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Theory Emergence in IS Research: The Grounded Theory Method Applied

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Keywords: IS theory, Grounded Theory, Literature review

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Abstract

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Introduction

Complaining about fallacies in the conceptualization of the theoretical core of the IS discipline almost forty years ago, Dearden (1972, p. 90) criticized research in our field as a "mishmash of fuzzy thinking and incomprehensible jargon." Since that time, other IS scholars (e.g., Lee, 2001b; Weber, 2003; Zmud, 1998) have complained about the lack of an IS-specific cumulative tradition of theory since only few theories specific to the IS discipline have emerged (Burton-Jones, McLean, & Monod, 2004, p. 3) and the IS field seems to remain at an early stage of theory building (Webster & Watson, 2002). At the same time, numerous theories have been borrowed from neighboring disciplines such as sociology or psychology on the behavioral side and computer science or engineering on the technical side (Baskerville & Myers, 2002; Gregor, 2006; Schneberger & Wade, 2007).

Research based on these borrowed theories can and has undoubtedly illuminated some aspects of humans' interaction with computing and the role of technology in contemporary organizations. However, the absence of indigenous theory based directly on observation of IS phenomena in the realms where they occur could be one of the causes of the discipline's recent "identity crisis" (Benbasat, 2001; Benbasat & Zmud, 2003) and the efforts to (re-)conceptualize what IS research is (Gregor, 2009). Especially with respect to the legitimacy of explanations from the IS field in comparison to its neighboring disciplines (Frank, 2006; Lyytinen & King, 2004), a distinct and unique theoretical body can help to compete in the "race for credibility" in the scientific discourse (Weber, 1997, p. 2). In practical terms the endeavor to build indigenous IS theory is of utmost relevance to the future development of our discipline as it competes for scarce resources such as research funding, young scholars, and attention in practice.

Arguably, the same reasons have motivated many of our neighboring disciplines to deal with the concept of theory and its implications for their disciplines in their own right. Examples can be found by looking at the social sciences (e.g., Dubin, 1976; Freese, 1980; Kaplan, 1964; Merton, 1967) or management science (e.g., DiMaggio, 1995; Sutton & Staw, 1995; Weick, 1989, 1995a; Whetten, 1989). This search process tends to focus on the phenomena at the core of a discipline and the findings, statements and observations that bring understandability and predictability to them. Gregor (2006) in particular suggests how different kinds of theories may be useful within the IS context. We would suggest that the development of explicit theory pertaining to a core body of IS phenomena is at most currently underdeveloped and is a worthy objective of significant research effort.

In an attempt to address this gap in the literature, we present our examination of grounded theory studies in which theories emerge that look directly at the core phenomenon of interest to our discipline. It is our belief that there are many possible sources of findings, statements, and observations pertaining to core IS phenomena that can lead to the further development of an indigenous IS theory base. One promising direction is to consider findings derived from grounded theory studies. By definition grounded theory studies take a fresh look at phenomena of interest and part of their goal is to produce theories in the form of statements about observed relationships among observed elements.

With this aim, the remainder of this paper is structured as follows. In the following section, we will briefly introduce one view on theory and highlight some of the challenges towards theorizing in IS research. In light of these challenges, we then define a theoretical and methodological approach to discover, analyze, and abstract theories that specifically emerge in an IS context in section three and four respectively. Section five introduced the results of our review of grounded theories before section six discusses the implications of these findings in the larger context of the discipline's theoretical discussion. Section seven summarizes our work, discusses its limitations and implications for future research.

A View on Theorizing and some of its Challenges in IS Research

Our View of Theory in General.

Theories in general provide for the description, explanation, and prediction of phenomena being studied in their discipline (Whetten, 1989). This is consistent with Gregor's (2006) view although she adds additional theory types for design principles and practices in the building of artifacts. Theory in the form of testable statements serves as a framework for the accumulation of new knowledge. At their inceptions theories may be fairly rudimentary. As they are tested contingencies, boundary conditions, and a greater accumulation of results become attached. For a discipline to center its findings and knowledge around theory provides a method for building a cumulative tradition that should enable an ability to solve or aid in addressing a broader array of problems in practice (Lewin, 1945; van de Ven, 1989). Examples for the centrality of theories can be found in various disciplines of both natural and social sciences (Atmanspacher, 2007).Contrary to this seemingly simple conceptualization of theory, providing a common definition and understanding of theory is rather challenging (DiMaggio, 1995; Freese, 1980; Sutton & Staw, 1995). This observation seems to be especially true for the IS discipline (Burton-Jones, et al., 2004), probably due to the rapid evolution of technology which forms a key part of the phenomena of IS (Weber, 2003, p. xii). Additionally, with the complexity of human-technology interactions, many relationships may not be accurately described by simple linear models where more of x leads to more of y, but rather are part of complex systems where each component may have varied effects under varied conditions (Runkel & Runkel, 1984; Weick, 1995b). Notwithstanding, the task can be approached from two principle directions: (1) Theory as the logical consequence or outcome of theorizing (process focus, i.e., if a process fulfills certain characteristics the outcome can be referred to as theory) or (2) looking at the constituents that would make a statement a theory (content focus, i.e., the constituent characteristics define whether a statement is theory or not). While the former has received quite some attention and certainly is an approach worth following when trying to comprehensively define theory (e.g., Dubin, 1976; Freese, 1980). This paper focuses on the latter, since we are interested in investigating contributions to the IS discipline and what we can learn from these contributions about our discipline's theoretical core.

