The process of information systems theorizing as a discursive practice

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THE PROCESS OF IS THEORIZING AS A DISCURSIVE PRACTICE

ABSTRACT

Although there has been a growing understanding of theory in the Information Systems (IS) field in recent years, the process of theorizing is rarely addressed with contributions originating from other disciplines and little effort to coherently synthesize them. Moreover, the field's view of theorizing has traditionally focused on the context of justification with an emphasis on collection and analysis of data in response to a research question with theory often added as an afterthought. To fill this void, we foreground the context of discovery that emphasizes the creative and often serendipitous articulation of theory by emphasizing this important stage of theorizing as a reflective and highly iterative practice. Specifically, we suggest that IS researchers engage in foundational theorizing practices to form the discourse, problematize the phenomenon of interest and leverage paradigms, and deploy generative theorizing practices through analogies, metaphors, myths, and models to develop the IS discourse. To illustrate the detailed workings of these discursive practices, we draw on key examples from IS theorizing.

KEYWORDS

Information systems theory, theorizing, research methods, discursive practices, problematizing, paradigms, analogies, metaphors, myths, models and concepts

THE PROCESS OF IS THEORIZING AS A DISCURSIVE PRACTICE

INTRODUCTION

Compelling progress has been made in describing the nature of Information Systems (IS) theory (Gregor, 2006; Gregor and Jones, 2007) and in evaluating and refining existing theories (Grover et al., 2008; Weber, 2012). However, there is an intense debate regarding what constitutes IS theory and the role of theories in IS (Avison and Malaurent, 2014; Bichler et al., 2016; Gregor, 2014; Holmström and Truex, 2011; Lee, 2014; Markus, 2014) with disagreement concerning native theories in the IS field (Grover et al., 2012; Straub, 2012). Some IS scholars argue that a theoretical core is unnecessary and logically indefensible (King and Lyytinen, 2004; Lyytinen and King, 2004; Lyytinen and King, 2006), whereas others maintain that the IS field's legitimacy cannot be established without core theories (Orlikowski and Iacono, 2001; Weber, 1987; 2003; 2006). Much of this controversy can be traced to the general problem of defining what does or does not constitute theory:

> *Theory belongs to the family of words that includes guess, speculation, supposition, conjecture, proposition, hypothesis, conception, explanation, [and] model, so if everything from a 'guess' to a general falsifiable explanation has a tinge of theory to it, then it becomes more difficult to separate what theory is from what isn't* (Runkel and Runkel, 1984) as cited in Weick (1995b, p. 386).

Literature on theory and theory development in the human sciences are plentiful, but they focus on differing goals and issues, and they vary across different disciplines such as sociology (Blalock, 1969; Dubin, 1969; Jaccard and Jacoby, 2010; Kaplan, 1964; Merton, 1968; Stinchcombe, 1987), psychology (MacCorquodale and Meehl, 1948), management (Bacharach, 1989; Corley and Gioia, 2011; Corvellec, 2013; Eisenhardt, 1989; Eisenhardt and Graebner, 2007; Gioia and Pitre, 1990; Morgan, 1986; Weick, 1989), entrepreneurship (Reynolds, 1971) and nursing (Fawcett, 1998). Such disparate efforts have resulted in a landscape of theory that is

complicated (Corvellec, 2013), and has long been described as nothing short of "incredible anarchy" (Freese, 1980, p. 189) with conflicting views of theory in management-related fields persisting to this day (Byron and Thatcher, 2016). In the context of IS research, Avison and Malaurent (2014) suggest that the desperate search for, and over-emphasis on IS theory, has produced uninteresting research, and Grover and Lyytinen (2015) claim that scripted research strategies that domesticate theories from other disciplines has led to lack of boldness and originality in IS research. Meanwhile, Markus (2014), in defense of theories, suggests that it is the narrow or conflicting notions of theory that lead to trivial and uninteresting findings.

Weick (1995b) anticipated these issues and argued that the problem lies not in the theories themselves, nor in arguing about whether research contributions constitute theories; rather, the problem and the solution lies in the *process of theorizing.* Instead of assuming the dichotomy between what theory is or is not, Weick (1995b) suggests viewing theory as taking the shape of a continuum that is often approximated. By their very nature, theories are incomplete, for no one theory can explain and include all phenomena, and thus, they can only be approximations. These approximations, which are essentially interim struggles in the process of theorizing (Runkel and Runkel, 1984), hold the key to building exciting theories by opening spaces for future thinking (Moore, 2004) and as critical steps toward developing better theories. Unfortunately, with the exception of several classical studies (e.g. Peirce (1893-1913/1931-1958)), and more recent studies concerning modes of logical reasoning such as deduction and induction (Adler and Rips, 2008; Ochara, 2013), most of the resources on theory development focus historically on articulating and testing hypotheses (Chamberlin, 1890) instead of what precedes these steps. In fact, the term "theorizing" has never been clearly defined and has

consequently been ignored in the philosophy of science itself (Swedberg, 2012; 2014c). To wit, Weick (1989, p. 516) emphasizes that:

> *Theory cannot be improved until we improve the theorizing process, and we cannot improve the theorizing process until we describe it more explicitly, operate it more self-consciously, and decouple it from validation more deliberately.*

As such, we agree with the scholars who emphasize the need for more theorizing and join a growing list of recent studies from our peers in the management and social science fields that are focusing more and more on the process of theorizing (Cornelissen and Durand, 2014; Ketokivi et al., 2017; Mantere and Ketokivi, 2013; Swedberg, 2012; 2014c). Calls to focus on theorizing as a discursive and reflective practice have already been made by IS scholars (Burton-Jones et al., 2014; Gregor, 2018; Truex et al., 2006), as well as by scholars from other disciplines, including education (Luke, 1995), organization science (Alvesson and Karreman, 2000), and nursing (Sargent, 2012). We add to this discussion by drawing on Foucault's (1972) notion of *discursive formation* to advance knowledge on the forgotten stage of research known as the *context of discovery* (Hanson, 1958; Kaplan, 1964) as a contribution to our understanding of IS theorizing and as a complement to studies on theory development in general. Foucauldian discourse analysis is not the only basis for informing the theorizing process. Many other philosophers and social theorists such as Giddens, Chomsky, Derrida and Habermas have all contributed and even disagreed with Foucault on several topics. However, very few offer the kind of depth of analysis into discourses of theorizing as Foucault did, especially on how discourses are organized and how power and knowledge in discourse are mutually constructive. Our framework also includes supportive arguments from many other theorists including Reichenbach, Merton, Kaplan, Hesse, Weick and Swedberg. We submit that a focus on the theorizing process within the context of discovery holds the key to building exciting IS theories.

THE CONTEXT OF DISCOVERY

For most social scientists and IS researchers, the logic of discovery (Popper, 1959) implies the development and testing of hypotheses (Chen and Hirschheim, 2004; Orlikowski and Baroudi, 1991) as a process that requires strict adherence to rigorous rules in order to meet the requirements of research and science (Nickles, 1980; Schickore and Steinle, 2006). In this process, research starts with proposing hypotheses and then proceeds to the empirical stage during which data is collected and analyzed to test those hypotheses. Reichenbach (1938) and Popper (1934) coined this process as the "context of justification" to prioritize it from what typically precedes it, which they call the "context of discovery." Thus, the *context of justification* is the stage of research in which the idealized logic of science, a reconstruction of the actual steps and thinking that took place, is presented in its perfected and refined form. Although many researchers begin this process with some kind of theoretical framework, theory is often added as an afterthought (Kaplan, 1964). By contrast, the *context of discovery* is the stage of research that represents the *actual* steps and thinking of the researcher, in which the practice of theorizing in the form of "disciplined imagination" (Weick, 1989) takes place and "intuitive leaps, false starts, mistakes, loose ends and happy accidents clutter up the inquiry" (Merton, 1967, p. 4). Despite this apparent messiness, it is this stage of research that exhibits the creativity and serendipity of discoveries. A summary of this stage of research is depicted in Table 1 at the end of the paper consisting of various practices including problematizing the phenomena, leveraging paradigms, bridging discursive and non-discursive practices, analogizing, metaphorizing, modeling and constructing the research framework, all taking place outside the context of justification.

Although the reconstructed logic (Kaplan, 1964) of the context of justification is cleaner, easier for reviewers and editors to understand, and facilitates publication, the deductive logic that

underpins it cannot infer anything beyond the data provided by its premises (Gauch, 2003) which in turn, limits the possibilities for new discoveries that makes for interesting research (Orlitzky, 2012; Schwab et al., 2011). This distinction is noteworthy to IS researchers because the research approach characterized by the context of justification, which is "concerned with the hypothetic-deductive testability of theories" (Chen and Hirschheim, 2004, p. 201), remains the dominant approach within IS research not only in North America but also in Europe (Liu and Myers, 2011). As Reichenbach (1938) notes, the researcher's subjective thinking processes, and the discursive activities that follow, which represent the context of discovery, are more valuable than the same researcher's "rational reconstructions" (p. 5), which take place in the context of justification. The creativity of the researcher is most strongly pronounced within the context of discovery, and foregrounding this stage of theorizing allows us to understand the researchers' creative strategies that led them to realize their goals (Swedberg, 2014b).

