend this research stream by adapting expectation-confirmation theory and treating post-adoption acceptance in terms of continuance of use. User satisfaction is based on experiences and the (dis)confirmation of initial beliefs such as ease of use or usefulness. This research stream typically treats user satisfaction, the confirmation of initial expectations, and habitual use as the main determinants of continued IT use (Bhattacherjee and Lin 2014). Table 2 notes how this research stream focuses on the technology (ease of use, usefulness, effort expectancy, performance expectancy), participants (age, gender, experiences) and the environment (social influence, facilitating conditions).

IS success and user satisfaction research. Another widely cited stream of research, focuses on IS success and user satisfaction. A prominent example is the original (DeLone and McLean 1992) and updated (DeLone and McLean 2003) versions of the IS success model, which treats system quality (technical quality of the IS) and information quality as factors contributing to user satisfaction, which in

turn contributes to individual and organizational impact. In the time since publication of the 1992 IS success model, practical issues related to user satisfaction shifted away from willingness to use an IS and toward whether an IS could be implemented efficiently and would genuinely support work systems (Petter et al. 2012). These developments were noted by Delone and McLean (2003) in a revision of the IS success model that added service quality (which WST would treat as quality of IT-related infrastructure) and treated the dependent variable as net benefits. Around a decade later, Petter et al. (2012) discussed the emphasis on technology and technology stakeholders (technical personnel, system advocates) in much of the research to that time. Petter et al. (2012) call for more research on informational aspects of an IS, new adaptive research processes, models for measuring user satisfaction and IS success, and practical approaches for preventing silos in this research stream. Table 2 illustrates this research stream as focusing on the technology (system quality), information (information quality) and the infrastructure (service quality).
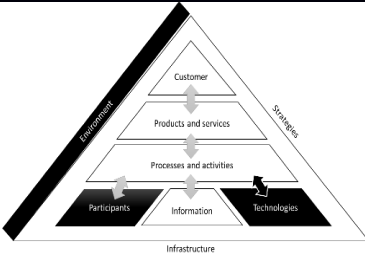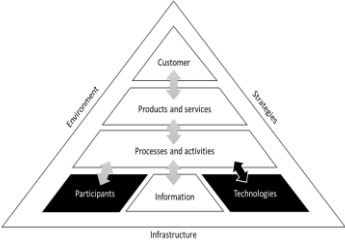
	Model	Independent variables	Dependent variables	Reference
	Post-adoption technology acceptance research Expectation-confirmation model	User satisfaction (Dis) confirmation, Expectation Beliefs, e.g., effort or performance expectancy Individual characteristics (Age, gender, experience)	Intention to use Use	(Bhattacherjee 2001; Davis 1989; Davis et al. 1989; Venkatesh et al. 2003)
	IS Success Model	Information quality System quality Service quality	User satisfaction Use Benefits	(DeLone and McLean 1992; Petter et al. 2013)
	Task-Technology-Fit Model	Technology characteristics Task characteristics Individual characteristics	Technology use User satisfaction Performance benefits	(Goodhue and Thompson 1995)

Table 2. Overview of Post-Adoption Acceptance and User Satisfaction Research

Task-technology fit. A third research stream on post-adoption phenomena treats task-technology fit as the central determinant of performance benefits and use. This theory says that IS use and performance benefits are attained when an IS is well-suited to the tasks that must be performed, where tasks are broadly defined as the "actions carried out by individuals in turning inputs into outputs" (Goodhue and Thompson 1995, p. 216) and the technologies are tools used by individuals. Task-technology fit is "*the degree to which a technology assists an individual performing his or her portfolio of tasks*" (p. 216). It operates at the intersection of task requirements, individual abilities, and the functionality of the technology. Although this research has been extended (Dishaw and Strong 1999; Furneaux 2012), the main focus is still on identifying task and technology characteristics that fit in different contexts such that performance benefits can be obtained. Table 2 portrays this research stream as focusing on technology (functionality of the technology), process-technology fit (task-technology fit) and participants (individual abilities).

