Co-creation of Knowledge in Healthcare: A Study of Social Media Usage

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Abstract

There has been a long-standing interest in how groups collaboratively solve problem and cross-fertilize knowledge assets. Knowledge co-creation is one of the hallmarks of innovation in organizations. Using a multiple case study approach, we analyze the use of social media by patients, their friends and families, caregivers, and organizations in the context of breast and prostate cancer to see how they collaborate to produce new knowledge. Based on our results, we propose a theoretical model that explains the process of knowledge co-creation. Three phases underlie this process: initiation, transition, and normalization. For each phase, we identify the key activities, drivers and challenges that are faced by the enabling actors. Our model accounts for the dynamic as well as the temporal aspect of knowledge co-creation in the context of cancer care, to provide a richer account of this phenomenon.

1. Introduction

A multitude of factors, including the increasing complexity of the healthcare system, a need for quality, the pressure towards efficiency, or the patient-centered care philosophy have pushed healthcare organizations to continuously innovate. To facilitate innovation and creativity, they have to harness the collective ability to process information and create knowledge; a particularly important contribution to innovation and problem solving that this collective ability can serve is knowledge co-creation. Defined more explicitly later, knowledge co-creation refers to producing new knowledge as a result of collaboration on a joint task. Given that innovation increasingly comes from such collaboration [1], is is important for organizations to have a clear understanding of how this process of knowledge co-creation occurs in order to harness the benefits of it.

The literature on knowledge co-creation examines the micro processes underlying individuals' collaboration to create new knowledge. A particularly salient characteristic of knowledge co-creation that emerges from this literature is that it is primarily a social process [2, 3]. In this regard, a great deal of research attention has been recently given to knowledge as embedded in human actions and interaction, and knowledge co-creation in situated practices such as in the case of communities of practice. This literature has examined issues such as how individuals interact and create knowledge in specific communities, their perception of collaborative knowledge creation and the role of collaborative learning in knowledge creation in a community [2, 4, 5-7]. It provides important empirical evidence of the social processes underlying knowledge co-creation, but it suffers from at least two problems. First, its fragmented nature has resulted in the lack of clarity about the different dimensions of these social processes and their potential relationships. Second, it is not sufficiently grounded in empirical data; it needs to be tested and refined over time.

The goal of this study is to explain how patients, their friends and families, caregivers, and organizations collaborate using social media to produce new knowledge. To do so, we investigate the use of social media to support breast and prostate cancer stakeholders. Based on our results, we propose a comprehensive process model of knowledge co-creation that accounts for the social processes that underlie such a process. In particular, we attempt to capture the complexity of knowledge co-creation by studying its underlying temporal and interactional dimensions, which are at the core of any social process. Our intended contribution is a rich explanation of the knowledge co-creation process in relation to these dimensions.

2. Literature Review

2.1. Knowledge Co-creation

The knowledge management literature does not clearly distinguish between knowledge creation and knowledge co-creation. In fact, the two terms are often used interchangeably in that knowledge co-creation is a special case of knowledge creation. Nevertheless, the literature suggests that the distinction between these

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two constructs is that knowledge co-creation necessitates some extent of a collaborative process in building new knowledge [2, 4, 5, 7, 8, 9, 10]. Hence, we adopt the view that individuals co-create knowledge when they not only share knowledge but they are solicited to collaboratively leverage their existing knowledge to produce new knowledge. In other words, knowledge co-creation is of a collaborative nature and involves both knowledge sharing and creation.

The goal of knowledge sharing is the exchange of knowledge from a source to a recipient. Knowledge sharing may occur through different means including through social interactions, e.g., apprenticeship [11]. Basically, knowledge sharing consists of making existing knowledge available to others. It may occur informally by way of dialogue, discussion and formally through training and documentation.

