Knowledge risks in organizational networks: The practice perspective

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ABSTRACT

This commentary paper aims to highlight issues associated with the supposed ability to transfer knowledge across networks. In response to the paper "Risks in Organizational Networks: An Exploratory Framework", (Trkman and Desouza, 2012, pp. 1–17), we argue that the taken-for-granted assumption that knowledge is transferrable represents a risk in itself. We analyze knowledge in networks using a practice perspective – in turn we consider knowledge as enacted in social practices and as context-specific. In contrast with Trkman and Desouza's paper, we argue that if knowledge is seen as enacted in practice, a framework that maps risks associated with knowledge transfer is limiting. We conclude that, since knowing in practice is emergent and not fully controllable, adopting a set of best practices on how to effectively transfer (or not) knowledge could itself be risky for managers who then believe that knowledge can be treated as a commodity and easily moved about a network.

1. Introduction

Managing knowledge is strategic for firms (Easterby-Smith and Prieto, 2008), providing a basis for achieving and sustaining competitive advantage (Grant, 1996). However, managing knowledge is challenging, particularly in organizational networks where knowledge is often created and developed in silos so that sharing such knowledge can be problematic (Swan et al., 1999). The aim of the Trkman and Desouza paper is to provide an exploratory framework to analyze "how to manage the risks associated with knowledge sharing" in network structures (p. 2). This focus is important because contemporary modes of organizing (e.g., project-based forms and inter-organizational collaborations and alliances) are based on networks (Hobday, 2000). Additionally, knowledge sharing is a central issue in such network forms and is not always straightforward (DiFillipi and Arthur, 1998; Lampel et al., 2008) so that studying the risks involved is important, albeit there is not that much literature exploring such knowledge risks as Trkman and Desouza highlight.

In examining these risks Trkman and Desouza focus on the risks associated with the *transfer* of knowledge and it is this issue which we address in this paper. More specifically, we argue that these authors have adopted a structural/cognitive perspective on knowledge, treating it as a "commodity" that is owned by individuals or groups and that can be transferred across sites (Gherardi, 2000; Newell et al., 2009; Spender, 1996; Swan, 2001). For instance, in distinguishing between dyadic and network settings they argue that "Knowledge *transfer* can occur between two parties or in a multi-party agreement" (p. 3); in another passage they introduce the theory of Transaction Costs Economics TCE) as their umbrella theory and argue that "If knowledge is *obtained* through networks, the additional costs are the costs of creating/maintaining the ties in the network and managing the risk of the knowledge *transfer*" (p. 4). They conclude that risk mitigation "influences both the

decision to start the sharing [of knowledge] and its evolution". All this reinforces the point that they conceptualize knowledge as a commodity, i.e., something that can be moved about an organization, albeit sometimes, they acknowledge, this is difficult, for example when the knowledge is tacit. Although this conceptualization of knowledge, which draws from the epistemology of possession (Cook and Brown, 1999), is probably the dominant view in the literature, we believe that it is important to recognize that there is another (and contrasting) way of treating knowledge – the epistemology of practice (Cook and Brown, 1999) – from which the risks associated with sharing in networks would be viewed rather differently.

The motivation underpinning our commentary is thus to highlight this second perspective of knowledge (the "practice perspective", in contrast with the "structural/cognitive perspective"; terms that we shall use throughout this paper). In our analysis, we have identified three main characteristics of knowledge that, according to the practice perspective, can produce risks in networks if overlooked, and we conclude with a paradox. The three characteristics are: (1) knowledge (or better *knowing*, to highlight the dynamic and social aspects of knowledgeability in practice) is not transferrable "as is"; (2) knowing in practice develops in particular sites of knowing (Nicolini, 2011) and is always emergent; (3) if knowledge transfer is not fully controllable, it is difficult to develop a set of "best practices" to govern and manage risks associated with this (Wagner and Newell, 2004). The paradox around which we build our commentary suggests that the risks associated with knowledge management in networks lies in managers' assumptions that knowledge can be relatively easily transferred (or indeed that its transfer can be restricted).

Our paper is organized as follows: in the next section we provide a review of the practice perspective of knowledge. In Section 3 we introduce a number of practice theorizing concepts and provide examples regarding the associated risks. In Section 4 we articulate the three knowledge characteristics that can lead to risks and conclude with a paradox. In Section 5 we highlight the implications of our insights and draw some conclusions.

2. Practice perspectives

Over the last decade, the practice perspective of knowledge has emerged as an important alternative to the dominant structural/cognitive perspective that sees knowledge as a commodity or resource that can be transferred across individuals, groups and organizations (Newell et al., 2009). A practice perspective starts from the premise that it is our being-in-the-world (Heidegger, 1927) and our engagement in a nexus of interconnected practices (Nicolini, 2011) that constitutes our knowledge. In other words, practices are not just descriptions of what is done; rather they constitute who we are and what we know. Knowledge, then, does not reside inside individuals' heads (cognitive view), nor is knowledge something external to individuals (e.g., embedded in structural routines and rules). Rather, knowledge, or more accurately, knowledgeability[2] (Orlikowski, 2006) is manifest in and through our practices. Knowledgeability is "inherent in the ability to 'go on' within the routines of social life" (Giddens, 1984, p. 4) as a form of "absorbed coping" (Dreyfus, 1995), where we are immersed in a flow of practice, using different tools and interacting with various people, without being consciously aware of these as "other". It is not, then, that our knowledge allows us to practice but rather that our practice is evidence of our knowledgeability; the knowledge cannot be separated from the practice.

