Telehealth Systems Deployment: A Multilevel Research Agenda

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One common approach to make sure that the provision of primary care is available and effective in remote areas is the implementation of telehealth. This is a new field of experimentation with information and communication technologies (ICTs). Telehealth involves a new context of studies given the specificities of the health environment: organization, culture and professional practices. This paper seeks to promote and circumscribe a research agenda in this respect.

Keywords: information systems, multilevel construct, research framework, telehealth deployment

INTRODUCTION

From the perspective of health policy, one pressing need in both industrialized and developing countries concerns the way in which the provision of primary care can be made available and even more effective in remote areas. In these areas, structural factors such as staff shortages, terms of physician practices, local policy, transportation and other variables often translate into inadequate delivery of health services and even into healthcare inequalities (Field & Briggs, 2001). Accordingly, a number of health policies aimed to resolve this issue have been implemented. However, most of these policies proved successful only in the short term (Bourgueil et al., 2006). Then, the focus has shifted to the potential of Information and Communication Technologies (ICT), in particular telehealth systems, to improve both management and the provision of health care services in remote areas.

A number of technological advances, such as digital data compression, high-speed telecommunications, and the lower cost of computer and video equipments, have recently revived the interest for telehealth, that is, health care and services provided remotely through ICT for information, education, research and clinical and administrative data processing (MSSS, 2004). Researchers, practitioners, and policy-makers believe that telehealth, if properly designed, can effectively help provide healthcare services to underserved populations, low-cost speciality services to areas where full-time staffing is not feasible, attract and retain health professionals in remote regions.

In this respect, telehealth is better thought of as a technological response aimed to get around the structural factors involved in healthcare inequalities in remote regions (Jean-Jules & Villeneuve, 2011). Indeed, telehealth relies on a bundle of information and communications technologies. Depending on the area of medical specialization to which the project relates, the telehealth system also includes medical technologies. ICTs are so central to telehealth that the successful deployment of telehealth programs is

premised on their successful implementation. Despite the centrality of information systems in telehealth, it is surprising to note that they were rarely considered in telehealth research.

In light of this, we briefly here delineate a research agenda regarding telehealth. The agenda underlines at least three subjects that are worthy of our research attention. The first subject of consideration would involve better understanding telehealth systems. The second concerns the identification of the phenomenon of interest to be privileged. The third subject of consideration involves exploring the ways or a theoretical framework whereby the phenomenon of interest can be properly studied.

TELEHEALTH: THE STATE OF KNOWLEDGE

Telehealth projects literature clusters around two main research streams: the literature on program evaluation and the literature on information systems.

With respect to telehealth, program evaluation research comprises two main strands: a project management oriented trend interested in the conditions that foster the success of such projects and a second trend that concerns the extent to which the promises of telehealth materializes in terms of cost reduction, patient satisfaction, etc. The second family, the information systems (IS) literature related to telehealth, focuses on three salient themes which are: the acceptance of telehealth systems by users (Brewster et al., 2013; Taylor et al., 2014;); the characteristics of the systems (LeRouge et al., 2002; Naegele-Jackson et al., 2002); the performance of telehealth systems compared to conventional methods of providing health care services (Taylor, 2015; Scheideman-Miller et al., 2002).

In conclusion, telehealth literature, except a few studies (Lehoux et al., 2002)), whether it is evaluation or IS-based, only implicitly addresses the technological systems which these projects rely on and still less the complex social relationships that are triggered when a technological innovation such as telehealth systems is introduced into an organization. However, it is important to take into consideration such social relationships including the very nature of the technological systems.

THE VERY NATURE OF TELEHEALTH SYSTEMS

Telehealth systems are as different from each other as the organization or purposes for which they are deployed. Multiple telehealth applications are deployed on the basis of a variety of technologies including videoconferencing, medical imaging devices, content entry devices, data storage and extraction equipment, etc.