We are not suggesting an abandonment of the context of justification and its related logic and methods. The associated rigor that constitutes the context of justification provides the scientific enterprise its credibility and authority. We suggest, however, that the preceding stage of research characterized by a logic-in-use—the modus operandi of great scientists—has been largely ignored within the IS field and allied disciplines. The likes of Emile Durkheim, Max Weber, Karl Marx, and Bronisław Malinowski did not begin their research with a scripted research approach or a theory domesticated (Grover and Lyytinen, 2015) from their reference disciplines. Instead, they imagined and theorized the core concerns of their phenomenon of interest (Rappaport, 1987), including the occurrence of suicide, the growth of capitalism, and the question of class conflict and universal culture—while not ignoring the fruits of serendipity.

Our juxtaposition of the context of discovery and the context of justification does not imply that the context of discovery is applicable only to hypothetico-deductive research. Other approaches such as interpretive and critical research naturally place a focus on the context of discovery, as seen for example, in the grounded theory method. Unlike hypothetico-deductive research, the theorizing process in grounded theory (Glaser and Strauss, 1967) is documented in detail through the various steps such as comparative analysis, conceptual clarification and developing theoretical sensitivity. This study enriches those approaches by describing the theorizing process at a deeper level for researchers. Foucault (1972, p. 64) describes this process of theorizing as the formation of strategies in the human sciences, 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.*

For example, even though the computer as an object of study in the IS field is the same as in computer science, the IS field formulates its propositions surrounding that object using a strategy that is different from the one based on symbol-processing rules in computer science (Denning, 1999; Newell and Simon, 1976). Because each field of study follows different rules of forming its discourse, and strategizes in different ways, each field builds different theories concerning their phenomenon of interest. Thus, each discipline lays claims to their own unique theories.

Viewing theorizing as strategizing is not unlike witnessing how a good chess player strategizes his or her game. A chess player who follows the rules of the game is not guaranteed a win, but it would be wise for that player to follow the rules if the player seeks to win (Kaplan, 1964). Beyond following the rules of the game—which metaphorically represent how elements of theorizing can be applied to the process within each discipline—the chess player strategizes each move to win the match. Similarly, in the context of discovery, strategizing requires

intuitively and imaginatively working with the elements of theorizing. Although there may not be a prescribed set of rules for how that can be accomplished, theorizing can be learned and taught (Swedberg, 2014c) in the same way that Rivard's (2014) "Ions of Theory Construction" can be marshalled for crafting new theories. Accordingly, our goal is to advance knowledge on how theorizing, and most importantly theorizing in the context of discovery, can be undertaken by IS scholars with key examples from the field.

We define theorizing as making certain claims in the form of statements that reflexively apply specific rules of formation to constitute a discourse within a field, thus creating "a group of statements in so far as they belong to the same discursive formation" (Foucault, 1972, p. 117). Thus, when the claim that "user involvement in systems development enhances the likelihood of system success" was examined by Ives and Olson (1984) early in the history of IS, they engaged in theorizing using a set of rules pertaining specifically to IS, and not, say, to computer science. This set of rules, or discursive formation, governs how additional statements are enunciated by that field, and those additional statements constitute the field of study itself. As Ives and Olson (1984) examined the various concepts and constructs surrounding user involvement, user roles, system type and the expected outcomes in system quality and level of acceptance, the discourse of IS was simultaneously constructed, and from their practice of theorizing, ironically discovered a lack of theory in earlier frameworks, thereby raising doubts about the claimed benefits of user involvement.

Theorizing within a field of study implies that the statements enunciated by that field of study should differ from the statements enunciated by another field, thus distinguishing economic discourse from legal discourse, medical discourse from biological discourse, and computer science discourse from IS discourse. At the same time, each discourse is comprised of

different sub-discourses. For example, the economic discourse developed mercantilist, Physiocratic, classical, Keynesian (Foucault, 1970), and monetarist discourses throughout its history, each making different claims based on different rules of discourse concerning how value and prices are determined, and how human economic needs and wants could be satisfied.

Even with these differences, a sense of unity in discourse allows a community of scholars to say that they are talking about "the same things," "at the same level," or "applying the same or different principles" with their colleagues. This practice of theorizing is what Foucault (1972) calls *discursive practices* (pp. 46, 48–49), in which certain relations among a heterogeneous group of concepts, claims, and other discursive practices are built. Discursive theorizing practices include, but are not limited to, formulating ideas, creating imagery, and engaging in deductive or inductive reasoning or logical inferencing. These discursive practices consist of "a body of anonymous, historical rules, always determined in the time and space that have defined a given period, and for a given social, economic, geographical, or linguistic area," which define the conditions for the formation of concepts and claims (Foucault, 1972, p. 117). This formation of the discourse from claims and statements is not unlike how discursive practices enact identities in social media, business consulting, and market categories (Vaast et al., 2013). The outcome of these discursive practices—the discourse—often develops into a field of study that is stable enough to be given a name (e.g., how specific discursive practices became to be known as *Information System*s) but at the same time is always in a constant state of renewal, subject to ongoing discoveries, criticisms, and corrections.

A FRAMEWORK FOR FOUNDATIONAL AND GENERATIVE DISCURSIVE PRACTICES

Following these ideas of the context of discovery as discursive practice, Figure 1 depicts IS theorizing as a set of foundational and generative discursive practices that deploy different strategies to produce specific theory components. Hence, the ultimate goal of foundational and generative theorizing practices is to produce the components of a theory, such as concepts, claims, and theory boundaries (Bacharach, 1989) that name and describe the phenomenon of interest, all of which are organized into a research framework. Theorizing as discursive practices requires that the building of such a framework be organically connected to the foundational and generative practices.

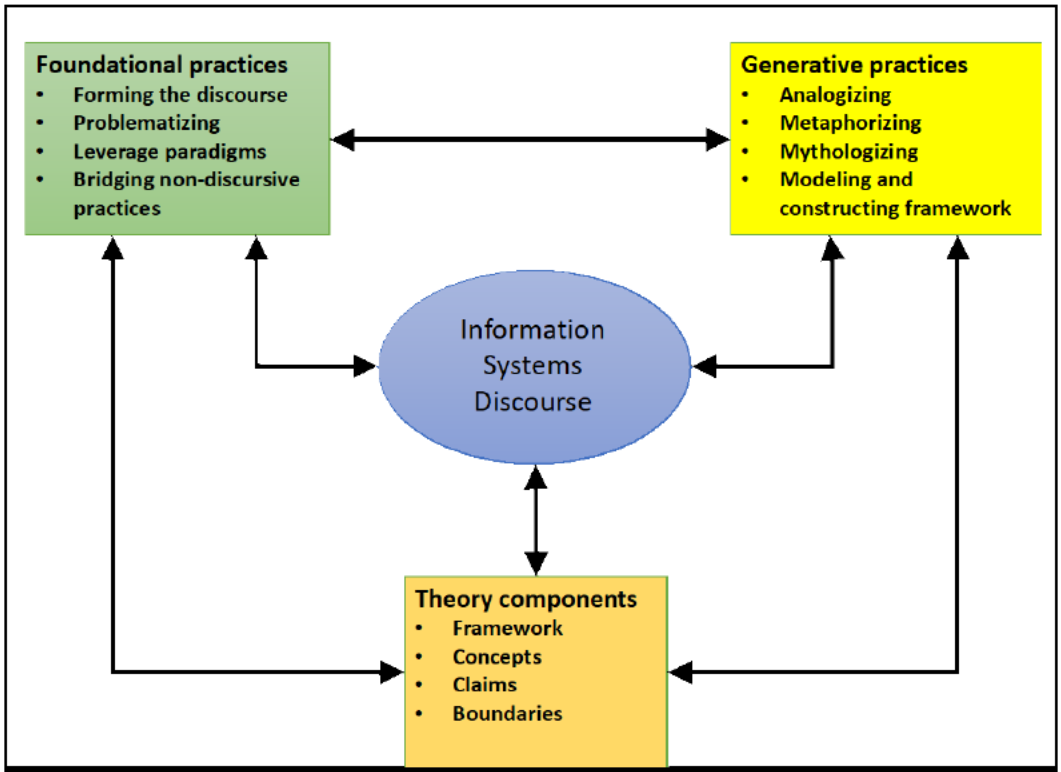


Figure 1: IS Theorizing as Discursive Practices

Often students are told, after crafting their research or dissertation proposal, that they lack a theoretical framework (Ågerfalk, 2014). A frequent reaction to this critique is to force an ill-

fitting theoretical scaffold over that existing effort, which brings with it additional problems that distract the research from its goals. Others may start by uncritically importing a theoretical framework without the requisite theorizing practices. By distinguishing between the "research" framework and the "theoretical" framework, Ravitch and Riggan (2012) highlight the need for requisite theorizing practices to take place in building the research framework before importing them. The domestication of theory that is often blamed for bland, uninteresting research (Grover and Lyytinen, 2015; Oswick et al., 2011) can be traced to this wholesale borrowing of foreign research frameworks.