A key approach to presenting theory is in terms of defined concepts and relationships among them. To establish a theory base, it is necessary, therefore, to identify these concepts and to propose, then describe and test the nature and strength of their relationships (Burton-Jones, et al., 2004; Feldman, 2004; Gregor, 2006; Maxwell, 1992; Schutz, 1954; Sutton & Staw, 1995; Weber, 2003; Whetten, 1989). Through these elements, theories are generally argued to enable explanations why or predictions when certain empirical patterns occur in observing a phenomenon (Glaser & Strauss, 1967; Gregor, 2006; Kaplan, 1964; Whetten, 1989).

Furthermore, Whetten (1989) emphasizes the importance of the "why" in suggesting that theoretical contributions need to go beyond the mere description of the what (i.e., concepts or constructs) by including the how (i.e., conceptual arguments) and why (i.e., causal arguments). Tying these thought together, Bacharach (1989) offers one of the perhaps most concise attempts to define theory: The relations between constructs are captured via propositions which hold true within certain boundaries (i.e., assumptions about relevant contingencies such as, e.g., time, culture, space).

Once suggested, and beyond its mere constituents, such a theory should not only advance a discipline theoretically, but also enable solving of practical problems (Glaser & Strauss, 1967). As a consequence, the literature also highlights the attribute of being falsifiable or testable in practice as an important characteristic of theories (e.g., Doty & Glick, 1994; Popper, 1980). Clearly such falsifiability is essential for testing the robustness of the observed patterns in other settings to determine whether initial findings are idiosyncratic to one setting, if they are contingent on one or more aspects of their setting, or if they are more generally applicable.

Applying the Understanding of General Theory to IS Phenomena.

We believe the task of developing indigenous theory to be particularly challenging in IS for two main reasons: (1) its socio-technical nature and (2) the nature of intervention and creation (i.e., what Simon (1996) called "sciences of the artificial"). As for the former, Lee (1999, 2001a) highlights that it is especially the interaction between technological systems and social systems that constitutes the IS discipline. This highlights our discipline's nature as an integration discipline at the intersection of social and technological phenomena. As an implication, we think that explanations of the interaction of humans and technology cannot be fully accomplished by examining human behavior without consideration of the affordances of particular technologies; nor will the measurement of technical attributes fully explain the operations and effects of socio-technical systems. The task of integrating the fuzziness and malleability of human behavior with the precision and fragility of technology by its nature requires dealing with a wider range of issues than considering only behavioral or technological systems individually. As an example, consider the rate of change of information technology and the potential for small changes in technical affordances to create a wide range of influence (from null to immense) on the user experience and resulting attitudes (Heinrich, 2005; Hirschheim & Klein, 2003). On the social side, the problem seems to be even more severe. Even if humans responded in predictable ways to identical stimuli (e.g., introduction of identical technical artifacts) within a given context, the number of factors influencing context (e.g., work vs. recreational technology use, required vs.

optional, or pushed from vendors vs. pulled from user demand) can result in combinatorial explosion of the sort of contingency described by Luhmann's (1984) social systems theory.

Examining the nature of intervention and creation, the "sciences of the artificial" operate with the expectation that artifacts begin with human intention, proceed with design, selection, creation, and introduction to an environment, and are either refined until they work at an acceptable (or better) level or are eventually abandoned. This is in contrast with the mindset of the behavioral and natural sciences, where the human observer is often viewed as a source of bias in otherwise naturally occurring phenomena. It is informative to understand the natural reactions of users to the introduction of a new technology, however the behavioral and physical sciences provide few research questions and little instruction regarding what the introducer should do to enhance the positive and suppress the negative reactions until costs are regained and objectives met. For example much of the group and meeting support system literature shows clearly how the introduction of technology can influence discussion structure (e.g., question, assertions, and conflict), satisfaction with various meeting aspects, decision quality, and attainment of tactical goals (DeSanctis et al., 2008). However, where low values of these measures may lead to system abandonment in practice, there isn't much instruction regarding how to continue working with an organization until its monetary investment in such systems are repaid and new meeting procedures are institutionalized (Niederman, Briggs, de Vreede, & Kolfschoten, 2008). Note that with complex systems, such actions may not be simple linear sets of instructions but rather more complex branching and looping instructions that depend on observation of intermediate outcomes and selection from a menu of responses. The key is the application of theoretical elements to the creation of products and related outcomes. This contrarian view suggests the tantalizing prospect that patterns may be repeatable at high levels of aggregation, but cannot necessarily be applied to any particular case. To those whom we seek to inform in practice, these patterns or resulting theories are most likely of less value than those that can be applied.

This latter type of theory, however, is likely not to be addressed by extracting theory from behavioral or natural science disciplines.. For example, natural sciences as described by Popper (2002) aim to make universal statements and seek general theories and laws that can be observed in similar circumstances across varied conditions. In contrast, IS aims to find, document, and profit from repeatable but not necessarily precise or deterministic patterns where technology in various forms is integrated within a social system (Simon, 1996). The "developer" and the "user" are generally not neutral observers of the effect of the technology. They rather are active participants evaluating the technology in stages and changing technical features and human operating procedures. This is done in a co-evolutionary manner until enough success is achieved to proceed or success appears too distant and the project is abandoned. A mere passive observation of random results does not yield sufficient understanding of this complex feedback loop of designers approximating user preferences, building or customizing systems for trial, then creating modifications in the technology or the procedures for their use. Static measures of cost, benefit, risk, and success become highly difficult to apply given that a change in affordances or features at a particular cost may have different benefits depending on the intentional or serendipitous reaction and creativity of users.

Providing a common conceptual understanding of what theory is can be a delicate task (Burton-Jones, et al., 2004; Freese, 1980; Sutton & Staw, 1995; Weber, 2003), even without the specific challenges of the IS discipline. Nonetheless, the challenges highlight that there may be merit in changing the rules a bit: Rather than trying to force our complex phenomena in theories that might not fully accommodate them, maybe we should start by better understanding how a different conceptualization of theory could capture the issues discussed above. Especially in light of the discipline's ongoing re-conceptualization – trying to integrate behavioral and design aspects as a true science of the artificial (Gregor, 2009) – such a fresh look at theory might be beneficial to that cause.

