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A further interpretation of the relational agency of information systems: A research note

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ABSTRACT

This paper proposes a reinterpretation of the agency of information system (IS) as relational. It explores how the agency of IS has been articulated in the extant stream of accounting information system (AIS) research and explains how a relational view of agency can enhance our understanding of IS in its organizational context. This reinterpretation highlights the limitation of viewing IS as technology (technocentric view) with predefined functionality and predictable effects. Attention is also shifted away from an anthropocentric conceptualization of IS; where the technology is seen as a tool and agency is attributed only to humans. We argue in the paper that both the technocentric and anthropocentric views of IS limit what can be learned about the agency of IS. Drawing on actor-network theory (ANT), this study conceptualizes IS as a relational network and proposes a relational view of the agency of IS. This relational view suggests that the social and material entities that make up IS have no absolute essence when viewed in isolation; rather, their collective force defines the agency of IS. The implications of the relational view of agency for AIS research are also highlighted.

1. Introduction

Prior information system (IS) research has raised questions about the agency of IS in organizational settings. Agency is generally conceptualized as the capacity of an actor to act and to generate effects (Latour, 2005). Within the accounting information system (AIS) literature, questions about agency have focused primarily on the extent to which IS generates or contributes to organizational performance outcomes. Within the context of extant research, whether and how IS has the capacity to act remains a debatable issue. Some prior studies have argued that information technology (IT) does not matter as it is only an artifact and commodity-type of resource that does not generate competitive advantage per se (Carr, 2003; Mata et al., 1995). Other researchers have sought to explain the agency of IS by highlighting how IS (generally conceptualized in terms of technology) generates organizational capabilities through which organizations may improve their performance (Konchitchki and O'Leary, 2011; Melville et al., 2004; Wade and Hulland, 2004). While these prior studies have engaged with the concept of agency, there are at least two broad concerns with these conceptualizations.

First, they present an overly simplistic view of agency which stems from their technocentric or anthropocentric conceptualization of IS as well as their focus on a standardized functional view of agency (Orlikowski and Iaconno, 2001). Addressing this issue has been the primary concern of the sociomateriality literature but more needs to be done in order to further research

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area. For instance, while the sociomateriality literature highlights the importance of the entanglement of the human and the technological, the literature emphasizes the importance of technology in shaping human conduct: partly because of the agenda to encourage organizational scholars to consider technology more explicitly in discussions of organizational practices (see for example Orlikowski and Barley (2001) and Orlikowski (2007)). Also, in rendering the relational view, the sociomateriality approach elaborates, almost exclusively, how agency is exercised by (and in) a network of the human and the material with little or no attention paid to how this network acquires the agency or capacity to act. The capacity seems to be taken as given. More so, the argument for relationality in the sociomateriality approach remains at the ontological level and the methodological advances lag behind this ontological development. This paper seeks to extend the sociomateriality literature by arguing for the decentering of agency and focusing attention on the dynamic interplay between the technical and the human and the generation of agential capacity. The paper also discusses the importance the relational view places on the examination of both how agency is acquired and how it is exercised; and offers a methodological corollary to the relational view.

Second, prior research adopts an essentialist view of IS, which posits that IS has a predetermined directional effect on organizational performance. Such conceptualization of the agency of IS limits what can be learned about IS in its organizational context. Drawing on actor-network theory (ANT), we aim to reinterpret the relational agency of IS and to explain the implications of such a relational view of agency for AIS research. Reconceptualizing the relational agency of IS will help broaden our knowledge of the emergence and enactment of AIS and the consequences for organizations. IS has no absolute essence but takes its form, and acquires its attributes and agency, as a result of its relations with other entities. This shifts attention away from viewing IS as a technology or a mere aggregation of technical specification (materiality) and functionality to a more sociomaterial interpretation of IS. That is, that which comes to be labeled as IS is a patterned network of heterogeneous elements and practices. This patterned network is nested in wider organizational relationships that shape the agency of IS and within which IS simultaneously shapes the agency of other entities. This makes IS an interdependent actor whose agency can be understood primarily with reference to other sociomaterial entities and practices with which it associates. Such a shift further implies that the agency of IS is indeterminate (*i.e.*, no *a priori* set of factors can adequately explain the agency of IS) and the organizational effect of IS may flow in multiple and unpredictable directions.

The purpose of this research is to explore the agency of IS as it has been articulated in the extant streams of AIS research, and to examine the enhancements that would derive from a further interpretation of a relational view of agency. To achieve this objective, first the major thrusts in existing AIS literature are reviewed and the limitations of the technocentric and anthropocentric approaches to organizational studies of IS are identified. The discussion then highlights how the literature on sociomateriality seeks to address the technical and human divide in the literature through the proposition of a relational view. Drawing mainly from ANT, the paper then reinterprets the notion of relational agency of IS. Second, the methodological implications of conceptualizing agency in IS as relational are explained.

