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Sociomateriality and IS Identity

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Abstract

Challenges to identifying the information systems (IS) field originate within the community, from external institutional forces, from the change in technology, from the emergence of new phenomena, and finally, from the changing understanding of what a "field" or "discipline" entails. In this study we trace the historiography of the IS field to illustrate sources of confusion arising from deeply held assumptions regarding the formation and legitimacy of IS identity. By introducing the identity of IS as a "human science" as opposed to that of a natural science, we illuminate an interstitial gap in knowledge which IS inhabits. To address this gap, we posit sociomateriality as a perspective that offers IS a distinct identity as an academically and socially relevant field by uncovering and enabling research into the entanglement of humans, information, and technologies.

Keywords

IS identity, disciplinary identity, sociomateriality, information, IT artefact,

INTRODUCTION

The issue of information systems (IS) identity remains a perennial concern as evidenced by the theme of the 2011 ACIS conference. Intellectually, a wide range of phenomena, which loosely orbit the interactions of information, human action and technologies, continues to emerge. Many of these phenomena call to question our conceptions of organizations and organizing, our conceptions of design, intervention and evaluation, our theories of language and communication and even questions of sustainability. IS as a field continues to influence and is influenced by an expanding domain of both academic and applied disciplinary endeavours. Research into domains such as social network phenomena and sustainability indicate that the field is expanding beyond its original focus on business organizations. On the practical side, IS as a field continues to struggle to maintain academic legitimacy and practitioner salience despite the recognition that information systems are increasingly indispensible in organizations, economies, environmental protection and human well-being. In part, this struggle hinges on the identity of the field – what are the field's exemplars, boundaries, methodologies, objects of study, and values (Kuhn et al. 2000). Although the debate regarding possible identities for IS has been extensive (Agarwal and Lucas Jr. 2005; Alter 2003; Gray 2003), the proposed identities remain limited to an organizational metaphor. This metaphor fails to address relationships the IS field has with other fields and disciplines, and ignores many of the potential contributions IS offers both the to individuals and to society. This paper deconstructs previous debates on the issue of the identity of the IS field and proposes an intellectual ideal for IS as a human science that resolves the extrinsic contradictions between the behavioural and the technical (Keen 1987), and the social and the material. As such it presents a developmental ideal toward which the IS community can aspire which does not diminish previous research nor constrain the field to boundaries that will only become restrictive as both humans and their entanglement with information and technologies develop.

WHAT IS THE IDENTITY OF AN ACADEMIC FIELD?

The discussions surrounding the identity of the IS field took centre stage after Benbasat and Zmud's (2003) provocative proposal for an artefact-based identity for IS. Based on this framework, any research that excludes constructs falling within an artefact-based nomological network, or which includes constructs that are outside the network, risks diluting the distinctiveness of IS research, and hence its identity and legitimacy. This proposal to establish boundaries for the IS field was met with a barrage of mostly critical responses (DeSanctis 2003; Galliers 2003; Gray 2003; Ives et al. 2004; Myers 2003; Robey 2003) from the IS community. The topic continues to draw attention in the form of expositions on identity and legitimacy (King and Lyytinen 2004; Lyytinen and King 2004; Lyytinen and King 2006; Weber 2006) and numerous contributions to the state of the

field (King and Lyytinen 2006; Larsen and Levine 2005; Sidorova et al. 2008). We begin our essay on what identity entails for an academic field such as IS by highlighting three concerns: (1) the misplaced organizational metaphor for IS identity, (2) the conflation of identity with legitimacy and, (3) the assumption that IS needs to circumscribe its objects of study.