A gap in the literature. Core topics in each research stream serve as a lens that focuses attention on certain issues. As noted by Burke (1984, p. 70), "a way of seeing is also a way of not seeing. A focus upon object A involves a neglect of object B." Table 2 illustrates that the three prominent research streams focus on important topics but tend to ignore many of the WST-related topics identified in Table 1. Many of our interviewees described those topics as quite important in relation to their perceptions of IS user satisfaction. Our research findings and conclusions provide a way to address that gap in the literature.

Methodology: A Multi-Case Study Approach

This section summarizes how we conducted five case studies undertaken with the simultaneous purpose of understanding more about IS user satisfaction and helping managers decide what to do about related problems. Our analysis follows the approach used by Lapointe and Rivard (2005) when they applied a new, multi-level perspective for the well-known user resistance phenomenon. This approach uses multiple case studies for data collection and within case as well as cross-case analysis for data analysis. We applied that approach for a similar purpose of understanding IS user satisfaction.

The case studies. We selected the five case studies to maximize variation (Lapointe and Rivard 2005). Table 3 summarizes the case studies. It notes similarities and variations related to four characteristics: context, the WS supported by the IS, the type of IS, and the status of the IS (in routine use or recently implemented). In terms of similarities, three sites were financial service providers (Laumer et al. 2017), two had selected the same financial and banking IS, and two others had implemented a similar type of system (enterprise content management (Laumer et al. 2013)). In terms of variations, we looked at three different types of IS (financial and banking, enterprise content management, e-recruiting (Eckhardt et al. 2014; Laumer et al. 2015)) in different types of organizations (financial service provider, automotive supplier, IT service provider) with a focus on different WS (Laumer et al. 2016). The case studies were performed between from 2009 to 2016 by two or three researchers that each included one or more of this paper's co-authors.

For internal validity, direct observation, documentation, and interviews served as three sources of evidence (Dubé and Paré 2003; Lapointe and Rivard 2005). At least one of us spent several days at each site observing how each IS was used. Documentation, minutes from committee meetings, memorandums, and letters were analyzed. Data gathered from these sources was used to corroborate, validate, and complement the interview data, which is the main source of data collected in each case study.

The interviews. Each lasted between one and three hours. The five cases involved 21, 15, 34, 10, and 31 interviews, respectively, for a total of 111 interviews. Interviews began with a generic question that allowed the respondents to express how they experienced the use of the IS that they had been using or that was being implemented. To dig deeper, we asked for the major positive and negative experiences related to each IS. Our main focus was to elicit user satisfaction narratives describing how respondents had significant positive or negative experiences with using the IS. Our questionnaire contained questions such as "What are your most important positive and negative experiences with using the IS?" Follow-up questions tried to identify how and why those experiences occurred and what were employees' behavioral responses as their experiences unfolded. We tried to establish links between reported IS user satisfaction issues and outcome results. By using this technique and by asking more specific questions, we tried to identify narratives of IS user satisfaction to ensure that the focus of each case was on similar aspects and that we are able to conduct a cross-case analysis (Lapointe and Rivard 2005). In each case, we ended our data collection when we saw that only redundant aspects were identified in subsequent interviews and that additional interviews would not provide new insights (Lapointe and Rivard 2005). We produced and coded complete transcripts using Microsoft Word and MaxQDA for each interview.

Case, context, year	Work systems	Information systems	Status	Inter-views
Case A: Automotive supplier 2009	The work system for recruiting new hires. This includes defining job specifications, attracting candidates, handling applications, organizing interviews, and making hiring decisions	E-Recruiting IS - provide web-based forms for applicants to produce and submit applications - collect scheduling and evaluation information related to applicants - make applicant information available where needed	Newly imple-mented	21
Case B: Financial service provider 2010	Different work systems (incl. sales, marketing, product management, management, etc.) related to investment and credit advice services, payment transaction services or other financial services to the customer	Financial and banking information system: - Controls and records transactions - Provides access to customer information through an interface	Newly imple-mented	15
Case C: Financial service provider 2012	Different work systems (incl. sales, marketing, product management, management, etc.) related to investment and credit advice services, payment transaction services or other financial services to the customer	Organization content management system - Repository of information related to the firm's financial product/services - Provides access to the information through an interface	Used for ten years	34
Case D: Financial service provider 2013	Different work systems (incl. sales, marketing, product management, management, etc.) related to investment and credit advice services, payment transaction services or other financial services to the customer	Financial and banking information system: - Controls and records transactions - Provides access to customer information through an interface	Newly imple-mented	10
Case E: IT-Service provider and software vendor 2015/2016	The work systems (incl. software development, sales, marketing, customer service, product management, management, etc.) related to the deployment of new software releases	Organization content management system - Repository of information related to the firms's software product/services - Provides access to the information through an interface	Used for two years	31