This study has important implications for encouraging and enhancing research on the relational agency of IS. The strategies and approaches used in developing a relational view as a guide to approaching future research examining the agency of IS are explained. The technocentric and anthropocentric approaches are critiqued in order to highlight the limitations of each in providing robust explanations of the entanglement of the social and material aspects of IS. The primary focus is on articulating the advantages of approaching research on the agency of IS through examination of the myriad of relationships surrounding and including the IS itself.

2. A further interpretation of the relational view of agency and implications for AIS research

This section seeks to critique the existing conceptualization and theorizations of the agency of IS and proposes a reinterpretation and extension of the relational view of agency. The focus is to highlight how the existing conceptualizations of agency limit what can be learned about AIS in organizations and to show how knowledge can be advanced when the agency of IS is conceptualized and theorized in relational terms.

2.1. Agency as theorized in the extant literature

The existing research has conceptualized and theorized the agency of IS with reference to either its technical components (technocentric view) or the human intervention in its 'use' (anthropocentric view). In the technocentric conceptualization of agency, IS is reduced to the technology that holds the information system together; and, attempts are made to understand the agency of IS with reference to the supposed functional properties of the technology (Arnold and Sutton, 2002; Benbasat and Zmud, 2003; Geerts, 2011; Alles et al., 2013). For researchers in this area, the technology is what acts and it does so in a number of ways including the following: simplifying and standardizing organizational work thereby making the actions and inactions of individuals visible, predictable, and controllable; enabling acts of engagement to be managed across space and time in an instant; determining organizational practices that are important; and engaging in knowledge fabrication. Technology design is often viewed as the solution to organizational problems (Hevner et al., 2004; Alles et al., 2013). In this technocentric view, theoretical primacy is given to the technological components and functions of the system; and, the research questions that are posed are generally influenced by the technology (Goodman, 2001; Gregor and Hevner, 2013). Much of this work has traditionally focused on technological determination from organizational study perspective (Leonardi and Barley, 2010).

In the anthropocentric conceptualization of the agency, the technological components of IS are reduced to inert objectives that are not capable of action on their own (Orlikowski, 2007). Rather the technological components of IS only serve as tools that are

manipulated by human beings to achieve desired goals (Arnold and Sutton, 2002; Masoner et al., 2011; Wheeler and Murthy, 2011; Azad and Faraj, 2013). Here, agency is defined in terms of use of the technology and human beings are those with the privilege to use technology to achieve AIS outcomes. By implication, agency resides in and with human beings. Arguably, this philosophy is overtly or inadvertently adopted by accounting and management researchers in organizational studies that largely ignore the IT component of organizations altogether (Orlikowski, 2007; Orlikowski and Scott, 2008; Arnold, forthcoming). This human-centered conceptualization has led to the development of theoretical frameworks that privilege human action over technology. The consequence of this is that research questions about the agency of IS are framed around human intentions to use; ease of use; human skills and creativity in using the technology; human information processing capacity; need fulfillment; human acceptance of technology; and human choices of technology (Dowling, 2009). A major limitation of such approaches is that the role that information and IT plays in organizational change is minimized (Leonardi, 2007).

While the dualistic separation of the agency of IS has led to some knowledge about the situated functionality of IS in organizational settings, they tend to foreclose many interesting things that can be learned about what constitute IS, how it acts, why it acts in the way it does, and what effects are generated in its name. A number of factors contribute to these limitations. First, both the technocentric and anthropocentric conceptualizations predetermine the form and direction of the agency of IS. That is, the agency of IS is assumed as a pre-existing reality that can be revealed through research (Goodman, 2001; Law, 1992). While this simplifies reality and facilitates the development and empirical testing of theoretical models about the agency of IS, these assumptions remove complexity from the model, reduce tension, and minimize surprise in IS research. But, complexity, tension, and surprise should not be assumed away (Law, 1999); rather, given that they are part of organizational life, they need to be explained. This implies that to understand the agency of IS, researchers should not start by assuming away things that need to be explained (Law, 1992); otherwise, interesting and surprising things that could be learned from the research process are not evident. There should be no presumption of agency since each instantiation of the technology (*e.g.*, SAP) is constituted in different networks of relations. That is, SAP in Caterpillar is not the same as SAP in Pacific Drilling. As the technology becomes entangled in the mechanics of two different organizations, it is altered in significant ways implying that the different systems may acquire and/or exercise agency in different and unpredictable ways. Rather than predetermining the agency of IS, the relational approach outlined in this paper, encourages us to ask questions about how IS acquires its agency, how the agency of IS may take different forms, and how the agency is enacted in practice (Mouritsen et al., 2010).

