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EDITORIAL

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Useful Products in Information Systems Theorizing: A Discursive Formation Perspective

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Abstract

Although there is a growing understanding of theory building in the information systems (IS) field, what constitutes IS theory remains the subject of intense debate. Following Weick's recommendation to focus on the products of theorizing rather than on what theories are, we assemble and analyze 12 products—question, paradigm, law, framework, myth, analogy, metaphor, model, concept, construct, statement, and hypothesis—that are rarely discussed together in any depth in the IS field and combine them into a coherent theorizing framework. Drawing on Foucault's thesis of discursive formation we characterize the unique role of each product in IS theorizing and illustrate the usefulness of the framework in relation to both classical IS theorizing in the form of media richness theory as well as next-generation theorizing.

Keywords: Information Systems (IS) Theory, Theorizing, Discursive Formation, Question, Paradigm, Law, Framework, Myth, Analogy, Metaphor, Model, Concept, Construct, Hypothesis, Statement, Media Richness Theory

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1 Introduction

Although major progress has been made in describing the nature of information systems (IS) theory (Gregor, 2006; Gregor & Jones, 2007), and in evaluating and refining existing theories (Grover et al., 2008; Weber, 2012), the status of theories in IS has come under intense debate (Avison & Malaurent, 2014; Gregor, 2014; Grover, 2012; King & Lyytinen, 2004; Straub, 2012; Weber, 2006). Avison and Malaurent's (2014) "theory fetish" critique suggests the emphasis on IS theory has produced less-than-interesting research; Grover and Lyytinen (2015) claim that scripted research strategies that domesticate theories from other disciplines lead to a lack of boldness and originality in IS research; Markus (2014) suggests that lack of contribution may be due to narrow definitions or conflicting notions of IS theory as opposed to an overemphasis on IS theory; and Gregor (2014) argues that the discussion surrounding theory in IS may lead to questioning "theory" in itself and proposes that the IS field should strive to understand the theorizing process rather than debate "theory."

The status of theory in research cannot be placed in doubt. Philosopher and behavioral scientist Kaplan (1964, p. 294) regards theorizing as "the most important and distinctive" activity of human beings: "to engage in theorizing means not just to learn by experience but to take thought about what is there to be learned ... lower animals grasp scientific laws but never rise to the level of scientific theory" (p. 295). Corley & Gioia (2011, p. 12) state that "theory is the currency of our scholarly realm," and Alvesson and Sandberg (2011, p. 247) note that "as researchers, we all want to produce interesting and influential theories." Academic priority is given *first* to

those who can build original and interesting theories, *second* to those who can use them effectively, and *third* to those who understand them. Even for theory creators, only when scholars *outside* of their disciplines acknowledge and apply their theories can they say that their theories are useful (Corvellec, 2013).

With the advent of new, unprecedented digital phenomena, theory development is becoming even more critical, and IS researchers are calling for the IS field to move beyond narrow definitions of knowledge and theory. Ågerfalk (2014) argued that contribution to knowledge is not limited to theoretical contributions but includes empirical contributions that challenge existing assumptions or reveal insights into a phenomenon without relying on any a priori theory. Hirschheim (2019) lamented the IS field's obsession with positivist theories and, at a workshop panel (Willcocks et al., 2019), Dennis bemoaned the fixation of top IS journals with what Gregor (2006) calls Type IV theories—theories for explaining and predicting—a positivist position that limits theory to "a system of constructs and variables in which the constructs are related to each other by propositions and the variables are related to each other by hypotheses" (Bacharach, 1989, p. 498). Such a narrow view of theory excludes classical theories, such as Linnaean's taxonomy (1735) in natural history, Mendeleev's (1869) period table of elements in chemistry, and Weber's (1930) Protestant ethic in sociology. Moreover, it excludes early IS theories such as Mason and Mitroff's (1973) cognitive style theory and Gorry and Scott-Morton's (1971) foundations of decision support systems, both of which have spawned decades of productive IS research.

Moving beyond the dichotomy between what theory *is* and *is not*, Weick (1995) suggested viewing theory as a continuum of approximations. As interim struggles in the process of theorizing (Runkel & Runkel, 1984), these approximations hold the key to building exciting theories by opening up spaces for future thinking (Moore, 2004). Consequently, we consider all types of theories covered by Gregor (2006)—descriptive, explanatory, predictive, and prescriptive—as legitimate, and suggest the IS field is best served at this stage of its conceptual development by unpacking the theorizing process with the help of what Weick (1995, pp. 385-389) called the "products" of that process:

> *Products of the theorizing process ... represent interim struggles in which people intentionally inch toward stronger theories ... Those emergent products summarize progress, give direction, and serve as place markers. They have vestiges of theory but are not themselves theories.*

Weick's use of the term "products" emphasizes that the *theorizing process* produces approximations of theory but not necessarily theories themselves. As these approximations serve as the foundation for further theorization, they should not be dismissed just because they do not qualify as full-blown theories. Hence, we draw on Hassan et al.'s (2019) work on IS theorizing as a discursive practice and assemble 12 products—question, paradigm, law, framework, myth, analogy, metaphor, model, concept, construct, statement, and hypothesis—into one treatise to describe their primary roles as theory frames, theory generators, and theory components in the theorizing process. Whereas Hassan et al. (2019) focused on the theorizing processes, specifically the differences between the context of discovery and the context of justification, this paper focuses on the products that are applied in those contexts. As such, this study contributes to the current debates surrounding IS theories by addressing the question: "What coherent framework and theorizing toolset could IS researchers use to support their efforts in building original, interesting and influential theories?" Unfortunately for IS researchers, the toolset of products of theorizing is scattered among different disciplines, with no attempt to integrate in a meaningful way the many elements of theorizing. Also, the products of theorizing have also not been critically analyzed in the IS field, leaving IS researchers with little guidance on how to theorize. To fill this gap, we gather all 12 products of theorizing into one editorial and provide specific examples of such products in the footnotes to this editorial. In this editorial, we show how these 12 products are marshaled in theorizing, using the classic historical case of *media richness theory* (MRT) (Daft & Lengel, 1986; Daft et al., 1987). As a well-known, mature IS theory that has undergone fierce criticism, MRT allows for an in-depth analysis of how the theory maintained its validity and evolved in the face of criticism.

2 Theorizing and the Discursive Formation Perspective

Fundamentally, theorizing is about making claims in the form of theories, and the study of theory formation can be found in a recent development of discourse analysis (Schiffrin et al., 2001) called critical discourse analysis (Weiss & Wodak, 2003), which provides a rich framework for examining issues between theory and practice and between theory and methodology. An approach within this genre, which we apply in this editorial, is Foucault's (1970, 1972) study of disciplinary activity, which describes how disciplines establish power relations to exert their authority. Using Foucault's method of analyzing discourses, it is possible to answer questions about the validity of knowledge in certain social contexts, such as: How did this knowledge emerge and gain influence? What are the components of that knowledge and theory that make up human consciousness? What can be claimed and what cannot be claimed?

Understanding a field's discursive formation is pivotal because it explains how the field of study emerges and gains influence as it attempts to legitimize the authority of its products of theorizing and its theories. The rules of this disciplinary activity, which Foucault (1972, p. 31) calls the *discursive formation,* establish relations that define the nature of the field. The operation of these rules makes possible the creation of new objects of study and makes claims about objects that belong to a specific discourse such that we can recognize economic discourse from psychological discourse, biological discourse from medical discourse, and computer science (CS) from IS discourse.[1] Foucauldian discourse analysis enables us to breakdown theory into its products of theorizing to explain how they reinforce action and exert power.[2] By drawing on what Foucault (1970; 1972) calls the "archeology of knowledge," which describes the detailed historical development of disciplines and uncovers their ontological and epistemological assumptions, we elaborate on the products of theorizing using terms familiar to IS researchers. Recognizing the distinctiveness of the IS field's discourse is especially consequential because of the field's diversity and porous boundaries. The multidisciplinary nature of IS creates a confusing and precarious state where discourses from other disciplines spill into the IS field, causing IS researchers to continually vacillate between influential disciplines.[3]

As Foucault (1970, p. 64) explains, the discourse of a field or discipline is established before the field emerges, and theorizing takes place at the same time, giving "rise to certain organizations of concepts, certain regroupings of objects, certain types of enunciation, which form, according to their degree of coherence, rigor, and stability, themes or theories." Similar to Abbott's (2001) description of how disciplines coalesce around their axes of cohesion (Sarker et al., 2019), some discourses eventually become fields of study, and because each field follows different rules and strategies in forming its discourse, each field builds unique theories concerning its phenomenon of interest.

If any IS theorizing is to take place, it can only exist within IS discourse because that is where statements belonging to the field and its theories are situated and where the axis of cohesion resides (Sarker et al., 2019). That does not mean that IS discourse cannot exist within another discourse. For example, when a lawyer applies medical evidence to defend a client, medical discourse operates within legal discourse. Thus, when the discourse of computer science emerged in the late 1940s and early 1950s as a result of the invention of the computer, a different discourse called IS was emerging at roughly the same time and was later formalized in early IS textbooks (Hirschheim & Klein, 2012) and degree programs. The differences between the rules of these two discourses tell us who is speaking, the culture the person is part of, and on what authority or social institutions the person is involved. Studying the field's discourse is pivotal for theorizing because the discursive formation provides answers to field-specific questions.[4]

Through the interplay of rules that govern the formation of mutually exclusive objects of study, the discursive formation binds together a group of disparate concepts and statements while the discursive formation itself remains stable. Thus, according to Foucault, *discourses* are groups of statements in that they belong to the same discursive formation.

[1] Theorizing in biology thus takes a different form than theorizing in medicine because they are *different discourses,* even though statements about organs of the human body, tissues, and cells are found in both disciplines. The rules of discourse of biology concern the study of organic structures that support life. Conversely, the rules of discourse of medicine concern the observation of the human body to identify diseases that affect its health. Similarly, Revens (1972, p. 486) describes the discourse of CS as "computing techniques and appropriate languages for general information processing, for scientific computation, for the recognition, storage, retrieval, and processing of data ... and ... automatic control and simulation of processes," which concerns the rules surrounding symbol processing (Denning et al., 1989) and differs from that of IS even though they share the same core concern: *the computer*.

[2] When an IS researcher applies economic theory to study the use of computers using rules concerning value, prices, costs, and trade-offs, which are part of the discursive formation of economics, the power of the economic discourse influences the direction of the study and by extension the IS field. These cross-disciplinary activities present an interesting dilemma to IS researchers. The legitimacy already established by the recognized rules from these "reference disciplines" provides an effective career-building path for IS researchers but at the cost of not building a cumulative tradition within the IS discourse. Additionally, this phenomenon raises the key issue of which discourse rules one should follow: IS or economics. The related issue is whether the researcher is conducting economics research, IS research, or economics research in an IS context. The choice of applying specific rules of discourse has wide-ranging implications, especially in the ability of the IS field to invent its own native theories. If the field believes that the growth of its knowledge depends on inventing its own concepts, statements, and theories (Markus & Saunders, 2007), then leveraging the discourse of other disciplines is unlikely to support such a goal and the IS field will remain multimodal, unable to produce theories with a capital "T."

[3] During its formative stages, IS largely followed the rules laid down by the psychological discourse (cf. Mason & Mitroff, 1973) and, even today, social psychology continues to exert a strong influence (cf. Davis, 1989; Venkatesh et al., 2003). Later, the strategic management field exerted its influence (cf. Ives & Learmouth, 1984; Parsons, 1983) followed by other discourses such as CS, engineering, management, economics, and communication.