Notwithstanding the few exceptions (DeSanctis 2003; Yoo 2010), what is common to almost all of the previous studies concerning IS identity is the organizational metaphor upon which identity depends, that is, the identity of IS equates to organizational identity. Benbasat and Zmud (2003) use Albert and Whetten's (1985) definition and criteria for organizational identity, and Aldrich's (1999) model for organizational legitimacy to frame their argument for an academic identity for IS. The identity of a business organization such as Coca-Cola is not the same as the identity of the soft-drink industry or the identity of the marketing discourse that is intimately related to its success. As Ives et al. (2004) indicate, attributes of a tangible purposive organization are very different from the attributes of an academic field. The former displays clear ownership and leaders, deliberate design in their structure and goal-orientation (i.e. profit making) while the latter promotes academic freedom, diversity of thought, individual contributions, and pursuit of scholarship. Although Albert and Whetten's (1985) research was based on their experiences in an academic institution, their definition for identity in terms of claimed central character, claimed distinctiveness and claimed temporal continuity refers more to the identity of the specific academic institution itself, a purposive organization, rather than to the overall academic field. Academic fields not only differ in their attributes, they are essentially fluid collectives of many individual organizations and institutions including universities, university departments, publishing organizations, a strata of practices such as pedagogies of teaching and research activities, and intellectual structures such as bodies of knowledge. Academic fields are therefore a far cry from Aldrich's (1999) business organizations and entrepreneurial model. They are closer to what Toulmin (1972) calls *rational or intellectual enterprises,* which are represented by many organizations, its members and their related practices. Unlike the business organization's strategic posturing, academic fields develop through an evolutionary process of "selective perpetuation of variants" (Toulmin 1972, p. 134) that promotes selected conceptual structures and personalities, and results in the integration of their diversity into a unity. Contrasting against Albert and Whetten's (1985) definition for identity, the identities of academic fields are reflected in, (1) their unique "intellectual ideals," which correspond to "claimed central character," (2) their own body of concepts, methods and fundamental aims, analogous to claimed distinctiveness, and (3) their continuing *genealogy* of problems, corresponding to claimed temporal continuity. When viewed in this sense, the problem of identity of the IS field raises both empirical and theoretical questions: (1) What is the intellectual ideal of the IS field? (2) What body of concepts, methods and fundamental aims can the field say are its own? (3) What genealogy of problems are current scholars passing on to their students? We begin to address these questions of identity by proposing an intellectual ideal for the IS field that acknowledges the contributions of prior research and embraces an increasing breadth of emerging phenomena and the evolving research methods required to address them.

The second concern hidden within the debates is the nature of the identity of the academic field vis-à-vis its legitimacy. Based on Aldrich's (1999) model of a community of nascent entrepreneurs attempting to create a new population, Benbasat and Zmud (2003) raise the need for establishing both cognitive and socio-political legitimacy of the IS field. This analysis assumes that the identity of an academic field is established as a result of its increased legitimacy or at the very least, together with the establishment of its legitimacy. Although this is entirely possible, it obscures the fundamental differences between identity and legitimacy. A sociology of science account of these two phases in the development of academic fields (Hambrick and Chen 2008; Merton 1973) refers to the former as "differentiation" – in which certain important phenomena are not being adequately addressed, or could not be addressed by existing fields of study—as opposed to the task of mobilizing and promoting the validity of the field. The act of addressing new phenomena constitutes the construction of the identity of a nascent field. Viewed in this light, the need for legitimacy is inherent in the act of establishing an identity, but not necessarily in the same way as proposed by Aldrich (1999) because the nature of both identity and legitimacy of an academic field is distinct from that of a business organization. We believe that the overlapping phase of achieving legitimacy cannot be undertaken without first establishing a proper identity. Achieving legitimacy requires mobilization, and unless we know the identity targeted by the mobilization of academic resources, legitimacy will remain elusive. In order for a new field to claim a unique identity, there must be something distinctive about the subject matter of the new field that existing disciplines are either unwilling or ill-equipped to address. This distinctive subject matter needs to be so compelling such that it will not only contribute to the advancement of knowledge, its development is seen as critical to the advancement of society itself (Hambrick and Chen 2008). In order for society to recognize this distinctive subject matter, the new field needs to offer a vision of a utopia that if the field were to have its way (Hagstrom 1965), would contribute to the advancement of society. In other words, the vision of utopia provides an ultimate goal that the field aspires to become if it is successful.

The third concern coming out of these debates is the conflict between those who wish to limit what the IS field studies either by conforming to a particular paradigm or by specifying a set of objects that should be studied (Benbasat and Zmud 2003), and those who prefer a more "flexible" and open-ended approach allowing the

"flowers to bloom" (Banville and Landry 1989). As Foucault (1972) and Toulmin (1972) argue, it is erroneous to assume that the authors of the field, or the homogeneity of its theories and content, or its objects of study, distinguish it from other fields. The same author may write on different topics, and different authors in many different works may discuss the same topic. Medicine, psychology and biology all study the human body or parts thereof and even share concepts and theories, but these objects of study do not distinguish them. Certain objects of study may occupy the attention of the field for a period, but later may be abandoned for another as circumstances, changes in the environment, and technology demands. These objects of study do not impose any form of temporal continuity or any loyalty on behalf of the members of the field. At one time, cognitive style occupied the attention of IS researchers until Huber (1983) showed that it would not support productive research in IS. Recently the cognitive sciences are experiencing a rebirth in IS in the form of neuroIS (Dimoka et al. forthcoming) and human-computer interaction (Te'eni et al. 2007).