Uncovering and Structuring IS Theory Development

One strategy to do so would be trying to come up with a normative definition of how such an IS-specific conceptualization of theory should look. As mentioned above, an extensive review and philosophical discussion would be needed to do so and certainly is a most promising and highly informative venue for future research. In this paper, we take an alternative more "bottom-up" approach. By looking at examples of IS-specific theories derived from grounded theory guided observations, we want to gain a better understanding of what makes them specific and what we can learn from the few existing IS theories for a more dedicated development of more of that sort.

Urquhart et al. (2009) suggest that Grounded Theory (GT) is a good source for theories originating in the IS field. As one of the most renown techniques to actually generate theory, GT was introduced by Glaser and Strauss (1967). In its origin, Glaser and Strauss defined it as "the discovery of theory from data – systematically obtained and analyzed in social research" (Glaser & Strauss, 1967, p. 1). Thus, theory development is characterized by an immersion in the empirical data on a phenomenon of interest. The researcher then engages in an iterative process of discovery and formalization. Additionally, theoretical sampling leads to the accumulation of more and more empirical data on the phenomenon. The results are theories that emerge from and are grounded in empirical observations that explain the relationships between the theoretical categories constituting a phenomenon.

In a recent review of GT literature, Urquhart et al. (2009) identify four general characteristics of the Grounded Theory Method (GTM): (1) focus on building theory, (2) no pre-formulated hypotheses, (3) joint data collection and constant comparison, and (4) theoretical sampling producing “slices of data.” Emerging GTs are generally found in the context of qualitative research (Myers, 1997) – may be one of the reasons why the approach is often confused as just a coding method (Bryant, 2002; Suddaby, 2006). However, the concept of GT is not just a description of how to code data but an approach to build theories. As an approach to investigate IS-related phenomena and to build respective theories, Scott (2000) finds that GTM has reported strengths that qualify it to be employed in the process of scientific discovery in our discipline. For some time, IS scholars have engaged in a discourse on the right usage of GT in IS research and how to maximize its potential to build emerging theories (e.g., Bryant, 2002; Urquhart, 2002; Urquhart, et al., 2009).

Research Method

Literature reviews have been identified as a well suited approach to provide an overview of current work on a given concept in a series of disciplines (e.g., Denyer & Tranfield, 2006; Mulrow, 1994). Especially their ability to aggregate and facilitate current knowledge as a basis for building new insights has been pointed out (Urbach, Smolnik, & Riempp, 2009; Viering, Legner, & Ahlemann, 2009).

In order to identify relevant GT papers, we reviewed the extended AIS senior scholar’s basket of scholarly journals (Saunders et al., 2006) known as the ‘basket of eight.’ The reason to focus our work on these eight journals is their acknowledged quality and their centrality in the IS discipline. All journals in the basket were covered from their first issue to the most recent issue available in the respective electronic databases (up until December 2010). Databases used to gain access to the journals' full-text papers include EBSCO, ScienceDirect, JSTOR, AISeL, and IngentaConnect. We also used the homepages of the respective journals or publishers (e.g., Wiley and Palgrave Macmillan) to ensure completeness and reliability of our search. Within the databases we conducted an extended search for articles that contain the phrase "grounded theory" in their title, abstract, or keywords. The rational for this approach is to exclude articles that only refer to GTM superficially, extend work of a previous article that was based on GTM, or use GTM for data analysis rather than with any goal of theory building. The resulting 27 articles were included in our detailed review and are listed in table 1.

Table 1. Articles reviewed by journal

Journal	**Papers**
European Journal of Information Systems (EJIS)	(Galal, 2001; Volkoff, Strong, & Elmes, 2005; Work, 2002)
Information Systems Journal (ISJ)	(Calloway & Ariav, 1995; Goulielmos, 2004; King, 1996; Lundell & Lings, 2003; Seeley & Targett, 1997; Siau, Tan, & Sheng, 2007; Urquhart, et al., 2009)
Information Systems Research (ISR)	(Hunter & Beck, 2000)
Journal of Information Technology (JIT)	(Palka, Pousttchi, & Wiedemann, 2009; Webb & Gallagher, 2009)
Journal of Management Information Systems (JMIS)	(de Vreede, Jones, & Mgaya, 1998; Pauleen, 2003; Scott, 2000; Zahedi, Van Pelt, & Srite, 2006)
Journal of Strategic Information Systems (JSIS)	(Irani, Love, & Jones, 2008; Petrini & Pozzebon, 2009; Tingling & Parent, 2004)
Journal of the Association for Information Systems (JAIS)	(Day, Junglas, & Silva, 2009; DeLuca, Gallivan, & Kock, 2008; Ribes & Finholt, 2009; Wales, Shalin, & Bass, 2007; Webb & Mallon, 2007)
Management Information Systems Quarterly (MISQ)	(Levina & Vaast, 2008; Orlikowski, 1993)

With these articles at hand, the first two authors scrutinized each paper independently. This review was conducted to assign each papers to one of three groups: (1) papers that use GTM to build an IS-specific GT, (2) papers that use GTM or elements of the method but do not build GT (e.g., work with a priori theoretical considerations or provide detailed empirical accounts of a phenomena using coding element of GTM), or (3) papers that deal with GT or GTM from a methodological standpoint describing the method itself rather than applying it to study an IS domain topic. Aggregating the individual analyses some 23 out of 27 (85%) papers were sorted into the same category immediately. A joint discussion and more detailed review of the papers allowed resolution of discrepancies, ensured inter-rater reliability (Tinsley & Weiss, 1975), and enabled aggregation of the results. Once classified into the groups (depicted in table 2), all three authors conducted a detailed in-depth analysis of the papers' content – focusing on the papers grouped in the first category. Beyond issues related to domain (topic, domain, boundaries, etc.) and method (strand of GT, methods and instruments employed, process of data analysis and theorizing, etc.), we paid particular attention to a thorough analysis of the emerging theories. To this end, each theory was analyzed with respect to its constructs and categories, the relationships among these, and the emergent theoretical statement. This analysis provided us with a deeper understanding of the papers contents, their theoretical claims, as well as their approach to theory building.