While the practice perspective comes under the umbrella of a constructivist (rather than realist) approach (Leonardi and Barley, 2010), it is also somewhat distinct from other constructivist approaches in terms of its focus on action rather than cognitions or norms. Thus, other social constructivist approaches (e.g., Berger and Luckmann, 1996; Grint and Woolgar, 1997; Harvey and Myers, 1995) assume that reality is socially constructed as people develop their (unique) representations of the world and then act according to these representations. A practice perspective, on the other hand, falls under the enactment approach that Leonardi and Barley (2010) distinguish, and starts from the premise that the world is socially constructed through our practices rather than our practices being the product of our social construction; our actions, in other words, are consequential, bringing the social world into existence (Feldman and Orlikowski, 2011). Knowledgeability is therefore not separable from action but rather is continuously re-constituted in and through the practices that we engage in (i.e., see the concept of performativity, further in this paper).

While the above are all features of a practice perspective of knowledge, there is no one practice theory or even way of theorizing (Schatzki et al., 2001). A useful way of comparing different approaches to conceptualizing the relationship between knowledge and practice is to consider Gherardi's (2006) typology as described by Nicolini (2011). As we will highlight in the next paragraphs, three main views of knowledgeability emerge: the *containment*, the *mutual constitution*, and the *radical* views.

2.1. Three views of knowledgeability

The first of these strands of the practice perspective of knowledge is the containment view: this sees knowledge as located in the relationships between people engaged in a particular practice. The literature on communities of practice (Brown and Duguid, 1991; Lave and Wenger, 1991; Wenger, 1998) is perhaps the best exemplar of this approach. This

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[2] Further in this paper we will use knowledge and knolwedgeability almost interchangeably. However, in most cases we will use the word knowledge in general contexts and will use the word knowledgeability to put the emphasis on the dynamic, processual, embodied, and practice-based conceptualization of knowledge.

Table 1
Taxonomy of knowledgeability.

Approach	Authors	Key concept
Containment view	Brown and Duguid (1991), Lave and Wenger (1991), Wenger (1998)	Knowledge is embodied in everyday activities of an established community of practice (working knowledge)
Mutual constitution view	Cook and Brown (1999), Marshall (2008)	Knowledge as a "thing" and knowing (working knowledge) are complementary and these two dimensions of knowledge can be used at different organizational levels (i.e. knowledge is possessed by individuals; knowing is socially created)
Radical view	Feldman and Orlikowski (2011), Sandberg and Tsoukas (2011)	Knowledge _is_ practice

literature emphasizes how newcomers are gradually socialized into these practices (through a process described as legitimate peripheral participation), so that common norms and ways of doing things emerge in a way that constitutes the practice and the knowledge. Knowledge originates at the collective level and is difficult to share, not just because it may be tacit (Nonaka, 1994) and sticky (Szulanski, 1996), but because it is embodied in the social and cultural context in which it originated (i.e., everyday work) (Suchman, 2000; Zuboff, 1988).

The mutual constitution view recognizes two distinct, but equally important, epistemologies – an epistemology of possession and an epistemology of practice (Cook and Brown, 1999). From this perspective, knowledge is possessed by individuals and groups and interacts, in a 'generative dance', with knowing, the actual practices engaged in (Cook and Brown, 1999). Knowledge and knowing each do distinct work that the other cannot do (Marshall, 2008) so that both are needed for competent performance, with knowledge (as explicit and tacit knowledge that an individual or group possess) being a tool of knowing (the work that is done by engaging in a practice). Knowledge and knowing, while mutually constituted, can therefore also be separated and treated as distinct entities, even though their separation is theoretical only: knowledge can be possessed (by individuals or groups) but is only relevant in the generative dance with knowing (practice).

The radical view sees knowledge and practice as ontologically equivalent (Sandberg and Tsoukas, 2011); knowledge is inextricably tied to practice and cannot exist as an entity outside the practice (Feldman and Orlikowski, 2011). Knowledge is constituted as actors engage in some practice, with other actors (human and non-human). It is the intertwining or entangling of non-human as well as human actors in everyday activities that is focal since it is these relationships, rather than rules or norms, that account for the relative stability of human organizing. Importantly, the focus is on _relative_ stability rather than stability, since knowledge and practice are always emergent – always "becoming" (Chia, 2003). This is because the knowing is dispersed among people and things so that there is always scope for some emergent enactment. This view is different to the containment view because it recognizes that in any given context, which can be described as a site of knowing, there is not just one single practice but a nexus of interconnected practices, and it is this nexus that constitutes how any aspect of organizing is performed (Nicolini, 2011). This view is also different to the mutual constitution view: the mutual constitution view assumes that practice and cognitive perspectives are complementary rather than antithetical; the radical view builds on the "_embodied_ nature of practice" (Sandberg and Tsoukas, 2011, p. 343, emphasis added).

While there are distinctions between these three approaches, the main difference is between the second (mutual constitution view) and the other two views, since both the containment and the radial views see practice and knowledge as ontologically equivalent, and both eschew the subject–object separation. The containment and radical views, then, suggest that the idea of knowledge as a possession, e.g., an entity that can be separated from practice or from other subjects and objects, is not helpful, or at least that not separating them can provide new insights that are different to those provided by the traditional scientific rationality approach, which does make this separation (Sandberg and Tsoukas, 2011). Knowledgeability, then, is a characteristic of a community or a particular site of knowing. Here we are interested in the challenges and risks associated with work that involves collaboration or networking across communities or sites of knowing, including interorganizational networking.

Table 1 synthesizes the above distinction between different views of the practice perspective of knowledge.