If the identity of the organization does not reflect the identity of its associated academic field; if the authors that write about the subject, the objects of study, the theories and principles, the paradigms reflected in the field, and its prestige among its stakeholders, do not characterize the identity of an academic field; what does? According to Foucault (1972) what distinguishes one field from another lies *not with the author or the text, or even the homogeneity of the concepts being studied*, but with the dynamic and often unconscious formation that sets up rules defining the constellation of objects and concepts to be studied. These rules of formation or what Foucault calls the "discursive formation" establish various relations that operate to define the nature and essence of the field. Because the rules characterizing the branch of study are neither the objects nor concepts being studied, these rules of formation enable the inclusion of diverse objects and concepts as part of that field. The operation of these rules creates statements that belong to a specific discourse such that it is possible to recognize economic discourse from psychological discourse, biological discourse from medical discourse, and computer science from IS discourse. Toulmin (1972) calls this "discursive formation" the field's intellectual ideals that that exist beyond any specific period of time and are not owned by any particular scholar. Both Foucault and Toulmin agree that this kind of *atheoretical* and *atemporal* core demonstrated by fields and disciplines extends beyond the work of specific periods, scholars or their *oeuvres*.

Essentially, an academic field cannot depend totally on its authors or its content. All that an academic field has is its identity, which is why it is of outmost importance to the field's survival. A field that is not distinctive risks at the very least, dilution, if not obsolescence. Perhaps, the pinnacle of actualizing a field's identity is when that field is recognized by the whole world as having contributed to society, as can be seen in the case of the Nobel Prize, or its equivalent such as the Turing Award.

WHAT KIND OF SCIENCE IS INFORMATION SYSTEMS?

Notwithstanding the likelihood that IS does not yet qualify as a science or as a discipline (Hassan 2011), its identity hinges on the kind of science it aspires to be. The type of science determines not only its research methods, but everything about it including its relationship with other sciences, the reception it will receive from others and its future direction. After the Renaissance, each of the modern sciences began forming its own identity beginning with the transformation of natural philosophy into early physics, chemistry and biology (Foucault 1970). The early successes of these natural sciences, and their Comtean humanistic counterparts (e.g. positivistic sociology and psychology) prompted Dilthey (1883/1989) and others to define anti-positivistic alternatives which they call the "human sciences." Such efforts are reflected in the emergence of fields such as anthropology and non-positivistic psychology that developed their own principles and methods of knowledge creation. Even today, the division of the sciences into the natural sciences that "explain" nomothetic phenomena versus the humanistic sciences that "understand" the individual and idiographic nature of phenomena remain controversial.

Many fields, including management, IS and computing science joined the natural science bandwagon and sought their identity and legitimacy by associating themselves with the positivistic sciences, The result was a loss of multiple dimensions of learning about human nature, socio-historical spirit, values, and the ability to analyse our lived experiences with technology. As a natural science the IS field is demoted to being as a computer science-related field focusing on the "social" or "psychological" side of computing, or alternatively as a contributing business field alongside management, finance and economics, limited to supporting the overall business goals of organizations. Dilthey (1883/1989) aptly describes this dilemma:

> Apart from a few beginnings, such as those of Herder and Wilhelm von Homboldt, which were not scientifically developed, previous epistemology—Kant's as well as that of the empiricists—has explained experience and cognition in terms of facts that are merely representational. *No real blood flows in the veins of the knowing subject constructed by Locke, Hume, and Kant, but rather the diluted extract of reason as a mere activity of thought* [emphasis added] (Vol 1, p. xviii).