As for knowledge creation, it is a process that culminates in the production of new knowledge. A commonly used conceptualization of this process holds that it consists of four mechanisms: socialization, externalization, internalization, and combination [12]. Socialization refers to conversion of tacit knowledge to new tacit knowledge between organizational members (e.g., apprenticeship). Combination refers to the creation of new explicit knowledge by manipulating existing explicit knowledge (e.g., literature survey reports). The other two mechanisms involve interactions that convert tacit into explicit knowledge (or vice-versa). Externalization refers to converting tacit knowledge to new explicit knowledge (e.g., articulation of best practices or lessons learned). Internalization refers to assimilation of explicit knowledge in action to the point that it becomes tacit knowledge.

Knowledge creation may be done individually or collectively. However, social exchange is often an essential aspect of the knowledge creation process. When this social exchange involves individual collaborating on a joint task, this process relates to knowledge co-creation [13, 14].

2.2 Group dynamics and knowledge co-creation

Individuals work together and co-create knowledge through a process that evolves temporally and is embedded in a web of interactions. Both temporal and interactional dimensions have been considered in the study of knowledge co-creation. For example, some studies analyze how group members relate to each other as they co-create knowledge [4, 5]. Some studies examined the chronology of the triggers of knowledge co-creation (e.g., evolution from team building to

meaningful dialogue to coordination and documentation to learning by doing) [15, 16, 17]. The goal of our study is to propose a process model that integrates both the temporal and interactional dimensions of knowledge co-creation.

3. Theoretical Framework: A process model of knowledge co-creation

Our literature review allowed us to identify some key phases as well as a number of elements that are paramount to understand the knowledge co-creation process. The following paragraphs describe the different phases of the knowledge co-creation process (initiation, transition, and normalization) as well as the elements that shape that process.

Before describing these phases, it is first worth mentioning the role of the *enabling actors* in this process. Indeed, some facilitators may emerge to help group members effectively communicate and better understand each other. These facilitators are akin to knowledge brokers [4] or boundary spanners [18]. In this regard, it is a widely held belief that the presence of bridging agents is an essential part of cross functional innovation in that they serve as an intermediary between dissimilar parties participating in the knowledge co-creation process [9]. This enabling actor, for example, facilitates communications, contributes to conflict resolution and encourages openness. S/he can also help leverage minority views as well as foster ways to select and retain good ideas from the impractical [19]. Enabling actors may also compensate for the lack of knowledge integration ability in a group. They can at times play a critical leadership role in providing the control needed while maintaining a balance of power favorable to group performance. The enabling actor can play this role by being both a progress manager and mediator. As a progress manager, s/he has to evaluate and guide group members. As mediator, s/he has to resolve disagreement in balancing the interest of all parties but so as to not impair collaboration. In this capacity, the enabling actor may have to decide the selection and retention of knowledge [5] on one hand. On the other hand, s/he has to align and reconcile the needs of all parties.

Now, for each of the phases that have been identified as critical in the knowledge co-creation process, we explain the activities, key drivers and challenges that have been identified as important to explain such a process.

3.1. Initiation

Activities: During the initiation phase, behavioral patterns and assumptions emerge to define the group interaction and its approach to the joint task. These patterns and assumptions typically persist until the transition period where they are revised. This time in the group lifecycle is a formative stage that is likely dominated by knowledge sharing as group members get to know each other and test various approaches to their task. In summary, initiation primarily consists of knowledge sharing and team building activities.

Key drivers: In this early phase, the group members' perception of each other is very important to their motivation. Motivation comes as a result of these members perceiving their interactions as non-threatening and personally beneficial. In this regard, research underlines the fact that knowledge sharing and creation occur when these interactions provides a sense of identity, belonging [4], safety [9], open sharing [5] and a disregard for hierarchy to facilitate boundary crossing [4, 20]. Such a climate motivates individuals to be assertive, take risks, ask questions, raise concerns, state objections and declare opinions, which encourages them to learn from other and to volunteer knowledge contribution [9, 21].

Knowledge sharing and team building depends also on the opportunities for effective interactions. In this formative phase of the group, both formal and informal communication outlets afford these opportunities. Group members will likely have to spend a significant amount of time in informal/unstructured forms of knowledge sharing to "get a feel" for each other. In this phase, technology can help knowledge sharing with electronic discussion spaces, means to identify the most relevant contributors and to remove traditional knowledge and communication obstacles [5, 9].