A second problem in extant theorizing of the agency of IS is the focus on associating agency with the object that holds the information system together. In the technocentric view, it is the technology that matters, thus agency is conceptualized and theorized in relation to the technology. Whereas in the anthropocentric view, humans are said to hold together what constitutes an IS. We argue that IS is not merely the technology that holds information, but an IS is held together by the technology (Latour, 1986). That is, what holds things together is the frame but what acts are the heterogeneous entities that are held together within the frame. The frame should be seen as an achievement rather than a starting point (Caliskan and Callon, 2009). This implies that to understand the agency of IS, the emphasis should shift away from the frame and focus on what is being framed. What is being framed are relationships, which can be social or material, between and among heterogeneous entities. The agency of IS then, is a property of the multilateral and heterogeneous associations that are held together in its name. The constitutive exchanges of properties between and among these sociomaterial entities that are assembled and held together as IS define the capacity of IS to act (Schneider et al., 2010). For this reason we argue that the agency of IS is relational.

Prior technology research recognizes the limitation of separating the human from the material and calls for explicitly examining how the two coproduce organizational practices and effects (Kling and Scacchi, 1982; Orlikowski, 2000; Orlikowski and Barley, 2001, Jones et al., 2004; Leonardi and Barley, 2010). For instance, prior research argues that due to social researchers' past aversion to the technological determinism school of thought (Leonardi and Barley, 2010), the non-social (the material) has received less attention in organizational studies (Woolgar, 2002; Orlikowski, 2007). As a result, materiality's role in organizational change and actions remains under theorized (Leonardi and Barley, 2008). Kling and Scacchi (1982), on the other hand, argue that past research largely ignores the social context of technology. Together, these researchers recognize the need for research to make explicit connections between the social and the technical. In response, research is starting to engage with both in the same study.

Unfortunately, the early work that sought to study both the social and the technical aspects of IS seems to either privilege the social or the technical. For instance, Orlikowski (2000) proposed the notion of "technologies-in-practice" as a way to re-focus attention on the intertwining of the social and the material in organizational practices. Unfortunately, this creates a one-way interaction model where the focus is on how human action interacts with technology to enact emergent structures (Orlikowski, 2000; Jones et al., 2004). Here, the human is privileged over the material. In recent times, however, there is a shift away from examining the social and the technical in a one-way or two-way interaction to treating them as inextricably intertwined and inseparable in everyday life (Orlikowski, 2007). This forms the basis of the relational view as proposed in the sociomateriality approach. A relational approach allows for and requires the researcher to explore the cumulative history of relationality between the social and material (Wagner et al., 2010).

2.2. A relational view of agency

Following from the above, we propose a relational view of agency. As the relational view is not new to the IS literature, the notion of relationality as presented in the sociomateriality approach is first outlined in this paper and then a reinterpretation of the relational view is proposed.

2.2.1. The sociomateriality approach to relationality

The literature on sociomateriality has primarily focused on elaborating a relational ontology for the study of technology and organizational practices (Orlikowski, 2007; Suchman, 2007; Leonardi and Barley, 2010; Yoo, 2010). Proponents of the sociomateriality approach have largely criticized the human-centered approach and the neglect of materiality in prior studies. This, they argue, limits what can be understood about organizational practices and the specific roles of IS. In elaborating a sociomateriality approach, Orlikowski (2007, p. 1437) highlights the need for IS and organizational scholars to "figure out how to take seriously the recursive intertwining of humans and technology in practice". They propose a relational ontology that seeks to bypass the divide between the human and the material and focuses attention on how the mutually constitutive relations between the two produce particular organizational practices and effects.

While in principle, the relational ontology implied in the sociomateriality approach effaces the distinction between humans and technology and has led to the agency of both to be accounted for in theoretical and empirical studies (Gaskin et al., 2014; Jones, 2014; Mazmanian et al., 2014; Scott and Orlikowski, 2014; Venters et al., 2014), some limitations remain in the way the sociomateriality approach accounts for relational agency. First, though the sociomateriality approach seeks to account for the constitutive entanglement of the human and the material, the existing literature seems to focus on highlighting the importance of technology (materiality) and to emphasize how organizing is bound with material forms through which humans act and interact (Orlikowski and Barley, 2001; Orlikowski, 2007). Here technology is presented as a conduit for human conduct which results in the privileging of the material over the human in accounting for agency. This is amply illustrated in the two examples presented in Orlikowski (2007) where material agency is emphasized and human behavior is said to be conditioned by the material agency. Such a rendering of the human and the material maintains elements of the technological separateness it seeks to dissolve and does not account adequately for relational agency.

Second, in elaborating a relational view, the sociomateriality approach focuses almost exclusively on how agency is exercised within an entangled network of sociality and materiality. The approach does not adequately account for how the relational network acquires agency (the capacity to act). That is, the sociomateriality approach attributes some essence to the human and the material and presumes that they have agential capacities. Focusing only on the exercise of agency arguably leads to a partial account of relationality. We propose that a relational view should account for both how agency is acquired and also how it is exercised.