The natural sciences are empirical studies of objects outside of man, whereas, the "human sciences" take man as the empirical object. A historiography of the IS field will show that humans have always been a focal object of study for the IS field. Attempts to fit the circle of IS into the square hole of the natural sciences only holds back the field from its potential. The "human sciences" were created as a result of problems faced by man; whether they were new norms imposed by a newly industrialized society, or problems caused by social and political imbalance. Unlike the natural sciences, where man as the subject studies the natural objects of science; in human science, man is *both the subject and the object of science*. Foucault (1970) views this emergence of the human sciences as part of the Renaissance that caused modern episteme (forms of knowledge) to fracture into a space of three dimensions: (1) the formal, deductive sciences such as the mathematical and physical sciences, (2) the empirical sciences of language, life, and production that theorize causal statements between objects of study, and (3) philosophical reflection, consisting of the various philosophies of life and symbolical forms. All of these forms of knowledge interact to create other planes of knowledge. For example, the first two dimensions interact to create the plane of the empirical sciences that are "mathematicizable" such as linguistics, biology, and economics.

Following Foucault's (1970) description of the human sciences, the discourse of IS can be identified as such. Because of its nature as a human science, the IS field cannot be found along any of these three dimensions, or on the surfaces of any of the common planes. The IS field as a human science may apply formal deductive mathematics, but do not require it. The IS field as a human science accepts the causal linkages between objects of study, but do not necessarily fashion its theory exclusively on the nomological network. The IS field includes all three epistemic dimensions, not because it is part of any one, but because it is situated in the interstices of these branches of knowledge. Therefore the IS field can be both empirical and non-empirical. It exists within the spaces between the three dimensions, which renders it so difficult to situate, to define, and gives its meta-epistemological positioning a sense of precariousness. The IS field is not a formal science, but can have, at one level or another, mathematical formalization. It is not strictly the science of life like biology, or physical and neurological activities as in chemistry and psychiatry, but does depend on, and borrow from these life sciences. That's why the IS field is sometimes perceived as threats to other fields, because IS is seen to continually intrude into their boundaries (Foucault 1970).

This dilemma of where to locate the IS field is elegantly describe by Foucault (1970, p. 348):

> …the 'human sciences' are dangerous intermediaries in the space of knowledge. The truth of the matter is, however, that this very posture dooms them to an essential instability. What explains the difficulty of the 'human sciences', their precariousness, their uncertainty as sciences, their dangerous familiarity with philosophy, their ill-defined reliance upon other domains of knowledge, their perpetually secondary and derived character, and also their claim to universality, is not, as is often stated, the extreme density of their object…

THE NATURE OF THE HUMAN SCIENCE OF INFORMATION SYSTEMS?

If the nature of IS as a human science can be accepted, the next step is to identify the vision of utopia that IS seeks to establish as a human science. All established fields are known for their clear discursive formations and intellectual ideals. The discipline of economics is identified as the discipline about human needs, wants, and how they are satisfied (Samuelson and Temin 1976). Biology's utopia is to be the "science of life" (Treviranus 1802-1822). Even emerging fields have their clarion calls. Molecular biology, extending the accomplishments of biology, positions itself as "holding the keys to the mysteries of life" (Yoxen 1982). In order to define the nature of the human science of IS, the intellectual ideal of IS needs to be articulated.

The utopian goal for IS can be analysed by studying the time and circumstances of its emergence. The IS field did not emerge in the 1960s or 1970s as most studies claim. It is important to distinguish between the cause of the emergence and "discontinuities"[1] in knowledge which result from those "discontinuities". For example, the microscope and other magnifying technologies, which uncovered hidden relationships between cells and organs resulting in a discontinuity with prior knowledge, was the cause of the new field of modern biology. The result of this discontinuity is our acceptance of a new field of biology over the older field of natural history (Cuvier 1800-1805). The technology of the industrial revolution, which made possible new objects of capital, investment, and production, ushered in the new field of modern economics (Ricardo 1817). The microscope and industrial technology were the causes of discontinuities in the fields of natural history and political economy, respectively[2]. In the case of IS, the same discontinuity in knowledge took place when the general-purpose computer was invented.

[1] Foucault (1970) defined discontinuities in knowledge as tectonic changes in human knowledge, its transformation and the sudden appearance of new scientific fields.

[2] Fetzer (1993) argues that the two most important factors that affect the growth of scientific knowledge are technological innovations and theoretical speculation.

Although the first enunciative statements on computational machines can be seen in ancient artefacts (Beynon-Davies 2010), and discussed as early as the 17th century by Schickard, Pascal, and Leibniz, and later in the mid 1930s by Turing (1936), Church (1936), and Atanosoff (1940), the major discontinuity related to IS was the invention of the general-purpose ENIAC and EDVAC machines by Eckert, Mauchly and von Neumann (von Neumann 1945). What started as an interdisciplinary effort by combining Eckert and Mauchly's electrical engineering skills with von Neumann's mathematical and logic skills, was the creation of a new unique "interdiscipline" called computer science. The objects of study of this new discipline were the general-purpose computational machines, their components, relevant techniques, and capabilities.