Besides motivation and opportunity, the success of knowledge sharing and team building depends on the ability to effectively exchange. Individuals' knowledge exchange has to be meaningful to the targeted parties. However, meaning is derived in an exchange based on some amount of commonalities such as a shared language or shared experiences. Hence, knowledge sharing in the initiation phase relies on the presence of sufficient commonalities in order to communicate, understand each other and relate to each other in a constructive way. These commonalities include shared knowledge [4, 16]; shared language [6, 9, 16]; shared experiences [4], and transactive memory [9].

Challenges: One of the main challenges in the initiation stage is overcoming the cross-functional, hierarchical and/or social boundaries [22] that can impair knowledge sharing. As mentioned, some boundaries—such as those created by functional boundaries, idiosyncratic language, or different approaches to work—are avoided when there is overlap in knowledge that enables individuals to understand each other [12]. Other boundaries are only overcome with greater accessibility. An example of this would be hierarchical boundaries due to a lack of social connection or informal ties between different levels of work. In sum, knowledge sharing is challenged as long as boundaries remain to segment the exchange between parties in a group.

3.2. Transition

Activities: After the initiation phase dominated by knowledge sharing and team building comes a transition stage in which the group adjusts to correct earlier problems and institute new arrangements. At this stage, there is likely a shift from an emphasis on knowledge sharing to an emphasis on collaboration leading to knowledge co-creation. In this regard, the group will be primarily engaged in determining the terms of a more effective collaboration approach. The group in the transition phase is marked by a more compelling awareness of time limitations and pressure to show visible progress.

Key drivers: Unlike the first phase where perception of each other drives the group members' motivation, motivation at this transitional stage comes from task-related considerations. As mentioned, there is an expectation within and outside the group to see visible progress toward the common task. This expectation affects the time, energy and efforts that individuals invest in their tasks [23] and the support that the group receives from the environment [24]. Indeed, group members' perception of the group's ability to demonstrate progress and function effectively and efficiently become critical in motivating contributions. At this stage, their motivation depends largely on perception that the group dynamics reflect the fact that group is not in stagnation, that the group norms improved based on what group has learned and that the group can meet its objectives.

In addition to sustaining motivation with more effective interactions, knowledge co-creation in this stage requires opportunities for the group to effectively collaborate on the task itself as well as the management of the task. Technology can play a pivotal role in this regard because it provides an easy-to-use means to capture, exchange, display, elicit feedback, and, manage various bundle of information. As the group seeks to recalibrate, technology can provide a plethora of mechanisms that better regulate how members to uniquely contribute to the group task and how to best to integrate one's contributions with other group

members'. Indeed, it facilitates collective co-authoring and organized interactions [25].

In this phase, novelty is critical for knowledge co-creation. Unlike the previous phase where the emphasis was on the ability to share information, the emphasis in this stage is to build new knowledge from this shared information. As mentioned, this new knowledge is generated through collaborative work, which may involve some extent of integration of the various contribution of existing knowledge. In sum, knowledge co-creation at this stage depends more on group members' ability to understand their contribution the common task and to appraise how these contributions fit with others'.

Challenges: The main challenge at this stage is to enable constructive collaboration channels for both task related matters and group maintenance matters such as negotiations about roles, organization, and procedures. As mentioned, this phase sees the transition between knowledge sharing to greater collaboration in solving the common task. As group members engage in this collaboration and define its terms, chaos or conflict is likely to arise [26, 27]. It is important to avert this transition from degenerating into chaos or conflict that impedes any meaningful progress. In sum, the challenge at this stage is to enable collaboration patterns that translate into a better approach to the common task and visible progress. Such transition requires the ability to ensure that communication remains open and task-oriented. It should empower group members to not only make the most relevant knowledge contributions but to integrate them with their counterparts'.

3.3. Normalization

Activities: At this stage, the main goal is to sustain the group members' performance on the course charted in the transition phase. It is the time when a group makes a final effort to meet expectations and experiences the positive and negative consequences of past choices. The group's accumulated experience can be an asset, launching it to effectively complete its task, or a liability, impeding the completion of the task.