Table 3. Case study overview

Data analysis. Both the case studies and the interview guidelines were designed to follow an explorative approach to identify IS user satisfaction issues. The data analysis started when the first case study was conducted in 2009 (Case A). Within that case study we applied an initial coding approach that allowed for identifying issues related to user satisfaction, related causes, and the individual responses. This initial coding identified statements in the transcripts related to IS user satisfaction. We used an open and iterative process (Eisenhardt 1989; Lapointe and Rivard 2005; Sarker et al. 2013; Sarker et al. 2018a, 2018b) to identify different categories of user satisfaction narratives. These indicate that user satisfaction is shaped by the relationship between the IS and WS (see results section), which inspired us to think about a systems perspective on IS user satisfaction. We elaborated further on this perspective in the other cases studies, where we used an open and iterative process, thereby building on both the data and our initial idea about the relationship between the IS and the WS (Lapointe and Rivard 2005; Sarker et al. 2013). We added new categories when narratives emerged that were not represented adequately by a previously existing code. New narratives that emerged in each case study were added to the list of categories, and those were further elaborated in the follow-up case studies. In this step, two researchers coded the interviews in parallel immediately after each case study was concluded. We compared their coding results, merged similar categories, and discussed divergences for each case. We produced a name and description for each category based on the results.

After we conducted the five case studies, we reanalyzed each case study using the codes we derived and the idea of relationships between IS and WS. We also considered user priorities implied by a systems perspective that we started to recognize after the first case study and that was further elaborated in the case studies that followed (see section 2) (Lapointe and Rivard 2005; Sarker et al. 2018a, 2018b; Yin

2009). We categorized the quotations related to user satisfaction based on categories derived in the initial coding step. Researchers who did not code the interviews in the first step coded the interviews using an axial and selective coding approach (Lapointe and Rivard 2005; Yin 2009) based on categories derived in the first step. Intercoder reliability was 0.89. Each quotation related to user satisfaction was classified as related to one of 14 aspects of the WS framework in Table 1 or was categorized as not related to any of those aspects.

Consistent with the process used by Lapointe and Rivard (2005), the resulting data was analyzed in two stages. First, we performed a within-case analysis. We summarized each interview using a WS snapshot (a central analysis tool in the work system method (Alter, 2006, 2013)) to identify each interviewee's narratives for the WS that the interviewee participated in that were supported by the IS. We aggregated these narratives to produce segments of narratives that describe phenomena found in several interviews in each case study. This clarified the nature of the IS user satisfaction narratives in each case study. As noted by Lapointe and Rivard (2005) this process applies data reduction and presentation techniques that help in understanding each interview and each case study as a base for the cross-case analysis.

Second, we conducted a cross-case analysis to identify common patterns of the different narratives identified the five case studies. As a first step in applying analytic induction (Lapointe and Rivard (2005)) we compared and contrasted the different narratives of each case study to identify patterns. Afterwards, we compared the five case studies in pairs to identify similarities and differences. To quantify the qualitative results, we used frequency counts to describe the presence of the 14 different work system aspects in Table 1 in each case study (i.e., the number of interviews in which an aspect was mentioned vs. total number of interviews). We use these numbers in the quantitative analysis to compare the case studies themselves and to compare the work system perspective with other theoretical approaches. The resulting chain of evidence (Lapointe and Rivard 2005) forms the basis for a general explanation for the five case studies.

Qualitative and Quantitative Results

Qualitative results. The qualitative results presented here are simply examples of interview quotations related to IS user satisfaction. (A cross-case analysis that identifies different narratives will appear in a longer journal paper.) Table 4 illustrates perceptions related to the efficiency and effectiveness in general. Tables 5, 6, and 7 organize perceptions using the three major categories in Table 1. Those tables illustrate many issues. Table 4 shows that work system participants evaluated the IS in relation to how well it helped them perform their work in an efficient and effective matter. User satisfaction increased when the IS supported users' responsibilities as a work system participants; it decreased when the IS did not contribute adequately to their efforts. Individuals in each case study mentioned at least one positive or negative observation related to support of product/services and customers (Table 5); internal operation (Table 6), and influence of the work system's environment (Table 7). A cross-case analysis (not presented here) provides a deeper view of the qualitative results by compiling and comparing case-specific narratives synthesized from related perceptions shared by multiple practitioners within specific cases.