At the same time that the discipline of computer science evolved, statements appeared in the popular media outside the group of "enunciative modalities" of computer science, began to appear in the late 1940s. These statements compared the computer with the human brain and human mental capabilities[3]; discussed the impact of the computer on labour and industry[4]; suggested different behaviours in relation to new machine applications[5]. These statements did not fall completely within the discursive formation of computer science, nor can they be found in management textbooks. This intellectual ideal could not be addressed by existing disciplines at the time. The vision of utopia that characterizes IS, as seen during the late 1940s and early 1950s, can be described as the entanglement and intra-action of the general-purpose computer with human praxis. Not all of these entanglements were successful, but nearly all of them resulted in a major change in the elements that comprise the entanglement. This entanglement and intra-action are what defines the field we call IS.

The historiography of IS as a field reflected the field's commitment to the methods of the natural sciences. The field began modelling itself against decision theory (Dickson 1968) and cognitive psychology (Mason and Mitroff 1973). While continuing on these two themes, the field ventured into strategic management (Parsons 1983) and social psychology (Davis 1989). Although the IS field attained some success with all these themes, it was limited to playing a complementary role to the parent discipline of decision science, psychology or management, mostly by borrowing and expanding on theories from the parent when it suited the context. As a result, very little progress was made as far as the development of its own concepts and theories and, not surprisingly, its identity remained elusive. At the same time, the discourse that emerged in the late 1940s surrounding the convergence of the general-purpose computer with multiple other disciplinary areas progressed in leaps and bounds as the new information age was ushered in with the help of improvements in hardware and software developments for the general-purpose computer. Information and technology artefacts became foundational to almost all areas of human activity and study. Even the computer science field admits to its inability to address the new problems and concerns created by their own invention (Floridi 2003). This new discourse, demanded new approaches to "highlight new objects having properties that none of the constituents or precursors posses" (Bunge 2004). This new discourse is not exclusively a computing issue, nor a management issue, nor a psychological issue but rather an entanglement of many disciplines that Floridi (2003) describes as 'demiurgic' (a creational power) making 'possible the construction, conceptualization, semanticization and finally the moral stewardship of reality, both natural and artificial' (p. 465).

Despite these new developments, the discourse of IS remained fixed within the limits of whatever parent discipline the discourse was about—decision science would be about individual or group decision making, psychology would be about the performance of the individual, and management would focus on the performance of the organization, each discourse separating the human element from the technological element. Each element of the phenomena was treated as separate independent or dependent variables that interacted with each other to cause some kind of impact that could be measured. The discourse that began in the late 1940s has taken a life of its own and has essentially left the IS field observing from a distance. This unfortunate circumstance can still be corrected. The window of opportunity for the IS field to capture its own unique discourse—the entanglement and intra-action of the general-purpose computer with human praxis—remains a viable clarion call and intellectual ideal. This entanglement and intra-action is what defines the field we call IS.

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[3] "Inside the biggest man-made brain: Navy's new calculator has steel bones, silver nerves, paper impulses, and can make mistakes." *Popular Science Monthly*, Volume 150: No. 5 -May 1947 (pp. 95-100); "Computers beat brain: New electronic devices said to be 100,000 times faster." *New York Times*, Friday, 31 January 1947 (page C5).

[4] "Two year's work in five minutes: That's what BINAC can do! The story of this newest electronic "brain" is a report on progress of Philadelphia's newest industry." *Philadelphia Magazine,* (October, 1949); "2150 A.D. Preview of the Robot Age: Machines that think and do the hard work will free men to develop their real talents", *New York Times Magazine*, Sunday, 19 November 1950 (pp. 19, 68f).

[5] "Why study when machine knows all the answers? Ivy oratory says mechanical brain solves Conant's income tax and makes salads", *Boston Daily Globe*, Wednesday, 4 June 1947; "UNIVAC beats statisticians on election night" *Systems Magazine*, December, 1952.

