Nothing Is More Practical than a Good Theory … except possibly a Good Paradigm or Framework or Model or Metaphor

Research-in-Progress

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Abstract

This research questions the frequently repeated, taken-for-granted aphorism that "there is nothing more practical than a good theory." It seeks to demonstrate that there is no reason to believe that theory is more practical than good paradigms, frameworks, models, metaphors or good versions of other conceptual artifacts. It identifies different types of conceptual artifacts along with nine criteria for evaluating conceptual artifacts. It validates four premises related conceptual artifacts by examining different types of conceptual artifacts associated with work system theory (WST).

Keywords: theory, conceptual artifact, evaluation of conceptual artifacts, work system theory

Questioning an Aging Aphorism about the Practicality of Theory: Is Theory More Practical than Other Types of Conceptual Artifacts?

The Call for Papers for the track on IS Theory Development and Use at ICIS 2015 starts with Lewin's (1952, p. 169) taken-for-granted aphorism that "there is nothing more practical than a good theory." This research questions why good theory should be seen as more practical than good paradigms, frameworks, models, metaphors or good versions of other conceptual artifacts (Bereiter, 2005) that people use when thinking about situations they want to understand, analyze, design, evaluate, or improve. Many types of conceptual artifacts are as practical and useful as theories. The elevated importance given to theory over other types of conceptual artifacts in the IS discipline is especially questionable when major conferences frequently feature anxious discussions about how IS research has little impact on real world practice.

IS and other disciplines have seen an inconclusive and sometimes contentious discussion about the nature and centrality of theory in IS (e.g., Sutton and Staw, 1995; Schatzki, 2001; Gregor, 2006; Weber, 2012; Avison and Malaurent, 2014; Lee, 2014). Gregor (2006) identifies five different types of theory, theories for analysis, for explanation, for prediction, for explanation and prediction, and for design and action. Schatzki's (2001) view of theory encompasses all of Gregor's types: "Theory means, simply, general and abstract account. A theory of X is a general and abstract account of X."... [Theories include] "typologies of social phenomena; models of social affairs; accounts of what social things (e.g., practices, institutions) are; conceptual frameworks developed expressly for depicting sociality; and descriptions of social life—so long as they are couched in general, abstract terms." Expressing a very different perspective, Weber (2012), Niederman and March (2014), and others restrict the notion of theory primarily to Gregor type IV theories (for explanation and prediction). With this divergence of views about the definition and nature of theory, it is unclear what is meant when someone today says there is nothing so practical as a good theory.

Goal and organization. This research advances IS theory and theorizing by seeing theory as only one of a variety of outcomes of knowledge creation and dissemination. It places theory in a broader context by

bringing the idea of *conceptual artifact* into the discussion of theories and theorizing. It pursues the unconventional research question of validating four premises related to conceptual artifacts:

- Many types of conceptual artifacts are important for theorizing in the IS discipline. (Among others, these include concepts, propositions, frameworks, theories, models, metamodels, and methods.)
- Theorizing can lead to the production of any of those types of conceptual artifacts.
- The uses, strengths, and shortcomings of any conceptual artifact may inspire improvements in that artifact and/or creation or improvement of valuable conceptual artifacts of any type.
- Theory is not better than the other types of conceptual artifacts.

Exploring these premises shines a new light on IS theory and theorizing. In combination, the four premises imply that there is no scientific or practical reason to believe that "theory is king" (a subheading in Straub, 2009) or that theory must be prominent in all respectable IS research and in every respectable IS journal article. The discussion of various types of conceptual artifacts and criteria for evaluating conceptual artifacts also illustrates limitations of evaluating all conceptual artifacts using criteria that are tailored for Gregor (2006) Type IV theories and less relevant for other types of conceptual artifacts.

This paper proceeds as follows: It identifies different types of conceptual artifacts along with nine criteria for evaluating conceptual artifacts. Following Avison and Malaurent's (2014) approach of using a specific example from the literature, it examines conceptual artifacts of different types that are associated with work system theory (WST) (Alter, 2013b). It shows how the four premises above are supported by the exploration of WST and associated topics.