2.2.2. A reinterpretation of the relational view of IS

Our starting point is to avoid *a priori* distinctions between humans and technologies and to focus theoretical and empirical attention on how they are assembled into what comes to be known as IS. That is, the focus is on what is held together as IS, not what holds IS together (Latour, 1986). The stuff that is held together as IS is an outcome of heterogeneous engineering involving the entanglement of the social and material (Goodman, 2001). In the engineering process, the social and the material mutually exchange properties through a series of associations to an extent where individual identities become less important (Goodman, 2001; Schneider et al., 2010). In this sense, the process of assembling entities (social and/or material) into an IS requires that the individual identities of these entities are discarded and analytical attention is focused on their collective force (Latour, 1993). This has a number of implications.

First, the social and material entities that make up an IS have no absolute essence when viewed in isolation (Law, 1992). On their own and in isolation, these entities are unable to act in the name of the IS and they are unable to take a form or assume particular attributes that qualifies them as an IS. The entities acquire the form and attributes of an IS only as a result of their interactions with other entities. For example, technology (such as a computer) on its own cannot become an IS without any associations with people and people cannot constitute an IS without technological devices (be they primitive or modern). One needs the other to constitute an IS. That is, each entity acquires its capacity to be counted as being an IS only because it maintains particular relationships with the other entities that make up the IS. Further, if these entities can only be an IS because they are in relationships with other entities, then it follows that they do not exercise the agency of IS on their own, but do so through the relationships established with other entities. This makes the capacity to act (*i.e.*, agency) relational.

In arguing that an IS has a relational agency, we are also arguing the capacity to act does not pre-exist the relationships from which it is derived, but is the outcome of these relationships (M'charek, 2010). This further implies that the agency of IS cannot be adequately theorized and defined *a priori*. Therefore, to understand the agency of IS, researchers need to characterize IS in its heterogeneity and to explore how the various entities come to be patterned into a network of relations that generates effects in the name of IS (Law, 1992). This also suggests that researchers should focus on how an IS emerges and becomes stabilized (albeit temporarily) as a relational agency network.

By effacing the distinction between the social and material aspects of IS and by discarding the identity of these entities through a focus on their relationship, we argue that: (a) "everything" deserves explanation; and (b) everything that is to be explained should be approached in the same way (Law, 1994). By "everything", the emphasis is on considering both what may appear as "technical" and "social" explanations without privileging one type over the other *ex ante*. That is, the researcher should start by giving both social and technical issues equal chances of explaining an observed phenomenon (for instance, IS success or failure) by exploring all possibilities from the start and seeing where the explanations may lead. This may lead to not only engaging with IS in its complexity but also to interesting and surprising discoveries. These entities should be allowed to freely associate (rather than holding some things constant and manipulating others) and there should be no arbitrary limit on the extent to which the entities explain or interact with each other. Analytically, these entities should be allowed to freely associate without any definite boundary between them (Keys, 1998).

Second, conceptualizing IS as an assemblage of heterogeneous entities raises the question about the ontology of these entities. Are these entities determinable *ex ante* and do they occupy fixed positions in the relationships that comprise an organizational IS? If yes, the relational form of an IS can be predicted; thus, its agential capacity can be predetermined. Unfortunately, the entities that make up an IS do not have a fixed and stable ontology. The entities differ in different organizations and may behave differently within the same organization. That is, the ontology is variable (Latour, 1999). If the entities differ from organization to organization, it means that the relationships formed within the technology may also differ. If the agency of IS is understood as relational, then this will mean that the same technology (*e.g.*, SAP) may not perform uniformly across different organizations. This implies that research models that seek to provide a unitary account of the agency of IS limits the range of phenomena that can be studied about the situated functionality of IS. A relational view of agency implies that both similarity and difference in the agential capacity of IS should be explored. It also encourages researchers not to ignore complexity, tension, and surprise rather to engage with them as they will reveal more about IS.

Third, whilst the above two points seek to explain the relational view of IS with reference to the entities that it holds together, these points only highlight how an IS derives its potential capacity to act (*i.e.*, how the capacity to act can be understood as being ascribed through the relationships that make up the IS). But that is just a part of the story about the relationality of agency. The other part is about the exercise of this agency. If an IS derives its agency from the relationships that exist between and among the entities that make it up, understanding how, in practice, an IS acts in organizations is important, why it acts the way it does, and what effects are generated from the exercise of its agency. These dynamics are explained with reference to relationships. That is, the ability of an IS to exercise its agency and to generate organizational effects is dependent on other organizational relational networks. This includes an IS's relations with other organizational elements such as procedures, systems, and practices. These relationships contribute to the ability of IS to generate effects.