Key drivers: At this point, the members' anticipation of the benefit from the product of the joint work is likely the main driver of their motivation. In this regard, a number of studies have explored the role of socio-psychological factors such as social exchange and reputation in the context of knowledge contributions [28, 29]. They find that existing and anticipated benefits determine to a great extent members' good-will and contributions to collective tasks such as

knowledge co-creation. Like an organization, a group depends on a rather fragile consensus between its members on the distribution of benefits [30]. When change in the group affects members' benefit expectation, it may trigger resistance to contribute to the common goal. In order words, motivation at the normalization phase depends on maintaining expectations of positive benefits from the group work.

As mentioned, the normalization phase entails a crystallization of the norms established during the transition period. The focus is on executing a designated collaboration scheme and course of action to complete the group's objectives. Technology can play an important role in affording opportunities to follow through this execution task. In this regard, it may be used to decompose, reconfigure, and synthesize knowledge, aiding in the coordination and management of dependencies [31]. In addition to relying on motivation and opportunities for a systematic progress, knowledge co-creation in the normalization depends on the group's ability to carry out control and monitoring functions. For example, it may to institute clear agendas and rules for their meetings or specific metrics for their progress.

Challenges: The main challenge in the normalization phase relates to the fact that the group is focused on execution, which requires that it more closely follows a structure for its work patterns. Structure determines "who" and "how" with regards to knowledge contributions and decision-making processes. It helps regulate the information flows and efficiently channels individual inputs into the group aim. In this regard, structure plays a central role in managing interdependencies, which is one of the main challenges of group work. In sum, the challenge at this stage is to maintain compliance with a structure so as to steadily progress towards the group's objectives. This has to happen without alienating any of the contributing parties.

4. Methods

Research Design: For the purpose of this research, we adopted a multiple-case study design, which is particularly suited to investigating complex issues since it contributes to better understanding real-world phenomena in context [32, 33]. Our cases focused on the use of Facebook in the context of cancer prevention and management. As our objective was to develop a process model, a theory-building approach was deemed appropriate [34, 35]. We began with the phases and elements identified in the literature and introduced in the previous section, which we developed further using an analytic induction approach [36, 37, 38]. It enabled

us to develop the model further, building upon our empirical data, through a process of iterative data analysis and conceptual development.

Site selection: Six cases were purposefully selected using a maximum variation sampling strategy [37]. This selection process allowed us to compare and contrast our cases in order to provide some theoretical generalization. The cases varied in terms of disease type (breast or prostate), country (Canada or USA), year founded, size (# of employees) and variety of social media tools used (see Table 1 in Appendix).

Data collection: We relied primarily on the qualitative content analysis of the Facebook pages. We began by collecting the content of the Facebook activities using a standardized template to create "data dossiers." For each organization, a data dossier represents a data collection template that provides a structured summary of the characteristics of the organization and content of the Facebook activities. To complement the data dossiers, we asked our participants to provide the relevant documentation from their organization (e.g. documentation describing the aims and means of the organization, annual reports, newsletters).

The data collection process resulted in several hundred lines of social media content data dossiers. We collected the content of post and comment in the organizations' facebook pages published during the year of 2012.

Data coding, analysis and theory development: Since our data analysis was based on analytic induction [36, 37], we began by building upon the salient takeaways that emerged deductively from the literature, as analytic induction begins with a deductive phase [37, 39]. This deductive phase was followed by an inductive phase, which allowed for new insights to emerge from the data. This also allows for the research to develop on the initial theoretical framework derived from the extant literature. In doing this, novel concepts emerged from the qualitative data, refining our initial conceptualization of the role of social media in knowledge co-creation [37].