[4] Field-specific questions determine one particular statement or proposition over that of another. Why was this theory formulated instead of another? Why were certain boundary conditions chosen? For example, medical questions will produce different answers related to suicide compared to say, psychological or sociological questions even though the phenomenon is the same.

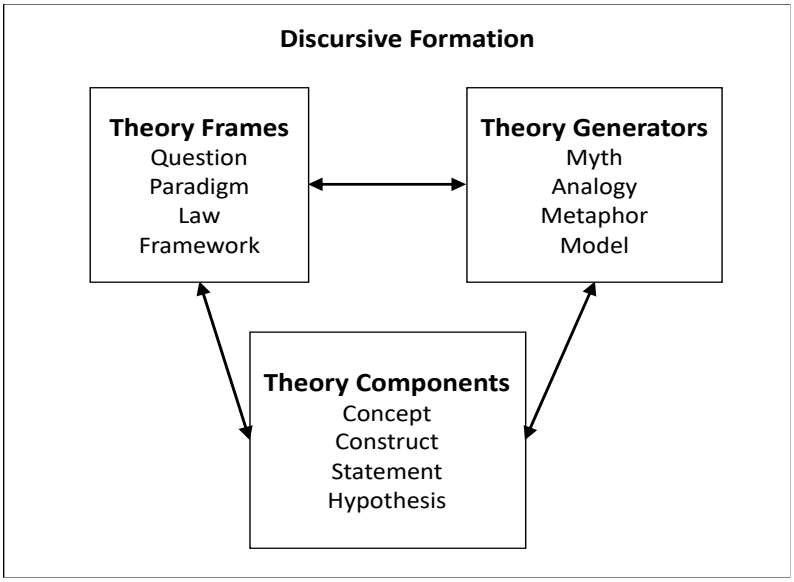

Figure 1. Intermediate Products in the Discursive Formation

We represent this discursive formation in Figure 1 as the structure that contains all 12 products of theorizing within three roles: theory frames, theory generators, and theory components. The roles are not mutually exclusive but are depicted to give researchers a sense of where each product plays its primary role in theorizing. For example, the research question frames the research and may suggest analogies that could be applied, which would in turn help generate new concepts for new theories. This is exactly what Darwin (1859) did so eloquently, moving from his question about co-adaptation to drawing an analogy with selective breeding to inventing the concept of natural selection.[5]

While theories have been subjected to some form of verification or testing, the intermediate products have not necessarily undergone such a process. The intermediate products are *pre-theoretical* in the sense that they are typically created or emerge prior to verification or testing, within the context of discovery (Hassan et al., 2019). *Models* may, for example, serve as informal conceptions that operate as analogies or commentaries for a theory. Thus, models are independent of theories but can contribute to a theory (Kendler & Kendler, 1962; Lachman, 1960) and, just like *concepts* and *statements*, can become parts of the theory (Suppe, 1977; Torgerson, 1958). These pre-theoretical conceptual artifacts inform the practice and imagination of academics and practitioners alike and have major implications for research and theory. As such, it is crucial to critically scrutinize them as expressions of interim struggles by researchers in theorizing. For example, when Burton-Jones and Straub (2006) scrutinized the pre-theoretical IS concept of *use*, they found that it had no accepted definition and that it had been operationalized in diverse ways according to the different nomological contexts to which it had been applied.

Within these discursive practices, researchers invent, derive, examine, and apply various pre-theoretical products as scaffolding to continue the theorizing process. As these pre-theoretical structures are refined, they are eventually formalized into different types of theories (e.g., Gregor, 2006). In these discursive practices, there are no set discrete stages or linear paths, nor are theories ever finalized or "complete" because taking that position would only limit the researcher's creative thinking. Figure 1 depicts the process of how intermediate products may become inputs to each other, and Table 1 offers a brief summary of the 12 products. Information about these products can be found scattered across other disciplines outside of the IS field, which makes it difficult for IS researchers to build a clear mental model they can use to theorize in their research. Moreover, writings on these products often contradict each other and cause confusion among researchers. For example, few researchers can describe how a model differs from a framework. Hypotheses are often formed as if they were propositions and vice versa, and most IS authors use concepts and constructs synonymously.

[5] As illustration, Darwin (1859) asks what explains the "coadaptation of organic beings to each other and to their physical conditions of life" (p. 4) such that everything fits perfectly? This question, which reframed the discipline of biology, led Darwin to draw an analogy between the practice of selective breeding (artificial selection) that resulted in the change of the animal's characteristics with the natural phenomenon of slow successive modifications. This analogy generated the concept of *natural selection*, which became a key component of the theory of evolution.

Table 1. Summary of Products of Theorizing

Product	Definition	Notes
Question	A *disciplinary question* addresses an object of study as a problem requiring a solution based on the field's rules of discourse and pattern of inquiry.	Disciplinary questions distinguish one discipline from another and frame the theories of that discipline. Asking questions includes problematizing the phenomenon, which explicates and revises underlying theoretical assumptions (Gkeredakis & Constantinides, 2019).
Paradigm	A *paradigm* is a shared exemplar for scientific practice in the form of concrete manifestations of analogies and metaphors on which communities of scientists and researchers agree in part or whole (Kuhn, 1977).	Largely maligned in the history of the IS field, paradigms have given birth to many new disciplines. The social construction of technology is an example of how paradigms function as research heuristics to frame theory (Bijker, 1995; Bijker et al., 1987).
Law	A *law* is a generalization that applies across space and time and provides a framework for events that we use to plot phenomena that may need explanation. It serves as the starting point from which we survey events looking for anomalies however they may be construed (Scriven, 1962).	As part of theoretical reasoning, laws form the components of any theory and help define the rules by which theories explain and predict any phenomenon (Schaller, 1997).
Framework	A *framework* is the researcher's map of the territory being studied, starting with its context and assumptions, and consists of the main concepts, constructs, variables, and their related propositions. It can take the form of a diagram or a narrative; it may be "simple or elaborate, commonsensical or theory driven, descriptive or causal" (Miles & Huberman, 1994, p. 18).	A framework is broader and more inclusive than models or theories and can include both. It is the total set of relations that unite the discursive practices that give rise to epistemological elements and formalized systems (Gorry & Scott Morton, 1971; Ives et al., 1980; Mason & Mitroff, 1973).
Myth	A *myth* is "a dramatic narrative of imagined events ... used to explain origins or transformations of something ... an unquestioned belief about the practical benefits of certain techniques and behaviors that is not supported by demonstrated facts" (Trice & Beyer, 1984, p. 655).	Myths have long been the source of creative theorizing in IS as researchers uncover unquestioned assumptions underlying IS phenomena, as well as the means of studying qualitative elements of the phenomenon (Boland, 1982; 1987; Boland & Pondy, 1983; Dearden, 1966; Hirschheim & Newman, 1991).
Analogy	An *analogy*, from Latin analogia for ratio or proportion, is a rational argument using a simplified, scaled-down reference to something familiar to explain or illustrate something more complex or less familiar (Bagnall, 2012; Hesse, 1966).	Similitudes and resemblance played the most constructive role as theory generators in the development of knowledge in the history of mankind as well as in the IS field (Angst et al., 2010; Keil, 1995; Kuechler & Vaishnavi, 2012; Sabherwal et al., 2001)
Metaphor	A *metaphor* "consists in giving the things a name that belongs to something else" (McKeon, 1941, p. 1476).	Metaphors are the physical forms of entire networks of analogies harnessed to clarify, enrich and enlighten and have historically been an active theorizing activity in the IS field (Kendall & Kendall, 1993; Mason, 1991)
Model	A *model* is an imperfect copy of the phenomenon of interest consisting of positive and neutral analogies (Hesse, 1966).	Models and frameworks are often confused, as are models and theories. Models are abstractions and simplifications whereas frameworks are elaborations and networks of relations. That is why frameworks are composed of models (Davis, 1989; Delone & McLean, 1992)
Concept	A *concept* is a set of ideas associated with the subject matter or elicited by a given word treated according to logical rules (Sartori, 1975). A conception is a concept that is taken in a particular way.	In the IS field, concepts are rarely discussed in contrast to constructs, although the generation of new concepts, which is evidence of progress in the field is more fundamental than constructs, which are measures derived from concepts (Markus & Saunders, 2007)
Construct	A *construct* is a term for a concept that is neither directly nor indirectly observable and can be defined only in relation to those observables, whereas a variable is an observational term that changes for a construct (Kaplan, 1964).	Whereas concepts are sets of ideas from observables that allow for classification and follow certain logical rules, constructs (or codes in interpretive research) are, in essence, fictional entities invented to further research (Furneaux & Wade, 2009; MacCorquodale & Meehl, 1948)

Statement	A *statement* is a mode of existence proper to a group of signs that describes a definite position for any subject (Foucault, 1972). A proposition is the meaning of a logical declaration that bears truth value (Fawcett, 1998; Foucault, 1972).	The statement is the most fundamental unit of any discourse and therefore any discipline, since it is the statements (or claims) made by disciplines that justify their existence. For example, causal statements are central to most if not all theory (Markus & Rowe, 2018)
Hypothesis	A *hypothesis* is an operationalized proposition that takes the form of empirically testable conjectures or follows a procedural rule to infer other propositions (Kaplan, 1964).	In the IS field, hypotheses are commonly associated with positivist research (Chen & Hirschheim, 2004), whereas qualitative and grounded theorists argue that hypotheses are natural components of their approaches (Flyvbjerg, 2006; Glaser & Strauss, 1967; Silverman, 2006)

Because researchers are not on the same page regarding these products, it is not surprising that progress on theory development in the IS field has been slow. The last column in Table 1 contains notes with salient discussions within the IS field and other fields related to the products. Below, we expand on each product of theorizing, explaining why the product is foundational, and then describe specific aspects that require the attention of IS researchers.

3 Intermediate Products of Theorizing

3.1 Question

Asking questions is a major part of research and theorizing and every field has its own peculiar set of questions. Following from the field's discursive formation, evidence from linguistic and philosophical studies (Bal, 2002; Bromberger, 1992; Meyer, 1995) suggests that a discipline is defined by the set of questions it asks. Thus, not all research questions can be admitted into a discipline; the questions need to pertain to the discipline and become disciplinary questions. A *disciplinary question* addresses an object of study as a problem requiring a solution based on the field's rules of discourse**.** An elegant example is how Durkheim (1951/1897, p. 324) posed the problem of suicide by asking the question: "why in every society, a definite proportion of people commit suicide in any given period?" In doing so, he was not focusing on the state of mind (e.g., despair, neurosis, depression, or any psychological state), as one would expect in the case of suicide as framed from medical or psychological discourses; rather, he was linking suicide to his newly emerging discipline of sociology.[6] As Foucault explains (1970, 1972), questions are the consequences of disciplines facing points of diffraction and contradictions in their findings that demand explanations and trigger programs of investigation that sometimes lead to the discovery of new disciplines.