Case	Quotations
Case A	*"The customer is used to me providing good service. Because of the new system, I now feel inferior because I can't process even simple requests. I have to tell the customer that I am not able to support him because a new system has been implemented. That is embarrassing."*
Case B	*"The information provided is not relevant for my task. It does not make it easier for me to decide which path to follow and to which department I should forward the customer request to."*
Case C	*"When an applicant wants to get a status update I just can look into the system and can provide this update within a few seconds. This is just one example, how the information provided makes it easier for us to work."*
Case D	*"I don't think that the information is appropriate for my tasks. I believe that support and technical employees can use them, but they are not appropriate for me as a sales person"*
Case E	*"One good thing about the new system is that it enables us to follow the processes specified by our administration. My work is now much easier and so I really like the new system."*

Table 4. Quotations related to user perceptions of how an IS does or does not contribute to an IS user's efficiency or effectiveness in performing work in a work system that it supports

Case	Quotations
Case A	*"We are used to providing good service quality. I was afraid that with all the changes and especially with the new system I would not provide good service quality anymore and I avoided using the system when interacting with the customer. That is really frustrating."*
Case B	*"If I relied solely on the ECM system, my service to the customer would be worse. The information provided does not support my daily work, so the quality of my service would be bad if I only worked with the ECM system."*
Case C	*"I believe that our service to candidates has improved. They can check the status of their application online. I like that this might reduce the number of applicants calling and asking for a status update."*
Case D	*"My service to the customer depends heavily on the information I use. When the information is incorrect, my service quality is poor. Therefore, I do not trust the SharePoint information and I am not satisfied with the SharePoint for that reason".*
Case E	*"I got the impression that customers were really happy when I could provide them information on the phone for which they had to wait a few days in the past. When I realize that my customers are happy, then I am also happy. This is the reason I like the new system."*

Table 5. Quotations related to whether and how an IS does or does not help an IS user generate product/services that satisfy the work system's customers

Case	Quotations
Case A	"I don't understand the logic of the new processes. I am dissatisfied by all these new rules that I have to follow. I simply do not like the new system and I want to work like I used to work in the past"
Case B	"Our technologies support our processes and activities well. There is only one exception, and that is the ECM system. I do not know how to use it effectively in my daily work. That is frustrating".
Case C	*"Long reaction times, I really mean the system, these response times, (…) until the windows open, (…) until I can open any applications, (…) all these attachments, until they open up, this is really extreme long. You make the clicks and then the hourglass is rotating and rotating and this is the moment where you think 'this could be a little bit faster now'".*
Case D	*"In my opinion, the major issue of the SharePoint is that we don't have defined processes so everybody knows how to search for information. Therefore, everybody, including me, is not satisfied with SharePoint, even though it is the lack of processes rather than SharePoint itself that is causing the challenges"*
Case E	*"Whenever I have to process a customer request, all information required is available. I do not have to call customers or any colleague to get all the information required. The information is simply provided by the system and that makes my job easier."*

Table 6. Quotations related to whether and how an IS does or does not help an IS user perform work related to the internal operation of the work system that the IS supports

Case	Quotations
Case A	*"We had so many changes in the past and the new system is the next one. I am really stressed by all these changes."*
Case B	*"Our strategy is to provide good service quality to our customers. From my point of view, the ECM system prevents us from realizing this strategic objective."*
Case C	*"We wanted to improve our employer image at the job market. I believe that was the reason management decided to implement the system."*
Case D	*"There are only two employees responsible for SharePoint. In addition, these two employees have a lot of additional responsibilities that prohibits them from spending enough time on it."*
Case E	*"We want to differentiate our services from other organizations by providing high quality service to our customers. I believe that the new system enables us to reach this goal."*