Results and observations

Structuring Grounded Theories

Sorting the articles by their use of GT and the journals in which they originated resulted in Table 2. Although ISJ and JAIS produced nearly half of the total articles, JMIS is shown to have produced the single largest number of IS-specific GT theory generating ones. One of the 27 papers deals with GT/GTM from a methodological standpoint (group 3). This paper, while it does not provide underlying IS theory, does aim to "suggest guidelines for grounded theory studies in information systems" (Urquhart, et al., 2009, p. 1). It also emphasizes the need for IS researchers to extract theory from the GT studies and the need to address issues of relevance in IS practice. We note from our review that this call has not yet been fully addressed as less than half of the papers we identified are actually generating theory.

Table 2. Groups of GTM-Article by Type and Journal

Journal	IS-specific GT	GTM method, no GT	Methodology	*Sum*
EJIS	-	(Galal, 2001; Volkoff, et al., 2005; Work, 2002)	-	*3*
ISJ	(Goulielmos, 2004; Seeley & Targett, 1997)	(Calloway & Ariav, 1995; King, 1996; Lundell & Lings, 2003; Siau, et al., 2007)	(Urquhart, et al., 2009)	*7*
ISR	-	(Hunter & Beck, 2000)	-	*1*
JAIS	(Day, et al., 2009)	(DeLuca, et al., 2008; Ribes & Finholt, 2009; Wales, et al., 2007; Webb & Mallon, 2007)	-	*5*
JMIS	(de Vreede, et al., 1998; Pauleen, 2003; Scott, 2000)	(Zahedi, et al., 2006)	-	*4*
MISQ	(Levina & Vaast, 2008; Orlikowski, 1993)	-	-	*2*
JSIS	(Petrini & Pozzebon, 2009)	(Irani, et al., 2008; Tingling & Parent, 2004)	-	*3*
JIT	(Palka, et al., 2009; Webb & Gallagher, 2009)	-	-	*2*
Total	**11**	**15**	**1**	***27***

Somewhat unexpectedly, 15 out of the 27 papers we reviewed only approach GTM as a methodology without explicitly using it to build an IS-specific GT (group 2). Most of these papers go to great length to provide detailed empirical accounts or use GTM to code data to work with a set of pre-established hypotheses. While some would argue that the latter is a misconception of GTM altogether (Suddaby, 2006), we feel that all of these papers provide rich insight into the phenomenon they study and that the application of GTM allows for a deep immersion in the materials the authors analyze. Nevertheless, these papers were less helpful in our purposes of examining GT originated theory building and considering their possible contribution to a cumulative knowledge base, thus we analyze further the content only of the group 1 papers.

Analyzing Grounded Theories

Further analysis of the 11 theory building papers (group 1) presents two additional observations. First, only few of these papers explicitly express that they are producing theory. Based on a thorough analysis of their empirical work, most papers aggregate their findings into an abstract representation that summarizes the factors and relationships the authors identify in their work. Only few of them state the theoretical nature of their findings. Second and possibly related, all of the group 1 papers produce theory in a very specific context. While this has impacts on their generalizability (Lee & Baskerville, 2003), they still qualify as "early" or "small" substantive theories which describe a specific area of inquiry (Gregor, 2006). Although this might be due to our choice of investigating GT studies, which is of explorative nature, we see no good reason why the authors ought not to be encouraged by editors and reviewers to consider what lessons from their study should be tested for more general principles across a broader range of domains in future research.

Although the produced theories are substantive and show not much relation or are even build on one another (a fact likely to be related to our small sample), we are convinced they contribute to a cumulative body of knowledge in IS research. As stated before, the connections might depend on the level of generalization one is looking for in the results. Thus, in order to establish a connection between the studies one has to move in the levels of generalization – e.g. titles, topics, finding, constructs or variables. Figure 1 shows the theories identified in our literature review in the boxes. Adding one level of generalization however – we loosely added typical topics of IS research in italic letters – a relationships between the GT studies can be established.

The topics of 11 papers show potentially overlapping areas of interest. Note that each paper can address more than one relationship or abstract conceptualization. The six relationships that we identify from the content of these individual articles are IS stakeholders, group issues, organizational IS activities, technology use, system effects/knowledge, and development approaches. Observing these particular "higher level" areas of potential generalization from GT studies is not too surprising. Large number of IS papers have studied aspects within each of these topics. However, there are at least two distinguishing aspects of such identification. Although the topic names are familiar, the bottom up approach suggest a new look at the content within each category. Each of these relationships are discussed below in terms of common or different categories, results, and proposed theory.