FORMATION OF THE SOCIOMATERIAL IDENTITY OF INFORMATION SYSTEMS

How different is this proposed utopian vision from the nomological network suggested by Benbasat and Zmud (2003)? Isn't it similar to including humans as one of the causal linkage in the nomological network? What makes such entanglement unique? As an intellectual ideal, sociomateriality moves IS research away from separating the human side from the technological side, from the historical conceptualization of people and things as independent self-contained entities that influence each other, as can be seen in IS impact or IS adoption research. Sociomateriality has its roots in socio-technical systems (STS) and actor-network theories (ANT). STS assumes interrelatedness between people and technology in the design of a workplace and seeks to find a joint-optimized configuration for the relationship between both components. The focus of STS is on the interaction (Trist 1981). ANT narrows the gap between the social and the technical by denying the distinction between the human and non-human elements in the network and any privilege one has over the others (Latour and Woolgar 1979). Each actor ("actant" in the language of ANT), human or non-human, in the network is important and if any are missing, the network breaks down. The focus of ANT is on the power relations and how the networks are constructed, maintained and dissolved. What is common in both STS and ANT is how they both treat the elements in the system as pre-existing, independent entities that are manipulated by various elements external to them.

Inspired by Suchman (2007) and Barad (2007), Orlikowski (2007) incorporates elements of STS and ANT to coin the term "sociomaterial" to describe the nature of the discourse. First, unlike the traditional IS perspective, sociomateriality does not make a black box out of the IT artefact or any other material element. In fact, it makes the material a key focus such that it will be possible to theorize and elaborate on its significance and interaction with other elements in different contexts. As an example, the microwave oven was originally introduced as a men's high-tech toy, later reintroduced as a kitchen appliance targeted to women. In each market, the design of the microwave changed from having bells and whistles as a high-tech toy to having simple knobs as a kitchen appliance. Its successful introduction not only required gender-stereotyping, it changed cooking and household habits, and gave birth to the huge industry of microwaveable foods (Verbeek 2005). The difference between this example and the typical technology impact study is how the material is constituted not as a pre-existing element, but as a result of the practice and entanglement with other social and material elements. The simple practice of writing illustrates the same phenomenon. Writing is a performative act in the sense that not only does a writer writes what he or she thinks; *the act of writing itself writes the writer*. The ontological separation between the social and the material is lost and they are entangled in an intra-action (as opposed to an interaction between pre-existing elements) that produces and co-produce each other (Barad 2007).

To describe this production and co-production of related elements, sociomateriality refers to the relationship as an "intra-action" as opposed to the "interaction" that they have with each other. To demonstrate how this new approach changes everything about IS, the traditional theoretical construct of "IS success" requires rethinking. Instead of trying to measure independent or dependent variables in an implementation, sociomateriality does not view "IS success" as some conceptual construct that can be theorized by observation. Instead IS success becomes a "situated action" (Suchman 2007) that changes and morphs depending on the context, the background surrounding the context and the material resources that are themselves produced and co-produced as part of the phenomenon. No measure of representation of success can accurately describe it; instead, the actions of the humans involved in the form of interventions with specific material and physical configurations, and reconfigurations, will determine the outcome. This notion of "intra-action" characterizes a phenomenon of IS can be truly relevant and academically rigorous at the same time.

IS has historically struggled with the gap between the behavioural and the technical (Keen 1987), as well as the conflict between being considered a behavioural (or pure) science versus an applied or design science (Hevner et al. 2004). Sociomateriality resolves these external contradictions making possible a new discourse for IS that uniquely distinguishes IS from other fields. Thus the sociomaterial perspective is longer merely a research method. Sociomateriality focuses research on the emergence of every element within the IS phenomenon. Through the holism engendered in sociomateriality, the novelty, emergences, and performativity of IS becomes the dominant discourse. From this discourse the identity of the IS field emerges as disciplinary ideal allowing IS concepts and novel problems to be addressed. The potential for this new discourse is endless. Elements of this approach were proposed in the early 20th century, primarily as a result of the prevalence of technology in scientific research, but they did not extend themselves enough to circumscribe a new discourse. In 1934, Bachelard (1984, p. 13) described this kind of inquiry as "phenomeno-technology," a combination of rationalism and realism. This view of scientific inquiry inverts the relationship between science and technology. It rejects the traditional view that science is the basis of technology. It draws from Heidegger's phenomenology and Dewey's "knowing as a technological artifact" view that, technology is not only paramount over science, it is a prerequisite for the progress of science. To explain this concept, Latour (1987, p. 174) coined the term "technoscience" to describe the kind of science that depends on its technological instruments. Foucault (1970) also supports this view and assigns not only power to technology but also attributes the evolution and progress of

knowledge to technology such that technology is the origin and cause of science (Ihde 1979). This does not mean that technology is given the primacy in the discourse, but it does shine the focus back to the IT artefact which the IS field has struggled to theorize.