2.2. Practice versus structural/cognitive perspectives

The Trkman and Desouza paper recognizes that knowledge is socially constructed rather than being a mirror of some objective reality and notes that knowledge can be possessed at different levels – individual, group and organizational. However, they assume, in line with Nonaka (1994, p. 17), that knowledge originates at the individual level, since "an organization cannot create knowledge without individuals" and "organizational knowledge creation, therefore, should be understood in terms of a process that 'organizationally' amplifies the knowledge created by individuals" (Nonaka, 1994, p. 17). The sister paper, then, draws upon Nonaka (1994), who recognizes the collective component of knowledge and articulates the concept of "communities of interactions", acknowledging that "While these communities [of interactions] might span departmental or indeed organizational boundaries, the point to note is that they define a further dimension to organizational knowledge creation, which is associated with the extent of social interaction between individuals that share and develop knowledge" (p. 15). Nevertheless, this approach still maintains that even tacit knowledge, which may be more sticky (following Szulanski, 1996) than explicit knowledge, can still treated as a resource that can be transferred across time and space because it can be

codified and so made explicit. In sum, as suggested by the SECI (Socialization, Externalization, Combination, and Internalization) process (Nonaka et al., 2000), one way to transfer knowledge is to transform it from tacit to explicit (given that explicit knowledge "is easily transferrable"); the other way is to "create a work environment that allows peers to understand craftsmanship" (p. 11). In sum, according to Nonaka (and to the cognitive/structural perspective), knowledge does not originate necessarily with collective processes, does not reside in practices, and can be easily divorced from the context. The structural/cognitive perspective of knowledge, then, focuses on how to manage knowledge transfer.

In order to expose complementary insights we adopt a practice perspective of knowledgeability that concentrates on the context-specific nature of knowing. Moreover, in order to highlight the differences between the two perspectives, we take the more extreme view of the practice perspective; that is the radical view. We, thus, consider the risks that are associated with sharing (or not) knowledge in networks from this perspective. Indeed, the emphasis on networks in the Trkman and Desouza paper is not particularly relevant here since from a practice perspective knowledgeability is inherently relational – constituted in and through networks of social and material actors.

3. Practice theorizing concepts

As already indicated there is no one practice theory (Schatzki et al., 2001) but there are nevertheless a number of practice theorizing concepts (Feldman and Orlikowski, 2011) that we can consider, and from these concepts consider the risks that might be involved from the perspective of managers in an organization trying to "manage knowledge".

In the next paragraphs we provide a list of concepts of practice theorizing and unpack them in light of the risks associated with neglecting those elements. However, in contrast with the paper by Trkman and Desouza, we highlight risks that derive from the belief that knowledge is 'transferable'.[3] The practice theorizing concepts that are discussed below are not intended to provide a comprehensive list/classification of ingredients to practice theorizing; rather they are some key ideas that are considered important when one focuses on knowing as practice.

3.1. Consequentiality

An action is considered to be a practice when it is consequential for the development of the activity (Feldman and Orlikowski, 2011). This emphasis on the consequentiality of action has been a response to the structuralist dominance in theories of organizing, where human agency was under-emphasized and approaches were over-socialized (Wrong, 1961). Instead, consequentiality implies "analyzing how behavior is embedded in concrete, ongoing systems of social relations" (Granovetter, 1992, p. 6). However, practice theories do not restrict agency considerations to human agency, as explained with the next concept (sociomateriality). Nevertheless, the important issue is the recognition that actions have consequences for the production of social life.

Risks: underemphasizing the consequentiality of action can lead to the assumption that organizing happens independently of human action (an over-socialized view) and this underpins the ontological idea that a separation between agents and structures exist. From a practice perspective, consequentiality implies that knowledgeability is emergent rather than controlled and so is not fully manageable. For instance, Feldman and Pentland (2003), in reconceptualizing routines as practice, highlight that routines are interdependent: "Participants cannot just act as they please, because the actions of others can create or close off alternatives. For example, if nobody applies for a job, no hiring can take place" (p. 105). In turn, the consequentiality of action suggests that the development of routines occurs through enactment (Feldman and Orlikowski, 2011). From this perspective, the risk is actually ignoring that knowledgeability is constructed within practice (Orlikowski, 2006), thus downplaying the consequentiality of actions. Robey and Boudreau (1999) provide a number of examples of inconsistent findings of research driven by a deterministic approach; that is, assuming that structures (e.g., technology structures) determine actions within organizations rather than recognizing the emerging consequentiality of the actions themselves. They suggest that theories that follow a logic of opposition – that is a logic that focuses on opposing forces that can simultaneously promote and hamper social change – helps us to understand the relative indeterminacy of the ways, for example, IT is entangled with social practices. Relating this to the concept of consequentiality, the risk is that managers think that they can create structures that promote (or restrict) knowledge transfer straightforwardly – i.e., they might assume that the implementation of an intranet between two branches of an organization or between partners in an alliance will lead to the outcome that relevant knowledge is exchanged. That this is not inevitable is illustrated in Newell et al. (2001) who consider the implementation of intranets within a network of branches of a global bank, the purpose of which was to promote knowledge sharing. The unintended consequence, however, was that the intranet promoted "electronic fences" between different functions and geographies, the opposite in fact, to what had been intended by management. Newell and colleagues conclude that knowledge cannot be fully extracted from its social settings and that attempts to do so only reinforce and refract existing divisions of knowledge. In other words, the risk of knowledge sharing from a practice perspective is to assume that IT or other management interventions can promote or restrict knowledge sharing automatically across a network; consequentiality helps us to recognize that practice (and so knowledge) is inherently indeterminate, albeit consequential.

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[3] The structural/cognitive perspective recognizes that some knowledge transfer may be sticky but nevertheless assumes that knowledge ultimately can be transferred.

3.2. Sociomateriality

From a practice perspective, knowledgeability exists in a particular local context and it is not individual subjects who are the source of the knowledge that underpins the decisions and actions that are taken, but rather the particular assemblage of social actors *and* material artifacts and natural objects that helps to stabilize (but never fix) practices (Orlikowski, 2007, 2010; Orlikowski and Scott, 2008). Knowing is distributed and dispersed and material objects alongside human agents help to produce (are constitutive for) the social world. Therefore, material (nonhuman) agency affects (and is affected by) social life (as is explained in the next paragraphs on dualistic thinking) in terms of being consequential in its production and re-production of organizing processes.