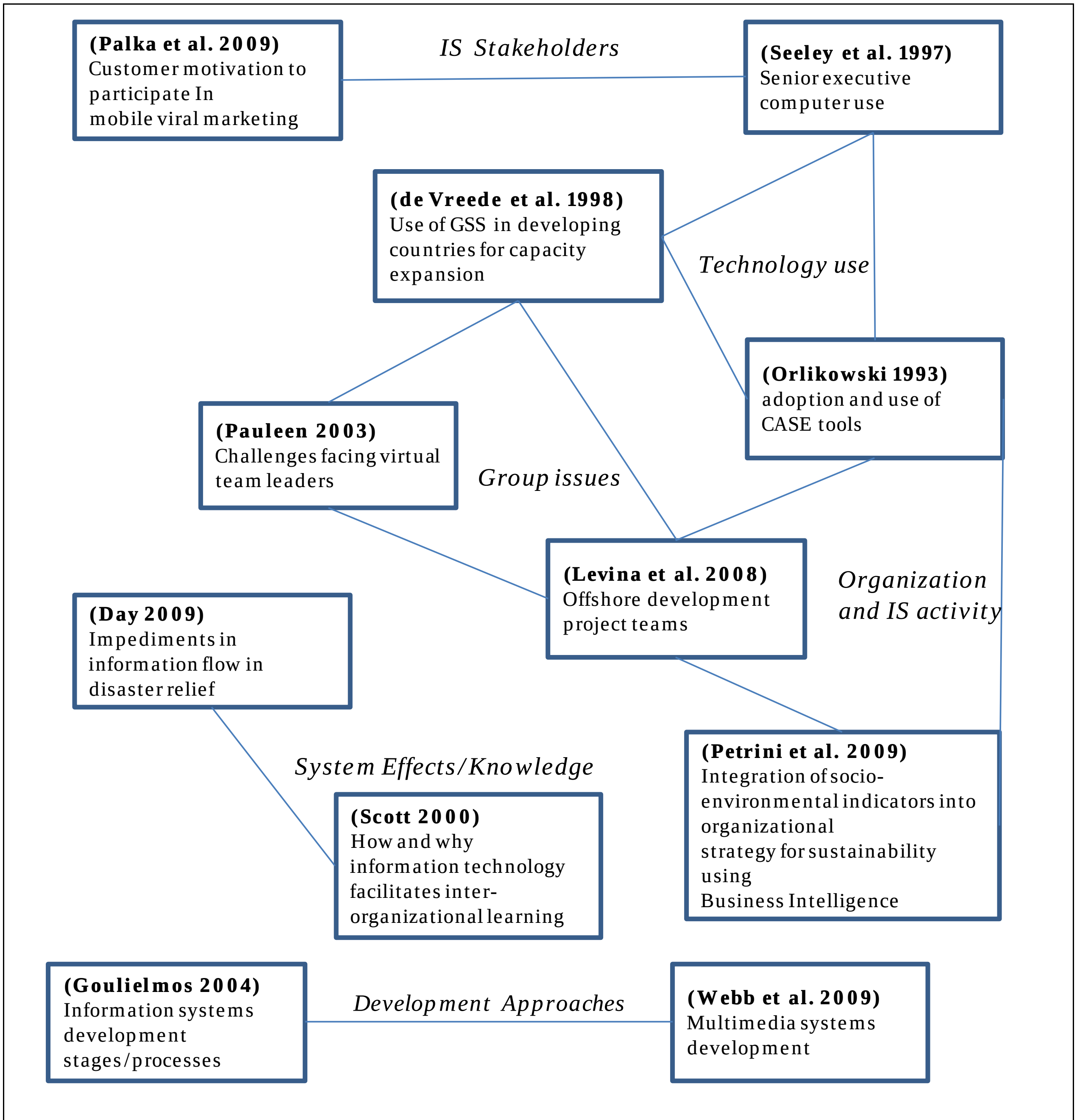

Figure 1. Emergent IS relationships based on GT studies

IS Stakeholders broadly defined represent users of the technologies, systems, and products of the IS function within organizations. In the two papers that address smaller subsets of this domain, we can see that one addresses consumers as a large general class (Palka, et al., 2009) and the other senior organizational executives (Seeley & Targett, 1997). These groups bear the commonality of responding to IS offerings and potentially afford the same range of possible responses to it; on the other hand one is internal and another external to the organization of the IS function. Palka et al. (2009) address three stages of participation in mobile viral marketing (opening, using, and forwarding) and consider antecedents and results of both intention and actual use at each stage and in significant detail. This study reflects a deep understanding of IS activity as a sequence of interrelated actions each with an intention and each with an action. It is most interesting that the detailed factors influencing intentions and actions at all three stages may result from similar categories but very different detailed factors.

In contrast Seeley and Targett (1997) aim more at describing levels of expertise among senior executives and matching the use of specific tools with these levels. While both of these address “consumers” of IS products, their targeted set of questions is quite different. Both, however, extensively calibrate their findings with prior IS literature. For Palka et al. (2009) this means absorbing the variables of TAM and other reference discipline theories of use into a much larger and more complex model. For Seeley and Targett (1997) this means contrasting their findings with other end user classification schemes. In both cases fuller and more detailed findings are presented. Neither paper makes an explicit statement of emergent theory. Implicitly, these studies show that a range of issues within the rubric of IS stakeholders will include both differentiation of attributes among customers and different influences for sequential action-intenion pairings regarding complex IS usage. Note also that the particularity of the technology is in the forefront of both studies – for (Palka, et al., 2009) viral marketing is quite specific in its targeted subject; for Seeley and Targett (1997) the specific technologies selected and used by executives are enumerated, though the study does not further link these uses to particular tasks.

Technology use is broadly defined as considering the individual and organizational responses to introduction of technology. Seeley and Targett (1997) were discussed above in terms of issues pertaining to "users" of technology per se. Orlikowski (1993) and Levina and Vaast (2008) take a more organizational perspective. Orlikowski (1993) considers the effect of introducing CASE tools into a development environment contrasting two instances where Levina and Vaast (2008) examine practices involving use of multinational development teams of varied configuration. Orlikowski's work results in a comprehensive model of issues involved in corporate adoption of CASE tools consisting of the following domains: environmental context, organizational context, IS context, conditions for adopting, adoption, consequences of adoption. Orlikowski's theoretical conclusion is summarized as, "…to understand effects of introducing a technology in an organization it is essential to account for (1) intentions and actions of key players; (2) the social context of implementation; and (3) the change processes enacted as a result" (p. 334). Although Levina and Vaast (2008) do not "test" this proposition, they do elaborate on a part of it. Their own theoretical conclusion can be paraphrased as: middle managers use of their economic, intellectual, and social capital decreases status boundaries among project participants resulting in more effective collaboration. It can be seen that the main principles observed as essential for introducing a new technology are not simple to specify. It is not clear that we have a good taxonomy of potential intentions or actions (neither that these are not subject to innovation and creation of new ones nor are we clear about the level of detail and abstraction for accounting for much less measuring such intentions). It is interesting to consider "borrowing" the Palka et al. (2009) concept of sequential intention-action pairings as a way to map or deconstruct the elemental intentions and actions as well as change processes involved with technology adoption.