What has not been discussed in IS research circles is the *nature* of those research questions. Thus, within IS research, if the question being asked is an economic question, then economic principles, methods, tools, and resources can be expected to address it and the research will likely adhere to the rules of economic discourse rather than IS discourse. Conversely, a research question that concerns information, systems, or technology that the economic discipline itself does not have the principles, concepts, methods, or tools to address would open an opportunity for the IS field to create them and thereby contribute to the economics discourse. Historically, it would not be an understatement to say that the IS field emerged from this discursive practice of addressing questions that its reference disciplines had not satisfactorily addressed.[7] Asking the right questions that interrogate and challenge the assumptions underlying existing literature is likely to produce interesting results (Alvesson & Sandberg, 2013; Davis, 1971; Slife & Williams, 1995). Asking the wrong questions will, at the very least, waste valuable research resources or lead research programs in a less productive or unintended direction.

Theorizing within the IS discursive formation requires asking: "What makes the research question IS-specific?" By addressing this question, the researcher is establishing what frames the research as IS research. Not asking IS questions exacerbates the field's identity issues (Benbasat & Zmud, 2003) and prevents the field

[6] The questions that he was asking distinguished his unique discourse from that of medicine or psychology and framed his theories within sociology. Among the many novel concepts that Durkheim (1951/1897) generated for sociology were the new concept of *social cohesion* along with sociological concepts of suicide, including *altruistic*, *anomic*, *fatalistic*, and *egoistic* forms of suicide.

[7] For instance, Mason's (1973) early framework for IS began with answering the questions: "What is 'knowledge,' 'effectiveness,' 'action;' and further, who defines them and for what 'purpose?'" (p. 475). Answering these questions created a framework connecting psychological types, problem types, and presentation modes. These questions did not fit exclusively into management, CS, or psychology alone. Similarly, Davis's (1989) TAM asks: "What qualities of systems increases its acceptance and the intensity of its use?," a question seldom addressed in CS after a system is delivered.

from demonstrating its value (Agarwal & Lucas Jr., 2005; Hassan, 2014b). The value of disciplines lies in their uncanny ability to ask questions about their areas of expertise and address questions whose answers we know that we do not know. Returning to creating a unique identity for the IS field and generating value in IS research, this means that effective theorizing in the IS field involves *asking questions that are not being asked by other disciplines, or asking questions that other disciplines are incapable of answering*. The answers to these questions, and the IS theories emerging from them, define the IS field and its value to other fields.

3.2 Paradigm

Partially as a result of criticisms of Kuhn's (1970) paradigm concept and its varied interpretations (Banville & Landry, 1989; Popper, 1970), the role of the paradigm in theorizing has been largely neglected and misunderstood in the IS field (Hassan, 2014a; Hassan & Mingers, 2018). Although there are several notable exceptions (Chen & Hirschheim, 2004; Goles & Hirschheim, 2000; Iivari et al., 1998; Khazanchi & Munkvold, 2003; Mingers, 2004; Moody et al., 2010; Richardson & Robinson, 2007), the IS field has abstained from actively debating about paradigms, at least in the concrete forms that Kuhn envisioned. Early attempts to theorize in IS by using paradigms were met with resistance due to, for example, the "disrepute into which this word has fallen" (Ein-Dor & Segev, 1981, p. vii), and for much of the history of the IS field, the Kuhnian paradigm was made out to be a dubious undertaking (Adam & Fitzgerald, 2000; Banville & Landry, 1989). Some IS researchers have associated paradigms with the natural sciences and monism, stating that,

> *The concept of paradigm, as Kuhn defines it, is derived from research in the physical sciences. This perspective may not serve well in the social sciences, where pluralistic models are more appropriate as the basis for understanding and analysis*. (Larsen & Levine, 2008, p. 25)

This trend of conflating paradigms with epistemology originated in the organizational sciences and the education field as part of their efforts to escape the hegemony of positivism (Hassan, 2014a; Hassan & Mingers, 2018). As a result, incommensurable research approaches developed into "paradigm wars" between positivists and interpretivists and realists and rationalists (Mingers, 2004), hampering research. Within these wars, paradigms were viewed as static, immovable structures that were to be defended at all costs, instead of as dynamically changing heuristics and frames for theorizing. Paradigms, as Kuhn (1977) describes in his response to critics, are really exemplars or concrete solutions to particular problems that can serve as the frame for solving other problems.

This theoretical plight is unfortunate. *Paradigms* have been applied successfully in many fields, not just in the physical sciences.[8] One notable example, the social construction of technology, which is often cited by IS researchers, is based on the Kuhnian paradigm. Explaining the basis of his concept of the "technological frame," Bijker (1995) notes, "the analogy with Kuhn's 'paradigm,' among other concepts, is obvious" (p. 123); he goes on to claim that the "technological frame is evidently one of the many children of Kuhn's (1970) disciplinary matrix" (p. 126). Abbott (2001, 2004) supports this view, arguing that unified sets of premises, such as Kuhnian paradigms, can function as research heuristics and therefore help frame theory. Theory can remain either stagnant by staying within an isomorphic enclosure that blinds its adherents, or progress from new paradigms that emerge from the discovery of contradictions and anomalies too glaring to be ignored (Foucault, 1970, 1972). The agnostic nature of the paradigm allows different quantitative and qualitative elements to work together to enhance creative theorizing. The *generative metaphor* (Schön, 1979) is an example of the use of paradigms to inspire perceptions of new features in the interest of generating novel views of problems.[9]

[8] Minsky (1975), a pioneer of artificial intelligence, acknowledges Kuhn (1970) as inspiration for his *frame theory*: "the basic frame idea itself is not particularly original—it is in the tradition of the 'schema' of Bartlett and the 'paradigms' of Kuhn" (p. 113). Likewise, in the social sciences, Berger and Luckmann (1966) credit Kuhn (1957) for their understanding of the social construction of reality, and Ritzer's (1980) *Sociology*: *A Multiple Paradigm Science* was based on the Kuhnian paradigm. The influence of Kuhn's paradigms is particularly evident in science and technology studies, in which Kuhnian concepts of normal science, worldviews, and scientific revolutions forever changed the understanding of progress in science and technology. Other concepts influenced by the Kuhnian paradigm include but are not limited to: Collins and Pinch's (1982) *frame of meaning*, Constant's (1980) *technological tradition*, Rosenberg's (1976) *focusing devices*, Gutting's (1980) *technological paradigm*, and Jenkins' (1975) *technological mind-set*.

[9] Using the metaphor of the pump, Schön (1983) describes how to generate new ideas for designing a paintbrush. Although the pump and the brush are two different products with two different delivery paradigms, they share developmental lines of thought in delivering paint such that the already familiar processes of one can be readily and creatively transferred to the other.

3.3 Law

Law-like statements have always been part of inductive and deductive reasoning, going back to at least Francis Bacon. [10] The hypothetico-deductive method itself, which is the dominant approach in IS research (Chen & Hirschheim, 2004; Liu & Myers, 2011), requires an inquiry "into the causes as well as the laws of phenomena—that such an inquiry cannot be avoided; and that it has been the source of almost all the science we possess" (Whewell, 1840/1967, p. 322). As this process was refined, Hempel (1965) and colleagues added other methods, including deductive-nomological (covering-law explanation), deductive-statistical, and inductive-statistical explanations, which all revolve around universal and statistical laws.

Given the centrality of laws as frames in theorizing, it is time for IS researchers to start including laws as part of their theorizing. Because a theory is essentially "a system of laws" and "theory explains the laws" (Kaplan, 1964, p. 297), laws explain facts and relate them to other facts. In many ways, laws frame theorizing processes but can, at the same time, be a part of theory. A *law* is established when the series of hypotheses is consistently tested to be true and is said to constitute *fact* when it is particular in content, or a *law* when it is general. Scriven (1962, p. 212) defines laws as generalizations that:

> *provide a framework for events that may be used to plot phenomena in need of explanation and may serve as the starting point from which events may be surveyed, in search of nonconformists, not only as the rules under which we try to bring them.*

Such a view of laws is seldom discussed within IS, partly because, to the field, even the possibility of social science laws is considered unlikely (Gregor, 2006). In a study of the top-two IS journals, Hovorka et al. (2008) found *no examples* of studies that incorporated laws as part of explanatory methods. To say that laws are not amenable to the social sciences is counterproductive if not blatantly incorrect. For example, in economics, *Say's law* (a powerful generalization that states that "products are paid for by products") and the *law of supply and demand* (which determines exchanged quantities) work with other laws, such as the *Walras's law*, to explain and constitute the *quantity theory of money* (Blaug, 1997). Laws are also not exclusive to deductive-nomological explanations or covering-law explanations. As Hempel (1965), Hempel and Oppenheim (1948), and Salmon (1984) explain, theorizing need not appeal only to universal laws, it can rely on statistical laws or noncausal laws, or other means of explanation that do not require strict causality yet are still linked to law-like statements.

Thus, the well-known Moore's law in technology, which is not a causal law in the form of "A causes B," not only explains the doubling of components on an integrated chip in eighteen months, it is so reliable that it has become part of predicting future trends, setting the pace of innovation and defining the rules and nature of competition related to digital innovations (Schaller, 1997). Instead of merely mentioning Moore's law in passing in IS studies, it could become an essential part of policy making and implementation and of theories. Such efforts are already making strides, especially in developing countries (Brewer et al., 2005). Taking Scriven's (1962) definition of laws, there is nothing to stop IS researchers from say, identifying nonconforming events (e.g., IS failures) or using established functional laws to describe rules of how systems are supposed to operate successfully without failures.

3.4 Framework

The term, *framework*—often called "conceptual framework," "research framework," or "theoretical framework"—is frequently conflated with the term *model*. Because frameworks act as an overall guide for and justify research, researchers need to critically examine existing frameworks related to the phenomenon being studied. Miles and Huberman (1994) describe the conceptual framework as the researcher's map of the territory being studied, which consists of main concepts, constructs, and related statements. It can take the form of a diagram or a narrative; it may be "simple or elaborate, commonsensical or theory driven, descriptive or causal" (p. 18). Maxwell (2013, p. 39) considers the framework to be a theory and broadens its scope to include a "system of concepts, assumptions, expectations, beliefs, and theories that support and inform" the research. Ravitch and Riggan (2012, p. xiii) view the conceptual framework as a mechanism that resolves "why the topic one wishes to study matters, and why the means proposed to study it are appropriate and rigorous." These definitions of the framework are captured by Foucault's (1972, p. 191) notion of *episteme*, which he describes as "the total set of relations that unite, at a given period, the discursive practices that give rise to epistemological figures, sciences and possibly formalized systems." In this sense, the framework is both a guide providing reasoned, defensible choices and a source of stability for theorizing and research. It is not surprising that frameworks have become some of the earliest products of theorizing used by IS researchers

[10] Francis Bacon once defined *inductive reasoning* as "nothing more than those laws and determinations of absolute actuality which govern and constitute any simple nature, as heat, light, weight, in every kind of matter and subject that is susceptible of them" (Spedding et al., 1901, p. 145-146).

(Gorry & Scott Morton, 1971; Ives et al., 1980; Mason & Mitroff, 1973) to build research programs that have continued for decades.

Unfortunately, what often takes place within the IS field is the creation of so-called "new" research frameworks that borrow pieces of existing frameworks and add one or two additional components to create a veneer of novelty. This strategy is flawed because existing frameworks contain the key theories, concepts, and epistemological and ontological grounds for the phenomenon being studied. Arbitrarily adding components to a framework risks ignoring the structures of the existing framework (Hart, 1998) that contain underlying assumptions and perspectives, including answers to questions like: What is the theory? Whose theory is it and where does it come from? What are those intellectual traditions? What is the history of the development of intellectual traditions? What are the main arguments?