Sociomateriality reflects the idea that material artifacts (e.g., technology) and agents (the "social") are "*constitutively* entangled in everyday life" (Orlikowski, 2007, p. 1437). Sociomateriality implies duality; that is, the focus is on relationships *between* rather than separation *of* our traditional conceptual oppositions (dualisms), such as subject–object, mind–body, cognition–action, and determinism–voluntarism. The dualism of the structural/cognitive perspective of knowledge is characterized by the effort to identify different types of knowledge (tacit versus explicit, for instance – see Nonaka, 1994). As highlighted in Schultze and Stabell (2004), "[it] provides the theoretical scaffolding for schemas of classification, taxonomies, and contingency theory" (p. 533). In contrast, the duality of the practice perspective (Orlikowski, 1992) implies pragmatism (Cook and Brown, 1999), knowing in practice (Bourdieu, 1977), and an immanent relationship between knowing and practice (Nicolini, 2011), whereby knowledge is constituted by and through practices. An example is Giddens' structuration theory (1984) where recurrent actions constitute structures but simultaneously enacted structures are constitutive of the ongoing actions. That is, in the flow of practice, subjects and objects are entwined together (mangled in Pickering's, 1993 terms), so that separating them makes no sense for understanding the practice. It is only when they face interruptions (temporary breakdowns), for example thwarted expectations or awareness of different practices, that those involved move from a mode of "absorbed coping" to thematic deliberation, "when the logic of practice momentarily becomes manifest and illuminated" so that their "relational whole comes into view" (Sandberg and Tsoukas, 2011, p. 346). Thus, Sandberg and Tsoukas (2011) call the stage when agents interact non-deliberately with artifacts "absorbed coping" and suggest the example of the teacher who is immersed in a lecture; when, eventually, the slide projector stops working, a "breakdown" occurs and the teacher starts reflecting on the relationship between the social and the material. This example highlights that the social and material are entangled effortlessly unless something changes (the projector breaks down) and the entanglement becomes clear to the agent.

Risks: not understanding the totality of human experience because of the tendency to separate subject and object can lead us to assume that objects are easily replaceable. In our view, this can represent a risk when knowledge (as it is conceived by scholars that follow the structural/cognitive perspective) is ontologically separated from the agents who, in line with this idea, are the "owners" of knowledge. For example, removing or changing an IT artifact can disrupt practice because it is hard even for those involved to appreciate the role that particular objects play in their daily practice (i.e., in their knowledgeability). Orlikowski (2007) provides two examples of the entanglement that characterizes sociomaterial practices: Google, and the associated changes in information search processes worldwide; and Blackberry, and the changes in the communication practices of professionals. In particular, the latter example highlights how organizational practices are sociomaterial; here,[4] individuals interact in real time within and across widely dispersed locations using Blackberry devices that create a tight communication network. The increased dependence on staying connected highlights how IT artifacts become embodied in everyday practices, even if this entanglement is not always recognized by agents (i.e., absorbed coping). Another example is provided by Wagner et al. (2010) who describe the conflicts between different groups of agents (central administration, faculty, and departmental administration) at 'Ivy' (a university) when a legacy information system is replaced with an ERP system. Those involved at Ivy only came to realize how the previous legacy system was entangled in the users' everyday practices when those practices were no longer supported by the ERP. In turn, the implementation was stalled until a new sociomaterial accommodation was negotiated. Therefore, knowledgeability was embodied in sociomaterial practices and it was evident that this issue was ignored by the management.

3.3. Performativity

It is the relationships (or better, entanglement/entwinement) between people and things that are the source of knowledgeability (Orlikowski, 2006, 2007; Orlikowski and Scott, 2008) and these relationships are always evolving so that knowledge is never fixed but is always in a state of becoming (Chia, 2003). In this sense, neither humans nor non-humans can be said to have particular characteristics; instead their characteristics (e.g., as a good knowledge resource) exist only in so far as they are enacted as such, and this enactment will always be historically situated and fragile. Pickering (1993), for example, identifies performativity as the dialectic of resistances and accommodations (the "mangle") that generates evolutionary (and unpredictable) transformations in practice, i.e., in knowledge.

Risks: assuming that practice is static over time and space while downplaying the emergent nature of knowledge and practice, can lead to unintended consequences. For example, a risk of IT project failure might occur in dynamic contexts

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[4] The following details on this case study derive from an earlier version of the paper (Mazmanian, Orlikowski, and Scott, 2006).

where actors do not realize that practices have changed and create IT systems that do not support emergent practices. The idea of knowledge as always changing is pointed out, for instance, in a study by Swan et al. (2000): their case focuses on 'Brightco', a global manufacturer and service provider, and SSP, a large-scale IT project that aims to integrate dispersed branches of Brightco within a single network. This case highlights that it is important to recognize that knowledge patterns are continuously and dynamically changing. Swan and colleagues conclude that knowledge should always be negotiated through interactive social networking processes in the form of dialogs. This finding is in contrast with the cognitive/structural idea that assumes that knowledge can be moved around a network; the Brightco study illustrated how this approach did not work. In another study, D'Adderio (2006) points to the difference between performativity and prescription in an IT context, highlighting that, while the first refers to dynamic adaption, the second refers to automatic production and pure repetition. D'Adderio, in discussing a case study of a complex technology distributed across a network, stresses the importance of taking into account performativity since "existing *agencements*[5] have to be rearranged or even profoundly transformed in order to become successful" (p. 786). That is, ignoring performativity is risky since it can lead to the adoption of the "prescription" view that leads to determinism, as we have previously pointed out using the Robey and Bourdieu (1999) example. Putting it differently, the risk is to overlook the dynamic and often unpredictable nature of knowledgeability.

3.4. Nexus of practices and power relations

Practices do not exist in isolation but rather form a nexus of interconnected practices within a particular site of knowing that are held together by discursive practices, artifacts, and spaces rather than by individual cognitions (Nicolini, 2011). This nexus, however, is always provisional and contested, entailing choices that reflect particular interests thereby producing and reproducing particular power relationships (Feldman and Orlikowski, 2011). Thus, while knowledge resides in action, not all action is equal: some actions "matter more" to those involved. The asymmetries created by power are thus fundamental to practice theorizing (Feldman and Orlikowski, 2011). Moreover, we are invested in our practice (Carlile, 2002) so that attempts to change practice will be resisted.