The above implies that to understand how an IS acts the way it does, researchers need to study how it inserts itself into organizational relations and the network relationships it develops as it seeks to perform itself. These elements work in relations with each other, and their roles and functionalities are carefully defined. Each of these elements participates simultaneously to shape the networks of relationship, and each element gains its spatial integrity by virtue of their positions in the relationship. This then makes the IS an independent actor (Chua and Mahama, 2007; Mouritsen et al., 2010). Therefore, understanding the organizational effects that the IS may be able to generate requires analytical attention on the wider network of relationships within which IS operates. This will facilitate an understanding (without determining *a priori*) of what enables and/or constrains an IS as it attempts to exercise agency and to generate effects.

Also, these networks of relationships that define how an IS generates effects should be understood as a recursive process rather than free-standing structures. The relationships are the medium and the outcome of interactions which recursively and precariously generate and reproduce themselves in further interactions (Law, 1992, 1994). The network of relations is considered a series of struggles, resistances, and negotiations. As a result, the network is constantly in a state of change; a change that is both a medium and an outcome of stabilizing the relationships. This implies that nothing is permanently stable, complete, or final; hence, the agency of IS cannot be taken for granted. This also means the organizational effects of IS cannot be predicted *ex ante* but can only be discernable *ex post*.

In summary, we conceptualize the agency of IS as relational, and argue that to understand how an IS acquires its agency, researchers need to discard identities of the entities and elements that make it up and focus on their association. The agency acquired through these heterogeneous associations only define potential for action; the ability to exercise this potential also depends on a series of relationships to which the IS may be tied.

3. A reflection on prior AIS research models

The relational view proposed in this paper requires a reassessment of prior AIS research models to show how this view extends existing knowledge. Two approaches to modeling AIS are presented, highlighting what is glossed over in those approaches and what more can be learned by focusing on relationships. These two approaches to modeling include studies that focus on AIS design and those that focus on AIS diffusion (Arnold and Sutton, 2002).

3.1. Design studies

Researchers who seek to understand IS design tend to model and theorize their work mainly with reference to the technological aspects of IS. These design studies conceptualize IS as a technological artifact and focus analytical attention on the technical functions. In doing so, they consider the technical design as unproblematic and seek to explain the choices made in design as a function of particular structural contingency variables and desired organizational outcomes (March and Smith, 1995; Hevner et al., 2004; Geerts, 2011). While these designs can be tested empirically, they ignore complexity and reduce the tension associated with the design process. The result is a structural account of design; and, design outcomes (positive or negative) are explained with reference to how particular designs conform to these structural factors. This arguably limits what can be learned about IS design. The design of an IS is not simply an exercise in technology but also involves people, procedures, and other organizational processes. These heterogeneous elements engage in multilateral negotiations that lead to specific design choices.

By emphasizing only the technical characteristics of design, prior research precludes other interesting things that can be learned about design. For instance, the extant design studies do not appropriately account for the interest of all users and their role in design choices. Interest is assumed in those studies; and, by implication, it is assumed to be homogenous. However,

given the multitude of actors (both social and material) involved in the design process, interests may be multiple, conflicting, and indeterminate. Hence, interests are not to be seen as background factors to be imputed by researchers but are to be brought to the foreground as attributes assigned by actors to themselves and those with which they interact. To account for the multiplicity and indeterminacy of interest in IS design will therefore require that the adoption of a much broader, all-inclusive approach by allowing all possible variables to be included in IS design studies. It will also require that no interest explanation is privileged over others.

The relational view of agency is much suited for studies of this nature as it does not start by assuming what is to be explained and does not predetermine relational forms. Rather, it focuses attention on the complex relationships through which IS design emerges. Focusing on the relations that produce the design will reveal the attribution and transformation of interests by actors themselves, how diverse interests become implicated in design choices, and how that determines the agential capacity of IS. Interests tie people to relationships and if the agency of IS is relational, then interests along with how they transform the design process must be considered. Encouraging researchers to appropriately identify the multiplicity and indeterminacy of interests, rather than assuming all interests are the same, increases researchers' chances of being able to engage with the complexity of IS design and maximizes our chances of being surprised by the design process. This, we believe, will significantly contribute to IS theory and practice knowledge.

Another issue with design studies is that these studies treat design as something that is achieved once and for all. The relational view suggests that the dynamic and precarious nature of the relationships that make up an IS also imply that designs will always be incomplete and imperfect since past contingencies or future conditions are, in themselves, unstable. In this respect, design "is a process or an effect, rather than something that can be achieved once and for all" (Law, 1992; p. 385). This implies that any efforts that seek to design an IS encounters its limits, at which time new forms of design may be needed to maintain the continuity and stability of the system. Therefore, no design process "is ever complete, autonomous and final" (Law, 1992: p. 386). This makes it worthwhile to investigate the temporality of the design process. Two examples are considered here as the predominant design science research streams in AIS: Resource-Events-Agents (REA) Ontology and Continuous Auditing/Monitoring.