The need for the theoretical framework to be consistent with the discursive practices of the research can be seen by analyzing the concepts and claims that are introduced into the framework. A concept is a set of ideas associated with or elicited by a given word, treated according to logical rules (Sartori, 1975). Such rules imply that concepts are discipline-specific and they demarcate a field of study's subject matter, as the field declares to the world what those concepts represent. It therefore makes little sense for researchers to uncritically import foreign concepts and claims into their framework without the necessary requisite discursive practices. Furthermore, the chosen concepts are tied together in one or more claims, the most elementary unit of a field's discourse. In Foucauldian terms, since a claim represents a definite position made by a field of study on any subject, the choice of concepts becomes critically important for the field since the ability of a field of study to produce its own unique concepts and claims is evidence that the field is making disciplinary progress (Foucault, 1972).

As Schön (1963) emphasizes, producing new concepts and claims is the *raison d'etre* of all disciplines and has been a mystery since antiquity. The same goes with the IS field in its

efforts to invent its own concepts (Markus and Saunders, 2007), in particular surrounding its core concerns—information and systems. Peter Keen (1980) once counseled:

> *Until we have a coherent definition of "information" we have nothing to measure. Surrogates for improved information, such as user satisfaction or terminal hours of usage, will continue to mislead us. (p. 9)*

Only recently has the IS field seriously engaged in what "information" means (Boell, 2017; McKinney and Yoos, 2010; Mingers, 1995; 1996) and what "systems" entail when they are coupled with information (Lee, 2010; Lee et al., 2015). The theorization of these terms should result in concepts and claims that belong to the IS field (Markus and Saunders, 2007) because it is through such meaningful and precise terms that the IS field declares its subject matter to others (Kaplan, 1964).

According to Foucault (1972), a theory does not just define relationships between several concepts as is often stated (Bacharach, 1989; Whetten, 1989), but also acts as a strategic choice of addressing its phenomenon of interest, arranging different forms of enunciations, manipulating concepts and giving them rules for their use, and placing those concepts into a constellation that could create new discourses. This definition fulfills the goals of theory not just to describe, analyze, explain, and predict (Gregor, 2006), but also to uncover, to excite, to inspire, and to be productive. It is no surprise that the expression "crafting strategy" alludes to the same essential activity as the expression "crafting theory," an activity that produces rules but in itself does not have a set of explicit rules (Swedberg, 2014b). Therefore, based on the nature of theories as strategic choices, theories can also be defined as regulated ways of practicing the possibilities of discourse.

The nature of theory as a productive force that produces new discourses is lost when it is viewed merely as means for explanation or prediction, as is commonly understood within IS

circles. This generative nature of theory is especially obscured when theory is added as an afterthought to dress up the research for publication. The work of Ferdinand de Saussure (1916/1966) illustrates this productive nature of theory when he proposed a theory that distinguished two concepts that were previously assumed to be inseparable: *langue* (language) and *parole* (speech). Saussure's strategic choice made possible a new discourse of historically studying languages which, because of the assumed inseparability of language and speech, was hitherto impossible. Doing so allowed Saussure to formalize a new theory of the root word, concluding that all Indo-European languages were derived from one original language. The particular rules of his discourse, which is known as structuralism, were applied to other fields beyond the study of languages. Lévi-Strauss (1955) applied the discourse of structuralism to study myths and founded the new school of structural anthropology that opened more possibilities for discourse in a new field of study. This process of theories spawning not just other theories but whole disciplines shows that theory is not just the product of intellectual activity within a field of study. Rather, theory becomes the formative element of that field of study and becomes the inspiration for other fields of study. As such, our theory of IS theorizing as discursive practices uncovers the creative activities wielded within the context of discovery.

FOUNDATIONAL THEORIZING PRACTICES

Foundational practices are discursive theorizing practices that involve high-level concepts such as its discursive formation, disciplinary questions, and paradigms shared by the community that characterize the phenomenon of interest. Foundational practices that consist of (1) forming the discourse, (2) problematizing the IS phenomena, (3) leveraging paradigms and (4) bridging discursive and non-discursive practices, assist members of the field in recognizing opportunities

for crafting theories, applying their expertise, and helping others understand the distinguishing features of the discourse.

More importantly, foundational practices bound our thinking processes to that which concerns our phenomenon of interest. Counter-intuitively, it is this bounding process that actually engenders our creativity. As Kant's formulation of the phenomena and the noumena implies, the very factors that make us finite (being subjected to space, time, context, and history) are also conditions for the possibility of knowledge. Foucault (1970, p. 340) calls this need to bound theorizing the "analytic of finitude." By establishing boundaries, one is forced to carve out knowledge within those boundaries. For example, to the untrained eye, snow is snow. Yet, anthropologists and linguists have found that Eskimo and Sami tribes, whose lives are bounded by their frigid and hostile environments, have developed dozens (Krupnik and Müller-Wille, 2010), and, in some cases, hundreds of names and classifications of snow and ice (Magga, 2006). The limitations of their environment made possible knowledge about snow that others outside their environment could not have fathomed. This extraordinary knowledge is made possible by foundational theorizing practices. The following foundational theorizing practices illustrate this process of delineating our phenomenon of interest.

Forming the Discourse

In the same way the language of the Eskimo and Sami tribes theorizes the numerous descriptions for snow, a field of study carves out its knowledge by following a set of rules that governs the formation of concepts and claims concerning its phenomena of interest. This set of rules which Foucault (1972) calls the discursive formation, defines the basis of the unity surrounding different phenomena associated with that field of study. As instruments of power, discourses identity the field of study, establish its disciplinary authority, and limit what can or cannot be

said and what is or is not acceptable. Disciplinary history demonstrates how rules of discourse delineates the boundaries of disciplines. When Auguste Comte (1830-42) envisioned the then new field of sociology, he framed it as "social physics" to describe how order can be maintained in society by applying the mechanistic rules of physics and other natural sciences. Borrowing from these natural sciences, Comte constructed new rules of discourse (i.e. formed a new discourse) that became known as sociology, which addressed social phenomena. New concepts and theories "native" to the new discipline are developed with the help of the new rules of discourse. Forming the discourse involves all the rest of the foundational theorizing practices and all the generative theorizing practices to define the set of rules that govern the formation of concepts and claims concerning the IS phenomenon.

Thus, when an IS researcher applies economic theory, or studies the use of computers using rules concerning value, prices, costs, and tradeoffs, which are part of the discursive formation of economics, the power of the economic discourse shapes and colors that research. One question that can arise in using this discourse is whether the research is primarily about economics, IS or whether the research is about IS in economics. The choice of applying a specific discursive formation has wide-ranging implications, not just for the direction of a study, but also for the direction of the entire IS field, especially if a similar discursive formation is ubiquitously applied in that field of study. The same object of study—information—can be researched in as many different ways as there are different rules of how claims about information can be construed. Because the IS discourse is yet to be clearly articulated (Hassan, 2011; Hassan and Will, 2006), IS researchers need to be sensitive as to which discursive formation is primarily in operation in their research. For instance, both the IS and the information and library sciences fields study information. However, how the study of information contributes to knowledge in IS

differs from how information contributes to knowledge in library sciences because the two fields apply different rules of formation concerning information (Ellis et al., 1999).

The wide-ranging implications of choosing a specific discursive formation can be seen in the IS field in the case of technology adoption with its long and varied historical tradition that included implementation, user involvement, user satisfaction, studies of IS failures, innovation, assimilation and media richness. Despite these diverse traditions, it was the discourse of social psychology—in the form of the technology acceptance model TAM and its variants—that overwhelmed other discourses in theorizing technology adoption. The genesis of TAM can be traced to Davis' (1986, p. 7) adaptation of Ajzen and Fishbein's extensive research on human behavior (Ajzen and Fishbein, 1972; 1973; Fishbein and Ajzen, 1974; 1975) to "provide a theoretical basis for a practical 'user acceptance testing' methodology … prior to implementation." Fishbein and Ajzen's discourse, subsequently instantiated as the Theory of Reasoned Action (TRA) (Ajzen and Fishbein, 1980) and the Theory of Planned Behavior (TPB) (Ajzen, 1991), was critical of the widespread assumption that beliefs directly impacted behavior. Since people with the same beliefs or attitudes do not necessarily display similar overt behavior, by distinguishing beliefs, attitudes and intentions as different concepts in predicting behavior, Fishbein and Ajzen were able to explain the historically poor and conflicting results in existing attitude research. By omitting the evaluation of beliefs, social norms and intention, TAM led adoption research back to the conflicting research results and discourse that Fishbein and Ajzen sought to remedy. As Benbasat and Moore (2007) suggest, subsequent versions of TAM merely brought the IS field back full circle to the original Fishbein and Ajzen models that TAM has dismissed at the beginning.