Risks: Ignoring power relationships is a risk associated with any kind of ongoing organizing and in particular in contexts where change is being promoted. For example, in attempts to introduce new IT, certain practices may remain dominant even when they are no longer competitively viable because people are invested in their practice (i.e., in their knowledge) (Carlile, 2004). Thus, it is not simply a case of providing knowledge to rationally outline changes that are going to take place; rather, practices must be transformed (Carlile, 2002). For example, if those using an integrated IT system are going to change practices in ways consistent with exploiting the integration potential, then knowledge (and so practice) will need to be transformed. This is evident in an ongoing project in which we (the authors of this paper) are studying the introduction of an Electronic Medical Record (EMR) in a healthcare network in Ontario, Canada. Although the different agencies involved in the project (a hospital, social services, the coordinated access agency, schools) seem to be happy with the ERM, power issues are conditioning the way the EMR is customized, the timelines of the implementation, and the extent to which existing processes and organizational routines within this network are being changed. This suggests that it is crucial to acknowledge that there might be organizations that matter more than others in collaborative networks and this can condition mechanisms of knowledge translation (see also the next section) within the network. Downplaying the role of power relationships in knowledge creation processes (an issue that, according to Contu and Willmott (2003) has been common in studies of knowledge and learning), leads us to believe that knowledge and its outcomes are predictable and knowledge transfer (or its prevention) throughout a network is a straightforward process. This derives from a functionalist view of organizations (Burrell and Morgan, 1979) that implies that common goals are typically agreed and will drive performance (in contrast with the premise of consequentiality and performativity, for example).

3.5. Knowledge translation

While knowledge cannot be transferred like an object, it can be translated (Czarniawska and Sevón, 1996, 2005; Gherardi, 2006; Latour, 1986, 2005; Nicolini, 2011). We have identified three main streams of research that focus on knowledge translation that correspond to the three views of the practice perspective of knowledge that we outlined above. First, there are scholars who develop a link between knowledge translation and knowledge re-creation, building on communities of practice: knowledge cannot be transferred between two communities of practice (it is embodied in a specific context and culture); instead, processes, practices, and techniques of knowledge creation can be shared and, thus, there is the diffusion of methods that support recreation of knowledge (in different settings) (see, e.g., Bresnen et al., 2003, 2005; Garrety et al., 2003). This conceptualization of knowledge translation corresponds to the containment view of the practice perspective of knowledge.

Second, there are scholars who concentrate on the gap between research and practice: they acknowledge that in order for research (theory) to be put in practice, a translation (rather than a transfer) process should take place (see, e.g., Davis, 2006; Graham and Tetroe, 2007; Graham et al., 2006; Straus et al., 2009; Tetroe et al., 2008). This research stream aims to improve

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[5] A socio-technical *agencement* is the assemblage of heterogeneous elements that is required for the world contained in the statement to be actualized: "A formula that progressively discovers its world and a world that is put into motion by the formula describing it" (MacKenzie, 2003, in Callon (2006, p. 19)). [Note was quoted from D'Adderio (2006).]

the (capacity of) translation of knowledge into practical settings (applied research), and the theoretical lenses used share much conceptually with the practice perspective. However, this group of scholars does not typically refute the possibility that (some) knowledge can be moved, for example, from academic to practical contexts (Baumbusch et al., 2008; Kontos and Poland, 2009; Oborn, Barrett, and Racko, 2010). This suggests that both a practice and a cognitive component of knowledge are involved. On the one hand the situated nature of knowledge is acknowledged (and, in turn, the idea that its transfer is not a straightforward process is accepted). However, on the other hand, the issues related to knowledge transfer are discussed with the proviso that such transfer will be influenced by a range of issues, such as differences between knowledge of different epistemic communities (where professionals of the same discipline share the same epistemic culture, background, beliefs, and interests, Knorr-Cetina, 1999) that makes sharing across such communities problematic. For instance, as highlighted in Brown and Duguid (2001), different practices are associated with distinct epistemic cultures and this suggests that, according to these scholars at least, some knowledge can be transferred as long as the recipients are likely to "understand" the knowledge that they are receiving (i.e. people who are part of the same epistemic community) – indicating that a cognitive conception of knowledge is considered. Given this acceptance of the complementarity of the two perspectives (cognitive/structural and practice), we argue that this second conceptualization of knowledge translation falls within the mutual constitution view.

Third, there are scholars who develop the issues associated with knowledge translation, conceptualizing it in light of radical practice theorizing. Examples include:

- Latour (2005), who focuses on the contexts where knowledge is created, used, and disseminated within a network of human and technological actors, in order for this knowledge to be reshaped and translated.
- Gherardi (2006), who identifies three instances of knowledge translation: invisible learning, mock learning, and catch learning that are developed around the concept of "memory work".
- Nicolini (2011), who distinguishes between translation "by contact" and "at distance", and highlights the role of mediators (social and material artifacts) that "establish and support an active process of translation" (p. 14), in contrast with the passive support given by "carriers" that are not embodied in practices.

Therefore, knowledge translation involves two distinct as well as mutually constituted practices: the *exploitation* of existing knowledgeability and the *exploration* of similar knowledgeability in new sites (Benner and Tushman, 2003; Galliers, 2004; March, 1991). This (radical) view of knowledge translation does not imply a recreation of knowledge through processes of techniques and methods sharing, as suggested by those scholars who refer to communities of practice (containment view); yet it does not imply a cognitive component as the complement of the practice conception of knowledge as collective and belonging to everyday practices (mutual constitution view). Therefore, conceptualizing knowledge translation using the radical view involves sociomateriality (i.e., the use of mediators); consequentiality (i.e., translation depends on human and non-human actors); performativity (i.e., knowledge is reshaped and never "copied"), and a nexus of practices (i.e., translating knowledge can be conditioned – rather than determined – by agents).