Ignoring the history of the framework and its hidden assumptions jeopardizes research, especially if the assumptions and traditions of the borrowed framework contradict the current research. Additionally, when different perspectives are combined into the same framework, the researcher must explain how they fit into the same framework. For example, problems may arise when adoption research in IS (Venkatesh et al., 2003) combines concepts from social psychology, such as *attitude* (Fishbein & Ajzen, 1975), which is not temporally bounded, with concepts from communication studies, such as *relative advantage*, which assumes a change in perception over time (Rogers, 1983).

Critically examining frameworks also means interrogating existing frameworks to uncover any weaknesses that might open opportunities for a myriad of theorizing strategies. The point of working with frameworks is not to borrow existing ones but to create new frameworks for the research. The new framework integrates all the products of theorizing and helps researchers assess and refine goals, develop questions, select appropriate methods, and identify potential validity threats. If there are existing theories, then the new framework provides a place for them with respect to the research. If there are no existing theories, then the framework becomes a nascent version of one. The framework helps design the research inductively, deductively, or using any other approach, and also assists in the ensuing data collection and data analysis (Ravitch & Riggan, 2012).

3.5 Myth

It is often difficult to comprehend how myths can contribute to theory building. It is easier to imagine such a process taking place when theory emerges from breaking down a myth. A classic case of such a process is the Copernican Revolution (Kuhn, 1957), which overthrew the myth of earth being the center of the universe. A *myth* is "a dramatic narrative of imagined events, usually used to explain origins or transformations of something … an unquestioned belief about the practical benefits of certain techniques and behaviors that is not supported by demonstrated facts" (Trice & Beyer, 1984, p. 655). Myths are theory generators because, although they are frequently used to refer to mistaken beliefs or popular misconceptions, they can help uncover unquestioned assumptions within existing belief systems and theories. Lévi-Strauss (1963, 1966) viewed myths as precursors to research, especially in theories of relations, whereas Cassirer developed a theory of symbolic forms inspired by his study of myths (Cassirer & Verene, 1979). Myths become useful inputs for theories when researchers apply them counterinductively. Because myths do not separate history from research, any myth, however ancient or absurd, has the potential to build, enrich, and even revise theories and knowledge. This was the case with the Pythagorean metaphysical beliefs of the Earth's movements and the development of traditional Chinese medicine (Feyerabend, 1978).

As theory generators, myths perform multiple functions (Hirschheim & Newman, 1991; Mousavidin & Goel, 2007). They provide means of explanation; the language for studying symbols of value, solidarity, and social structure; and ways to manage conflict and contradictions (Cohen, 1969). Theorizing using nonrational myths has identified many factors with equal or greater influence on the effectiveness of system development strategies (Franz & Robey, 1984; Hirschheim & Newman, 1991). Early works by Boland (1982; 1987), Boland & Pondy (1983), Hirschheim & Newman (1991), and Robey & Markus (1984) are particularly impressive regarding the leveraging of myths, and we lament this lost art. For example, Hirschheim and Newman (1991) identified six common myths in IS development that have become common IS knowledge, such as the "overriding advantage of user involvement," "the need to ameliorate user resistance," and "the necessity of system integration."[11] Myths are closely related to

[11] Boland (1982) and Boland and Pondy (1983) introduced the notion of rational and nonrational myths, highlighting the need for research that includes both types to understand the interaction of organizations and technology. Boland (1987), for example, asserts that the "rational system" myth is noteworthy because users expect systems to meet developers' costs and efficiency demands while simultaneously accomplishing mythical goals. Theorizing using nonrational myths identifies many factors with equal or greater influence on the effectiveness of system development strategies (Franz & Robey, 1984; Hirschheim & Newman, 1991). For example, early critics of management information systems (MIS) invoked the "myth of real-time systems" (Dearden, 1966) to expose several fallacies

rites, which depend on myths for validation (Cohen, 1969), and research on both myths and rituals can be found in several classic IS studies. For instance, Robey and Markus (1984) describe how system developers use rituals to maintain the appearance of rationality while working to achieve private interests—upholding the myth of rational decision-making in systems development.

3.6 Analogy

Although research is a concrete activity requiring resources, methods, and tools, it also requires forms of abstract reasoning, including problem solving, analysis, and theorizing, all of which are supported by analogies. It is thus not surprising that analogies and similar structures, such as similitudes and resemblance, played the most constructive role as theory generators in the development of Western thought up to the Age of Enlightenment (Foucault, 1970; 1972). *Analogy*—from the Latin *analogia* for ratio or proportion—is a rational argument using a simplified, scaled-down reference to something familiar to explain or illustrate something more complex or less familiar (Bagnall, 2012; Hesse, 1967). Analogies are not merely literary devices, as they supply the raw materials for theorizing and, if suitably handled, can yield theories (Tsoukas, 1993). Within the context of discovery, analogies allow for demonstrative inferences that are difficult or impossible to achieve in purely positivist schemes of explication and justification.

Scientific modeling using analogies was a major feature of early modern science, as illustrated by many examples. Analogies of electron flow and those of wave and corpuscular theories of light were foundational to theoretical development in physics.[12] Darwin drew an analogy between artificial selection (i.e., the breeding of domesticated animals) and natural selection to argue for the plausibility of the latter. Einstein's thought experiments and discoveries can be considered elaborate analogies (Geary, 2009) that were later concretized into propositions and hypotheses. Campbell (1920, p. 119) highlighted the critical role of analogy in theorizing as follows:

> *The value of the theory is derived largely, not from the formal constitution, but from an analogy displayed by the hypothesis. This analogy is essential to and inseparable from the theory and is not merely an aid to its formulation.*

In the management field, Beer (1972, 1979) drew an analogy between the human body and the enterprise, and theorized that only five major subsystems are required to coordinate and control any organization.

Although IS studies often apply analogies implicitly, the field seldom turns to explicit analogical reasoning. A design science study (Kuechler & Vaishnavi, 2012) applying analogical reasoning to translate theoretical domains into design domains suggests that the IS field is realizing the importance of explicit analogical reasoning. Implicit analogical reasoning can be found in many IS studies but the reasoning and theorizing processes behind the analogy are typically left unexplored. For example, when Keil (1995), Keil and Robey (1999), and Keil et al. (2000) apply the term *escalation* to the context of software project management, they use an analogy originally applied in military scenarios (Kahn, 1965) that draws from similarities between intensifying conflict and climbing the rungs of a ladder. Similarly, when IS scholars study *punctuated equilibrium* or *systemic change* (Street & Denford, 2012) or describe system adoption in terms of *contagion* (Angst et al., 2010), they are leveraging analogies from other disciplines, such as geology and biology. Yet, within the IS field, such analogies are rarely analyzed.

3.7 Metaphor

Metaphors, the linguistic form of analogies, are products of theorizing that have been in use as theory generators at least since Aristotle's time (Schön, 1963). Whereas analogies are abstractions of similarities, the metaphor selects tangible things that carry the meanings of those similarities. Notions like "my broken heart" or "a fishing expedition" help communicate abstract ideas, feelings, or even legal concepts; ergo, they represent powerful theory generators (Geary, 2009). Because knowledge is construed from some point of view, all knowledge is perspectival and thus metaphoric (Brown, 1976). Consequently, metaphors are not merely rhetorical devices, but essential products of and tools for theorizing. Metaphors are valuable at any stage of theorizing, including the preliminary stages of inductive and deductive theorizing and retroductive and abductive reasoning as well as the later stages of extending existing theories.

In his *Poetics*, Aristotle defines *metaphora* as a "carrying over" from one thing to another, with *phor*

regarding the assumed capabilities of computers to support management functions. Boland (1987) described five pervasive myths, which he pejoratively called "fantasies," about information that he believed obstruct progress in IS research.

[12] In using analogies, researchers select key similarities between domains rather than features of individual objects. For example, physics researchers draw an analogy between the flow of electrons in an electrical circuit and the flow of people in a crowded subway. The analogy depicting the flow of electrons via the flow of people emphasizes the movement of the objects, not the size or shape of the people compared to electrons (Gentner, 1983, 1989).

meaning "carrying" and *meta* meaning "beyond" (Kirby, 1997). Whereas an analogy finds similarities between two different things**,** a *metaphor* "consists in giving the things a name that belongs to something else" (McKeon, 1941, p. 1476). Aristotle asserts that crafting powerful metaphors depends on the ability to perceive likeness between things that are dissimilar or likeness that might not initially be obvious:

> *The observation of likeness (homoiou theoria) is useful with a view both to inductive arguments and to hypothetical deductions, and also with a view to the production of definitions.* (Aristotle, qtd. in Kirby 1997, p. 536)

Metaphors are valuable to theorizing for their ability not only to transfer meaning but also to impress, clarify, enrich, and enlighten (Ortony, 1979). The origin of the metaphor is usually elegant, beautiful, impressive, or respected in its own way and is often spoken spontaneously (Kirby, 1997). A metaphor harnesses an entire network of analogies to accomplish its task. For example, when early computer scientists used the metaphor of the brain to describe the computer's central processing unit, they quickly transferred well-known functions of the brain to explain something unfamiliar at that time: computer processing. At the same time, this metaphor is also intended to impress and enlighten the audience concerning computer technology, thereby serving as a source for the concept of "machine learning," in turn inspiring awe for computers. Metaphors possess characteristics of good theorizing, such as originality, economy, consistency, elegance, and perspicuity. In IS research, metaphors are most often found in earlier studies and usually coupled with myths (Hirschheim & Newman, 1991; Kaarst-Brown & Robey, 1999).[13]

3.8 Model

Because no part of the complex universe can be understood without abstraction, simplified abstractions of the real world—or *models*—play the role of addressing the research question on a practical level of detail (Rosenblueth & Wiener, 1945).[14] One of the earliest theorizing works on magnetism by William Gilbert (1893/1600) applied the model of the earth as a magnet to explain why compasses point north. Likewise, biologists and paleontologists have applied principles of modeling in their attempts to predict the role that biological structures in animals play in their habitat and to thus also predict (and speculate, in the case of, for example, dinosaurs) how they can be conserved (or why they went extinct).[15]

Models can take many forms, including mathematical, analogical, physical scale, computer, or conceptual, emphasizing a different aspect of the phenomenon of interest. One well-known *mathematical* model in the social sciences is the *Black-Scholes option-pricing formula* (Black & Scholes, 1973), which models the price of an asset following a log-normal random walk in just the right way to eliminate risks. An example of a *conceptual* model is the *model for corporate social*

[13] Early examples propose organismic, sports team, and city-state metaphors for IS strategic planning, offering alternatives to the war metaphor that dominated strategic thinking at the time (Mason, 1991). Several IS articles explored the use of other metaphors to theorize about system development. Kendall and Kendall (1993) emphasized the need for developers to understand the metaphors applied to system development to better communicate with users, whereas Oates and Fitzgerald (2007) later described how metaphors help developers theorize about organizations to tailor the methodology and process for specific IS development contexts. Some IS scholars have applied Schön's (1979) notion of a "generative metaphor" to the planning and development of systems to accommodate a multiplicity of interests and relationships (Atkinson, 2003). Using the metaphor of magic as it is applied to generally accepted rituals in IS development, Hirschheim and Newman (1991) theorized about the social nature of IS development and how it affects a project's probability of success. Brynjolfsson et al. (2010) applied the metaphor of electrical utilities to describe the types of services expected of cloud computing as a utility while also theorizing several dissimilarities between electrical utilities and cloud computing.