An analysis of TAM's discourse uncovers several other more fecund alternatives for studying adoption. For example, Rogers' (1983) diffusion of innovation discourse (Moore and Benbasat, 1991; Rogers, 1983) revolves around how new ideas are diffused over time among members of a social system; whereas, TAM's discourse is about how perceived features of the technology motivate use; two very different discourses that could theorize adoption. As such, the Rogers' diffusion model is a more comprehensive model that includes pre-adoption stages, the innovation-decision process, continued adoption and discontinuance. The extensive scope of this discourse enables prediction of the rate of adoption (i.e. early adopters and laggards), not possible with other discourses. More broadly, studying the discursive formation of reference theories opens IS researchers to alternative, perhaps more parsimonious, discourses for adoption studies, including those from network science (Katz and Shapiro, 1985; 1986), philosophy of technology (Ellul, 1973; Feenberg, 1991; Heidegger, 1977), and social constructionist discourses (Bijker, 1995; Bijker et al., 1987).

Problematizing the IS Phenomenon

The notion of problematizing as a theorizing practice has been extensively addressed, especially within the organization sciences (Alvesson and Sandberg, 2013; Locke and Golden-Biddle, 1997; Sandberg and Alvesson, 2011). Generally, it is defined as identifying and challenging the assumptions underlying existing theories and research. In relation to IS, this definition can be extended to mean asking questions other disciplines are not asking or are incapable of asking. Unfortunately, current research approaches, including those applied by the IS field, are increasingly neglecting the important role of questions in research (Meyer, 1995). Intuitively, researchers often focus on providing and constructing answers to questions, but Alvesson and Sandberg (2013) consider question construction to be the more crucial aspect of research because

questions encourage intellectual reflection, whereas answers tend to encourage closure and inactivity. It is much easier to follow a scripted method of research (Grover and Lyytinen, 2015) that outlines how to provide and construct answers to existing questions, even though it is the construction of the questions that helps the researcher venture into new territory and become more reflective and intellectually productive. For example, in the case of the IS field, after decades of asking questions that were limited to the concerns of IS management within the organization (Brancheau and Wetherbe, 1987; Kappelman et al., 2013), IS scholars are expanding their list of questions beyond organizational management to global challenges such as environmental sustainability, poverty, cyber-attacks, diseases, and global conflict (Becker et al., 2015; Gholami et al., 2016; Winter and Butler, 2011).

The key to problematizing is to focus on the *disciplinary question* instead of just the research question. Every field of study has its own unique set of questions. Since questions need to pertain to the discipline, not all research questions can be admitted into that discipline (Bal, 2002; Bromberger, 1992; Meyer, 1995). Asking the wrong questions wastes valuable research resources, as the results often do not address the research problem and the entire research program could proceed in a less productive or unintended direction, which in turn prevents the field from demonstrating its value (Agarwal and Lucas Jr., 2005; Hassan, 2014b). A disciplinary question is one that addresses the phenomenon of interest as a problem requiring a solution based on the field's rules of discourse. Thus, when Durkheim (1951/1897, p. 324) posed the problem of suicide and asked the question of why a definite proportion of people commit suicide in any given period in every society, he was not focusing on the state of mind (e.g., despair, neurosis, depression, or any psychological state of individual members of the society), as one would

expect in the case of suicide; rather, he was linking suicide, the object of study, to the newly emerging discipline of sociology. His questions essentially defined his discipline.

Given the significance of disciplinary questions, it is not surprising that the IS field emerged as a result of addressing questions its reference disciplines had not satisfactorily addressed. Mason's (1973) early framework for IS and Davis' (1989) TAM asked questions that did not fit exclusively into either management, computer science, or psychology. In media-richness studies, the triggering question concerned managers' activities. If managers spent 80% of their time communicating, as studies had found, then what kind of communication media do managers use, and are some of these media more effective than others? By asking these questions Daft and Lengel (1983; 1984) modified the rules of their discourse, which originated in communication (Bodensteiner, 1970) and management studies, toward the IS discourse. Following from the possibility that certain structures and IS artifacts translate organizational messages at different levels of richness, Daft and Lengel asked if the richness of media is related to the translation richness of information, which directly impacts information-processing needs. By the time this study was published in *Management Science* (Daft and Lengel, 1986), the first sentence in the article no longer asked a communication-related question; rather, it asked the IS questions: "Why do organizations process information?" (p. 554) and relating to IS artifacts, "How do organizations process information?" (p. 568).

The right questions not only make the research relevant to the IS field, but they also embody curiosity and inquisitiveness and spawn other interesting questions. What kinds of information-processing mechanisms and IT artifacts are most helpful to organizations? How can such IT artifacts be evaluated? Do different environments and problems require different kinds of mechanisms and IT artifacts? Can these different mechanisms be integrated? Despite the

availability of new advanced communications, why do managers still prefer face-to-face meetings (Daft et al., 1987)? Accordingly, problematizing the IS phenomenon of interest implies asking questions that are not being asked by other disciplines or asking questions that other disciplines are incapable of answering.

Leverage Paradigms

Partly as a result of criticisms of Kuhn's (1970) paradigm concept and its varied interpretations, the role of the paradigm in IS theorizing has been largely neglected and misunderstood (Hassan, 2014a; Hassan and Mingers, 2018). Although there are several notable exceptions (Chen and Hirschheim, 2004; Goles and Hirschheim, 2000; Iivari et al., 1998; Khazanchi and Munkvold, 2003; Mingers, 2004; Moody et al., 2010; Richardson and Robinson, 2007), the IS field is discouraged from actively engaging paradigms in theorizing (e.g., Adam and Fitzgerald, 2000; Avison, 1997; Banville and Landry, 1989; Cushing, 1990; Jones, 1997; Khazanchi and Munkvold, 2000). This tendency can be traced back to the earliest phases of the IS field's development, when attempts to theorize using paradigms were met with resistance because of the "disrepute into which this word [had] fallen" (Ein-Dor and Segev, 1981, p. vii).

This state of affairs is unfortunate. Kuhnian *paradigms*, defined as shared exemplars for research that provide concrete problem-solutions, have historically been widely accepted as useful objects for theorizing. They can take the form of research achievements, widely agreed-upon political bases and legal precedents, and standard classical textbooks and illustrations (Kuhn, 1970), and leveraging them involves using the organizing principles, recognized scientific achievements, heuristic illustrations and other concrete scientific problem-solutions on existing research. The paradigm concept has been applied successfully in many other fields of study. The software development subfield of computer science relied on the engineering

paradigm to develop its discourse, as is evident from the rallying cry of software engineering in the 1960s to establish it as a professional discipline (Naur and Randell, 1969; Shaw, 1990). Historian David H. Fischer (1970, p. 161) asserts that "historians in every field have much to learn" from Kuhn and the historian David Hollinger (1980) explains how the Kuhnian paradigm helps neutralize the biases of social and anthropological theories without excluding them from developing historical theories.

Minsky (1975), a pioneer of artificial intelligence, admitted his debt to Kuhn 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). In the social sciences, Berger and Luckmann (1966) credited Kuhn 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. The field of social construction of technology, which is often cited by IS researchers, is based on the Kuhnian paradigm. Explaining the basis of Kuhn's concept of the "technological frame," Bijker (1995) noted: "The analogy with Kuhn's 'paradigm,' among other concepts, is obvious" (p. 123). Bijker went on to claim that the "technological frame is evidently one of the many children of Kuhn's (1970) disciplinary matrix" (p. 126). Other such children include 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." All of these cognate terms reflect how fundamental paradigms are to theorizing.

As illustrated in the case of problematizing in IS, media richness theory (MRT) was inspired by communication studies, which applied a linguistic paradigm thus suggesting that managers preferred natural languages to formal mathematical languages. Sensing the limitations of this paradigm for their work, Daft and Lengel (1983) integrated two other paradigms into MRT (Daft and Lengel, 1986) to describe two complementary dimensions that explain why organizations process information: to reduce task uncertainty, drawing from Galbraith (1973; 1977), and to reduce equivocality, drawing from Weick (1979; 1995a). Galbraith's information-processing paradigm offered a concrete problem-solution that links information-processing and the notion of uncertainty to organization design. Weick's sensemaking paradigm provided a means of explaining media richness using the concept of equivocality. In this example, paradigms play a double role of limiting the discourse to what the researcher is already familiar with while allowing the researcher to "see his problem as like a problem he has already encountered" (Kuhn, 1970, p. 189), thus making possible new discourses that can be constructed to describe the phenomena being researched.