We first proceeded with a first round of coding of the social media data dossier; our initial codes were based on the categories derived from the literature. In particular, we paid attention to the three phases identified: initiation, transition and normalization. Facebook pages were read, and coded by two of the researchers (IV, JR), and validated by a third one (LL) to ensure that the resulting coding was not due to spurious associations. In case of disagreement, all three researchers met to attain a consensus on the coding. The analysis of the documentation was used to provide

additional information and to corroborate and validate the information gathered. Afterwards, we proceeded to a round of open coding using standard methods of qualitative thematic analysis. This process of iterative data analysis produced new codes and complemented the coding made during the deductive phase. Then, through axial coding, codes with the same content and meaning were grouped in higher-level categories (e.g. activities, key drivers, challenges). Finally, through selective coding, we linked the resulting categories (e.g. activities) to the main categories (e.g. phases). During the overall process of data coding, as a team, we reviewed and discussed the codification of each data dossier until we had reached a consensus [40]. According to Larsson [41], adopting a consensus approach to resolve discrepancies is a "superior way to correct coding mistakes" (p. 1521).

Finally, we simplified the coding of each posts and comments included in the data dossier using binary yes/no variables of themes (e.g. the content of the post/comment is *sharing testimonies*: yes/no). Finally, we calculated descriptive statistics based on the frequency of the main themes for four months (March, June, September, December 2012). SPSS 9.0 was used to support the analysis.

This process allowed for a progressive in depth understanding of the process of knowledge co-creation enabled through social media use and resulted in our proposed model of social media enabled knowledge co-creation. This model is presented in Figure 1.

5. Results
We report here excerpts of the results of our content analysis of Facebook posts and related comments, which allowed us to identify the type of activities performed during each phase (initiation, transition, normalization) of knowledge co-creation. We report here two specific cases that clearly convey the underlying temporal and interactional dimensions of this knowledge co-creation process. The first case begins with a February 19th post on the Prostate Cancer Foundation (PCF) Facebook page and the second from an April 14th post on the Canadian Breast Cancer Foundation (CBCF) page.

On February 19, the PCF shared a link to a documentary titled "You Are Not Alone," which, according to the post, profiled twelve patients and survivors of prostate cancer: *"PCF is pleased to announce a new documentary, Men's Retreat, featuring 12 patients and survivors who share their experiences living with prostate cancer! The documentary can be viewed in its entirety, or individual chapters."* Here, PCF initiated the process of knowledge co-creation by posting the link, which, as explained in the previous sections, is an instance of sharing knowledge. With

thirty-nine likes and four comments, it shows that the transition phase of knowledge co-creation – through individuals responding to and interacting with other regarding this post – occurred. For example, in this phase, one individual said that he even wished he had known about it earlier since he was a prostate cancer survivor and would have liked to be a part of the documentary itself. Reaching the phase of normalization occurred, as illustrated by the fact that one commenter indicated that she had shared the link on her own personal blog, demonstrating a sense of agreement and perpetuation of knowledge creation and sharing.

A second case is a post by CBCF on their own page on April 14th, which received seventeen likes and six comments, initiated the knowledge sharing process through conversation about the association between lifestyle changes and reducing the risk of cancer: *"Yesterday, we posted about how even the smallest of lifestyle changes can help reduce your risk of breast cancer. Have you been making any new choices lately to live a healthier life? Share them here!"* Once this knowledge sharing began, many individuals involved themselves in the conversation, shifting the process to the transition phase. Here, people responded to this post, in agreement, by indicating the lifestyle changes they had made: through "*organic fruit and veggie delivery,"* drinking "*healthy coffee,"* and eating vegan, and as they described their lifestyle changes they educated others on why these were healthy choices. For example eating vegan, according to one poster, helps mitigate the "*strong and direct link between eating animal products and all types of cancer.*" Another poster brings in a bit of debate; though she agrees that eating healthfully is useful, she mentions that there are broader issues to address: "*It's great to change the things you can control like diet and exercise but until environmental pollution and pesticides, etc. are reduced, fighting cancer will be a losing battle.*" Through the number of likes and the conversation through comments in this phase, we see that the process was moving towards normalization.