The REA ontology and related semantic modeling approaches are premised on the view that accounting phenomena or business events per se, can be captured through semantic models that capture and represent that reality (McCarthy, 1982). For twenty years, the AIS community generally accepted that REA representations were sufficient to capture all business event data for accounting and related business needs. However, as interorganizational relationships expanded, Geerts and McCarthy (2002) recognized the limitations of the model and expanded the REA model to incorporate commitments that represented in-process transactions between organizations. Overall, the focus in both cases is on developing semantic models that are sufficient to capture the essence of a business event and reduce it to a database entry. While the REA ontology has made significant contributions to our understanding of business processes and associated accounting transactions, more remains to be known about the multilateral negotiations and the choices that attend the design process. There is equally more to be learned about the path dependence of the ensuing modes and the socioeconomic effects these models generate (Sutton, 1992, 2010). Expanding research in this area requires that researchers engage with the intertwining of the material and human aspects of REA semantic models. However, at this stage REA research has primarily focused on the material properties of the design to the exclusion of the social. Yet, the propositions that inform REA at the ontological level suggest that the socialization of various human agents is integral to REA processes and models. These agents socialize each other into economic activities (events) and they are also implicated in the choices about the acquisition and flow of resources that REA models seek to model. This implies that human agency is an important component of the REA ontology that should be considered. Unfortunately, the human aspects of REA have received little research attention.

Further, when designers put together a particular infrastructural design as representation of the flow of economic activities, they make choices about what is accounted for as economic events and behaviors and what may be excluded from the models. As they do this, they are exercising agency and such agency and the effects such choices generate need to be accounted for in order to expand our knowledge of REA semantic modeling as an organizational practice (and not merely a technical design exercise). This is particularly useful as there will be multiple designers who negotiate design specifications among themselves and in these negotiations issues of interest, legitimate expertise, and history also come into play. This suggests that REA is not purely a technical exercise but is a juxtaposition of the human and the technical. In this respect we argue that REA research can be extended if a relational approach is adopted. By considering the intertwining of the human and the material, the relational approach will enhance the ability of research to account for how particular REA semantic models emerge as sociotechnical representations (business models), how these models engage with wider organizational practices, and what effects they generate. A relational approach will be particularly timely as "the REA domain continues to grow and expand" and as it now engages with interorganizational cooperations and knowledge management, and as it also increasingly becomes implicated in global standard setting (Sutton, 2010).

Similar strategies are evident in the continuous auditing/monitoring research. Vasarhelyi and Halper (1991) triggered a stream of literature focused on continuous auditing with the assumption that adoption by external auditors was inevitable. Fifteen years later, the evolution was clearly growing within the internal audit function of organizations with a focus on internal control sufficiency; and, researchers argued this was where continuous monitoring would take hold (Alles et al., 2006). A review of the existing research on continuous auditing reveals a separation between the technical and the human. One stream of the research focuses on the material properties of the underlying continuous auditing and monitoring technology. The focus of the research here has been on how to build continuous audit and monitoring systems, and the associated technical challenges (Alles et al., 2013; Jans et al., 2013). There is little focus on human agency in this type of research. In the other stream of research, the

focus has been on the social and psychological factors associated with the adoption and use of the continuous auditing and monitoring methodology (Gonzalez et al., 2007; Chan and Vasarhelyi, 2012). Here the material composition of the underlying technology is taken as given and the focus is on use intentions and behavior. Within this stream of research, there has also been some focus on a myriad of societal and organizational factors that surround and affect such adoption (Kuhn and Sutton, 2010). The separation of the technical and the social in research tends to ignore complexity and limits what can be learned about continuous auditing and monitoring in practice. A relational approach will allow for continuous auditing and monitoring to be studied in its complexity and will provide a richer account of how this methodology is a fragile sociomaterial arrangement. Conceptualizing continuous auditing and monitoring as a sociomaterial arrangement will focus attention on how the technical and the human are inextricably intertwined in the design and enactment of this methodology, how the methodology acquires its relative capacity to act, and what organizational effects are generated in its name.

3.2. Diffusion models

Another area of IS research where a relational view of agency can potentially contribute to the body of knowledge is the AIS diffusion domain. Diffusion models describe the spread of AIS across a population of organizations, and these models have been investigated extensively in the IS literature (Rogers, 1995; Dowling, 2009; Azad and Faraj, 2013). Proponents of the diffusion model conceptualize IS as a technical innovation and then study how it travels through space and time. In this approach, emphasis is placed on sameness of the technical components of IS; and, research seeks to explain its spread with reference to some assumed functional properties and some structural factors. These structural factors predetermine who adopts IS, how IS will function when implemented, and what outcomes are generated.