An example of such theorizing is provided in Orlikowski (2007). When a person searches on Google, the phenomenon is considered a sociomaterial IS phenomenon because the human becomes part of the entanglement with other humans (who may have suggested the search item and created links to webpages) and the material resources (the computer code and Google's patented algorithms) as well as the different platforms upon which the search is being done (e.g., PC versus a mobile phone). The social and the material elements only emerge as significant due to the intra-action of the search interface with the user, the relevance of the information to the user's query and the created perception of Google's accuracy and relevance.

INFORMATION AND THE PERFORMATIVE ACCOUNT OF INFORMATION SYSTEMS

As a human science, the IS field does not need to separate itself from the natural sciences. In fact, as Dilthey (1883/1989) explains, the human sciences encompasses the natural sciences. In reality, any phenomenon comes into being, survives, and is studied as a result of its function as a material being and its connection with the material environment. The difference between this new sociomaterial discourse of IS and traditional positivistic discourse is the focus on the performative nature of the intra-action. Each of the human sciences can be distinguished by the nature of its fundamental activity. For example, psychology is differentiated from sociology when the researcher *psychologizes* as opposed to when he *sociologizes*. When a researcher *psychologizes*, he is studying man in terms of functions that are receiving stimuli, reacting to them, adapting himself, evolving, and reacting to the demands in the environment. When a researcher *sociologizes*, he is studying man in terms of conflict, having needs and desires, and entering into opposition with other men, resulting in the establishment of a body of rules for that interaction (Foucault 1970). The performative activity of *sociologizing* can be distinguished from the activity of *psychologizing* even when the same person performs both activities.

Consequently, we can identify the intellectual ideal of IS as the phenomenon of intra-action of the individual, the social, the informational, and the material as the act of *informatizing*, a discursive practice that forms the apparatus by which certain things are included or excluded from being significant. *Informatizing* can be described as the act of ascribing meaning to the signs and symbols that are entangled with other sociomaterial elements. In this activity, the IT artefact matters and by becoming an actant by which boundaries and properties of entities within phenomena are enacted, also help enact the causal structures through which some components (the effects) of the phenomena are marked by other components (the causes) in specific ways. In addition to the performative account of *informatizing,* the IS field is distinguished by its act of *systematizing* its objects of study. *Systematizing* can be described as the act of constructing skeletal and structural scaffoldings that constitute reality and materiality as a result of creating relations among different elements among sociomaterial components. These two performative acts characterize the intra-action of the elements of the IS phenomena.

Thus, the identity of IS as a sociomaterial field and a human science, identifies IS as capable of *informatizing and systematizing* the objects of study in other fields such as biology, psychology, sociology, engineering, and even computer science. For example, to *informatize* biology means that IS has a role to play in modeling and conceptualizing the meaningful linkages, and millions of possibilities in protein and genomic patterns. If the field of psychology is capable of *psychologizing* individuals and groups, thereby producing objects such as cognition, leadership, motivation, group dynamics and organizational behaviour; IS should be capable of *informatizing* individuals and groups as well, and produce its own set of objects, concepts and theories. To *informatize* the field of electrical and electronic engineering means to study how engineering and communication technologies can become meaningful systems of representation in human life.

CONCLUSION

This proposal for a new intellectual ideal and sociomaterial identity for IS constructs a new future for the IS field. The IS field emerged from the inability and unwillingness of existing academic disciplines to address the new phenomena surrounding the widening distribution and application of general-purpose computers. The problems upon which the field was founded; technology adoption, decision support systems, computer mediated communication, group support systems, information system development etc., were real and significant. But these problems have largely been addressed as an extension of the reference disciplines of social psychology, management and decision sciences and computer science. The proposed new identity for IS offers a unique view of the same historical topics and is capable of addressing current and emergent IS phenomena that appears vaguely related to its historical discourse; social media, globally distributed computing, data overload, information economies. These historical and future topics require a new ideal from a field that has the capacity to accommodate both the ubiquitous and boundary-spanning qualities of information and the supporting systems and the future emergence of novelty we can yet, not imagine.

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