Types of Conceptual Artifacts

This research introduces the idea of conceptual artifact (Bereiter, 2005) to the IS discourse about the centrality and importance of theory. It builds on Hassan's (2014) article on "Products of Theorizing" and on Weick's (1995, p. 386) observation, noted by Hassan (2014), that "theory belongs to the family of words that includes guess, speculation, supposition, conjecture, proposition, hypothesis, conception, explanation, [and] model," … "If everything from a 'guess' to a general falsifiable explanation has a tinge of theory to it, then it becomes more difficult to separate what theory is from what isn't."

Consistent with Schatzki (2001) this paper treats theorizing as the production and improvement of abstract knowledge objects, which are called conceptual artifacts in *Education and Mind in the Knowledge Age* (Bereiter, 2005). In Bereiter's use of that term, *conceptual* refers to "discussable ideas, ranging from theories, designs, and plans down to concepts, like unemployment and gravity. *Artifact* conveys that these are human creations and that they are created for some purpose. However, being conceptual, they are not concrete artifacts either, as are books, statues, and fire hydrants." Conceptual artifacts have origins and histories; can be described; can be compared with other artifacts; have varied uses; can be valued or judged worthless; may be modified or improved upon; may have unforeseen attributes, uses, or defects that may be discovered; and may be understood and used differently by people with different levels of skill. (pp. 64-65).

The idea of conceptual artifact applies directly to the discourse about theory and theorizing in the IS discipline since theory and theorizing fundamentally are about abstractions that are created and used by people. A central purpose of most research disciplines is to create, improve, and disseminate conceptual artifacts that encapsulate knowledge related to the questions that the discipline addresses. Theory is not the only form of such knowledge. Figure 1 is an influence diagram that summarizes this paper's view of theorizing and theory. It says that existing knowledge, paradigms, and a researcher's personal knowledge and motives influence research questions. Research questions influence theorizing, which often occurs within a paradigm and uses and produces conceptual artifacts such as metaphors, analogies, concepts, constructs/variables, theories, and frameworks. Thus, generally consistent with the spirit of Weick (1995), theorizing may produce and test theories, but often produces other types of conceptual artifacts.

Most of Hassan (2014) is devoted to defining and discussing the various types of "products of theorizing," including research questions, myths, metaphors, paradigms, concepts, constructs, variables, propositions, hypotheses, models, frameworks, and theories. It does not mention other important types of conceptual artifacts such as analogies, metamodels, and methods. The current research takes the next step by treating

all of those as conceptual artifacts and asking whether there is any rationale for treating one type of as superior to the others. This paper will not repeat definitions and nuances discussed by Hassan (2014), nor does it provide a generic overview of philosophical concepts that would appear in a completed journal article. Instead, it devotes the available pages to the new ideas in the research.

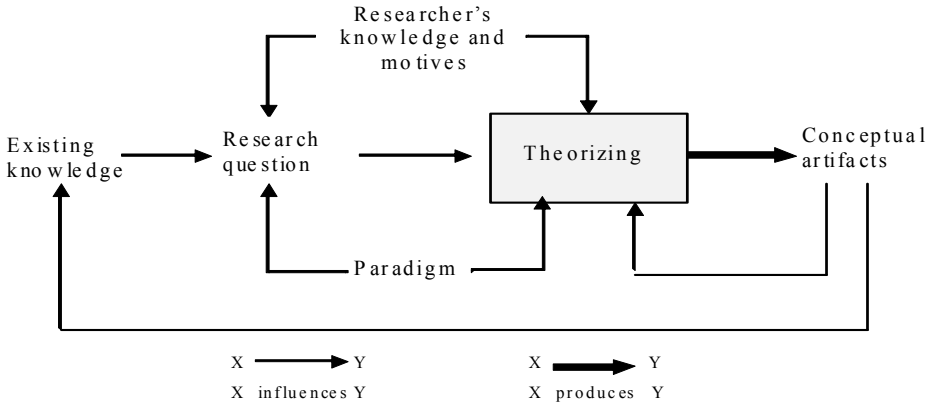

Figure 1. Theorizing produces conceptual artifacts that may or may not be theories