Bridging Non-Discursive Practices

Foucault (1972) argues that every field of study has both discursive and non-discursive practices. *Non-discursive practices* are material relations that enunciate the same discursive formation and items of knowledge as their corresponding discursive practices, but take the shape of repeatable materiality in things unsaid in the form of routines, processes, and events in social, legal, economic, and political institutions (Bacchi and Bonham, 2014; Foucault, 1972). In contrast to the received view of the IS field as being "applied," (Keen, 1980; Robey, 2003; Taylor et al., 2010; Vessey et al., 2002), the notion of the non-discursive practice implies that the IS field is an applied field that is inseparably connected to its discursive side. Consequently, the idea of a non-

discursive practice closes the oft-repeated gap between "basic" and "applied" sciences and between theory and practice. Indeed, non-discursive practices provide the horizon, background, and justification for any discursive strategy to be intelligible (Dreyfus and Rabinow, 1983) and bridging with non-discursive practices imply providing the tacit knowledge, fore-meaning (the horizon), context and tradition (the background), and warrants (the justification) from practice for the theorizing process.

The recent rise of "applied mathematics" or "applied statistics" in the form of non-discursive practices of data analytics and Big Data (Davenport and Patil, 2012) for the "pure science" of mathematics illustrates the inseparability of discursive and non-discursive practices. These non-discursive practices contribute to the revival of a discursive practice within IS known as business intelligence. Therefore, certain discursive practices within the IS field are shaped, appropriated, or even abandoned as a result of the non-discursive practices of these data scientists and statisticians. As these examples illustrate, theory cannot be separated from practice.

This inseparability is in part why non-discursive practices are considered foundational: when they are articulated, these practices form the basis for a discipline. The history of the IS field itself speaks of such a phenomenon (Caminer, 1997; Ferry, 2003; Hirschheim and Klein, 2012), as the non-discursive practices of the J. Lyons and Company in the UK, and of the military implementations of ENIAC in the United States, inspired other companies to set up their own non-discursive practices in the form of the earliest MIS departments, which, in time, led to several discursive practices (textbook publications) in the late 1950s and early 1960s (Gregory and Van Horn, 1960; Langefors, 1966), and eventually the first graduate MIS program at the University of Minnesota in 1968. As Foucault (1972) explains, a "whole non-discursive field of

practices, appropriation, interests, and desires" (p. 69) with other discursive practices and discourses external to the discourse itself, together define the discipline. Therefore, theories cannot be crafted separately from their relationship with the non-discursive practices that surround discursive practices, and provide the authority to take one or another strategic choice in theorizing (Dreyfus and Rabinow, 1983).

Some aspects of the non-discursive practice are difficult to articulate. The illusive "gut feel" and almost automatic decision-making processes that are associated with practitioner activities are often opaque to the prying eyes of the researcher. These aspects of non-discursive practices are known by different names and descriptions. Aristotle (1934) calls it phronesis; Polanyi (1958) calls it tacit knowledge; Bourdieu (1977) calls it habitus; Ryle (1949) calls it "knowing how"; and Knorr-Cetina (2014) calls it intuitionist theorizing. Scholars deal with frameworks, concepts, claims, and theory boundaries (Figure 1), while practitioners typically deal with more pragmatic concerns. However, both scholars and practitioners within a field are bounded by the same rules of discourse.

To illustrate, the rules of discourse for the decision support system (DSS) area in the 1970s were concerned with the different characteristics of information (source, scope, time horizon, frequency) and the different levels of decision making in the organization based on the spectrum of programmability between structured and unstructured tasks (Gorry and Scott, 1971). By the time Keen and Scott (1978) and Alter (1977; 1980) formalized the discourse in the form of the DSS, considerations on how DSS might be designed, proposals for different types of DSS, and ideas for how they could be deployed in the organization were added to the discourse. Although these contributions added new elements to the discourse, the rules of that discourse did not change substantially. Even when Rockart et al. (1979; 1988; 1982) extended the discourse by

proposing a similar support system for executives (i.e., ESS), or when the researchers associated with the Minnesota Experiments (Dickson et al., 1977; Watson et al., 1988) and the Center for the Management of Information at the University of Arizona (Applegate et al., 1986; Dennis et al., 1988; Nunamaker Jr et al., 1987) began investigating how such systems (called GDSS) could be used in a group environment to enhance collaboration, the same rules of discourse applied, albeit with a few additional rules (e.g., anonymity in the case of GDSS). Foucault (1972) describes this process of bridging between theory and practice as the "procedures of intervention" and "rewriting" (pp. 58–59), during which certain claims are transferred from one domain or context to another, without losing their enunciative homogeneity. This process allows scholars and practitioners to recognize the same phenomena in their disciplines, albeit in different contexts.

GENERATIVE THEORIZING PRACTICES

As shown in Figure 1, foundational discursive practices define the information systems discourse and impact generative practices. Generative theorizing practices support or modify the development of the discourse once it is founded or once its nature is clearly delineated. These generative practices wield "the power of putting our finite resources to virtually infinite use" (Leary, 1995, p. 267) to name and describe the phenomenon of interest using components of theory, such as concepts and claims, and to construct frameworks to organize such components into a theory. Generative practices are not to be perceived as "exploratory research," as merely the under-laborer to the "real research" task of developing and testing hypotheses and investigating propositions. Instead, these practices play an ineluctable role in research by offering the "magnified tendency to call up ideas" (Peirce, 1992, p. 182) and organizing those ideas to make sense of the phenomenon. The following generative theorizing practices involve

analogizing, metaphorizing, mythologizing, and modeling (Figure 1), discursive practices that Kuhn (1987, p. 20) states are "the most obvious and most consequential" to scientific progress.

Analogizing

Among the most powerful of the generative practices is *analogizing*, which played a highly constructive role in the development of Western knowledge up to the Age of Enlightenment (Foucault, 1970). William James (1890, p. 530), as cited in Leary (1995), views analogizing as "the leading fact of genius of every order." An *analogy*—from the Latin *analogia* refers to ratio or proportion and the practice of analogizing involves using a simplified or scaled-down reference to something familiar to explain or illustrate something more complex or less familiar (Bagnall, 2012; Hesse, 1967). Tsoukas (1993) argues that analogies are not merely literary devices; rather, they supply the raw materials for theorizing and, if suitably handled, yield theories. Hesse (1966) goes even further to insist that analogies do not just yield theories but are an ineradicable part of them. For example, the analogy of the flow of electrons in an electrical circuit as the flow of people in the subway is what helped theorize the flow of electricity, and is, at the same time, part of the theory itself (Gentner, 1983; 1989).

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. Darwin (1859) drew an analogy between artificial selection (i.e., the breeding of domesticated animals) and natural selection to argue for the plausibility of the latter and, as a result, distinguished his discourse on biological evolution from that of earlier natural history. In the management field, Beer (1972; 1979), drawing an analogy between the human body and the enterprise, theorized that only five major subsystems are required to coordinate and control any

organization. Accordingly, Campbell (1920) highlighted the ineradicable nature of analogy in theorizing:

> *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 (p. 119).*

Although analogizing in the IS field has produced many research programs, most of them are undertaken implicitly rather than explicitly. For example, when Keil et al. (1995; 1999; 2000) applied the term "project escalation" in the context of software project management, they used an analogy originally applied in a military scenario (Kahn, 1965), which draws on the similarity between intensifying conflict and climbing higher up the rungs of a ladder. When MRT researchers propose that "rich" information processing mechanisms are necessary to successfully address complex and ambiguous environments, they are drawing an analogy between managerial work and complex human biological systems. Other IS scholars that study "punctuated equilibrium" or "systemic change" (Street and Denford, 2012), or discover a "contagion" (Angst et al., 2010) of system adoption, are implicitly applying analogies from other disciplines, such as geology or biology, to inform and explain IS phenomena. Explicit analogical reasoning has only recently captured the attention of IS researchers (e.g., Kuechler and Vaishnavi, 2012).

Explicit analogizing harnesses the potential of analogies for explaining how the world and societies work to their fullest extent. In sociology, Erving Goffman's ethnographic studies are prime examples of explicit analogizing (Vaughan, 2014). In *The Presentation of Self in Everyday Life* (Goffman, 1959), he draws an analogy between the face-to-face interaction that everyone has with others and theatrical performances. In this work, he theorizes that when an individual comes into contact with another person, that individual will control or guide the impression that the other person forms by altering appearance and manner, much like actors in

movies and theater. For IS, the usefulness of this generative theorizing practice should be obvious if we consider the offline and online lives and activities of Internet users. For example, a study of the relationship between identity verification and knowledge contribution in online communities (Ma and Agarwal, 2007) finds that IT features that support persistent labeling, self-presentation and deep profiling, all of which enhance identity verification, promotes satisfaction and knowledge contribution in those online communities.