As Orlikowski (1993) and Levina and Vaast (2008) can be viewed as addressing use of technology, they can also be viewed as tacking issues of adopting technology in the organizational context. They are joined in this by Petrini and Pozzebon (2009) who focus on the organizational context within which business intelligence programs may be introduced into organizations. The categories elicited by analysis in pertaining to organizational context are: (1) corporate view (top commitment and leadership); (2) organizational structure (governance structure and formal sustainability area); (3) organizational mechanisms (education, communication and monitoring, recognition and valorization); and (4) indicators in perspective (triple results indicator; functional view; structural view). This can be viewed as filling in details for one of Orlikowski's (1993) model components with organizational context. Petrini and Pozzebon (2009) conclude in essence that IT processes can help support organizational sustainability projects and further that – while the programs may be viewed as technical – organizational factors as detailed in their study are also key to successful programs. Given the level of detail in enumerating particular organization context elements, it is a short inference to consider how each might play a role in BI project success. However, the nature of the relationship among these elements and success (e.g., are there thresholds for each element? Do they tradeoff or are they independent?) remains to be refined further.

Group issues in IS pertain to the subset of technologies aimed at supporting, guiding, or performing work for groups or teams. Two papers use grounded theory to examine this broadly defined topic. De Vreede et al. (1998) introduce classic meeting support systems into use by groups in Tanzania whereas Pauleen (2003) examines the factors that are important for leadership in the virtual team environment. Although de Vreede et al. look at collocated teams and Pauleen examines teams separated by distance, both are focused on issues of leadership, relationships between leaders and members, and organizational acceptance. De Vreede et al. very explicitly found that GSS technology acceptance was based upon (1) endorsement of technology by top management; (2) computer literacy; (3) satisfaction with use; (4) acceptance inhibited by preference for oral communication; and (5) prevalence of referent power over "rational" decision making. Pauleen (2003) found positive leadership behavior to require four processes occurring iteratively. These were: (1) assessing conditions; (2) targeting level of relationships; (3) creating strategies; and (4) engaging in work tasks. Each of these processes, however, themselves contained dense clusters of issues to be considered and dealt with. The analysis was based on the following GT categories: communication channels, communication strategies, communication protocols, virtual team leadership, and related issues, culture, human interaction, organizational issues, nontechnical barriers, and technology. It is clear that these papers address somewhat different approaches in considering a particular introduction of a fixed technology versus considering concerns for setting up a flexible program across tasks and groups possibly using different subsets of a technology array. Both of these situations fall soundly within the domain. Some mapping of key theoretical elements seems possible – communication channels and preference for oral versus written communication; organizational issues and endorsement of technology by top management. On the other hand, remaining issues seem applicable to one setting or the other.

System Effects/Knowledge Flow relates to methods for facilitating information flow and for converting organizational information into learning. Day et al. (2009) presents a construction level view of issues pertaining to the flow of knowledge and its inhibitors particularly in disaster relief context. The authors propose four design principles: (1) identify and deal with both incongruent data points and data credibility issues; (2) monitor with visual/mapping capability not only the disaster zone but also relief zones and reconstruction areas; (3) capture and store audio, visual, and textual data with minimum human intervention and automated conversions; (4) a social network of people. It is likely that some of these principles are tightly coupled to the particular technology addressed, but others may be translatable to other situations. For example the value of automated capture and conversions may be general to many applications. Scott (2000), in contrast, looked less specifically at functionality issues and more broadly at mechanisms by which information technology per se facilitated organizational learning. Among the conclusions are that simulations helped convert explicit to tacit knowledge; IT facilitated communication; trust is promoted by knowledge of mutual benefit; specific knowledge transfer and adeptness of collaboration are two processes of learning occurring simultaneously and recursively from exploration and experience with collaborations. These findings appear to be complementary and orthogonal rather than contradictory.

Finally, **development approaches** pertain to methods for approaching the activity of development per se. Goulielmos (2004) investigated the difference between textbook versions of development methodologies and observable actions of developers in practice. The result was a rich description of phases in development with detailed explication of specific issues and practices at each point. Observation suggested that important factors in development success include: (1) company-wide involvement; (2) understanding actual needs (3) understanding organizational culture; (4) communication; (5) understanding technology; (6) sharing a common vision; (7) top management support; (8) management of changes; (9) unrealistic project pressures; (10) team composition; and (11) more involved clients. Interestingly, these factors would likely provide significant commonality with Orlikowski's (1993) observations regarding adopting technology in context. Targeting the factors influencing development for a particular technology, Webb and Gallagher (2009) used the following categories in their analysis of multimedia development: context complexity (amount or level, intensity, duration, rate [of increase]) action/interaction strategies. Their conclusions focus on the differential need for developer interaction with users based on the complexity of the application. As with the other domains, these findings are orthogonal and complementary across two development oriented studies leaving much room for cross referencing of factors in other contexts to test for more general patterns.