[14] Using notions of *positive analogies* (i.e., common properties between two different objects), *negative analogies* (i.e., properties that differ between objects), and *neutral analogies* (i.e., uncertain as to whether positive or negative analogies exist), a *model* can be defined as an imperfect copy of the phenomenon of interest, consisting of positive and neutral analogies (Hesse, 1966). By analyzing the extent of positive, negative, and neutral analogies, researchers can draw out horizontal relations between model properties to the phenomenon of interest and speculate on vertical or causal relations stemming from those similarities. If both horizontal and vertical relations exist, Hesse would call those analogies *material analogies*, which enable predictions to be made from the model.

[15] As Harré (1970) explains, a model is no more than a putative analog for a real mechanism, modeled on things, materials, and processes that we already understand. Harré (1970) describes several types of models distinguished according to whether the subject of the model is also the source of the model. For instance, Weber's (1930) ideal types are models in which the subject of the model (e.g., the Protestant capitalist) is also the source of the model, just as a model airplane in a wind tunnel is constructed based on the original airplane. Harré terms these models *homeomorphs*, which can differ in terms of scale, purity, and level of detail. Models in which the subject is not the same as the model are termed *paramorphs*, which are used to model a process that is unknown or yet to be investigated. Economic models that demonstrate how the economy "expands" and "contracts" as a result of flows of activity are other examples of paramorphs. The subject of the model, the growth or shrinking of the economy, is not the same as its source, which is that of a balloon expanding or contracting.

responsibility by Carroll (1979), which is based on the dimensions of categories of responsibility, social issues, and different ways of responding to those issues. As pre-theoretical products, models can be created without any theoretical justification. A conceptual model is essentially a material analogy that is "wholly imaginary … not realized in any existing ... physical system ... modified and fitted ad hoc to the data" (Hesse, 1966, p. 67); nevertheless, because it may allude to known causal relations, it can be predictive, as Carroll's seminal model from the management literature illustrates.[16]

In the IS field, models and frameworks are among the products of theorizing that are most mentioned, but they are also among the most ambiguous and problematic. IS researchers have difficulty distinguishing models from frameworks, and they are frequently conflated with "theories." TAM and the *IS success model* are cited as the two most applied IS theories (Moody et al., 2010; Straub, 2012), even though both are labeled and depicted as models. The first difference between them is depicted in Figure 2, which shows frameworks as theory frames and models are theory generators. Second, because models are putative analogs for the phenomena of interest, they provide a means by which the researcher can theorize about those phenomena using things, materials, and processes that they already understand. Conversely, frameworks are detailed and elaborate maps that are related to the phenomena of interest and could include models. Hence, whereas models are images or representations of analogies, frameworks are detailed and elaborate maps that describe models.

Like frameworks, it is tempting to borrow models or cherry-pick elements of a theory or theories and integrate them into a new "IS theory;" to do so is relatively easy and often initially yields good results. For example, two of the most popular theories in the social sciences, the diffusion of innovations theory (DIT) (Rogers, 1983) and the theory of reasoned action (TRA) (Fishbein & Ajzen, 1977), are also among the two most applied theories in assessing the influence of IT on individuals (Lim et al., 2009). However, these theories clash because they apply different models and seek incommensurate goals.[17]

3.9 Concept

As shown in Figure 1, the process of building a unique discourse revolves around working with theory frames and theory generators to give birth simultaneously and successively to theory components. Foucault (1970; 1972) explains how the rules of formation of the discourse form the basis of the regularity within which these theory components relate to or disperse from each other. The generation of new concepts in the field become evidence for the progress of that field of study. As Nobel laureate Sir George Thomson (1961, p. 4) notes:

> *Science depends on its concepts. These are the ideas that receive names. They determine the questions one asks, and the answer one gets. They are more fundamental than the theories which are stated in terms of them.*

A *concept* is a set of ideas associated with or elicited by a given word, treated according to logical rules (Sartori, 1975).[18] Such rules imply that concepts are discipline specific and demarcate a field's subject matter, as the field is made known to the world through those concepts. For example, no one doubts that respiration and circulation are biological concepts, as relativity and quantization are concepts belonging to physics. The question is: What concepts belong to the IS field?

Concepts are not limited to physical characteristics, and are particularly amenable to behavioral and social research, as argued by Dilthey (1883/1989).[19]

[16] Carroll's (1979) conceptual model theorizes the question of what *social responsibility* means for a corporation by building on three dimensions: (1) categories of social responsibility (i.e., ethical, legal, economic); (2) types of social issues that must be addressed (i.e., environmental, product safety, discrimination); and (3) the philosophy of the response (i.e., reactive, defensive, accommodative). Contrary to the typical theoretical demands of top IS journals, Carroll (1979) offers no theories to serve as the basis for this this model of corporate social responsibility. Yet, it is a seminal work (with nearly 15,000 citations at the time of writing this article).

[17] These theories describe two different models of innovation. Diffusion of innovations theory (DIT) originates in the communication field and models innovation in terms of the flow of information. Consequently, flow-related analogies, such as *channels* that carry information, the time taken for the *rate of adoption*, and the *social system* engaging in the flow, provide a rich set of concepts and constructs to be researched. The theory of reasoned action (TRA) is a theory of behavior predicated on an individual's *behavioral intention*, which in turn is affected by the individual's *attitude*. Comparing DIT to TRA, because DIT includes a time element, it is able to describe the logistics curve of innovation, which is not possible when using TRA. Conversely, TRA's focus on attitude is only tangentially addressed by DIT.

[18] Sartori (1984) considers *concepts* as the basic unit of thinking in the same way that Dubin (1969) refers to concepts as "units" of theory. As Satori explains, "it can be said that we have a concept of A (or of A-ness) when we are able to distinguish A from whatever is not-A" (p. 74). Concepts are always associated with observable objects of study and are discipline specific because they are superimposed on our experiences as a way for us to understand the world. Several concepts can be combined to form a gestalt that engenders certain expectations.

[19] Providing an alternative to the positivistic approach of the natural sciences, Dilthey (1883/1989) argues that positivist representational facts fail to capture the human experience

Unfortunately, the social sciences, the IS field included, face challenges in clarifying their theoretical concepts. Blumer (1954), one of the earliest exponents of interpretivism, blames the vagueness of social science concepts for the counterproductive practices of reproducing abstruse research, borrowing heavily from the natural sciences and forcing our idiosyncratic categories onto a world far removed from our research. In IS, concepts are especially relevant to theorizing because the field lacks concepts of its own (Markus & Saunders, 2007). When concepts are ill-defined, tautological (e.g., "performance is the perceived effect of the manager's job performance"), or defined in conflict with everyday use or accepted research, they obscure rather than illuminate empirical reality (Czarniawska, 2013). Thus, whether IS concepts are invented or adapted, there is a dire need for conceptual development in the IS field.

Although the search for new, unique concepts has preoccupied scholars, philosophers, and scientists since before the Age of Enlightenment, the means by which new concepts are created has remained a mystery. Schön (1963) suggests that the production of new concepts is closely related to understanding how to work with metaphors and analogies. [20] Unfortunately, the IS field seldom explores the concepts it applies in research (Markus & Saunders, 2007), hindering the development of many of our core concerns (Orlikowski & Iacono, 2001; Weber, 2003; Zhang et al., 2011).

3.10 Construct

Virtually all research traditions distinguish between two groups of research terms: observables and nonobservables (Kaplan, 1964). *Observables* are either directly or indirectly observable. They form the empirical part of the research, circumscribe the locus of the problem, and help marshal the data. Nonobservables include constructs that are invented to provide solutions and measures to further research. Whereas concepts are sets of ideas from observables that allow for classification and follow certain logical rules, constructs (or codes in interpretive research) are, in essence, fictional entities (MacCorquodale & Meehl, 1948) that are abstracted from the concept, contrived to enable the use of some form of measurement or evaluation or to bridge several concepts in the study. In the IS field, concepts, constructs, and variables are often conflated and rarely distinguished, making comparison between research studies awkward. [21] Additionally, constructs should *follow* concepts since concepts are derived from observations; however, in the IS field, concepts rarely take preference over constructs. This confusion leads to further confusion and the misspecification of reflective constructs and formative constructs (Petter et al., 2007).[22]

and that "no real blood flows in the veins of the knowing subject constructed by Locke, Hume and Kant" (p. 50). He proposes that an emphatic understanding of human behavior (*verstehen*) is necessary to capture the "knowledge of the forces that rule society, of the causes that have produced its upheavals, and of society's resources for promoting healthy progress [that] has become of vital concern to our civilization" (p. 56). This emphatic understanding opened the doors to a new category of disciplines of the human sciences.

[20] He notes that "the new concept grows out of the making, elaboration, and correction of the metaphor" (p. 53). He calls this process the displacement of concepts, in which words undergo *transposition* (i.e., applying an old concept to a new situation), *interpretation* (i.e., assigning that concept to a specific aspect of the new situation), *correction* (i.e., an adjustment resulting from adaptation and modification), and *spelling out* (i.e., resolving commonalities and differences) as a way of addressing problems or improving understanding. Another way of creating concepts is by inductively deriving them from data using methods such as *grounded theory*. The process of coding in grounded theory is itself the process of *conceptualizing data* (Strauss & Corbin, 1990). Philosophers like Foucault (1972) suggest creating new concepts by first observing the context from which the objects of study emerge, what kind of authorities delineate and acknowledge their existence, and how the objects of study can be classified and organized. Depending on these factors, concepts will exhibit different forms of ordering and demonstrate various justifications for their validity and ability to transfer their meaning to different domains.

[21] A *variable* is a term that varies for concepts whose applications rely on direct or indirect (inferred) observation. In situations where the concept cannot be observed directly or even inferred, it is called a *construct*, which is a concept that is neither directly nor indirectly observable and can be defined only in relation to observables. Kaplan (1964) added that when the construct is hypothetical and its existence is dependent on the theory that creates it, it becomes a *theoretical term*. Keen (1980) was correct to criticize the IS field for not agreeing on a *dependent variable*; unfortunately, his analysis of the field's use of constructs and indirect observables was lost in the confusion. Keen proposed that the IS field should abandon using observables and constructs such as *usage* and *user satisfaction* because they have little theoretical significance to the core concern of the field: *information*. For Keen, the IS field needed to agree on a definition of information before a theoretically sound and practice-relevant dependent variable could be established. Indeed, in the positivist vein, how could the usage or usefulness of information be measured when information itself had yet to be defined? Yet decades of research in IS are dedicated to such a pursuit.

[22] These complex abstractions combine multiple concepts belonging to the field, making it difficult to unpack their actual content. Dubin (1969) called these formative constructs or abstractions *summative units*, which is similar to Kaplan's (1964, p. 80) notion of *collective terms* or *composite variables*.