Table 7. Quotations related to better (or worse) fit of the IS with the work system's environment, infrastructure, and strategies

Quantitative results. Table 8 summarizes quantitative results based on the percentage of interviews for each case that mentioned issues related to each of the 14 categories in Table 1 (aspects of the WS framework). For example, customers were mentioned in 33% of the interviews in Case A and processes and activities were mentioned in 90% for Case D. Shading within Table 8 shows the 5 most frequently mentioned categories for each case. Some such as technologies were highlighted in Table 2, which does not highlight many other top 5 items for specific cases (e.g, customers for Cases B and E and processes

and activities for Cases A, C, and D). Those omissions exemplify issues that the widely used models in Table 2 would have missed entirely.

The prominence rating in the last column in Table 8 is the unweighted average across the cases (giving equal weight to cases with different numbers of interviews). Technologies was the most prominent category (87%). Processes and activities (68%) and information (65%) were second and third. Notice that perceptions of our 111 interviewees indicated that other topics had important impacts on IS user satisfaction. For example, slightly less prominent topics included fit between technology and processes and activities (64%), fit between technology and information (55%), infrastructure (51%), participants (50%), customers (48%), fit between customers and product/services (48%), environment (45%), and so on. Perhaps most remarkable, quotations from interviews of IS users fit into 69 of the 70 possibilities implied by 14 categories for 5 cases. The only omission was the 0% for environment in case D. A manager concerned about IS user satisfaction should not ignore any of the 14 categories.

Table 9 shows that an analysis based solely on the three prominent research streams in Table 2 would have found 23%, 30%, and 30% of the perceptions related to IS user satisfaction. Thus, analyzing IS user satisfaction based on prominent research streams would have missed many topics that real world IS users noticed and cared about.

Element or fit relationship within the WS framework	Case A (15)*	Case B (34) *	Case C (21) *	Case D (31) *	Case E (10) *	Prominence Rating **
Customer	33%***	50%****	43%	52%	60%	48%
Fit: customers and product/services	40%	56%	38%	48%	40%	45%
Product/services	13%	12%	14%	16%	10%	13%
Fit: product/ services and processes and activities	47%	21%	29%	45%	20%	32%
Processes and activities	100%	27%	91%	90%	30%	68%
Participants	67%	33%	62%	48%	40%	50%
Fit: participants and processes and activities	20%	15%	19%	42%	30%	25%
Information	20%	91%	52%	90%	70%	65%
Fit: information and processes and activities	13%	94%	38%	87%	40%	55%
Technologies	93%	88%	81%	84%	90%	87%
Fit : technology and processes and activities	87%	38%	71%	55%	70%	64%
Environment	73%	35%	43%	74%	0%	45%
Infrastructure	27%	15%	71%	65%	80%	51%
Strategies	53%	24%	33%	16%	20%	29%

Table 8. Percent interviews associated with specific elements or fit relationships

*   Number of interviews for each case
**   Prominence rating is the unweighted average of percentages for the cases. It is not weighted by the number of interviews in each case because the cases are assumed to be equally meaningful
***   All percentage entries are rounded to whole numbers for ease of viewing.
****   Shading identifies the five cells with the highest percentages in each column

Prominent research streams	Case A	Case B	Case C	Case D	Case E	Average of cell values across the five cases
	Sum of normalized values for each lens					
UTAUT/TAM/Continuance (four components)*	27%	22%	23%	18%	27%	23%
IS success model (three components)**	20%	**33%**	30%	**29%**	**40%**	30%
Task technology fit (three components)***	**36%**	27%	**31%**	23%	33%	30%

Table 9. Aggregated results organized by prominent streams of user satisfaction research

*   Items associated with the UTAUT/TAM stream include participants, technologies, fit between technology processes and activities, environment

** Items associated with the IS success model stream include information, technology, infrastructure

***   Items associated with the task-technology fit stream include technologies, fit between technology processes

and activities, participants

Figure 2 provides a graphical summary of Tables 8 and 9. The left column uses shading to show the relative prominence of the 14 aspects of the WS framework (Table 1) in the interviews in the five cases. The right column, copied from Table 1, shows the aspects of the WS framework that are emphasized by the three prominent research streams. The blank areas in those triangles represent the topics that practitioners in the five cases perceived as important but that those research streams would have ignored.