Risks: assuming that knowledge can be transferred downplays translation processes and fails to recognize (i) the importance of mediators, and (ii) that exploitation (of existing knowledgeability) and exploration (of similar knowledgeability in new sites) are mutually constituted processes. One example of the role of mediators is provided in Nicolini (2010), who undertook a 3-year field study in a hospital in northern Italy. Nicolini describes telemonitoring as a process of knowledge translation "at a distance"; that is IT, infrastructures, programs, and interfaces that allow the doctors to collect information from a patient's home are all mediators of knowledge that is translated in different settings. For instance, Nicolini (2011) quotes a dialog (phone call) between a patient (at home) and a nurse (in the hospital). The nurse gathers a lot of information from the patient (i.e. the patient was sick the previous night, his daily pressure reading is fine, he made a decision to stop taking a drug) and then needs to reach the doctor (in the example, a cardiologist), refer everything to him/her, and make sure that the doctor listens carefully to the whole conversation and makes the right decisions that will be then be reported to the patient (as Nicolini highlights "Often doctors listen to you only briefly and support your decisions" – p. 7). In this example, the nurse acts as a mediator "at distance" that *translates* knowledgeability across contexts. As Nicolini points out, "ideas and practices are disembedded from their existing context and translated in a different place or time" (p. 1013). Another example is from the case study mentioned above that we are currently conducting in a healthcare network in Ontario (this concerns a pilot project that aims to improve healthcare delivery for children with multiple care needs). The managers have recently (in early 2011) decided to involve in the steering committee (representative people of the agencies involved who periodically review its evolution/success/problems) four families of the children who are participating in the pilot project. We have been present for a number of the steering committee's discussions and have had the opportunity to observe the key (and active) role of the families during the meetings – they have acted as mediators, translating for doctors, nurses and, administrators the situation "out there": i.e., the practical and concrete needs of the families. Nicolini (2011) calls this type of knowledge translation, "translation by contact". The risk associated with not using mediators to translate knowledge became apparent in this project during the first year of its operation when the family members were not on the steering committee. The barriers between the healthcare network and the families of the children with complex care needs did not allow the managers to make the transformations necessary to improve healthcare delivery in this specific context until this translation by contact was established.

Table 2 synthesizes practice theorizing concepts and highlights the links identified between these concepts and networks risks.

Table 2
Practice theorizing concepts and risks.

Practice theorizing concepts	Key concept	Risks	Risks in networks
Consequentiality (Feldman and Orlikowski, 2011; Granovetter, 1992)	Actors (and actions) have consequences for social life	Making deterministic assumptions that lead to assuming that the evolution of action is controllable (determinism)	Assuming that IT or other structural management interventions can control knowledge sharing within a network (as in the example of Newell et al. (2001))
Sociomateriality/dualistic thinking (Orlikowski, 2007, 2010; Orlikowski and Scott, 2008, Wagner et al., 2010)	Elements that are traditionally antithetic (i.e. social and material) are conceived as entwined together	Modifying material artifacts without taking account of their role in practices	Removing or changing an IT artifact that disrupts everyday practice (i.e., knowing) in networks (such as the Blackberry adoption example Orlikowski, 2007)
Performativity (Chia, 2003; Orlikowski, 2006, 2007; Orlikowski and Scott, 2008)	Knowledgeability is continuously becoming: everything flows	Conceiving knowledge (and practice) as not dynamic	Ignoring the dynamic nature of knowledge (as in Swan et al. (2000) example of the integration processes of the branches of the Brightco network)
Nexus of practices and power relations (Feldman and Orlikowski, 2011; Nicolini, 2011)	Practices can be conditioned by actors; that is, not all actions have equal "weight" in practice	Believing in pre-established cause-effect relations between actions and assuming that all organizational actors address their effort to common objectives and are equal	Unbalanced power in collaborative networks affecting the ways knowledge is translated (as per our example of the Canada fieldwork)
Translation (Czarniawska and Sevón, 1996, 2005; Latour, 1986, 2005; Nicolini, 2011)	Knowledge translation (in contrast with knowledge transfer) emphasizes the embodied nature of knowledge	Equating knowledge with a commodity such as money: i.e. thinking that knowledge does not need to be translated for new contexts	Assuming knowledge can be transferred as-is rather than using mediators (at distance and by contact) to translate knowledge (as per Nicolini, 2011 example)

All concepts listed in Table 2 are tightly connected to each other and interdependent. These concepts help us to think about the limitations of some of the taken-for-granted assumptions of the structural/cognitive perspective. In the next section we aim to reinforce this by considering the risks associated with treating knowledge as a commodity or resource.

4. The paradox of knowledge risk assessment

Trkman and Desouza (this issue), consistent with the structural/cognitive perspective of knowledge, suggest that the risks associated with knowledge in networks relate to virtual or concrete damages arising from knowledge that, once shared (and transferred), loses the characteristic of being a unique source of competitive advantage (Alavi and Leidner, 2001; Barley and Kunda, 2001; Norman, 2002) for the organization that allowed such sharing. In turn, along with this idea, knowledge transfer might be avoided rather than encouraged, at least in some circumstances. The implication is that organizations should carefully adopt countermeasures to knowledge transfer (that can be risky for the above reasons) or at least evaluate the extent to which knowledge transfer can lead to the loss of competitive advantage (risk assessment). Trkman and Desouza, thus, suggest a framework that aims to help firms assess the risks of knowledge sharing (and transfer) in relation to a (potential) loss of competitive advantage.