In the positivist tradition, constructs help to make vague concepts such as *intelligence* more tangible and amenable to measurement, allowing the research to progress (Lewis et al., 2005). In layman's language, constructs are attempts to make concepts less "abstract" even though constructs are abstractions of concepts. They help researchers make sense of hypothetical entities, act as heuristic devices, and form what is known as the *nomological network*, an "interlocking system of laws which constitute a theory" (Cronbach & Meehl, 1955, p. 290). Although the term *nomological network* explicitly includes laws, it is commonly understood in the IS field as an interlocking system of concepts and constructs typically represented by box-arrow diagrams. In nonpositivist research, constructs are typically applied differently than in positivist research. When interpretive researchers conceptualize data, they are not inferring the existence of certain entities or postulating people's attributes; instead, they are creating "constructions of other people's constructions of what they and their compatriots are up to" (Geertz, 1973, p. 9, qtd. in Walsham, 2006)).[23]

3.11 Statement

Once a field has defined its own concepts and constructs, it can start formulating the most fundamental unit of its discourse: *statements or claims*. A *statement* is a mode of existence proper to a group of signs that describes a definite position for any subject (Foucault, 1972). This cryptic Foucauldian definition of a statement contains many layers of meaning with key implications for theorizing. First, following discourse analysis, a statement is not just any sentence, it is a mode of existence within a specific discourse that enables groups of signs to exist in a distinct way. Expressly, a statement is a claim that is subject to its discursive formation. For example, the statement "time is golden," which contains the signs "time" and "gold," when taken out of its discursive formation, bears little relation to the physical makeup of time or to its chemistry despite its use of the chemical element "gold," but does makes sense within the discursive formation of English literature. [24] Second, statements are made of signs grouped in a special manner. When a field makes a *statement*, it is not merely formulating a *sentence*, which is a series of linguistic signs following a grammatical rule (Foucault, 1972), nor is a statement the same as a *proposition*, which is the meaning of a logical declaration that bears truth value (Fawcett, 1998; Foucault, 1972). [25] Rather, it is expressing what Foucault (1972) calls an *enunciative function*, which invokes the authority of the discipline that it is associated with. As a result, a researcher who views two sets of statements can clearly distinguish an IS statement from those of other disciplines.

For example, it can be argued that the statement "user participation enhances the quality of a system" belongs to the IS field because its related concepts (participation and system quality) are IS specific and have been theorized as such. The statement derives its authority from system developers, and its context and field of emergence is the system development process. Within the field-specific context, we can ask such questions as: "When is user participation best suited?" and "What form should user participation take?" A major part of theorizing, thus, is producing meaningful statements related to the discursive formation of IS—statements that carry truth value and may be useful to society. Simultaneously, these meaningful statements "connect the dots" and uncover relations that are not necessarily obvious to the layperson. As Gibbs (1972) noted, statements "assert order in the universe" (p. 93), which is one of the goals of theorizing.

[23] Concepts such as themes, meanings, and essences of human experiences are gathered using various means, such as (1) close involvement with the participants in the field, observing, listening, interviewing, and reflecting (e.g., case research, ethnography, grounded theory); (2) coming to an understanding of or interpreting texts and social action (i.e., *hermeneutics*); and (3) describing human experience (i.e., *phenomenology*). In the nonpositivist tradition, observations and interviews are primary research methods for accessing experiences, which are typically documented in textual, visual, or other formats like field notes, transcriptions, memos, narratives, or recordings. After some form of validation, these experiences undergo an interpretive process by the researcher that transforms them into abstract concepts that are indirectly observable or nonobservable. Analogous to positivist research, the interpretation of the researcher becomes the construction (Flick, 1998; Miles et al., 2014; Silverman, 2006).

[24] Similarly, statements such as the "earth is round" and "organisms evolve" do not constitute the same statement before and after Copernicus (for the former), or before and after Darwin (for the latter) because those statements depend on the concepts, theories, and discursive formations of these scientists' respective disciplines and thus exist in different modes in different times. Namely, these statements are closely related to the theories that they represent.

[25] Several statements together can express a single proposition, and a single statement can give rise to different propositions. For instance, the table of elements in chemistry is composed of many signs but contains few sentences. Nevertheless, the grouping of signs, arranged in a special tabular manner enunciates *numerous statements* about chemical elements. Likewise, a statement is not the same as a proposition. The sentences "no other element besides gold has the atomic number 79" and "it is true that gold has 79 protons in its atom" express the same logical proposition but are grammatically distinct sentences and modally distinct statements. In the field of accounting, for example, multiple different statements may make the same proposition regarding the financial health of a company.

Statements that make assertions and form the building blocks of arguments are called *propositions*. Propositions tie together concepts using logical links to determine whether something is or is not the case (Copi & Cohen, 2001; Gibbs, 1972). Thus, the above statement about user participation, when reformulated using a logical form such as "the greater the level of user participation, the higher the probability of project success," becomes a formal *relational* proposition (Fawcett, 1998) that hypothesizes a relationship between one or more concepts, as commonly found in the antecedent-consequent type of IS research (Furneaux & Wade, 2009). Because theory takes various forms (Gregor, 2006), the propositions that make up theory also differ in nature. Theory that is descriptive could be made up of existential and definitional propositions (Fawcett, 1998). *Existential propositions* exert the existence or level of existence of a concept.[26] According to Doty and Glick (1994) and Gregor (2006), when these kinds of nonrelational propositions take the form of typologies and taxonomies, *they already qualify as explanatory theories*. *Definitional propositions* describe the characteristics of these practices in a constitutive definition, representational definition, or operational definition.[27] Hambrick (2003) considered this typology to be among the most widely tested, validated, and enduring theory in management. Although representational and operational definitions are useful inputs into causal theories (Fiss, 2011), top IS journals editors and reviewers rarely agree and often sweepingly declare taxonomies as atheoretical and exploratory and thus rarely publish them, further undermining IS theorizing.

In addition to the identity of statements, how society values them is pertinent to the IS field. Foucault (1972, p. 118) introduced the concept of the *law of rarity of statements*, which states that it is not enough simply to make a statement—statements should have ramifications for the discursive formations they occupy and, because of their value, should build connections with other meaningful statements in the larger corpus of knowledge. Consequently, the challenge for the IS field is not just to formulate statements of interest to scholars but also to be of interest and use to society at large.[28]

3.12 Hypothesis

When propositions take the form of empirically testable conjectures, they are called *hypotheses*, the product of theorizing with which many IS researchers are most familiar. Derived from propositions, usually by linking operationally defined concepts, hypotheses represent expectations about the way the world works, assuming the assertions of the model are empirically adequate. It is common to see IS researchers claim that hypothesis testing is only associated with positivist research (Orlikowski & Baroudi, 1991). However, that is an oversimplification. Flyvbjerg (2006) argues that qualitative case study research is as amenable to hypothesis testing as quantitative research. Grounded theorists (Glaser & Strauss, 1967; Strauss & Corbin, 1990) agree that, in addition to building hypotheses, the deductive processes of grounded theory require the testing of hypotheses. Hypotheses represent the most concrete form of the proposition and deal with rigorously defined concepts that undergird the claims of that proposition. Because of the focus on clarifying and sharpening concepts and relations, qualitative research is arguably better suited for both generating and testing hypotheses (Silverman, 2006).

4 Crafting Theory with the Products of Theorizing

Next, we demonstrate how a reflective and mindful application of the 12 products of theorizing supports novel and creative research. We illustrate the different roles that each product plays at various stages of research. Theorizing is a creative process of discursive practices; thus, no set rules or methods can be specified for these practices. Nevertheless, examples of how

[26] Alavi & Leidner (2001) keenly demonstrate these types of nonrelational propositions in their highly cited knowledge management research. Based on their review, they propose three common applications of knowledge management that can all be empirically tested: (1) the coding and sharing of best practices, (2) the creation of corporate knowledge directories, and (3) the creation of knowledge networks.

[27] For example, the classic Miles and Snow typology of organizational strategy (Miles et al., 1978) categorizes organizations into *prospectors*, *analyzers*, and *defenders*.

[28] Within the nonpositivist tradition, statements play an even more critical role in research because the crux of any interpretive, ethnographic, phenomenological, grounded, critical, or other nonpositivist tradition are statements made about the meanings and essence of human experience. Whereas positivist research creates statements by seeking out cause-effect relationships among its concepts and constructs, phenomenological research brackets out prejudgments, biases, and preconceptions to capture the essence and meaning of human experience and consciousness (Moustakas, 1994). Conversely, prejudgments and biases are foregrounded and highlighted in the way hermeneutical research forms its statements (Gadamer, 1975). That is, the form of statements in nonpositivist research is determined less by the relationships between concepts and constructs (as can be seen in the typical box-arrow diagram in the IS field) than by how the researcher participates in the experiences of the research subjects (i.e., *ethnography*); induces, deduces, and verifies meaning from the data (i.e., *grounded theory*); understands and interprets text (i.e., *hermeneutics*); and perceives and reduces the quality of the experience to the things themselves (i.e., *phenomenology*).

products are deployed in theorizing can be helpful to researchers. As any study proceeds, the researcher is saddled with decisions that involve the various products of theorizing, such as: How do I address the research question? Do I have the right research question? What can help me build my thesis? Where do I look for inspiration to push the research forward?

Using media richness theory (MRT) as an example, a classic theory originally crafted within management discourse but later reached its maturity in IS discourse, we reconstruct the authors' discursive practices and applications of the products of theorizing. These discursive practices, shown in Figure 2, represent one instantiation of the numerous paths that researchers can take with the products. The reconstruction is based on a combination of historical evidence, published documents, and personal communication with several of the researchers. The goal is to approach the unique logic-in-use of the researchers and as we do so, to illustrate how they come together to support discursive practices. Each path is numbered and corresponds to the discursive practice described in the following subsections. The reconstruction does not imply that there exists a universal theorizing strategy involving the products. Each study and context produces its own unique set of products of theorizing and specific paths based on the creativity of the researchers.

4.1 Raising Questions from Myth (1)

The first discursive practice in MRT began with debunking a myth. At that time, the management field entertained a myth that managers acted like orchestra leaders, performing the classic four "management activities" of planning, organizing, coordinating, and controlling. Using six different studies of managers and his own study of five American CEOs, Mintzberg (1973; 1975) found that managers are not reflective systematic planners; they spend more than 70% of their time engaging in informal verbal communication and acting spontaneously when informed.

Inspired by the debunking of this myth, Robert Lengel (1983) and his supervisor Richard Daft, formulated the problem statement that later triggered the research for his dissertation:

> *Managers spend eighty percent of their time communicating, often working under intense time pressures. As a result, many errors or problems within an organization are caused by poor or inaccurate communication. The purpose of this study has been to explore techniques which managers can use to communicate effectively.* (p. iii)

The challenge at this stage of theorizing was to decide *which questions to address.* The reliance of managers on verbal media, namely telephone calls and meetings, in the context of the increasingly sophisticated technologies of the time (email and video conferencing), raised tantalizing questions that needed answers, such as: Which media should managers use to be effective in their roles as problem solver, negotiator, master of ceremonies and rituals, and mentor? Given the reliance of managers on verbal media and face-to-face meetings that Mintzberg found, how will managers react to the introduction of information technology designed to support these tasks?

4.2 Drawing Analogies from Questions (2)

Answers to questions posed can often be found in other fields of study. Because the questions were related to how professionals communicate, Lengel found an analogous situation in the dissertation on communication channels for research scientists and engineers by Bodensteiner (1970). Bodensteiner made the point that informal channels for communicating scientific research (e.g., face-to-face meetings, phone calls, memos), are just as important or even more important than formal channels (e.g., journal articles, official reports). The similarities between the two domains were close enough for Lengel to draw an analogy from the characteristics of communications among research scientists to the context of general managers. Whereas Bodensteiner's (1970) study within the communication field asked about how the use of informal communication channels would change as a function of project uncertainties, Lengel's own questions pertained to how media choices made by managers affected the richness of information, a concern more specific to the IS field.