Evaluation Criteria for Conceptual Artifacts

Many criteria can be used in evaluating conceptual artifacts. Rigor, falsifiability, and parsimony are key criteria for theories stated as propositions, but other criteria may be more important for other types of conceptual artifacts. Table 1 presents the author's personal view regarding the typical importance of each of nine criteria for different types of conceptual artifacts. Table 1 uses an intentionally imprecise 1-2-3 scale because the main point is not the numbers, but rather the observation that criteria such as rigor or parsimony that are very important for evaluating concepts and theories may be less important for other types of conceptual artifacts such as metaphors, models, or methods that may provide imprecise but useful guidance in many situations. Each criterion in Table 1 will be discussed briefly, with special emphasis on how that criterion is relevant to the discussion of theory and theorizing.

Table 1. Applicability of criteria to different types of conceptual artifacts.

	value	rigor	testability	parsimony	breadth of use	robustness	durability	generativity	source
research question	1	1	2	1	2	2	2	2	?
paradigm	1	1	1	2	2	2	2	1	?
analogy	1	2	2	1	2	3	3	2	?
myth	1	2	2	2	2	3	3	2	?
metaphor	1	2	2	1	2	3	3	2	?
concept	1	1	1	1	2	2	2	2	?
variable	1	1	1	1	2	1	2	2	?
proposition	1	1	1	1	2	1	2	2	?
framework	1	1	2	1	2	1	2	2	?
(type IV) theory	1	1	1	1	2	1	2	2	?
model	1	2	1	2	2	1	2	2	?
metamodel	1	1	1	2	2	1	2	2	?
method	1	2	2	2	2	1	2	2	?

Scale: 1 = almost always important; 2 = sometimes important; 3 = rarely important

Value. The value of conceptual artifacts is related to whether their use leads to non-obvious understandings, insights, explanations, or predictions. The importance of value does not imply that theorizing produces only valuable conceptual artifacts, however. In fact, initial phases of theorizing often create conceptual artifacts of little value other than as stepping stones toward more useful concepts.

Rigor. As is discussed repeatedly, the IS discipline often has difficulty achieving the right balance between rigor and broad applicability. While rigor is often important, greater rigor may not help in many situations, and may only make ideas more complicated and less understandable or less useful. For example, consider how conceptual artifacts such as UML or BPMN models that can be used for software development often are far too rigorous to be used directly by business professionals.

Testability. The idea of testability is quite different from falsifiability, a criterion often associated with Gregory Type IV theories but not with Gregor Type I theories for analysis including "classification schema, frameworks, or taxonomies." For example, testing the usefulness or completeness of models, methods, or theories that are basically abstract accounts (Schatzki, 2001) is not fundamentally about whether those conceptual artifacts are true or false in their application to specific situations. In particular, "all models are wrong; some are useful" (attributed to the statistician George Box) because they are models rather than reality itself. Along those lines, Star (2010, p. 608) notes that a particular map of a primate's brain "did not need to be accurate to be useful. It could serve as the basis for conversation, for sharing data, for pointing to things—without actually demarcating any real territory. It was a good communicative device across … worlds of clinical and of basic research." Similarly, a heuristic that is not an algorithm may be quite useful even if it does not provide a prescription for every possible situation.

Parsimony. Conceptual artifacts should be as terse and straightforward as possible, consistent with a comment often attributed to Einstein: "Everything should be made as simple as possible, but no simpler." A key trade-off is between omitting important aspects or nuances of an idea by being too simple versus being unnecessarily complex, and therefore unnecessarily difficult to use. The criterion of parsimony is especially important for theories stated as relationships between variables (e.g., Gregor Type IV theories). Parsimony is less important for conceptual artifacts such as many models, metamodels, or methods where more complete coverage of multifaceted situations and special cases may be far more important than parsimony. For example, a metamodel mentioned later identifies many different types of information. An earlier, more parsimonious version treated information only as a general category. The less parsimonious version is more valuable because it reduces the likelihood of ignoring types of information that might be overlooked.