Case A   Case B

TAM/UTAUT/Continuance Research

Case C   Case D

IS Success Model
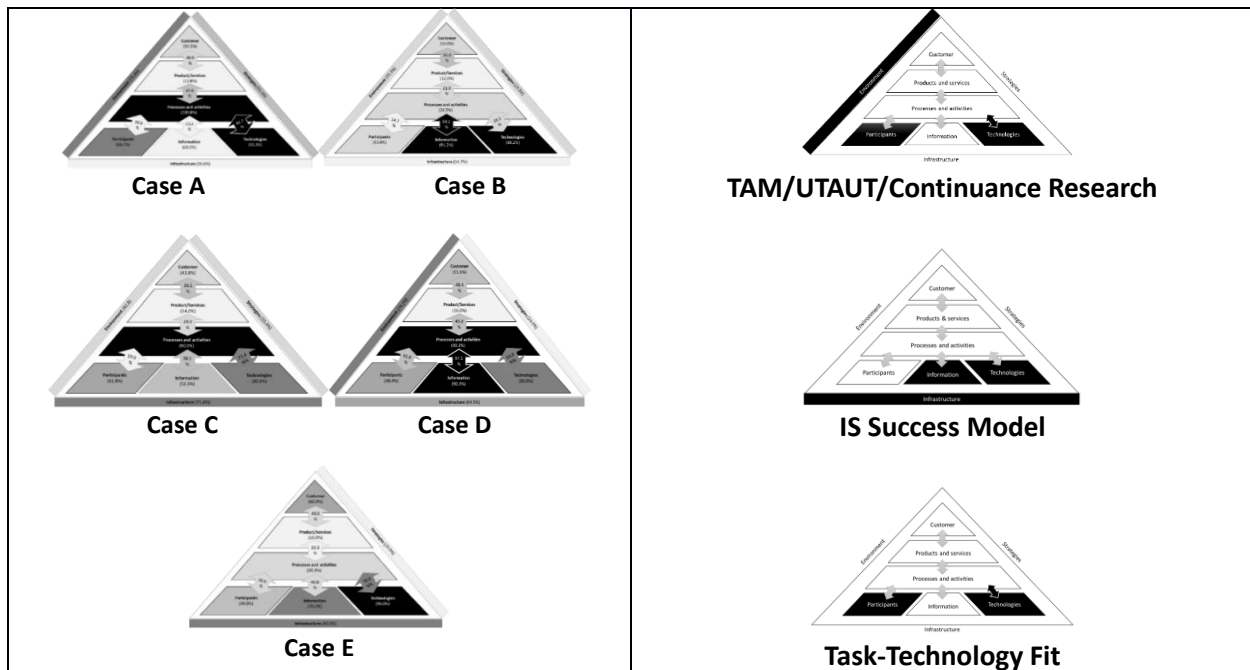
Case E

Task-Technology Fit

Figure 2. Comparing primary concerns of prominent research streams with relative prominence of 14 aspects of the work system framework in five case studies

Summary of qualitative and quantitative findings. The IS in all five case studies was essential for the WS that it supported. Removing the IS in all five cases would undermine or disable the WS. The interviewees were WS participants who evaluated the IS from the viewpoint of trying to execute responsibilities efficiently while serving the WS's customers effectively. Users often described satisfaction issues in relation to their ability (as WS participants, not just IS users) to perform work efficiently and effectively. IS usage was mandatory in the five cases, which occurred in highly digitalized organizations.

In all five cases, we viewed IS user satisfaction as is an individual level variable based on accumulated personal perceptions (positive, neutral, and/or negative) of experiences with an IS in the context of performing work in organizations. Most positive perceptions stemmed from ways in which the IS facilitated efficiency in performing work and effectiveness in serving the needs of WS customers. Most negative perceptions stemmed from disappointments about the contribution of the IS, including annoyances and pain-points related to inefficiencies, malfunctions, confusions, and/or beliefs that better IS capabilities or better fit with the WS would lead to better results. As a significant side note, some participants attributed WS shortcomings to the IS even though the IS did not seem to be the main cause of WS shortcomings.