These diffusion models arguably oversimplify how IS travels through time and space. First, they tend to assume near complete similarity in IS. That is, as the IS becomes 'diffused', it maintains its structural and processual integrity. By such an assumption, empirical studies then focus on a unitary account of IS spread by building generalizable models. This is partly because these diffusion models focus on the technology that holds an IS together. As argued in the previous section, the relational view proposes that the focus should be on what is being held together in the name of IS and that includes social and material entities. What is held together may not necessarily be diffused; IS is not just the technology but also the people. So when an IS travels, it loses some entities (*e.g.*, some people and some technical components), gains others, and may become modified as it attempts to insert itself in wider organizational relations. This implies that what spreads in the name of IS may have properties that make them similar but will also be different. While the existing diffusion models are built on the things that are similar, they wish away the things that make the IS different as it spreads. Both the similarity and difference are important in understanding the agency of IS, for they define the constitution and transformation of the relationships as IS travels in space and through time. The relational view suggests that as IS travels and becomes transformed, its agency differs across space and time. However, the AIS literature has largely assumed an anthropocentric view with interests focused on when humans accept or adopt technologies. This research orientation is evident across the various foci of accounting research.

From an audit standpoint, the focus on audit support systems is a primary example. As the public accounting firms have adopted various technologies to support the audit process, researchers have focused on when auditors will use such systems and the influences that lead to adoption and diffusion. Dowling and Leech (2007); Curtis and Payne (2008) and Dowling (2009) are primary examples. Dowling and Leech (2007) highlight the various capabilities embedded within audit support systems and discuss firms' use of restrictiveness embedded within such systems to drive user behavior. This led to Dowling's (2009) study that focuses on firm, office, and audit team level influences on auditors' decisions to use audit support systems in a way intended by the firm. Curtis and Payne (2008) similarly investigate the influences of audit firm and audit team context on the adoption and use of advanced audit technologies. These two studies seem to primarily focus on human agency and the technical aspects are taken as given. These technical properties of technology are expected to maintain their structural integrity as the technology is diffused. What brings about variation is the human element. However, as Dowling and Leech (2014) highlight, these relationships which are constitutive of and constituted by the technologies that support the audit process are much more complex. The technical is juxtaposed with influences emanating from regulators, auditor mental state, and firm training that all come together to simultaneously influence the audit process. The description by Dowling and Leech (2014) highlights the importance of a broader relational view on how these technologies embed themselves.

The research in management accounting considering the transformational effects of business intelligence (BI) systems similarly adheres to an anthropocentric view of technology diffusion. Lee et al. (2014) focus on the role of the top management team in developing support for BI systems adoption. Elbashir et al. (2011) similarly examine the role of how the top management team creates a knowledge creation culture and how this is embedded at the operational management level to drive the assimilation of BI systems. This latter study is extended by Elbashir et al. (2015) where the influence of the Chief Information Officer on promoting information technology intelligence and understanding at both the top management and operational levels is viewed as key to BI assimilation and subsequent performance gains. Yet, all of these management accounting studies really look at how management, organizational structures, or behavioral focus drive adoption and diffusion; the technology is a bystander in the research.

Finally, Arnold et al. (2012) highlight similar effects within the financial accounting domain. XBRL has often been viewed as a transformational technology for how investors access, analyze, and use financial information. Arnold et al. (2012) examine this effect by providing electronic tagging of a medium-sized organization's management discussion and analysis (MD&A) section of their annual report. As the researchers note, the MD&A is heavily used by non-professional investors. Arnold et al. (2012)

highlight how users of tagged information alter their information search processes and incorporate information into their decisions. However, one of the ironies is a side note in the paper—the SEC has actually not allowed companies to provide XBRL tagged MD&As with their financial statement filings because of perceived problems in the consistency of companies' tagging such information. Thus, Arnold et al. (2012) show tagging of the MD&A improves non-professional investors' decision making, but at the same time note the SEC will not let companies tag the MD&A. This essentially means that to understand XBRL and the effects generated in its name, one has to account for the larger relational network within which they are enacted and through which they act. Focusing on the technical functionality of the underlying XBRL technology per se will be insufficient in explaining its capacity to act.

4. Methodological implication of a relational view of agency

The relational view of agency (as discussed) implies that what matters from a methodological standpoint are relationships. That is, to study the agency of IS, one needs to follow actors (social and material) as they constitute themselves into relationships that come to represent IS and as they go about enacting these relationships. For Callon (2004) relationships are performed or exist only in doing them. This implies that researchers should study IS in the making rather than IS ready-made (Callon et al., 1986).

To study IS in the making requires that the adoption of a performative approach. A performative approach suggests that a relational network or an assemblage "can only be understood if the researcher knowingly disregards prior assumptions about the connections in it" (Mouritsen et al., 2010, p. 293) and focuses analytical attention on practical activities through which the relationships acquire their existence, form, and functions, and by which relationships generate effects. This places action (the doing of things) at the center of methodological inquiry. This performative approach has methodological implications.