Breadth of use. The boundaries of applicability of conceptual artifacts should be defined starting with areas of most direct applicability, including areas of less useful applicability, and possibly identifying areas where application might be misleading. For example, the widely mentioned technology acceptance model (Davis 1989) says that perceived usefulness and perceived ease-of-use determine an individual's intention to use an artifact, which in turn affects actual usage. That statement makes sense for voluntary usage, but is less applicable when usage is mandatory.

Robustness. For conceptual artifacts this is a tendency to be appropriate across a specific range of relevant situations and to become less appropriate in more distant situations without generating seriously erroneous results. This is consistent with Star (2010, p. 612) noting that "all concepts are most useful at certain levels of scale. [For example] the concept of boundary objects is most useful at the organizational level." The robustness of conceptual artifacts that purposefully or accidentally ignore relevant factors is often problematic. For example, the original version of the widely cited IS success model (DeLone and McLean, 1992) basically says that system quality and information quality lead to use and user satisfaction, which lead to individual impact and then organizational impact. That model's lack of robustness is evident from trying to apply it to corporate information systems that suffered security breaches involving millions of user accounts. Those breaches challenge any view that those systems are successful, even though use and user satisfaction may have led to beneficial individual and organizational impacts at some point.

Durability. Ideally, conceptual artifacts should have a long shelf life. Inexorable advances in IT make durability a significant challenge for conceptual artifacts specifically related to IT or its use. For example, an interesting theory about e-commerce, e-government, or the creation or use of websites in general could

be meaningful only for a few years before becoming obsolete when underlying technologies, expectations, and practices morph into something that is quite different.

Generativity. Part of the value of many conceptual artifacts is in providing a basis for developing other conceptual artifacts and applications of conceptual artifacts. For example agency theory and institutional theory have had a broad range of applications. Similarly for many individual concepts such as agility, control, "anywhere, anytime", service, and value. It is difficult to evaluate the potential generativity of a conceptual artifact in advance, just as it is difficult to anticipate how users may use or adapt products in ways that were never imagined by product designers.

Source. The source of conceptual artifacts matters in the IS discipline in several ways. The refereeing of research papers often pays great attention to where conceptual artifacts came from, and sometimes rejects ideas that are not related clearly to previously published theories. Also, the IS discipline often is concerned with whether theories are "native theories" (Straub 2012) or whether they are imported from elsewhere. The question marks in the column for *source* in Table 2 reflect the author's view that excessive concern about the source of ideas is often substantively counterproductive even if it may be expedient in academic politics.

An Example: Conceptual Artifacts in Theorizing Related to Work System Theory

This section explores the applicability of this paper's view of theorizing (Figure 1) and of conceptual artifacts. It looks at the theorizing that occurred in the body of research involving work system theory (WST) and its applications and extensions to date (Alter, 2013b). WST consists of three things, 1) the definition of work system (p. 75); 2) the work system framework (p. 78), summarizing a relatively static view of a work system as it operates during a particular time; 3) the work system life cycle model (p. 78), summarizing how work systems change over time through a combination of planned and unplanned change. The various versions of the work system method (WSM) are applications of WST, not a part of WST. Extensions of WST that are mentioned later in this paper include work system principles, a set of work system design spaces, a work system metamodel, and a theory of workarounds, among others.

This section explains how every type of conceptual artifact in Table 1 played a role, either in theorizing or as a product of theorizing for WST and directly related topics. It proceeds in the same order as Table 1, citing examples based on publications related to WST. This section was inspired partly by the way Avison and Malaurent (2014) discussed Schulze (2000) as an example in its analysis of issues related to the exaggerated emphasis on theory in the IS discipline. Consistent with Weick (1995) and Hassan (2014), this section illustrates why seeing (type IV) theory as the main result of theorizing is a myopic view of what theorizing is about and what it accomplishes. It also contributes to doubting whether theory (especially type IV theory) is either better or more practical than other types of conceptual artifacts.