Whereas IT project failure research that applies analogies from escalation literature assumes the presence of negative information, failures often occur in the absence of negative information (e.g., the Obamacare website crash, see Cohen, 2013). In such cases, the escalation literature might not be appropriate. Other forms of failure research, such as disaster ethnography (Vaughan, 1996), safety science (Le Coze, 2008), and disaster prevention and mitigation (Weichselgartner, 2001), could offer better analogies for those kinds of failures. These alternative genres of research offer what existing IT project failure lacks—identifying counter-intuitive causes of failure, spotting red flags of impending disasters, providing post-disaster management, and identifying the normalization of deviance, all of which IT project managers can apply to better prevent and manage failures.

Metaphorizing

Metaphorizing involves extending the goal of finding similarities in analogizing by selecting often familiar physical or linguistic objects to not only carry the meanings of analogies but also to elegantly clarify and impress on those meanings using the characteristics of those familiar objects (Ortony, 1979). Isaiah Berlin (1999) states

> *To think of one phenomenon or cluster of phenomena is to think in terms of its resemblances and differences with others ... All language and thought are, in this sense, necessarily metaphorical* (p. 158).

Thus, *metaphors* are essentially linguistic forms of analogies and have been used in discourse since Aristotle's time (Ricoeur, 1977; Schön, 1963). Whereas analogies are abstractions of similarities, metaphors select a term or sets of terms that carries the meanings of those similarities (Geary, 2009). In this way, metaphors represent powerful generative practices. In *Poetics 21*, Aristotle defined *metaphora* as a "carrying over" from one thing to another, with *phor* 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" (Aristotle, cited by McKeon (1941, p. 1476)).

Metaphors are valuable to theorizing for their ability not only to transfer meaning but also to highlight, clarify, enrich, and enlighten (Ortony, 1979). Therefore, the origin of the metaphor is usually elegant, beautiful, and impressive (Kirby, 1997). The metaphor harnesses an entire network of analogies to accomplish its task. For example, when computer scientists use the metaphor of the brain to describe the computer's central processing unit (CPU), they quickly transfer well-known functions of the brain to explain something often unfamiliar to the public—computer processing. Aristotle suggests that the more dissimilar the objects are where analogies are found, the more powerful the metaphor:

> *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, translation cited in Kirby 1997, p. 536).*

Only a handful of IS studies demonstrate extensive metaphorizing that leads to inductive arguments, hypothetical deductions, or production of definitions. Mason (1991) proposed organismic, sports team, and city-state metaphors for IS strategic planning, offering alternatives to the war metaphor that dominated strategic thinking at the time. The area of IS development attracted most of the work that applied metaphors. Some studies used the metaphor of magic, as

it is applied to generally accepted practices in IS development (Hirschheim and Newman, 1991; Kaarst-Brown and Robey, 1999), to theorize about the social nature of IS development and how it impacts a project's probability of success, while others described how useful metaphors can be when communicating with users during the systems development life cycle (Kendall and Kendall, 1993) or in persuading users to support the integration of two different systems (Oates and Fitzgerald, 2007).

Metaphors are not only useful for drawing similarities, but also for distinguishing differences and highlighting incompatibilities. Carr (2003) applies the metaphor of household utilities to argue that because IT has become for all intents and purposes as common as electricity and plumbing, it can no longer support the goals of achieving competitive advantage. Brynjolfsson et al. (2010) apply the same metaphor of utilities to arrive at the opposite conclusion. They argue that IT, unlike utilities, is scalable and incorporates digital innovations and complementary services; that electricity- and plumbing-like utilities do not offer these services; and thus, IT supports efforts toward achieving competitive advantage. In theorizing, metaphors cut through difficult and complex issues and enable the researcher to view those issues in a more familiar light.

Mythologizing

Mythologizing involves using myths, mythologies, and hidden assumptions to provide or interrogate a means of explanation, as well as to study symbols of value, coherence, unity, social structure, conflict, and contradictions (Cohen, 1969; Hirschheim and Newman, 1991; Mousavidin and Goel, 2007). 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 and Beyer, 1984, p. 655).

Although myths are frequently referred to as mistaken beliefs or popular misconceptions, they can address unquestioned assumptions within existing belief systems and theories. Lévi-Strauss (1963; 1966) viewed myths as parallels to science, especially in the science of relations, while Cassirer developed a theory of symbolic forms inspired by his study of myths (Bidney, 1955; Cassirer and Verene, 1979). As such, myths provide a means of explanation; a language for studying symbols of value, solidarity, and social structure; and a means of managing contradictions (Cohen, 1969).

To illustrate the use of myths, Daft and Lengel's (1983; 1983) MRT studies can be traced back to certain myths concerning what managers do and how management was assumed to consist of the essential activities of planning, organizing, coordinating, and controlling. Mintzberg (1972; 1973) debunked this myth and found instead that managers rarely plan; rather, they spend more than 70% of their time in verbal communication and act spontaneously on trigger information. Daft and Lengel's MRT studies began as a result of interrogating this myth. The notion of the "total information system" propagated in the 1960s that was thought to enable planning, organizing, coordinating, and controlling leveraged such a myth. The earliest critics of MIS invoked the "myth of real-time systems" (Dearden, 1966) to expose several fallacies regarding the assumed capabilities of computers to support management functions. Mintzberg (1972) observed that because managers rely on informal communication channels—which often carry gossip, hearsay, and speculative information—the information provided by formal IS will be at odds with a manager's information requirements.

Because myths are often viewed pejoratively, this negative view of myths occupies most of early theorizing of myths in IS. Boland (1987) described five universally claimed myths, which he called "fantasies," about information that might distort the progress of research in IS.

Hirschheim and Newman (1991) identified six common myths in IS development, such as the overriding advantage of user involvement, the need to ameliorate user resistance, and the necessity of system integration. In artificial intelligence, myths make up much of its hype and Roszak (1994) meticulously uncovers the layers of fabulous myths and claims in support of the "information age" or "information economy" to enhance quality of life, when in reality, these claims carry with them an equal if not a disproportionate weight of threats to human and societal well-being.

What is yet to be developed in the IS field is viewing myths in their positive sense, which Lévi-Strauss (1966) calls "mythical reflection" (p. 17). This form of theorizing on the intellectual plane is similar to *bricolage* on the technical plane. In its positive sense, mythologizing involves the *bricoleur* going beyond standard tools, methods, or data to using "devious means" from "whatever is at hand" (pp. 16) to take advantage of the heterogeneous repertoire that is available. As Lévi-Strauss (1955; 1966) argues, myths and their derivatives, rituals, are universally found to be extremely organized, ordered, and precise, thus suggesting that they contain scientific parallels that are yet to be discovered, and it is these scientific parallels that the process of bricolage targets. The scientist as *bricoleur* is constantly on the lookout for images and signs from their phenomena of interest.

In the IS field, Claudio Ciborra was among the few who highlighted the significance of bricolage as a theorizing practice (Avgerou et al., 2009; Lanzara, 2009). Realizing that established IS strategies were becoming increasingly ineffective for studying rapidly changing technological environments, Ciborra argued that much of the IT innovation taking place in current volatile marketplaces did not come from methodically evaluating the industry by evaluating threats, opportunities, threats, and weaknesses; identifying key success factors and

distinctive competencies; and selecting the optimal strategy. Rather, innovation came from opportunistically adapting to highly unpredictable environments and continuously learning from direct experience. Ciborra (1992) refers to what essentially is bricolage as "tinkering," which involves extracting solutions "embedded in everyday experience and local knowledge" (pp. 301–302).

Going beyond experimenting and improvising, bricolage involves IS researchers essentially becoming mythologists, who, like Lévi-Strauss, are able to encode the structures of IS phenomena based merely on symbols and signs from their various myths. Robey and Markus' (1984) classic on rituals of IS design exemplifies this kind of work, as they uncover the political and symbolic activities that routinely take place as stakeholders of systems with conflicting interests compete for dominance within what might appear to be a rational process of systems design.