Discussion

The results we obtained from our review have allowed us to suggest some theory building avenues pertaining to the IS discipline. While the list we compiled certainly cannot claim to be comprehensive, it allows us to identify areas of theory emergence. First, by investigating GTM applied in IS research, we look at specific and arguably genuine IS phenomena, thus approximating the intellectual cores of the IS discipline as depicted in Figure 1. The topics on which we established a connection between the theories arise from the data. Of course, other levels of connecting the theories are possible – for instance by establishing a connection between the constructs and findings or detailed variables that were investigated. In that case the figure would look far more complex and the discussion probably exceeds a single paper. (We are glad to provide the resulting graph upon request.) By connecting the produced theories on the level of the topic however, we point to an approach to accumulating knowledge in IS research.

Extending this perspective, our analysis permits us to take an intense look at eleven indigenous IS theories. Beyond the extraction of some of the phenomenological facets of our discipline, the analysis and categorization of the theories has also allowed us to develop a better understanding of the role of theory in the scientific discovery of the IS discipline. More specifically, we could observe three distinct aspects that warrant further discussion and probably even future analysis.

First, the analysis of the theories with regards to content showed that they provide a broad spectrum of theories. This ranges from taxonomical descriptions of a phenomenon to specific recommendations how to design information systems for certain problem domains. This observation can be substantiated and refined using Gregor's (2006) theory classification. She identified (1) typology, (2) explanation, (3) prediction, (4) explanation and prediction, and (5) design and action as the five major theory types in IS research. We used her framework to further refine our analysis of the theory building papers as shown in table 3.

Table 3. Classifying group 1 based on Gregor (2006)

Theory for … (type)	Papers
… analysis/typology (1)	(Seeley & Targett, 1997)
… explanation (2)	(Day, et al., 2009; Levina & Vaast, 2008; Orlikowski, 1993; Pauleen, 2003; Petrini & Pozzebon, 2009; Scott, 2000)
… prediction (3)	(Palka, et al., 2009)
… explanation and prediction (4)	(de Vreede, et al., 1998)
… design and action (5)	(Goulielmos, 2004; Webb & Gallagher, 2009)

Notably, all five types of theory were present with a significant majority addressing theories for explanation (type 2). More than half of the papers aimed at theory building produce theories for analysis or explanation of a phenomenon (types 1 and 2). Only four of the reviewed papers provide theories that allow for predictions of some kind, inform the design of artifacts, or prescriptively guide actions (types 3 through 5). Classifying the identified GT papers using Gregor's scheme presents additional perspectives for future research, for instance:

- Even though we observed relatively few theory type 5 papers we expect that even fewer derive from reference discipline theories. This leads to research questions regarding more specifically how GT may be used to develop type 5 theories.
- Descriptively, are there systematic differences in the flavor and approach to GT relative to the type of theory they aim to develop or normatively are there approaches to GT that enhance successful development of particular theory types?
- Can GT be used to help move theory from one type to another (e.g. add explanation or prediction to typology) or does it only support its initial inception?

Second, the researchers' effort to abstract from their observations somewhat generalizable statements shows an effort to create theory at multiple levels of generality. Particularly those papers producing theories of types two through four seem to work in that direction. Quoting Weick (1992), Sutton and Staw (1995) argue that this is quite a natural process in scientific discovery and that knowledge grows by extension. They suggest that providing accounts of small but comprehensible events is a chance to build cumulative theory. Along similar lines, Holmström et al. (2009) and van Maanen (1989) highlight the need for a strong basis of descriptive narratives before being able to build strong theories. Over time, the iteration of proposing relationships among concepts, applying them in various settings, observing results, and reformulating observations into new statements will produce theories of increasing scope (Dey, 1999). For example, Day et al. (2009) use their insights from investigating the disaster response to hurricane Katrina to identify a set of factors that explain how information flows are impeded in extreme cases. Pauleen (2003) offers a detailed discussion of how leaders can facilitate relationship building in virtual teams. Such explanation will enable a certain degree of prediction, an example for which is the paper by Palka et al. (2009).

Following this logic, it is noteworthy that initial, sometimes unfalsifiable descriptive observations are not necessarily atheoretical. One need not dismiss these early observations of patterns or the ability to predict without full understanding as if they are something less than theory. Rather one can view theory of this nature as representing a significant - though incomplete as it may be - state in the evolution of understanding regarding these particular phenomena. Following Gregor's (2006) logic, there is no sense in which the various theory types are "better" than one another. Rather the different theory types seem to explain and categorize our collective understanding at different points of experience. To be able to assess how far along this upward trajectory towards grand theory a given theory has come, Lee and Hubona (2009) suggest that there are two general forms of validity. The formative validity of a theory describes a theory's property to adequately capture a phenomenon's concepts and their relations and is achieved through a diligent theory building process. We interpret this first as emphasizing the care in observing the domain of practice and organizing concepts in a way that reflects the realities of the actual settings and second as maintaining a compelling internal logic. A theory's summative validity means that it survives repeated empirical testing and that its external validity grows as the theory is able to model or predict more and more instances of the phenomenon. This we interpret to emphasize not only that efforts to falsify the statements are undertaken, but that results of such tests are carefully used to refute, support, or amend the theory's statements in consistent and logical ways.

Third, this leads us to discuss the theories' search for applicability, another constituent of relevance (Benbasat & Zmud, 1999). A good example is provided by de Vreede et al. (1998). A grounded analysis of the acceptance of a group support system in an African context identifies constructs refining TAM. In doing so, they highlight contingencies that make the propositions of

TAM more applicable as they would, for example, help facilitators of meetings in East African countries to improve their strategies for employing GDSS. Beyond this, and as theories reach a certain level of maturity, they might even be ready to directly inform the design of specific IS artifacts (Hevner, 2007; Hevner, March, Park, & Ram, 2004). Such could be done, for example, by means of helping to establish design theories (Gregor & Jones, 2007; Walls, Widmeyer, & El Sawy, 1992) for the solution of a particular class of problems. In our analysis, Webb and Gallagher (2009) are suggesting a methodology for multimedia systems development which, if followed, will lead to more comprehensive and successful development project for this class of systems. We suggest that a fully realized IS domain cumulative tradition would include high level theories, perhaps derived from reference disciplines, decomposed into low level detailed theories that can be applied in particular domains, with a solid accompaniment of theories for design and action that guide the application of theory in the creation of socio-technical artifacts.