Research question. Alter (2013b, p. 113) describes how the original research question that eventually led to WST was to develop systems analysis ideas that could be used by typical business professionals. Over time, additional research questions arose, such as how to combine simple models for business professionals with more rigorous models for IT professionals. That new research question led to the creation of the first version of a work system metamodel (Alter, 2010a), which has been revised and is now in its fifth version. Another new research question about how emergent change occurred as part of the work system lifecycle model led to a theory of workarounds (Alter, 2014).

Paradigm. The central ideas in WSM did not come from formal IS research, but rather from 1992, 1996, 1999, 2002 editions of an IS textbook. (Alter, 2013b, p. 113) The idea of developing a systems analysis method for business professionals did not fit well into the typical paradigms in the IS discipline, such as performing IT-centric systems analysis, studying determinants of whether IT will be used effectively, and or assessing the economic impact of IT. The issue of how to understand systems in organizations from a business viewpoint seemed to be in an amorphous area somewhere between the disciplines of IS, operations management, and general management. A perceived disconnect from established paradigms led to papers entitled "18 Reasons why IT-Reliant Work Systems Should Replace the IT Artifact as the Core Subject Matter of the IS Field" (Alter, 2003a) and "Sidestepping the IT Artifact, Scrapping the IS Silo, and Laying Claim to 'Systems in Organizations'" (Alter, 2003b). The articulation of work system

theory in Alter (2013) and the subsequent claim that WST is becoming a platform (Alter, 2015) supports the notion that WST is the core of a paradigm that might be called work system thinking.

Analogy. The idea of developing WSM was based on a direct analogy between IT professionals and business professionals. If IT professionals needed systems analysis methods that would help them, surely business professionals could use an organized systems analysis method that would suit their needs. That thought was expressed in the title of the paper published more than a decade later, "Systems Analysis for Everyone Else: Empowering Business Professionals through a Systems Analysis Method that Fits their Needs." (Truex et al., 2010).

Myth. The development of WSM was based on what might be viewed as a motivating myth, the unproven belief that business professionals need an organized systems analysis method. On the other hand, part of the rationale for explaining the potential value of WST is that common acronyms such as CRM, ERP, and BPM seem almost mythological. For example, contrary to their names, CRM software does not manage customer relationships; ERP is not fundamentally about resource planning for an entire enterprise; and BPM software does not actually manage business processes. It would be interesting to pursue that line of thinking through empirical research that explores and contrasts the motivational value and misleading nature of myths, hype, and positioning in the IS discipline, both in academia and in practice.

Metaphor. Alter (2013a, p. 1) reports "building on past research highlighting metaphors related to organizations, IS, and projects."... "It is shows how considering common, broadly applicable types of subsystems (not standard IS categories such as MIS and DSS) might provide direction, insight, and useful methods for analysis and design practitioners and researchers." It "identifies relevant metaphors, concepts, theories, methodologies, success criteria, design tradeoffs, and open-ended questions that could augment current analysis and design practice" for eight types of subsystems [e.g., communication, decision making, control] that are relevant to most systems in organizations.

Concept. WST is based on a series of concepts starting with the definition of work system and the definitions of the terms in its two central frameworks. Extensions of WST such as a set of work system design spaces (Alter, 2010b) identify many concepts for analyzing and designing systems. For example, concepts related to *work system as a whole* include capacity, scalability, resilience, and transparency, whereas concepts related to a work system's human participants include age, skills, and interests.

Theorizing related to the work system framework struggled with several basic concepts. Initially, the activity performed by a work system was called its *business process*. Later that was changed to *work practices* to minimize confusion between the process as documented versus the process as performed, and also to avoid assuming that all work systems had well defined processes. That term was replaced by *processes and activities* because some MBA students had difficulty using the term *work practices* meaningfully. Another concept that changed was *output*, which sounded computer-oriented, and therefore was changed to *products and services*. Research related to service science led to changing that term to *product/service* to avoid focusing attention on yes/no distinctions between products versus services. Alter (2012, pp. 27-29) explains why those distinctions are of little use in understanding or improving work systems whose product/services combine some characteristics often associated with products (e.g. tangibility and separation between providers and consumers), and some characteristics that are often associated with services (e.g., customizability and customer experience).