Modeling and Constructing the Framework

Modeling is a generative practice that builds different forms of models, including mechanical, mathematical, computational, graphical, and narrative models. A model is often confused with framework and theory. Also referred to as *analogues* (Hesse, 1966), models apply analogies to build precise and economical representations of selected elements and relationships to produce and examine the phenomenon of interest. Emphasizing the importance of models for theorizing, Suppe (2000, p. S110) stated that "models are the heart of scientific experimentation, observation, instrumentation, and experimental design." Using notions of positive analogies (common properties between two different objects), negative analogies (properties that differ between objects), and neutral analogies (uncertain as to whether positive or negative analogies exist) (Hesse, 1966), a *model* can be defined as an imperfect copy of the phenomenon of interest,

consisting of positive and neutral analogies. Nobel laureate Thomas Schelling (1978a, p. 87) defines the model as the "precise and economical statement of a set of relationships that are sufficient to produce the phenomenon in question" or the "actual biological, mechanical, or social system that embodies the relationships in an especially transparent way."

Models are useful for building theories because they reveal the consequences of making certain assumptions and including or excluding certain elements in an economical way (Swedberg, 2014b). For example, William Gilbert (1893/1600) applied the model of the earth as a magnet with the poles as the ends of that magnet to explain why compasses point north. In economics, Schelling (1978b) applied the model of the thermostat to explain the reasons and the social mechanisms behind the return of measles to the U.S. after its elimination in the 1960s. As these examples show, models are not theories but simplifications of the phenomenon of interest that offer limited explanation and may serve as part of a theory. Also, models are not frameworks; models may become part of a framework that represents a map of the elements of the research process and helps researchers to assess and refine goals, develop questions, select appropriate methods and models, and identify potential validity threats.

Hesse (1966) categorizes the process of modelling into two approaches: Continental modeling, which is the more abstract, logical, and systematic approach, and English modeling, which is the more visual, imaginative, and intuitive approach. Researchers in IS are most familiar with the former, which often takes the shape of box-arrow diagrams that depict causal or associative relationships. In IS and other fields, these models are called "conceptual models" and are mentioned synonymously with "conceptual frameworks." Jaccard and Jacoby (2010) include various models as part of their discussion of theory construction. In nursing theory for example, models are treated as part of a theory's *a priori* frame of reference that defines what questions

will be asked, guides the generation of new theories, focuses the researcher on specific problems, and facilitates the selection of methods for the discovery of new theories (Fawcett, 1995; 1998). For more mathematically-inclined disciplines, the ultimate goal of this systematic and logical form of generative practice is a mathematical system with a deductive structure that succinctly explains the phenomenon of interest during theorizing (Hesse, 1966). Notwithstanding its systematicity, formal box-arrow diagram modeling can be counterproductive because it (1) bypasses many other forms such as mechanical, computational, narrative, and alternative graphical models that could bring insights into the research, and (2) encourages arbitrary extensions in which "splitting of concepts and their endless rearrangement becomes the central endeavor" (Mills, 1959, p. 23).

The IS field is replete with models that use Continental modeling, and these models are often loosely referred to as theories, obscuring the theorizing process. The technology acceptance model (TAM) and the DeLone and McLean IS success model are claimed to be the two most applied IS theories (Moody et al., 2010; Straub, 2012) even though both are labeled and depicted as models. Problems also emerge when theories are uncritically imported from another field into the IS field because these outside theories may be based on different models. For example, two popular theories in the social sciences, the diffusion of innovations theory (DIT) (Rogers, 1983) and the theory of reasoned action (TRA) (Fishbein and Ajzen, 1977), are among the two most applied theories in assessing the influence of IT on individuals (Lim et al., 2009). These theories describe two different models of innovation. The DIT originates in the communications 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, stages of adoption, and the social system engaging in the flow, provide a rich set of concepts and

constructs to be researched. The TRA is a theory of behavior predicated on the individual's behavioral intention, which, in turn, is affected by the individual's attitude. Because the DIT includes a time element, it can describe the logistic curve of innovation, which is not possible when using the TRA. Conversely, the TRA's focus on attitude is only tangentially addressed by the DIT. Being aware of the model underlying the research is critical during IS theorizing and models are often ceremoniously introduced into research before enough modeling is undertaken.

Following a formal modelling practice, TAM researchers compare eight conceptual models to assess their relative utility for theorizing adoption. Based on this comparison, they suggested the UTAUT version of TAM incorporating ten constructs consisting of four predictors, four moderators, one mediator, and one dependent variable chosen from eight models from social psychology: the original Fishbein's behavioral intention model (1975), Ajzen's (1991) planned behavioral model, the intrinsic-extrinsic motivation model (Vallerand, 1997), Triandis' (1971) attitude change model, Rogers' (1983) innovation diffusion theory model, Bandura's (1982) social cognitive model, the gender differences model (Bem, 1981; Helmreich et al., 1981), and the age differences model (Hall and Mansfield, 1975). Unpacking this complex web of models makes it difficult to explain the results from applying the unified model.

The more intuitive English modeling practice rejects the view that models are mere aids to theorizing that can be disposed of when the theory is formulated. This approach presupposes the mutability of theories, which, as they are extended and modified to account for new phenomena, are not divorced from the analogies that were originally used to build them. Instead of being mere aids to theorizing, analogies are an essential part of theories without which the theories would lose their value. While the formal modeling practice allows any model to be attached to a working theory, the intuitive model depends on the analogy that builds the theory.

In his classic text, *Micromotives and Macrobehavior*, Nobel laureate Thomas Schelling (1978b) emphasized the usefulness of intuitive modeling following the English approach in reproducing the essential features of complex behavioral systems. Using the home thermostat as analogy, Schelling explained in detail how the spread of disease follows upswings and downswings in a cyclical way similar to how a thermostat mechanism reaches a tipping point and the temperature keeps rising even when someone attempts to lower the temperature. This process of modeling affords the researcher several advantages during the context of discovery. The model helps visualize social epidemiology as a cyclical process that involves a tipping point, an overlapping phenomenon that a box-arrow diagram may not be able to elucidate. As such, the researcher can identify several key concepts that are critical to the process of containing the epidemic. There are few English modeling practices within the IS field. Kirsch's (1996; 1997) work on controlling and managing complex systems development processes includes merging the Ouchi's control model (another example of a English model consisting of behavioral and outcome measures) with agency theory to build an intuitive model that comprises of behavior, outcome, clan and self-control methods.

TOWARDS GENERAL PRINCIPLES FOR THEORIZING

In addition to discussing the use of specific discursive practices, and how these practices organize different forms of enunciations to produce and manipulate concepts and claims about the phenomena of interest, we offer general principles that apply to all discursive practices in the context of theorizing. These general principles start with where theorizing begins, how theories can serve as inspiration, how to establish relationships with disciplines outside the IS field, and how to evaluate the success of theorizing. Most of these general principles follow from Peirce's (1893-1913/1931-1958; Swedberg, 2014a) view of how to theorize.

Starting in the Context of Discovery

Theorizing does not begin when hypotheses or propositions are considered or when they are tested or validated. As the superset to reasoning, theorizing is as natural to human beings as thinking, and it is this rich natural capability endowed in all human beings that characterizes the activities within the context of discovery well before any claims are considered. Unfortunately, graduate research training may have preconditioned many researchers to not theorize as freely as we should when we encounter an interesting phenomenon. Instead of focusing on the context of discovery by taking advantage of all plausible avenues to explain the phenomenon, research practice tends to limit thinking to the sanitized, rationalized reconstructions found in published works. In addition to digging deeper into the insights and creative thinking that characterize the context of discovery, researchers must use the natural human capabilities they are endowed with and have a certain level of willingness to question and even forget previous thinking to engage in original research. As Whitehead (1917, p. 115) observes: "A science which hesitates to forget its founders is lost."

Deriving Inspiration from Other Theories

Theories can be inspired, borrowed, or adapted from other disciplines. Because a theory is a strategic choice taken within a discourse, theories are tethered to the discourse and ultimately to the associated discipline. Thus, when theories are inspired, borrowed, or adapted from other disciplines, they carry with them the same rules of discourse by which they were constituted. Theories are bounded to the discursive formation of their discipline. These rules of discourse are consistent with what Truex et al. (2006) describe as the “underlying notions” and “methodological implications” (p. 798) of those theories, as well as the need to “be inculcated into the internal logic and intellectual tradition associated with the theory” (p. 801). Theories in

IS, they argue, cannot simply be uncritically borrowed from other disciplines, and any borrowing and adapting, they advise, must be undertaken in a more "reflexive manner" (p. 799). By applying the various foundational and generative theorizing practices, theorizing naturally takes place in a reflexive way because doing so requires a deeper examination of the rules of discourse, analogies and other elements underlying those theories that serve as inspiration for theorizing.

The case of structuration theory in IS that was borrowed from Giddens (1976; 1984) exemplifies this need. For example, despite efforts in the form of the adaptive structuration theory (AST) (DeSanctis and Poole, 1994) to address issues that structuration theory presented (Jones, 1999; Rose et al., 2005), the rules of discourse that operated in structuration theory remained in operation in the proposed theory. This resulted in a disproportionate application of structuration theory itself and a lack of overall coherence and cumulative development in studies that apply structuration (Jones and Karsten, 2008; Orlikowski, 2000). A close study of the rules of the discourse of those theories provides a more consistent approach toward theorizing.