A System Perspective on IS User Satisfaction

These results lead to a new systems perspective on IS user satisfaction that differs in content and approach from most of the theories and models in the three prominent research streams shown in Table 2 and Figure 2. The new systems perspective can be expressed using a summary statement and three corollaries.

> **Summary statement**. *The primary driver of user satisfaction for an IS that supports a WS is the degree to which the IS contributes to an individual user's efficiency in executing responsibilities within the WS and effectiveness in serving the WS's customers.*
>
> **Corollary 1 - Customer-focused concerns:** *Higher (or lower) perceived beneficial contribution of the IS to an individual user's effectiveness in serving the WS's customers is associated with higher (or lower) user satisfaction with the IS.*
>
> **Corollary 2 - Internal operational concerns.** *Higher (or lower) perceived beneficial contribution of the IS to an individual user's efficiency in executing responsibilities within the WS is associated with higher (or lower) user satisfaction with the IS.*
>
> ***Corollary 3 – Contextual concerns.*** *Better (or worse) perceived fit of the IS with a supported WS's environment, infrastructure, and strategies is associated with higher (or lower) user satisfaction with the IS if that fit affects an individual user's work performance.*

This summary of our results is easy to understand and use both in practice and in research. Someone analyzing and/or improving IS user satisfaction would evaluate how well the IS contributes to the efficiency of IS users in executing responsibilities within the WS and effectiveness in serving the work system's customers. The corollaries would provide directions for delving further. To go beyond the three corollaries, it would be simpler to use the work system framework and work system method directly instead of specifying 9 or 14 separate corollaries corresponding to the various aspects of the work system framework,

Discussion and Conclusions

Today's increasingly digitalized organizations, governmental entities, and business ecosystems operate through WSs that rely increasingly on carefully constructed ISs. Successful operation of those organizations requires mandatory participation in WSs and mandatory coordination through corporate ISs and databases even when some users have discretion about how they will perform their individual tasks or whether they will use personal devices for some tasks. Organizations whose structure requires coordination and consistency within or between internal units and with customers typically do not view usage of related ISs as voluntary regardless of personal perceptions or preferences related to ease of use, perceived usefulness, system (i.e., technology) quality, information quality, service quality, or other variables.

Even under those circumstances, it is widely recognized that many ISs and other WSs suffer from design flaws, inadequate support from other WSs, and many other problems. Our case studies revealed many positive and negative effects in which intended and unintended IS characteristics and other circumstances led to a wide range of positive and/or negative perceptions related to ISs whose usage was mandatory.

Main finding. The only single-factor causal relationship implied by our research is the summary statement above, which highlights the degree to which the IS contributes to an individual's efficiency in

executing responsibilities within the WS and effectiveness in serving the work system's customers. Seeing the main driver of IS user satisfaction as the perceived contribution to a user's success in performing work is consistent with all five case studies and responds directly to the call in Vaezi et al (2016) for identifying a single major factor that determines IS user satisfaction or IS success. The notion of perceived contribution includes both positive and negative factors. Positive perceptions stem from how an IS facilitates an individual's efficiency and effectiveness. Negative perceptions stem from disappointments in the contribution of the IS, including annoyances, pain-points, inefficiencies, malfunctions, confusions, and/or beliefs that the WS would be better if the IS had better capabilities or fit better with work practices.

Aggregating across users. IS user satisfaction is an individual-level variable. Aggregating across important users leads to a new form of the IS success model whereby the success of an IS that supports a specific WS can be evaluated based on the extent to which it supports the WS's efficient internal operation and effective production of product/services for its customers. That type of aggregation would be more complicated and in some cases would be misleading for ISs that support or serve as a platform for multiple WSs. In those situations, an IS that is well tailored to one WS may degrade the performance of other WSs.

Breadth of practitioner concerns. Table 8 showed that that quotations related to IS user satisfaction occurred in all categories in all five case studies with only one exception (fit with environment in Case E). Thus, all 14 of the possible categories (9 elements + 5 fit relationships) appeared in quotations related to IS user satisfaction in four of the cases and 13 of the 14 appeared in quotations from the other case. This demonstrates the relevance of the work system framework for visualizing or understanding user satisfaction.