Variable. Some, but not all of the concepts in WST and its extensions can be viewed as variables. For example, information, technology, and process steps used in a particular work system are treated as components of a work system rather than as variables that take on multiple values. On the other hand, when designing a system it is possible to think of many attributes as variables that need to be calibrated. A set of design spaces for sociotechnical systems (Alter, 2010b) identifies relevant variables including how structured processes and activities should be, how complex, how automated, how many people should be involved, and so on. From a quite different perspective on the importance of variables, Ramiller and Pentland (2009, p. 474) argue that "the 'variables-centered' research paradigm, which focuses its attention on covariance among independent and dependent variables ... [is] ... the predominant research tradition in the field ... [but unfortunately] appears to distance researchers from the organizational actors, such as managers, to whom they would give advice and counsel."

Proposition. The first extensions of WST was a set of 24 proposition-like work system principles that extended the sociotechnical principles of Cherns (1976). Alter and Wright (2010) used opinions of six

small cohorts of Executive MBA students to evaluate the principles. The criteria were the extent to which they believed that each principle should apply to most work systems in their organizations and the extent to which they believed the operation of work systems in their organizations seemed to conform.

Hypothesis. WST and most of its extensions are not stated in terms of explicit hypotheses, although many of them are based on implicit hypotheses of the form "results of an analysis or design effort would be better if topics X or Y were considered." For example, a discussion of different versions of WSM expresses the implicit hypothesis that CRM-related design and implementation projects would avoid many pitfalls if they viewed the situation as a customer-facing work system rather than as an implementation of commercial software with certain features (Alter, 2013b, p. 115).

Framework. Two of WST's basic components are frameworks: the work system framework and work system life cycle model (Alter, 2013b, p. 78). The latter was given the designation *model* over a decade ago but is more like a framework. An effort to augment the work system framework with more of the spirit of service led to a new framework called the service value chain framework (Alter, 2008). That framework separates customer and provider responsibilities across generic steps in service instances and incorporates ideas such as service interactions, onstage and back stage from service blueprinting (Bitner et al., 2008), and value capture by both customer and provider across an entire service instance.

Theory. Whether or not WST is a proper theory is controversial. Niederman and March (2014, p. 350) treats Gregor type IV theories as proper theories and argues that WST is more like an atheoretical model. Alter (2013b, p. 75) calls WST a theory based on a previously mentioned definition of theory as an abstract account (Schatzki, 2001, pp. 12-13). One of the extensions of WST, a theory of workarounds (Alter, 2014) is a process theory augmented by a set of factors that interact to influence each step.

Model. A basic tool in WSM is a work system snapshot, a formatted one-page summary of a work system identifying customers, product/services, processes and activities, participants, information, and technologies (Alter, 2013b, p. 86). A work system snapshot of a particular work system is a model of that work system that is useful in preliminary discussions of what the work system is and what work system-related problems or opportunities are being addressed. Many other models using techniques such as flow charts, swimlane diagrams, and fishbone diagrams can be used as the analysis unfolds.

Metamodel. Different versions of a work system metamodel (e.g., Alter, 2010a, 2012, 2015) are extensions of WST that provide a more detailed representation of components of a work system. Analogous to an online map with zooming capabilities, the less detailed work system framework and the more detailed metamodel are related to each other and can be used for some of the same purposes, but are designed to be especially useful for their own particular purposes. (Note: The work system framework can also be viewed as a metamodel because it identifies components that should be included in a work system model of a specific situation. The designation "work system metamodel" was initially used to differentiate between the work system framework and a more elaborated version that was similar in form to metamodels produced over many years by many researchers in the German-speaking IS community.)

Method. WSM is a method for describing and analyzing a system by seeing it as the smallest work system that has a problem or opportunity. The various versions of WSM share the distinguishing features of treating a work system as the unit of analysis, describing the "as is" work system, analyzing it, and proposing an improved, "to be" work system along with reasons why the changes would be beneficial. As explained in Alter (2013, 2015), the development of WSM starting in the 1990s preceded the published articulation of WST as a theory in 2013. Alter (2015) goes further by explaining how "the beneficial effort of clarifying WST's scope and details started as an attempt to legitimize work system ideas and WSM by the fact that they were based on a theory." The ideas had existed for over a decade, but it seemed that they had to be packaged as a theory in order to seem legitimate.