These two cases illustrate the knowledge co-creation process, occurring on Facebook pages of two different cancer foundations. They show the three phases of this process: initiating a conversation (in the initiation phase of knowledge co-creation), responding (transition phase) and agreeing (in the normalization phase). While overall, many of the comments did reflect responding and agreeing, we did also observe a bit of debating in the transition phase as well as a bit of educating in the normalization phase. This emerged from the content analysis and can also be seen in the descriptive statistics below.

In addition to the content analysis, we transformed our qualitative data from our full sample of posts and comments into binary variables based on the activities that emerged from the content analysis. From this, we could calculate descriptive statistics about these activities based on the frequency of the main themes. The salient activities for each phase are described in Table 2. As indicated, the most common activities in the initiation phase are posting information to start a conversation, the sharing of testimonies, and requests for information. In the transition phase, the most salient activity involved providing supplemental information. In this phase, we noted that responding and debating were also prevalent activities. Finally, both informing and agreeing brought the knowledge co-creation process to the normalization phase, with informing being especially prevalent.

Table 2:
Salient content of posts and comments
in the three phases

	N (%)
Initiation	
Sharing testimonies	178 (28.2)
Requesting information	66 (10.4)
Starting a conversation	388 (61.4)
Total	*632 (100)*
Transition	
Debating	23 (2.4)
Supplementing	737 (77.4)
Responding	192 (20,2)
Total	*952 (100)*
Normalization	
Agreeing	82 (27.1)
Informing	221 (72.9)
Total	*303 (100)*

Finally, based on the theoretical background and the analysis of the data dossier, we were able to develop a social media enabled knowledge co-creation model. This model is presented in Figure 1 (see Appendix). Our model shows that within three phases of knowledge co-creation through social media there are a set of key activities, key drivers and challenges. In the initiation phase, the main activity is knowledge sharing, which includes sharing testimonies about prevention, tests, diagnoses and the experience with the disease itself. The initiation phase also includes

requesting information or initiating a discussion by calling for a response from the community.

In the transition phase, the key activity is collaboration with an increasing number of participants in the discussion. Collaboration occurs through debating, about such topics as "healthy habits" as described in the case above, supplementing information that other community members may have provided or responding to a question from another member of the community.

In the final phase, normalization, the main activity is reaching consensus on an idea, such as coping mechanisms for the disease. Normalization occurs through agreeing or informing, through providing information that is generally agreed upon.

6. Discussion

Understanding knowledge co-creation is of particular importance in this age where innovation and creativity have become a source of competitive advantage [42, 43] and, in particular, where social media has emerged as an enabler of such co-creation. In the context of health, we see how it becomes possible to build upon collaboration between patients, their families, and healthcare organizations. We have outlined a process model that seeks to identify the main factors in the knowledge co-creation process, enabled through social media in this context. Our analysis of six cancer foundations with social media presence shows that there are three key phases that are the pillars of this process: the initiation phase, the transition phase and the normalization phase. Through our analysis, we have developed a model that describes the key activities in each of these phases.

Our data seem to imply that organizations must play a major role in enabling this social media knowledge co-creation process. Indeed, our results indicate that the role of the organization is that of the boundary spanner, in order to overcome communication and collaboration boundaries. To do this the organization must be the facilitator of the platform that is available for a wide target audience. In our context, this platform (here, Facebook) allows a diverse set of members to participate including patients, family members, and health promoters of all ages and backgrounds, and from across a wide geographic area. It is the role of the organization to facilitate the knowledge co-creation process and ultimately reaching consensus. In this role, they also moderate and promote discussion and ensure the quality of the information on the platform.

Much of the innovation and creativity in organizations comes from knowledge co-creation [1] and would not be possible without interactions among constituents. Literature on teamwork illustrates that team members' ability to uniquely contribute to a task and to integrate their contributions with those of other group members' is key. To co-create knowledge, communities must draw from shared knowledge [16], transactive memory [9] and absorptive capacity [44]. In our cases, we saw that the knowledge co-creation process builds upon collaboration enabled through social media for the six healthcare organizations we examined.