In contrast with the position in Trkman and Desouza and in light of our practice perspective, we make three points on Trkman and Desouza's approach and we propose a different angle in order to identify the risks associated with knowledge sharing (and translation) in networks. The three points are: (1) we argue that viewing knowledge transfer as 'sticky' is insufficient and that instead the focus should be on knowledge translation; (2) we argue that knowledgeability is an emergent process, and (3) we argue that presenting knowledge management as a set of "rules" to assess risks associated with its transfer falls short because such an approach overlooks the emergent nature of knowledgeability. Each is articulated below:

4.1. From knowledge transfer to knowledge translation

A number of scholars have theorized on barriers to knowledge transfer (Dyer and Hatch, 2006; Ko et al., 2005; Mitton et al., 2007; Sun and Scott, 2005; Szulanski, 1996; Tsai, 2001) and there is considerable empirical research that demonstrates failures in transferring knowledge that have had consequences on, for example, projects, strategies, and innovation processes (Akkermans and van Helden, 2002; Garavelli et al., 2002; Lam, 1997; Robbins-Gioia, 2001; Scarbrough, 2003; Scarbrough et al., 2004; Wong, 2005). We have argued, however, that it is not simply that some knowledge may be 'sticky' but rather that knowledge is embodied in practices that will be translated and recreated in new contexts. The risk is, therefore, in managers' belief that knowledge transfer is possible and "controllable", which can lead to unexpected failures.

4.2. Knowledgeability as an emergent process

The dynamic nature of knowledgeability indicates that its development takes place *in* practice. As noted by a number of scholars (e.g., Gherardi and Nicolini, 2002; Nicolini, 2007, 2011; Orlikowski and Scott, 2008; Wagner et al., 2010), it is not only that knowledgeability is not "controllable", knowledgeability is also *emergent* in the sense that its creation and repro-

duction always vary (performativity), although agents can modify actions that generate knowledgeability (nexus of practice). The risk is that managers ignore this emergence and assume that they have full knowledge of something.

4.3. Knowledgeability cannot be governed with rules and best practices

The emergent nature of knowledgeability suggests that a set of best practices to manage knowledge and actions can be risky. The IS literature (especially the studies that focus on the introduction of technology in organizations) highlights the risks associated with the belief that knowledge is transferrable, controllable, and that best practices can drive IS implementation. For instance, while some scholars (e.g., Aladwani, 2001; Huber et al., 2000; Taudes et al., 2000) see large-scale IS implementation as a series of steps drawing from traditional innovation diffusion theory (Cooper and Zmud, 1990), other scholars, following Markus et al. (2000), recognize the importance of capturing "onward and upward" efforts of the users to recursively learn how to exploit the characteristics of technology in practice (Elbanna, 2006; Newell et al., 2004; Robey et al., 2002; Wagner and Newell, 2004). These concepts can be linked to the above discussion between the (rational) structural/cognitive approach to knowledge that aims to fully control its development, and the practice approach that acknowledges the entanglement of the social and the material (Orlikowski, 2005).

The three issues that we have developed help us to conceptualize the risks associated with knowledge (ability) in networks as a paradox: that is, managers' belief that knowledge can be transferred is a risk in and of itself, and can lead to unintended consequences, including producing the opposite effect to that intended (as with the intranet creating electronic fences, for example). The risk, in other words, in the kinds of network settings that Trkman and Desouza consider, is that managers will assume that knowledge can be transferred across the network. In turn, the practice perspective would focus on efforts to translate knowledge across a network by using different mediation practices.

This risk is rather different to the risk identified by Trkman and Desouza since their paper does not focus on risks associated with transferring knowledge across a network, but rather on preventing this sharing where valuable commercial interests are potentially 'at risk' if others 'know', for example about a firm's R&D efforts. While our practice perspective may be better able to identify the risks associated with assumptions about the ability to transfer knowledge, it also has something to say about this idea of preventing transfer. Thus, from a practice perspective, we would argue that not only is the transfer of knowledge across a network problematic, but so also is the straight-forward prevention of that transfer (or better translation from our perspective). For example, if in an alliance, those from different organizations are engaged in joint practices, it is likely that knowledge will be shared, despite the efforts of managers to prevent this.

An example of our contrasting perceptive is related to the discussion regarding the implications of knowledge sharing and risk management, where Trkman and Desouza discuss the proliferation of the virtual organization as a form of organization that can balance risk management costs (that decrease, since there is no longer a collaborative network), and coordination costs (that do not increase as they might in a merger). We have serious concerns in terms of equating a virtual organization with the possibility of transferring knowledge with zero risks. For instance, our earlier example of Ebank and the electronic fences (Newell et al., 2001) shows very contrasting results. Our point is that strategically, organizations may want to decide which knowledge to transfer but in practice, such knowledge transfer is problematic and is a reflection of knowledge (ability) itself.

In sum, we have attempted in this article to highlight the main gap between the cognitive/structural perspective (where knowledge transfer can be managed and controlled), and the practice perspective (where it is recognized that knowledge *is* practice and that the unpredictable evolution of practices does not allow design of definite processes that treat knowledge as a commodity or resource). We argue that, conversely, being aware of the dynamic and not fully controllable nature of knowledgeability as emergent in practice might lead to the avoidance of unexpected failures in projects/processes that rely on 'knowledge transfer'.

5. Conclusions, implications, limits, and future avenues of research

This commentary is aimed at outlining knowledge sharing processes within networks from a perspective – the practice perspective – that contrasts with the structural/cognitive perspective taken by Trkman and Desouza. The main epistemological difference that has emerged involves the idea of knowledge as a possession of individuals and groups (structural/cognitive perspective) who need to be careful in transferring knowledge in order not to lose competitive advantage, as opposed to the idea of knowing as embodied, and, more radically, identified with actions/practices. The ontology underpinning these antithetical conceptualizations of knowledge lies in the following principle: the structural/cognitive perspective sees agents and their actions as two distinct units of analysis; the practical consequence is that knowledge is considered as a tangible asset that can be relatively easily managed. The practice perspective sees agents and their actions as ontologically overlapping; in turn, knowledge is not fully controllable and is emergent.