First, it suggests that IS should be conceived as practice. Practice refers to all the activities that contribute to the emergence and enactment of an IS within an organization (Law, 1994; Kjellberg and Helgesson, 2007). The performative approach argues that the orderly properties of the sociomaterial arrangements that represent IS should be conceived as the direct effects of practical activity (Ahrens and Chapman, 2006). Methodologically, therefore, IS should be studied as practice (Orlikowski, 2000). Studying IS as practice will allow researchers to: (a) focus on the associations rather than the distinction between the material and the human that characterize the extant literature; (b) avoid *a priori* assumptions about the functional form of IS as this is revealed in practice; (c) examine the complexity and tension that characterize the daily realities of IS work; and (d) uncover the transformations that IS undergoes when it interacts with other organizational practices.

Second, the performative approach to studying the agency of IS also has implications for the type of research questions that should be investigated. It shifts attention from predictive and deterministic type questions to reflective type questions. Predictive questions assume that the researcher already knows something about the phenomena of interest beforehand and that the phenomena will remain constant throughout the research (Mouritsen et al., 2010). Research questions are then crafted to determine whether or not the *ex ante* knowledge is established. In the performative approach, research questions are crafted in a reflective fashion. If we are not to presume the agency of IS or determine *a priori* the specific roles of each element of an IS, then we need to focus on questions that seek to uncover how the fragments of IS fit together to form temporally stable relations. Some of the general questions that should be explored by IS researchers using this approach are as follows: (a) How do the disparate elements that constitute IS hold together, albeit temporarily; and, how does the emergent IS (conceptualized as a patterned network) shape its constituent elements? and/or (b) How is it that IS extends itself and translates distant others? (Law, 1992). Thus, the research questions should focus on the performative character of relations and the elements constituted into those relations.

Third, given that all IS related activities contribute to the agency of IS, no primacy should be accorded to some activities *ex ante* while others are marginalized in order to explain the effects of IS. This is not to deny that some activities will be more significant than others; but, as Law (1992) puts it, this is to suggest that the primacy or significance of activities are outcomes generated in a relational and distributed manner. For instance, in the technocentric approach, activities assumed to be technical feature prominently in the explanation of the effects of IS and those activities deemed social are assumed to be unproblematic. Social entities enter into the discussion only when actions do not follow the 'true path of reason' (Latour, 1987). This asymmetrical analysis is also present in the anthropocentric analysis of IS. In the same vein, researchers are encouraged to focus explanations on only factors (activities) that are deemed internal to IS for what is internal is not in any way insulated from the external (Latour, 1987). In other words, there is a positive feedback loop between the internal, where IS is assumed to reside, and the external, where IS has to go. For analytical purposes the internal-external activities divide needs to be avoided so that research can examine how their linkages produce IS effects. In this respect, the performative approach suggests that *practice variations* should explain the observed differences in IS effects rather than privileging the material or social (and internal vs external) explanations.

Fourth, the relational view suggests that an IS is an assemblage of heterogeneous elements whose relationships are performative and who have variable ontology. This implies that IS practices vary across space and time to the extent that attempts to generalize from empirical observation to a population will be counterproductive. As a result, the performative approach requires that research account for uniqueness and differences in practice rather than pursue empirical generalization.

5. Discussion and conclusions

This paper has sought to reinterpret the agency of IS as relational and to explain the implication of a relational view of IS research. We explored the agency of IS as it has been articulated in the extant IS literature with the view of highlighting how knowledge can be enhanced from a relational view of the agency of IS. Primarily, the limitation of viewing IS as technology

(technocentric view) with predefined functionality and predictable effects is highlighted. This paper also sought to shift attention away from an anthropocentric conceptualization of IS; where the technology is seen as a tool and agency is attributed to people. Both the technocentric and anthropocentric views limit what can be learned about the agency of IS. Drawing from the sociomateriality literature, IS should be conceptualized as a relational network by proposing a relational view of the agency of IS. This view suggests that the social and material entities that make up IS have no absolute essence when viewed in isolation, but that their collective force defines the agency of IS.

The paper has important implications for research. First, the relational view implies that the agency of IS does not pre-exist the relationships from which it derives its capacity to act; meaning that the agency of IS cannot be adequately theorized *a priori*. Second, the entities that make up IS have variable ontology and that has implications for research that seeks to predict and/or provide a unitary account of the agency of IS. Third, the relational view also suggests that when research seeks to explain how IS exercises agency in a particular organizational context, analytical attention should focus on the wider network of relationships within which IS operates. Fourth, the relational view of agency has a methodological corollary; and, guides on how research adopting a relational view of agency may be conducted empirically have been provided. In particular, we propose a performative approach that focuses attention on practices. Practices, we argue, efface the analytical separation between social and material entities and focus research attention on the collective force of these entities. Fifth, the relational view of agency posits *practice variation* as an important explanatory factor for the differences in the observed effects of IS. Using the extant IS literature (design studies and diffusion models) as examples of research focusing on either the technocentric or anthropocentric views; we highlight how a more relational view of the agency of IS may provide additional insight.

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