We highlight in this paper that knowledge co-creation depends to a great extent on the social connections of individuals. The importance of these connections relates to group members' need to entertain relationships of intimacy and mutual acceptance between each other. In this regard, the climate resulting from the interpersonal relationships greatly affects the motivation knowledge co-creation at least in the initiation phase [5, 6, 44].

Here, we see the social media has enabled an opportunity for knowledge co-creation, in that such outlets facilitate interactions, discussion and communication. Social media is increasingly growing in its capacity as such outlets. In this regard, it provide features allowing users to quickly receive feedback from other community members, different from those they may be able to interact with face-to-face, and for those who otherwise may be isolated from others suffering from the same condition, i.e. individuals with rare diseases.

Knowledge creation has been mostly studied in relation to a "goodness" of fit between the cognitive, technological and structural factors that enable it at a particular point in time. Yet, its interpersonal dynamic and its temporal aspect of are also important factors. This suggests that the models that deal with knowledge co-creation as static phenomenon are incomplete. Though time is considered in many knowledge co-creation models, no significant effort was made to explicitly theorize about the effects of the group dynamics on these activities. The contribution of this article is to help understand knowledge co-creation through social media by paying attention to these processes.

7. Conclusion

While knowledge co-creation initiatives have earned considerable research attention, this research is so fragmented that there is not yet a clear definition of the process that underlies it. For healthcare organizations, trends towards personalized medicine and patient empowerment bring the occurrence, and therefore relevance, of knowledge co-creation and understanding the process behind it to the forefront. In the new

technology-mediated environment of healthcare, this becomes even more salient.

Given that knowledge co-creation has been shown to incite innovation and create value, healthcare organizations and providers benefit from such a model in that it can provide a foundation for articulating interventions that would facilitate knowledge co-creation. Organizations can use it as a guideline to help enable and maintain the ongoing effectiveness of the knowledge co-creation process.

The theoretical contribution of this paper emphasizes the importance of group dynamics and collaboration in knowledge co-creation. In addition, it highlights the importance of time by identifying the different phases of this process. Our work combines the richness of extant literature with the insight from the reality of the field. As such, we hope that it will stimulate more theoretically grounded research on knowledge co-creation.

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Table 1: Description of the six cases

Cases	Name, country, disease type, year founded	Description
Case #1: BCA	Breast Cancer Action USA Breast Cancer 1990	A grassroots organization for women with breast cancer and their supporters, at the forefront of the breast cancer activist movement. Number of employees: 8
Case #2: BCS	Breast Cancer Society Canada Breast Cancer 1991	A registered, national, not-for-profit, grassroots charitable organization dedicated to raising funds Number of employees: 5
Case #3: BCF	Breast Cancer Foundation Canada Breast Cancer 1986	A leading national volunteer-based organization dedicated to creating a future without breast cancer Number of employees: 197
Case #4: UsT	Us Too International USA Prostate Cancer 1990	A non-profit Cancer Education and Support; international support network Number of employees: 5
Case #5: PCF	Prostate Cancer Foundation USA Prostate Cancer 1993	A very large philanthropic source of support for prostate cancer research to discover better treatments and a cure for prostate cancer. Number of employees: 30
Case #6: PFP	Pints for Prostate USA Prostate Cancer 2008	A not for profit organization aimed at raising awareness and fundraising by making appearances at beer festivals, social networking and pro bono advertising. Number of employees: 2

Figure 1: Social Media Enabled Knowledge Co-Creation Process

	Initiation	Transition	Normalization
Main activities:	Knowledge sharing through, e.g., sharing testimonies, requesting information, and initiating discussion.	Collaboration through, e.g., debating, supplementing information, and responding.	Reaching a consensus through, e.g., agreeing and informing.
Key drivers:	adequate group climate; formal and informal knowledge sharing encounters; shared language and knowledge.	visible progress; Mechanisms for effectively and efficiently eliciting contributions; Capacity to relate the contributions to each other.	Anticipated benefits; Mechanisms for effectively completing the group task; Control and monitoring of the group progress.
Challenges	Overcoming the various boundaries to communication (e.g., cross-functional).	Maintaining constructive negotiation channels.	Ensuring the quality of the knowledge agreed upon.