Relative importance of different parts of a system. A common concern of variance-oriented IS research is to identify which factors tend to be most important in relation to a phenomenon. In contrast, a systems perspective would not say that internal concerns (summing to 66% in Table 8) are roughly twice as important as the sum of customer-focused concerns (summing to 16%) and contextual concerns (summing to 19%). Instead, a systems perspective would recognize that all concerns were important enough to be mentioned by interviewees, and further, that issues in any area might be related to issues elsewhere and might call for adjustments anywhere. Thus, the 16% for customer-focused concerns indicates that those concerns mattered to interviewees, not that those concerns can be ignored because internal concerns were more common.

Built-in limitations of primary concerns of major IS research streams. Figure 2 provides a visual representation of the results from Tables 8 and 9 by using different degrees of shading to represent prominence of specific elements or fit relationships. The left column illustrates the prominence ratings from Table 8, with different patterns of shading in each of the five cases. The right column shows the representations of each stream from Table 1, with shading either dark for a topic included or blank for a topic excluded. The preponderance of white space in the icons on the right is a visual representation of the 23%, 30%, and 30% prominence ratings in Table 9, In contrast, the highly variegated appearance of the icons on the left show the range of different prominence ratings in Table 8, where 69 of 70 possible areas for shading are somewhere between lightly shaded and dark, while only 1 of 70 (fit with environment for Case E) is completely white. The three prominent research streams served their original purposes but are less successful in capturing IS user satisfaction because they focus on certain topics and ignore or downplay other topics that often matter greatly, such as customers, product/services, and processes and activities.

Implications for research. This paper extends IS user satisfaction research by explaining and justifying a new systems perspective that differs from perspectives used in most IS user satisfaction research (Vaezi et al. 2016). The existing literature touches on how individual elements or characteristics of an IS influence satisfaction but does not explain user experiences as a whole whole (Oliver 2014; Vaezi et al. 2016) or how user experiences are related to interactions between ISs and WSs. Our systems perspective extends this literature by focusing on the interplay between the IS and WS, thereby going beyond impacts of individual elements or characteristics.

Future research could extend our results in several ways. As noted by Burton-Jones et al. (2015), there is no necessary benefit in keeping different research approaches separate. Our use of a systems approach

could motivate follow-on research using variance or process perspectives. The summary of our empirical findings says that the primary driver of IS user satisfaction is the degree to which the IS contributes to an individual user's efficiency in executing responsibilities within the WS and effectiveness in serving the work system's customers. Variance-oriented research could test that generalization by collecting and analyzing quantitative responses related to positive and negative contributions of an IS to a WS success. A process-oriented approach would hypothesize or search for process-like steps that move from initial implementation to usage to articulation of user satisfaction perceptions. That research would acknowledge the conformation or disconfirmation of expectations regarding the IS and the WS but would also consider impacts of various types of overlaps and interactions between the IS and WS over time.

Future research might also look at issues related to attributions, where we found that some IS users seemed to attribute WS shortcomings to IS shortcomings. In several cases, process improvements within the WS led to improvements in IS user satisfaction even without IS changes, implying that the problem was more a WS problem than an IS problem. Future research could explore the related phenomena and their impacts.

Implications for practice. Both our systems perspective and our empirical results led to straightforward, actionable recommendations for practice in the five situations that we studied. More generally our systems perspective potentially provides guidance for managers, developers, and users who are concerned about IS user satisfaction in their organizations.

When analyzing IS user satisfaction in organizational settings, it is important to recognize the simultaneous existence of the WS and the IS, plus the possibility that they may overlap and the possibility that the IS may play a variety of roles in the WS. Those roles include providing access to information, providing methods for analyzing information, controlling aspects of workflows, suggesting decisions, and even performing totally automated tasks autonomously. Consequently, interventions to improve user satisfaction may involve aspects of the IS by itself but may also require changes in the WS. One should assess the efficiency and effectiveness of the WS to identify pain points, and then should consider whether and how those pain points are directly related to the IS. In areas of overlap it may be useful to identify situations where IS users participate simultaneously in activities in two systems, the WS that provides product/services for its customers and the IS itself. That viewpoint could help in assessing IS user satisfaction in relation to issues that matter the most to IS users, who likely tend to evaluate the IS based on the extent to which it contributes to their own efficiency and effectiveness, and ultimately to the efficiency and effectiveness of the WS.

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