In other words, Telehealth systems result from the grouping of heterogeneous devices made up of several intrinsically complex and independent components (Paré and Sicotte, 2004). Accordingly, these systems are better thought of as a focal technological system, which is linked through a set of connections to the social, political and institutional contexts (Kling and Scacchi, 1982). Such a representation makes clear that even though the technological artefact is a central element of a telehealth system, it remains an element of an ensemble set that also includes the components needed to apply the artifact to a given socio-economic activity (Kling and Dutton, 1982, Illich, 1973). These components include commitment, additional resources such as training, qualified personnel, organizational arrangements, policy and reward system, in short, all that is needed to support the effective management and use of the system (Kling and Scacchi, 1982). Such characteristics of telehealth systems induce at least three concerns. First, the need to consider these systems as embedded in a dynamic and complex social context (Orlikowski and Iacono, 2001) and thus to examine how different social influences combine to shape their deployment and how different 'groups of targeted users appropriate them. Secondly, the need to consider the ambiguity and the problems of interpretation inherent in such systems because of the diverse technologies they combine and the organizational arrangements they require. Not to mention that as innovation, they most often break with the thought patterns and procedures of daily actions in organizational settings (Barley, 1986). Finally, the mutual structuring between these systems and the organization needs to be considered (Orlikowski and Iacono, 2001). Such considerations draw attention to the structural potential, i.e. the rules and resources on the one hand, and the spirit of these systems on the other (Giddens, 2005).

The preceding development makes it obvious that regardless of the nature of the telehealth systems phenomenon under investigation, it will be necessary to not only explore the shared social representations of these systems, but also to consider that the phenomenon is likely to be influenced by factors related to the attributes of these systems, the characteristics of the institutional context including the interactions between the technological innovation and the organizational environment. In the following section we argue in favor of a phenomenon of interest that we consider relevant to investigate when it comes to telehealth systems.

ASSIMILATION AS THE RELEVANT PHENOMENON OF INTEREST

A frequent criticism of information systems research concerns its lack of relevance to practice in that it is somewhat disconnected from the real needs of organizations, and therefore research results rarely impact practice and that IT/IS professionals usually do not read academic IS journals (Benbasat and Zmud, 1999). Choosing relevant topics certainly does not ensure that the research itself is relevant, but should ensure that if the implications of the research are formulated in an implementable way, they will serve to address issues of interest to business practice (Benbasat and Zmud, 1999). From this point of view, in order to identify the phenomenon to be investigated with respect to telehealth systems, it becomes necessary to question the concerns of practitioners regarding telehealth.

The collective performance of telehealth projects in terms of clinical value and technical feasibility has prompted more and more health professionals and administrators to integrate telehealth into the mainstream clinical care system.

Given the central role of information technology in telehealth projects, it is imperative to translate these managerial concerns into technological concerns. In fact, incorporating telehealth into the healthcare system is tantamount to inserting telehealth information systems into clinical and administrative routines and, in so doing, embedding them into the organization's technological and informational architecture. This transposition points to an understudied phenomenon in IS research: assimilation. This includes two sub-processes: routinization and infusion (Saga and Zmud, 1994). Routinization refers to the extent the system ceases to be perceived as a novelty and becomes taken-for-granted (Saga and Zmud, 1994). Infusion refers to the extent to which the system is embedded in organizational procedures and work architectures (Cooper & Zmud, 1990).

This phenomenon is important since it is widely acknowledged that an implemented innovation must be fully assimilated into the organization's work processes if it is to provide the expected benefits (Chatterjee et al., 2002; Purvis et al., 2001). However, very little is currently known about the assimilation of information and telecommunications technologies used in the context of telehealth projects and even less about the factors that influence it. The reason is that few studies address this issue. Therefore studies that aim to understand the factors how telehealth systems can be assimilated in healthcare organizations including the factors that may positively influence the phenomenon are warranted.

IN SEARCH OF A THEORETICAL FRAMEWORK

Relevant Theories
The choice of theories to frame the study of any IS-related phenomenon should take into account the specific nature of the system including that of the phenomenon under consideration.

Telehealth systems link two or more organizations and several categories of actors. Accordingly, a fine understanding of social relations, work organization, cultural factors, and the history of technologies in these organizations is essential to the success of their deployment. In the case of information systems that make up telehealth systems, there are many decisions and technologies that are too large and complex to be grasped by the cognitive ability of one person. In addition, decisions to acquire and deploy such systems generally do not fall within the discretion of a single member of the organization (Eveland and Tornatzky, 1990 p.124). Indeed, telehealth systems require the implementation of complex organizational arrangements. Their adoption and implementation are the result of numerous decisions induced by

economic and social forces that go beyond managerial rationality. In such cases, classical models of IS analyses are quite limited since they do not take into account the influence of economic and social forces in the decision-making process. On that basis, we recommend using rather broad social theories in order to be able to address the different aspects involved in the deployment of telehealth systems.