Following from the possibility that IS artifacts translate organizational messages at various levels of *richness*, Lengel asked if the richness of media is related to the translation richness of information. If media richness is related to the translation richness of information, then it is related to information processing needs, making it possible to predict what kind of media might be suited for managerial information processing needs.

These questions, which pertain to how information processing takes place in organizations, situated this study within the field of IS, and they gave rise to other disciplinary questions that had to be answered before the first set of questions could be addressed (Lengel, 1983): "(1) what are the task characteristics that cause a need for rich information? and, (2) how do media differ in their ability to convey rich information?" (p. 11). These questions were foundational because they provided possible answers to larger questions that were being asked about the use of communications technology for managers (Daft et al., 1987; Lengel & Daft, 1984), such as: Why do managers prefer face-to-face exchanges of information in lieu of expensive and extensive computer-based management aids, or written media in general? Why does soft information often have more impact than hard data?

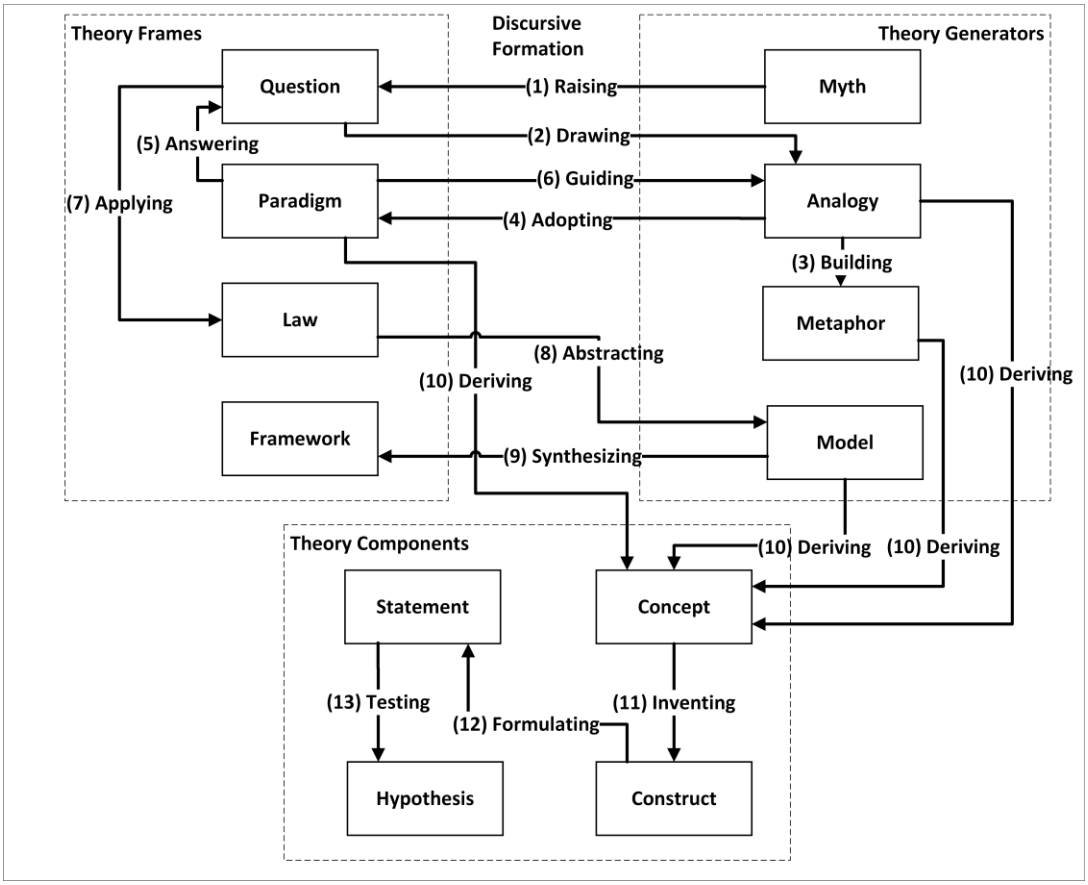

Figure 2. Application of Products of Theorizing in Media Richness Theory (MRT)

When this study was published in *Management Science* (Daft & Lengel, 1986), the disciplinary IS question was the article's first sentence: "Why do organizations process information?" It is this question that Daft and Lengel addressed in detail in their MRT studies. More importantly, in contrast to the scripted manner in which much of IS research is being undertaken (Grover & Lyytinen, 2015), Daft and Lengel not only borrowed from communication studies, they drew analogies between similar phenomena in a different discipline with the questions they posed in IS research to create new concepts that applied directly to IS phenomena.

4.3 Building Metaphor from Analogy (3)

MRT studies drew an analogy between complex managerial decision-making and the higher-level complex biological and social systems (Boulding, 1956), thereby allowing the *richness* concept to be applied also to information and to information processing (Daft & Lengel, 1986; Lengel, 1983). The analogies between organizations and complex biological systems offered two metaphors for the research: the image of the organization as an information processing machine and information as the lifeblood of human societies. The first metaphor implies that precision, clarity, logic, and rational behavior result in targeted optimal performance. The second metaphor, which compares managers to organs of the body that use information to interpret the external environment, emphasizes the intuitive, social, and nonlogical aspects of managing the organization.[29] Consequently, a later MRT study (Daft et al., 1987) directly challenged the myth that more advanced communication technologies and telecommuting would replace face-to-face meetings and enhance managers' performance.

[29] The metaphor of the organization as a machine is exemplified by the notion of the "total information system" of the 1960s research (that use supposed "objective" data and formal reports to optimize decision-making processes and enable total systems management), supporting the prevailing myth of the total MIS (Mintzberg, 1972). The biological metaphor of managers as intuitive and social elements of organizations is at odds with the machine metaphor, resulting in major implications regarding a manager's information requirements. If managers' behavior is predominantly intuitive, the information provided by formal, logical MIS will conflict with their needs. This conflict indicates why managers did not buy into newly introduced advanced communication technologies at the time—such as video-conferencing systems, supposedly capable of transmitting verbal and visual information.

4.4 Adopting Paradigm from Analogy (4)

Early theorizing for MRT was inspired by language and communication studies (Daft & Wiginton, 1979), which applied a linguistic paradigm to evaluate the quality of communications based on sound (*phoneme*), words used (*morphene*) and patterns applied (*syntax*) (Lengel, 1983). This paradigm suggests that because formal channels of communications limit coding, research scientists prefer verbal and face-to-face communication. Daft and Lengel (1983) argued that linguistics was "only one aspect of managerial communication" (p. 7). The linguistic paradigm ignored the role of media in conveying information and may have been too abstract to serve as a useful heuristic so Daft and Lengel adopted two other paradigms: Galbraith's (1973) information processing paradigm and Weick's (1979) sensemaking paradigm.

4.5 Answering Questions from Paradigms (5)

Galbraith's paradigm offered a way to link information processing and the notion of uncertainty to organization design. Similarly, Weick's paradigm provided a means of explaining media richness using the concept of equivocality. By 1986, these two paradigms were integrated into MRT (Daft & Lengel, 1986) as complementary dimensions that explained why organizations process information—namely, to reduce task uncertainty and resolve equivocality. In this case, MRT researchers used paradigms to "see his problem as like a problem he has already encountered" (Kuhn, 1970, p. 189), and extend their theorizing into new discourses to better describe the phenomenon being studied.

4.6 Guiding Analogies from Paradigms (6)

The two paradigms of information processing and sensemaking also provided guidance for MRT researchers to extend the analogies drawn from Bodensteiner's (1970) work of ranking particular communication media in their capacity to process rich information. Concepts from the information processing and sensemaking paradigms such as structural mechanisms that reduce uncertainty, facilitate the transfer of richer information, and reduce equivocality were analogized to Bodensteiner's (1970) concept of richer subjective and personal media. Both uncertainty reduction and equivocality reduction were integrated to create new concepts.

4.7 Applying Law from Questions (7)

MRT studies did not establish any laws because many of their hypotheses faced challenges from follow-up empirical studies. However, MRT studies did implicitly apply the *law of requisite variety* (Ashby, 1968), which states that the number of states of the control mechanism must be greater than or equal to the number of states in the system being controlled. This implicit example of the use of laws in theorizing is an instance of where laws initiate the theorizing process rather than become the result of a theorizing process. MRT is one of the few research studies in IS that discusses general laws (Hovorka et al., 2008). Other than McLuhan's (1988) proposed *four laws of media*, there appears to be no general law of media characteristics that could serve as part of the system for governing managers' behaviors and media choices. The law of requisite variety (Ashby, 1968) fulfills this role in the case of MRT. Thus, to stabilize the organization, the control mechanism that addresses information needs requires multiple coding systems, cues, and rapid feedback, which are the concepts that MRT applies in its model.

4.8 Abstracting Models from Law (8)

Following the law of requisite variety (Ashby, 1968) that requires the use of multiple coding systems, cues, and rapid feedback to stabilize the organization, the MRT model is based on the fit between information processing and effective media. This fit model abstracts the complex decision-making processes that managers undertake as reducing uncertainty and resolving equivocality through media, focusing on media choices made by managers. In this model, the richness of information reflects the amount of change in understanding from interpreting the information communicated. This fit model of MRT is visualized by several conceptual models. The first uses two dimensions—uncertainty and equivocality—to construct a two-dimensional conceptual model that categorizes four kinds of events and problems that managers address via their communication processes. The second model relates seven structural mechanisms (group meetings, integrators, direct contact, planning, special reports) on a continuum with respect to their capacity for reducing uncertainty and resolving equivocality. The third model defines two underlying task characteristics—task variety and task analyzability—that link the structural mechanisms and the richness of information required to accomplish different tasks. All these homeomorph models represent distinct aspects of complex managerial communication and decision-making processes.

4.9 Synthesizing Framework from Models (9)

All these models are used to synthesize the MRT research framework (Figure 3), which maps out the background of the research and the main concepts (elaborated below) to their associated propositions. Although this framework looks like a box-arrow diagram, it is *not* a causal model, and includes the uncertainty-equivocality model, the structural mechanism model, which houses the different media and their capacities to process information, and the task characteristics model, which is related to information

processing requirements. The original framework in Lengel's dissertation included additional concepts not shown in the diagram, such as moderating variables of personality, organizational culture, and geometry. In implementing this framework, Daft and Lengel recorded the manager's preferred media choice rather than the manager's actual use of media, which became a point of contention for MRT's challengers. Thus, critics (e.g., Dennis & Kinney, 1998) maintain that the central proposition of MRT—i.e., the use of richer media in equivocal situations results in higher performance—was never actually tested.

The framework that was built from the communication-based models of the earlier MRT studies (Daft et al., 1987; Lengel, 1983) emphasized information flows and information processing concepts. In this framework, the translation of information, richness of information, analyzability of tasks, equivocality, and uncertainty all contributed to the main concept of media richness and the role of media in managerial communications and performance.