Connecting to Other Discourses

Within a discipline, theorizing does not take place in isolation. Theories are developed within the larger discursive constellation in which the discipline belongs. Concepts and claims that are invented within the field should not be inconsistent with well-known concepts and claims outside the field. Theories in IS therefore cannot be developed or operate independently of other disciplines; rather, they must demonstrate a coherent relationship with others. In addition to establishing a certain level of coherency with other disciplines, this close connection establishes the IS field's relevance to the stock of knowledge of the world and helps make the field intellectually influential.

For example, when the IS field theorizes about "technology" or about "artifacts," any inconsistencies with, or divergence from what is well-known about technology or artifacts within the larger discourse in allied fields, or generally accepted definitions, need to be clearly justified and made clear to all. When Weick (1979) redefined the concept of organizations, which are typically interpreted as static, bounded entities, to the concept of organizing, he not only switched a noun into a verb, his work built on and connected with other discourses in the larger constellation of discourses. His theorizing released management theory from the boundaries of the static organization and connected to other discourses including among others, the discourse of ethnomethodology from Garfinkel (1967), Merton's (1948) self-fulfilling prophecy, Campbell's (1965a; 1965b) sociocultural evolution, and Simon's (1957) and Allport's (1962) studies in social psychology.

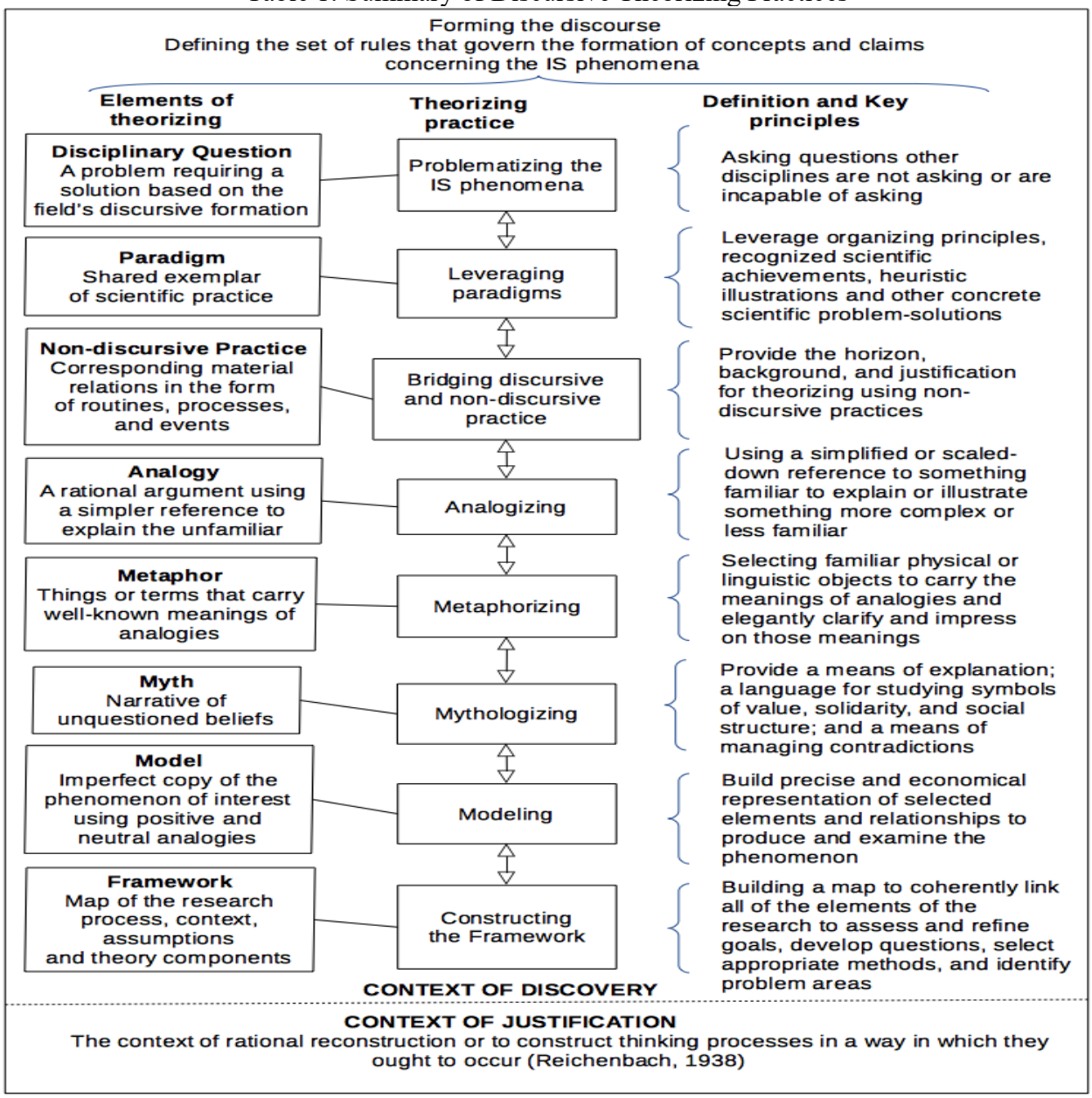
Evaluating Success in Theorizing

The criterion for evaluating success in theorizing lies in the value of the concepts and claims that the theorizing process produces. In theorizing, concepts and claims in existing theories are not merely reorganized but are often reconstituted and given a new meaning, and, if theorizing is especially productive, new concepts are invented. Theories might not last the test of time, but often concepts and claims are what spawn new creative endeavors. For instance, although older biological theories are replaced by more recent ones, the concept of "organic structure" originally coined from biology (Cuvier, 1800-1805), remains useful as it was redefined in the context of social psychology (Spencer, 1897) and was later made famous by management studies to explain how organizations innovate (Burns and Stalker, 1961). This process of inventing new concepts and crafting new theories is what qualifies a field of study for becoming a discipline, following what Foucault (1972, pp. 186-188) describes as the threshold of positivity and the

threshold of epistemology. The threshold of positivity occurs when the field of study starts applying its own set of rules for producing original mutually exclusive concepts, while the threshold of epistemology is reached when the field of study becomes coherent, ordered, is accepted as legitimate by others, and ultimately produces theories that exert an influence on the stock of knowledge in the world (Hassan, 2011). The success of theorizing is reflected in how it either carves out its own space within existing knowledge or it builds something novel over and above that knowledge. "A theory must somehow fit God's world, but in an important sense it creates a world of its own" (Kaplan, 1964, pp. 308-309).

We summarize the discursive theorizing practices in Table 1 showing how various elements of theorizing are marshalled within the context of discovery. The activity of forming the IS discourse comprises the entire list of discursive practices, the related major elements of theorizing as well as key principles associated with practicing each element. Although the focus is on the context of discovery, each of the discursive practices have implications for the context of justification and it is very likely that activities in the context of justification may inform theorizing practices in the context of discovery. Similarly, the discursive practices typically interact during IS theorization. For example, the construction of the framework may raise further questions related to the phenomenon and suggest further disciplinary questions. Each theorizing practice may lead to any number of other theorizing practices.

Table 1: Summary of Discursive Theorizing Practices



CONCLUSION

Although IS researchers have spent considerable effort understanding and debating the role of theory within the IS field, there is little understanding of the process of theorizing, in particular as it relates to the creative and serendipitous activities within the context of discovery. We suggest that focusing on the foundational and generative discursive practices of theorizing within the context of discovery, holds the key to building exciting IS theories. The elaborate, subjective,

intuitive thinking processes and the related discursive activities that precede the context of justification are the source of creativity and excitement. The foundational discursive practices help bound and identify the IS discourse and its theorizing practices. The generational discursive practices help create the infinite possibilities for IS knowledge within the discourse. As such, the proposed theory of IS theorizing as discursive practices uncovers the seemingly opaque process of theorizing to help researchers understand more clearly the nuances and intricate thinking processes involved in theorizing. The theory clarifies that good theorizing need not begin with borrowed theories; and, if researchers do borrow, it illustrates how such a process can be performed in a critical and transformative manner with elements of theorizing that contribute in a significant, inspiring, and creative way. Although we have presented a pragmatic guide to theorizing as discursive practices, there are no set recipes for theorizing and any such recipes are likely the best way to thwart inspiration. Instead of simply relying on what has worked from reference disciplines, the theory encourages IS researchers to engage in innovative thinking by inventing their own original concepts and claims with bold conjectures that eschew the "incremental adding-to-the-literature contributions and a blinkered mindset" (Alvesson and Sandberg, 2014, p. 967).

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