Conclusion

This research contributes to the discussion of theory and theorizing in the IS discipline by introducing and applying the idea of conceptual artifact as elaborated by an educational psychologist. This research-in-progress paper identified different types of conceptual artifacts along with nine criteria for evaluating conceptual artifacts. It showed how each type was involved in the theorizing that produced WST and its applications and extensions to date. This research can be extended in a number of directions:

1) Continue developing the idea of conceptual artifacts in IS. Build on Hassan (2014) by compiling alternative definitions of each of the types of conceptual artifacts. List at least five important exemplars of each type of conceptual artifact. With regard to theories per se, use Gregor's five types of theory and show that some of them overlap with other types of conceptual artifacts, such as frameworks.

2) To the extent possible, replicate the WST discussion for other theories and approaches that are relevant to IS. For example, it would be interesting to look at the various conceptual artifacts related to activity theory, agency theory, coordination theory, institutional theory, and the resource based view.

3) Apply the nine criteria for conceptual artifacts to WST and to other conceptual artifacts, especially theories such as those mentioned in the previous item).

4) Collect a substantial number of examples and anecdotes illustrating that theories are not more important than other types of conceptual artifacts. Initial examples are shown in Table 2. While those examples might seem cherry-picked, the existence of the examples represents a direct challenge to the possibly excessive primacy of theory in IS field (e.g., criticisms in Avison and Malaurent, 2014). The challenge is to find a set of convincing examples that illustrate how theories are more important than other types of conceptual artifacts in IS (and definitely not using theories from physics such as the theory of planetary motion or the theory of relativity or Maxwell's equation to demonstrate the centrality of theory in the quite different field of IS).

Table 2. Examples illustrating that theories are not more important than other types of conceptual artifacts

- **Concepts without formal theory**. Many of the most important developments related to creating and implementing systems in organizations were based on concepts but not on theories. Examples include most software development techniques (e.g. entity relationship models) and methods (e.g., agile development).
- **Theories, frameworks, models**. The 2009 Nobel Prize speech by the economist Eleanor Ostrom specifically mentioned relationships between frameworks, theories, and models in her research and contained no implication that theories are more important than frameworks or models. (Ostrom, 2009)
- **Theories vs. methods.** Greenwald (2012, p. 102) found that 82% of Nobel Prizes in physics, chemistry, and medicine in the period 1991 to 2011 cited contributions to methods and only 18% cited contributions to theory.
- **Theory vs. concepts**. The winner of the 2013 Turing Award, the most distinguished award in computer science, noted that he received the award because of concepts related to distributed systems that he helped develop, and specifically not because of theoretical contributions. (McGoneal, 2014)
- **A "world view," not a theory**. As demonstrated by over 6600 citations since it was first published, Vargo and Lusch's (2004) first article on service dominant logic has been discussed and cited extensively by scholars in marketing and related fields. The article presents eight "foundational premises" of a "worldview," not a theory.

Completing the four steps above would produce convincing support for the four premises stated at the beginning of this paper: 1) many types of conceptual artifacts are important; 2) theorizing can lead to the production of any of those types of conceptual artifacts; 3) uses, strengths, and shortcomings of any conceptual artifact may inspire improvements in that artifact and/or creation or improvement of valuable conceptual artifacts of any type; 4) theory is not better or more important than the other types of conceptual artifacts, contrary to its privileged position in the IS discipline.

Overall, this research supports the conclusion that theorizing is essential for research and that theories *per se* are only one of many types of conceptual artifacts that theorizing uses or produces. Treating theory (especially type IV theory) as an ultimate accomplishment in IS is based on tradition, training, politics and other factors that seem not to be substantively related to maximizing the IS discipline's real world impact. (Are there any convincing arguments to the contrary?) While various types of theory are obviously important, there is little evidence that privileging theory (especially type IV theory) over other types of conceptual artifacts has beneficial impacts on pursuing the research questions that the IS discipline needs to study at a time of rapid social and technological change.

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