This difference has a major impact on how one views the "management" of knowledge in networks. On the one hand, managers accepting a structural/cognitive view of knowledge assume that knowledge can be moved about a network; their perception is that moving too much knowledge is risky since they can lose know-how. On the other hand, managers who accept a practice perspective of knowledge are aware of its situated and embodied nature and acknowledge that, being very context-dependent, it is not likely to be straight-forwardly applicable to different contexts. The practice perspective suggests

three approaches that can be followed to share knowledge in networks. The first approach derives from the containment view and focuses on sharing processes and practices that support the recreation of knowledge (and capabilities) in a different context (i.e., when there is an attempt to reproduce it from one community of practice to another). The second approach draws from the mutual constitution view and suggests that it is helpful to consider individual knowledge as well as to be aware that, once agents interact (e.g., at the team level), new and different knowing becomes embodied in practice and cannot be easily divorced from the team/group where it has originated. The third approach – the one that we have followed in this paper – draws from the radical view of knowledgeability. Here, practice is equated with knowledge. In turn, knowledge (as well as practice) is not fully controllable; it is unpredictable, emergent, and embodied in ongoing actions. From this perspective, mediators can be used that, being embodied in practice, facilitate its translation from one context to another. For example, Nicolini (2011) uses the example of a therapy sheet (a sheet which records various data from a patient), which "knots all the involved knowings together". The therapy sheet acts as a mediator because it allows the patient's history to be reconstructed from the data recorded during different tele-monitoring episodes, thus allowing a practitioner to get an overview of the patient from which they can then take actions.

Although the practical implications of the practice perspective of knowledge in networks (and in particular, the implication of the radical view) have been highlighted throughout the paper with examples and comments on the risks associated with not taking a practice perspective, in the last part of this final section we draw some general conclusions and highlight the strategic implications for firms that aim to 'manage knowledge' in networks. First, processual analyzes of IS implementations that are aimed at supporting knowledge sharing should consider the sociomaterial entanglement as it is performed in everyday practices, which is not straightforward and predictable (consequentiality). This means that IS change is risky because of the tight – yet not always recognized – entanglement between the social and material. For instance, changing artifacts can disrupt consolidated practices of users' "absorbed coping" (sociomateriality). Second, using a negotiation strategy when implementing IT has been shown to work better than imposing technology and also helps users to develop knowledgeability (performativity); that is the way IT is implemented in networks has a strategic role in leading to successful technology adoption and use. Third, considering power as inherent to organizational life and as affecting inter-organizational relationships suggests that managers may be able to condition some actions, yet some actions will also be influenced by other people and objects so that managers need to be aware of this (nexus of practices) and recognize that it is always evolving. Therefore, knowledge is not a commodity that can be transferred anywhere and thus divorced from its context without being translated to another context (translation).

In sum, in this paper we discuss a number of taken-for-granted assumptions regarding knowledge transfer in networks (i.e. those assumptions that follow from assuming that knowledge is possessed by individuals) and we show that rethinking knowledge sharing processes (and associated risks) using a practice perspective of knowledge can shed light on issues associated with strategically managing collaborative networks. The issues which we surface by adopting a practice perspective suggest both theoretical and empirical areas that future research can usefully focus on.

We argue that more theorizing is needed to understand how the entanglement of IT in everyday organizational activities and knowledgeability creates problems (risks) when new strategies are introduced that might upset this ongoing entanglement. We have provided a number of examples where large-scale projects, planned changes, and organizational transformations fell short because managers treated knowledge as a commodity. Yet relatively few authors have built theory related to how to translate knowledge in networks (examples are Gherardi, 2006; Latour, 2005; Nicolini, 2010, 2011). For instance, while mediators are crucial in translating knowledge (Nicolini, 2011), it is still not clear how those mediators can be "activated" by those managers who lead knowledge translation processes. Moreover, no theorizing has been developed so far related to whether (and to what extent) human agency can influence knowledge translation processes –i.e. whether managers can speed up those processes of knowledge translation. Knowing how to manage mediators could have an extremely relevant strategic impact and would positively affect organizational performance. This suggests that more theorizing is needed regarding the extent to which human actors can affect (or not) the flow of actions in practice given that knowledge and practice and human and material are intertwined (Giddens, 1984; Orlikowski, 2005). Nevertheless, such practice theorizing should take into account that, as noted in Feldman and Orlikowski (2011), theoretical generalizations do not generate models to follow or predictions; rather, practice theorizing can be understood as a way to generate principles that shed light on actions.

We also highlight the limits of practice theorizing: we acknowledge there is an over-emphasis on the collective level at the expense of the individual level. Although "agents" are crucial in constituting practices, the practice perspective of knowledge does not consider agents *per se*; and this represents both a characteristic and a limit of the practice perspective.

We encourage empirical research that explores the dynamics underpinning knowledge (re-)creation and translation in networks. As suggested by Feldman and Orlikowski (2011) ethnographic, qualitative, and longitudinal research is particularly appropriate to investigate how knowledge in practice takes place. This is confirmed by the (few) studies where a practice perspective of knowledge is highlighted in network settings (Nicolini, 2010, 2010; Wagner et al., 2010). However, additional empirical research is needed to fully explore the knowledge translation processes in networks, especially adopting a radical view.

Finally, we believe that both theoretical and empirical insights regarding the application of the practice perspective of knowledge in network settings should be integrated and taken into account by managers and executives. As we have shown in this paper with our examples, there are relevant implications of our theory development for practitioners: according to the practice perspective, decision makers should recognize that knowledge management processes might not be a priori

planned. Knowledgeability does not follow a straightforward and linear development path – and this is highlighted by all the practice theorizing concepts described above. Therefore, a major practical risk of knowledge sharing in collaborative networks is to ignore the unpredictable nature of knowledge and, as we have highlighted throughout the paper, to assume that knowledge can be transferred. It is strategically crucial for decision makers to be aware of the tools available to manage knowledge (i.e. the mediators) and of the boundaries (if any) around which actions can be addressed to affect knowledge-ability. In conclusion we argue that exploring IS strategizing from a practice perspective (and taking a radical view) can help to shed light on how to strategically manage knowledgeability.

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