In addition, the presence of such systems may, because of the technologies they combine, pose unique challenges for the health community in terms of interpretation and sensemaking for both managers and health professionals. Since these technological innovations are exogenous to the context of the health environment, their introduction is likely to induce a certain hiatus between the systems of meaning, legitimacy and domination in place and the new demands of the daily actions of health organizations (Barley, 1986). These new technologies therefore affect the ability of organizational members to reason about the structures of telehealth systems, because technologies in general and new information technologies in particular lend themselves to interpretative flexibility (Weick,1990) as they allow different possible and plausible interpretations from various social groups and may therefore be misunderstood, uncertain and complex (Pinch and Bijker, 1987, Weick, 1990, Orlikowski and Gash, 1994).

Regarding the phenomenon of interest, assimilation, there is no reason to suggest that the needed sensemaking effort will be a collective endeavor at first sight. Moreover, it has been found that cognitive changes often underlie changes in organizational routines induced by technological innovation. This suggests that the assimilation of telehealth systems could stem from individual and then collective cognition before manifesting at the organizational level. This way of conceptualizing the phenomenon suggests that assimilation, like other organizational phenomena such as performance, leadership, is a multilevel phenomenon.

This stance leads to, at least, three major considerations. The first concerns the need to lay the theoretical foundations of the model, the second the need to clearly explain the levels of analysis in order to avoid flaws in reasoning, and the third refers to the need to specify the sources of variability. In other words, the theorization exercise will have to start by laying out the phenomenon of assimilation and then follow with the theoretical constructs that underlie it.

Given that multilevel models essentially aim to describe phenomena that take place at a level and that can be generalized at higher levels, it will be imperative to specify the formation of the collective constructs of assimilation by explaining as much their structures as their functions (Morgesson et al. Hofmann, 1999), which involves describing how the phenomena are interrelated at different levels (Kozlowski and Klein, 2000). It will be also necessary to specify the processes whereby the collective constructs of assimilation unfold (Kozlowski and Klein, 2000) and clarify whether this is a composition or compilation process. Finally, it will be necessary to specify the sources of variability (Klein et al., 1994).

EXPECTED CONTRIBUTIONS

Theoretical Implications

On the theoretical level, we anticipate that this research program will have two implications. First, it can help to enrich prior studies of IS assimilation. Indeed, a number of studies (Zmud and Apple, 1992, Saga and Zmud, 1994, Fichman and Kemerer, 1997/1999, Meyer and Goes, 1998, Purvis et al., 2001, Gallivan, 2001, Chatterjee and al., 2002) have focused on the organizational assimilation of information technologies. These studies certainly contributed to our knowledge of the phenomenon. However, as they considered assimilation as an exclusively organizational phenomenon they overshadow potential alternative explanations that could further enrich our understanding. In particular, these studies are silent with respect to the structure as well as the functions of assimilation constructs. By adopting a multilevel perspective, the proposed research agenda will result not only in a more integrated understanding of the nature and the way assimilation process unfolds at different levels of the organization, but will also undoubtedly help identify factors of influence of assimilation to which it would be otherwise impossible to think. Secondly, the proposed program has the potential to provide answers to various questions such as: a) The role of the institutional context in the organizational assimilation of telehealth systems. In particular, the link between cognition and actions at the individual and collective levels resulting from group dynamics including the

role of the health care environment in shaping the actors' social representations of telehealth systems. More broadly, how users of a technological innovation manage to reduce uncertainties about the nature, the use and the likely consequences of using this innovation; (b) the individual attributes involved in the assimilation of innovation; (c) the role of the social structure, the socio-technical system and the human agency in collective assimilation.

Managerial Implications

In practical terms, on the one hand, drawing on the theoretical knowledge generated about the nature of assimilation and the factors likely to influence it, we expect this research program to set out the range of managerial interventions necessary for successful implementation of telehealth and therefore the effectiveness of such systems. On the other hand, this research, by identifying at the individual, collective and organizational levels the different factors that influence assimilation, will give indications as to the locus of authority for each managerial intervention and thus contribute to shed light on of governance mechanisms related to telehealth systems.

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