Concluding Remarks

What would be needed to create an accumulation of indigenous IS theory more efficiently? As a discipline, we would profit from more highly valuing rich and thick description of specific actions and events as constituting theoretical contribution. While the general interplay of the phenomenon's constituents is important for understanding its principle function, a stronger focus on specific context and its impact should better link theories to practice. In doing so, the general understanding of the phenomenon's behavior might then, in turn, help us and the practitioners we seek to inform to devise specific statements about interventions towards a desirable outcome.

Limitations and Future Research

Before turning to our research's implications, it is appropriate to briefly reflect some of our study's limitations. In this regard, our selection of the "basket of eight" journals may have left out solid GT studies published in other journals. We particularly note that the *Journal of Information Technology Theory and Application* and the *Scandinavian Journal of Information Systems* published GT and GTM research. While such papers are not included in this review, we draw on their contributions to inform our approach and in our discussion and analysis of the review (e.g., Bryant, 2002; Chang, Yen, Huang, & Hung, 2008; Ovaska, Rossi, & Smolander, 2005; Urquhart, 2002). Some journals also publish articles using GTM or producing GT in IS that are not labeled so in their titles, abstracts, or keywords (e.g., Feller, Finnegan, Fitzgerald, & Hayes, 2008; Kirsch, 2004; Lederer & Mendelow, 1990; Ransbotham & Mitra, 2009). For reasons of consistency of our search criteria and overall feasibility of our study we decided to not include these in this review. However we can see potential benefit in their future inclusion as extracting implications for research present in these may be helpful.

With respect to the analysis of the papers, their approach, as well as their content, the authors coded independently at each level of analysis. Afterwards, generally during extensive workshops, we found significant agreement. Of course our conclusions regarding the relationship of elements, results, and implicit theory of individual studies are based on our own interpretations and might also be debated by other scholars. Beyond this, we all share general principles that are in accord with the goals and purposes of grounded theory. It is not clear that investigator disinterested in or more critical towards GT on principle would have the same level of agreement or come to similar conclusions.

Finally, a more comprehensive and explicit review of theory in an effort to work towards an IS-specific conceptualization of theory would be an important extension of the present study. This includes important epistemological and ontological considerations that might bear additional insight with respect to the ability to accumulate the various topics and approaches we studied. However, given the relevance of the nature and conceptualization of the emerging theories in the studies we reviewed, we considered a more normative, prescriptive definition of theory risky as it might lead us to unintentionally replace the original contributors' theoretical ideas and concepts. Future research, however, could and should look in more detail at the actual theories that emerge, comparing them against what has been learned about the constituents, nature, and role of theory in some of our reference disciplines.

While this study focuses on GT, we acknowledge that other efforts to establish indigenous theory have been undertaken. For example the DeLone and McLean IS Success Model offers an interesting historical development. Since the introduction of the first version (DeLone & McLean, 1992), there have been two major cycles of revising, extending, and integrating the body of knowledge around this model (DeLone & McLean, 2003; Petter, DeLone, & McLean, 2008). Additionally significant evolution of theories such as TAM (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989) may be offered as constituting an IS theory base. Methods for integrating these threads of investigation provide additional future research questions.

We call for continued GT based studies targeted to IS phenomena of all types. We would like to see more GT studies conducted and published and, in that vein, we authors individually are involved with multiple GT based studies at present. Beyond ourselves, and by drawing on Simon's (1996) writings on the science of the artificial, we suggest that IS researchers shouldn't be afraid of the challenge to fill our discipline *"with theoretical and empirical substance distinct* *from the substance of our supporting disciplines"* (p. xii). Such additional indigenous IS theories might then help us to advance our understanding of theory.

Contributions

Unfortunately, the number of GT studies aimed at theory building that we could identify is quite small. There are an extraordinary number of additional specific phenomena that could be examined using inductive methods. As a result, we are hard pressed to provide detailed and documented indicators of the development of grand theories resulting from these studies. However, we hope that we have shown the potential for more of this sort of study to (1) show inherent value relative to its narrow domain; (2) show potential for combining either as a complement, an overlap, an expansion, or contrast in findings with studies in related domains; and (3) show hints of the value of grand theories derived inductively such that conclusions can be "drilled-down" to very specific applications in practice. Ultimately, we find the accumulated findings of these studies suggestive of a tentative and emergent set of indigenous theories that at grand levels may reflect in whole or part theory drawn from reference discipline to apply to IS phenomena, but drawn with greater specificity and applicability to field level IS practices. We are convinced that such IS theory will eventually stimulate the reconsideration and integration of reference discipline theory generated findings with theory based on direct interaction with IS activities.

We have argued for the strengthening of indigenous IS theory as part of a growing theory-centered cumulative IS knowledge base. The intention of this paper has been to identify studies using grounded theory for theory development and show how these provide a potential for using their results in combination to suggest an approach to a cumulative IS knowledge base. We have discussed six topical areas built from observations at the elemental level in the individual studies.

This bottom up approach offers the potential for linking theory at the level of application with that at higher levels of generalization. We have also shown that such GT theory building can address each of the five Gregor (2006) theory categories and suggest some follow up questions for extending this analysis. Although this is but a single step, we hope that this line of inquiry will stimulate additional, explicit investigation and construction of a clear set of theory constituting an IS core knowledge base.

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