MRT's problem originated from the management discourse (i.e., Mintzberg, 1973), but the inspiration and the concepts for addressing the problem come from the communications field (i.e., Bodensteiner, 1970). As Daft and Lengel continued their study, the discourse shifted from purely management or communications concerns toward the IS discourse. The rules of the discourse, the discursive formation, shifted from how to get work done through others (i.e., management), and the format, content, and channels of human communication (i.e., communication studies) to the capacities of different structures and IT artifacts and implications on organization design and performance of the IS field (Daft & Lengel, 1986; Daft et al., 1987). Working within the IS discursive formation, Daft and Lengel were able to explore more interesting questions concerning the relationship between information processing, media, and managerial tasks that would *not* have been asked had the theorizing process stayed with the management or communication studies disciplines.

4.10 Deriving Concepts from Paradigm, Analogy, Metaphor, and Model (10)

Guided primarily by multiple paradigms, MRT researchers used the pre-theoretical products of theorizing, including analogies, metaphors, and models, to derive many new concepts that would become part of the MRT research framework. MRT studies introduced the new IS concept of *media richness* by analogizing Bodensteiner's (1970) concept of channel fitness to the concept of media richness. By doing so, MRT studies attributed to media the very concepts that Bodensteiner had applied to communication channels. MRT studies also borrowed from the information processing paradigm the concept of *information richness*, defined as the extent to which information changes understanding as a result of its interpretation. Lengel (1983) *transposed* concepts of channel richness and information richness from the discourse of communication in research organizations to the discourse of managerial communications. This transposition enabled MRT authors to invent new concepts such as *translation, execution, and translation richness*. MRT studies also suggested certain propositions about managers' information needs. This transposition of concepts enabled MRT's creators to *interpret* how managers acquire and disseminate information—what would in subsequent articles be transformed into the concept of *sensemaking*—and the role of media in meeting their information needs. By conceptualizing richness in terms of information needs and media capacity, the MRT authors were able to use IS concepts to theorize how managerial communication is linked to information processing.

4.11 Inventing Constructs from Concepts (11)

Bodensteiner (1970) derived two constructs to define the concept of information channel richness: the channel's *capacity* and its *capability*. Using these constructs and their related variables, Bodensteiner ranked communication channels according to their richness and found a positive relationship between the use of richer channels and periods of uncertainty in projects. Analogously, Lengel (1983) derived three constructs for the concept of information richness: the *variety of information cues* a medium can use, its *feedback capability*, and its *personal or impersonal nature*. Lengel's set of constructs differs from Bodensteiner's in that the former are characteristics of media rather than characteristics of the communication channel.

Both Daft and Lengel and Bodensteiner characterize oral media as being more personal than written media. The way that the constructs of media and the concept of translation richness are defined as *inherent* and *objective* characteristics of media or situations reflects the positivist nature of the MRT study. As in any positivist study, the choice of concepts and constructs is critical. Indeed, both the concept of media richness and that of translation richness are summative or composite terms that often create complications in research and in theorizing.

4.12 Formulating Statements from Constructs (12)

With the help of a pilot study, MRT researchers defined their core concepts and constructs, which were used to formulate statements that describe how those concepts relate to each other. The primary statement is that "managers will be more effective and efficient communicators if they chose rich media to do translation tasks and less rich media to do execution tasks" (Lengel, 1983, p. 55).

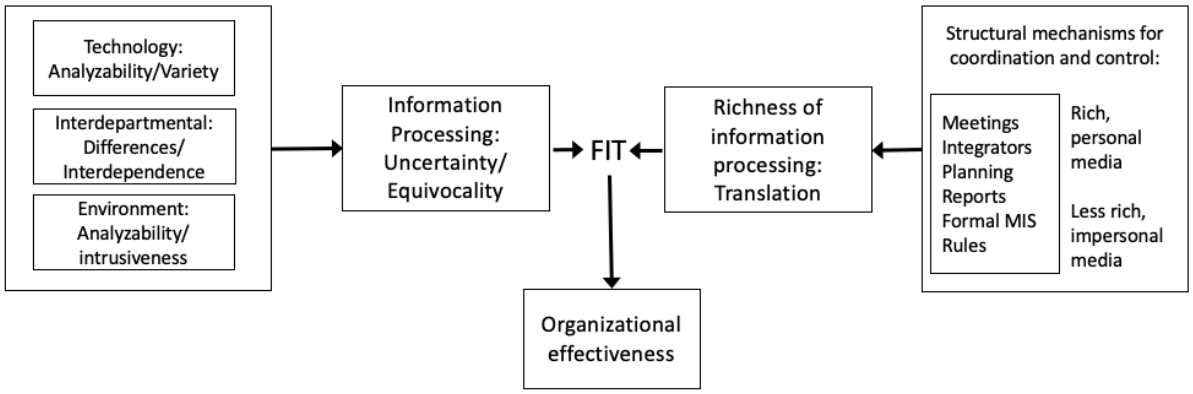

Figure 3. MRT Framework Adapted from Daft and Lengel (1986)

Because tasks demonstrating high equivocality require more coordination and exchange of opinions, Daft and Lengel (1986) suggested that the use of more personal oral communication media would be related to higher levels of information processing. These statements do not imply that other factors (e.g., organizational mandates, personal preferences, culture) have no influence on the choice of media, only that a significant relationship exists between the preference for rich media and ambiguous, emotion-laden communication.

4.13 Testing Hypotheses from Statements (13)

Based on the biological metaphor that complex information requires equally complex processing, a simple regression plot of the richness of media against the richness of information would show a strong positive relationship. This proffered relationship became the basis for constructing several hypotheses in MRT. These hypotheses were refined by the information processing and sensemaking paradigm by the time a portion of Lengel's dissertation was published in *MIS Quarterly* (Daft et al., 1987). Chi-squared tests for the first hypothesis showed that media richness is not independent of translation richness, and results from testing the second hypothesis showed that managers prefer oral media over written media when communication situations are equivocal. The results also supported the third hypothesis, which states that managers who choose the most suitable media perform better. These results were challenged by follow-up studies reporting no such conclusive results (Dennis & Kinney, 1998; Markus, 1994; Rice, 1992).

These propositions and hypotheses underwent changes during the theorizing process and these changes contributed to problems that would later be addressed by other IS researchers. Lengel's (1983) dissertation, which was guided by the linguistic paradigm, focused on "the richness of information conveyed or the amount of convergence required to reach understanding" (p. 2), represented by the concept of *translation richness* (or information richness). Later MRT studies (Daft et al., 1987; Lengel & Daft, 1984) *corrected* translation richness (which originally represented the amount of convergence required to reach understanding) into the concepts of uncertainty and equivocality. This change marked the first major source of contention in MRT-related studies. Follow-up studies showing managers using written media (email) to resolve equivocal situations contradicted MRT's claim that oral media is better suited for such situations. These conceptual differences led other studies to challenge MRT.

The frameworks that were built in studies that challenged MRT, including *media synchronicity theory* (MST) (Dennis & Kinney, 1998; Kinney & Watson, 1992; Rice, 1992; Valacich et al., 1994), emphasized the notion of new media, social presence, task activities in a group context, and group-related outcomes. Notably, the concepts applied in the MRT and MST research frameworks are starkly different. It is thus not surprising that studies challenging MRT found contradictory results. The goal of the MST study was not to refine or fix the existing MRT theory. MST offered a completely new theory that could explain the capabilities of new media. Consequently, the authors of MST built a fresh framework for their research while remaining in the same general area of study.

As the case of MRT demonstrates, not only are the products of theorizing useful in themselves, but it is also reasonable to assume that if theorizing includes more such products, the quality of theorizing and therefore the quality of the research will be enhanced. As the researcher works on defining each product and its relationship with other products, the overall coherence of the research improves. This does not mean that all products require the attention of the researcher, because each research area is contextually unique; however, the consideration of more products in the theorizing process suggests that researchers, or members of a subfield, have expended an adequate level of effort in laying the foundation for the research.

5 Conclusion

The status of theories in the IS field and the process of theorizing are being called into question. To address these issues, we assemble the intermediate products of the theorizing process that can be found scattered in theorizing resources from different disciplines and offer a coherent view of how theorizing can be enhanced in IS. As the examples in our editorial demonstrate, considerable theoretical progress is made when the products are identified, explicated, unpacked, synthesized, and transformed in the theorizing process, bringing the results closer to becoming a theory ready to be empirically tested. The processes of theorizing in which these products are involved are described in Hassan et al. (2019), and the wide-ranging implications from using these products of theorizing for researchers, reviewers, and editors are summarized in Table 2 below.

A focus on pre-theoretical products frees IS researchers to make bold conjectures and undertake innovative research that eschews the "incremental adding-to-the-literature contributions and a blinkered mindset" (Alvesson & Sandberg, 2014, p. 967), and allows them to progress forward unencumbered by the fear that their research will fail to make a theoretical contribution. Regardless of whether theorizing uses a positivist, interpretive, critical, critical-realist, or any other nonpositivist approach, the products of theorizing play a critical role in advancing research in a productive and innovative fashion. The beauty of the products lies in their ability to open up spaces for scholarly discussion within any IS subfield and between distinct subfields, encouraging more research in the context of discovery rather than in the context of justification (Hanson, 1958). Using a clear explication of the products and a pragmatic way forward, we trust that this manuscript will make the process of theorizing less of a mystery and more of a way to inspire innovative thinking in IS research.

Table 2. Implications from Using Products of Theorizing

Products	Implications
Discursive formation	Clarify within which discourse the research is undertaken and around which axis of cohesion the study is coalescing. Is it really extending IS research or is the research extending social psychology, computer science, economics, or other reference disciplines? Along which boundaries of various discourses are the cross-disciplinary studies being conducted?
Question	Problematize the research based on disciplinary questions. What makes the research question IS-specific? Are the same questions being asked by other disciplines or is the research asking questions that other disciplines are incapable of answering?
Paradigm	Leverage exemplars in paradigms. Identify contradictions that could become the source of new paradigms. What paradigms exists out there that could provide concrete problem solutions for the research? What generative metaphors exists that could inspire novel views for the problems at hand?
Law	Identify generalizations that could serve as starting points for events to be examined. What social laws support IS theorizing?
Framework	Recognize and marshal the total set of relations of epistemological elements that address why the topic matters and why the means proposed are appropriate and rigorous. What intellectual tradition, system of concepts, assumptions, beliefs, and theories support and inform the research? What weaknesses within existing frameworks open opportunities for theorizing?
Myth	Interrogate unquestioned assumptions, common knowledge, or unproven beliefs. Has the researcher explored nonstandard tools or methods available at hand to investigate symbols of value, solidarity, and social structure that have held despite conflicts and contradictions?
Analogy	Draw analogies from similar structures in different domains in order to illustrate the phenomenon under investigation using a simplified reference to something more familiar. What scaled-down reference is capable of demonstrating and explaining something more complex?
Metaphor	Harness the entire network of analogies in physical or linguistic objects that are different from the phenomenon being studied but are able to clarify, enrich, and enlighten. What metaphors exist that describe the phenomenon in an original, economic, consistent, and elegant manner?
Model	Abstract the phenomenon of interest using positive and neutral analogies in order to build a precise and economic representation of selected elements and relationships. What models can reveal the consequences of making certain assumptions or excluding certain elements?
Concept and Constructs	Invent IS-specific set of ideas that demarcate the IS field's subject matter and declare to the world the identity of our field. What concepts belong to the IS field?
Statement	Connect all the products of theorizing into meaningful IS statements that make claims, carry truth value, and are useful to society. Which IS statements connect the dots and reveal relations that are not obvious to the layperson? Which IS statements assert order in the universe?

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