Categorizing and understanding collaborative innovation approaches

- Laurent SIMON,   Associate Professor, Entrepreneurship and Innovation, HEC Montréal

Co-director Mosaic – Creativity and Innovation Hub – HEC Montréal

- Karl-Emanuel DIONNE, Ph.D. Candidate, HEC Montréal

- Juliana ALVAREZ, Ph.D. Candidate, Aménagement (Design), University of Montréal

- Patrick COHENDET, Full Professor, International Business, HEC Montréal

Co-director Mosaic – Creativity and Innovation Hub – HEC Montréal

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Key messages

A changing innovation environment: Today's organizational and societal environment changes are pushing towards a shift in the locus of innovation that is influencing the way actors work, learn and innovate. Problems that need to be solved are getting more complex, commanding the need for the hybridization of knowledge coming from multiple domains. However, approaching innovation processes in a collaborative manner so that multiple actors and collectives get involved, be it actors from multiple industries or users that also want their voices to be heard, comes with new and complex challenges related to knowledge boundaries between all of these stakeholders. Indeed, they all have different but valid concerns, interests, visions and sometimes conflicting values that need to be bridged together, which make it ever more complex to define and frame problems, and develop solutions that respond to these stakeholders' needs.

That is why we provide this knowledge synthesis about collaborative innovation approaches to support organizational and societal adaptation in this evolving context, in order to facilitate new technologies' adoption. Here are the key messages from our synthesis.

Collaborative innovation approaches:

1. *Have different impacts on knowledge and communities*. Our conceptualization allows to understand and explain the different impacts that collaborative innovation approaches may have on collaborative knowledge development and interdisciplinary learning. Our framework allows a deeper analysis of new approaches and spaces for design, and discusses emerging ways of bridging multiple stakeholders and their specific knowledge. It also takes into account the whole complexity of knowledge sharing between different communities. In this regard, it accounts for experiential knowledge, know-what, know-how, know-who, know-about and multiple ways of knowing. Finally, we tried to provide a richer understanding of the issues and challenges contributing to the design of collaborative learning in collaborative settings and spaces.

2. *Should be designed to benefit all involved stakeholders*. Most open innovation approaches are designed to support the organization's goals – that is mostly increasing efficiency and profits in private owned firms. However, we showed that these approaches could allow a genuine opening of innovation to further develop stakeholders' knowledge and competence to facilitate technology production, implementation and diffusion for collective good.

3. *Can impact the whole value chain of innovation*. Collaborative innovation approaches are more than co-creation devices that should be mobilized in the early phases of innovation. They could be useful much earlier, upstream, in the co-definition of issues but also, later, downstream, as co-innovation devices. These approaches can also play all along the innovation process by allowing to progressively work, rework, and hybridize stakeholders' knowledge bases.

4. *Provide the ability to develop a community and structure an ecosystem for collaborative innovation*. We provided a dynamic view of the potential for community development through the mobilization of different sets of collaborative innovation approaches. These approaches should not be considered in silos, but as a process of actors' engagement in a collective body that supports knowledge and capability development. This vision may allow the development of collectives that bridge multiple knowledge domains and organizations.

Executive Summary

Today's innovation challenges are getting more and more complex, commanding the need for a transformation of how we innovate. These challenges are too complex to be solved through closed expert knowledge perspectives, and demand the involvement of multiple actors, while focusing on the benefits for all. It is at the intersection of multiple sectors and knowledge domains that solutions exist. However, bridging multiple knowledge domains is complex since the multiple actors and collectives that want to be involved in the development of services and products have different interests, knowledge and visions. We observed a proliferation of multiple approaches aiming at opening the innovation processes to all concerned actors, managing their collaboration and focusing on user experience, to answer users' specific needs. These modern users are increasingly time constrained, educated, empowered, informed and are willing to participate in the improvement of the products and services based on their experiential knowledge. Finally, today's innovation problems are complex and often ill-formulated, due to confusing information, involving many stakeholders with conflicting values. Multiple systemic ramifications are thoroughly adding to the inherent complexity of current problems. We then need to move toward new ways of innovating, by doing more than "opening to" the crowd of actors coming from multiple domains. We need to "collaborate with" these multiple actors – be it citizens, firms, public organizations and communities - in a meaningful way to develop innovation capabilities and positive outcomes for all.

We provide a literature review and a framework of analysis that allows to specifically address the socialization challenges related to knowledge and innovation in collaborative approaches. We first present three axis of literature review, followed by a conceptualization of collaborative innovation approaches through these three axes. We finally analyze thoroughly three modern collaborative innovation approaches that are gaining traction in management practices.

The first axis focus on *Opening Innovation to Multiple Stakeholders.* In the 20th century, organizations have been working internally to support innovation development, which consequently pushed firms towards the construction of strong bureaucracies and vertical integration (Chandler, 1977). However, the accessibility and the importance of information, and the increasing role of the hybridization of different knowledge domains that are distributed globally have switched the locus of innovation from inside firms to supra-levels of organizations such as inter-organizational networks, communities and ecosystems (Adner and Kapoor, 2010; Baldwin and von Hippel, 2011; Chesbrough, 2003; O'Mahony and Lakhani, 2011). Now, organizations turn to the principles of open innovation, that is "a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology" (Chesbrough, 2003). However, this approach has not yet reached its full potential in bringing together multiple collectives and pushing towards the hybridization of their knowledge in a collaborative manner. Indeed, the literature on open innovation is still centered on the organization's benefits instead of conceptualizing it as a collaborative approach benefiting all involved stakeholders. In addition, the literature has not provided much theorization of approaches and processes to bridging multiple knowledge communities across their knowledge boundaries to push for a co-innovation agenda that considers the various values, visions and interests of involved stakeholders.

The second axis is about *Moving From "Opening To" towards "Collaborating With".* Today's society is marked by a turning point in the place given to the work and values assigned to it. This new ideology comes with a desire of working collectively as a reaction to individualism; open innovation being one of many examples. However, there are different ways of working collectively. As the integration of different and multiple actors during the development process becomes the norm and earn interest from organizations, collective working dynamics need to be understood and conceptualized. To understand them and apply them correctly, the type of reasoning as well as the modes of construction of action and knowledge of these approaches should be understood and defined. Moreover, these modes of action are based on the recognition of stakeholders and user needs.

The third axis deals with *Learning as a Social Activity and Overcoming Knowledge Boundaries*. Studies on communities have emerged strongly in organizational studies in the past 20 years to better explain how knowledge is constructed, shared and transformed with some authors even suggesting that this theoretical focus is more suited to contemporary organizational challenges (O'Mahony and Lakhani, 2011). In this axis, we first theorize knowledge and learning as a social process that is based on a set of structures - such as norms, languages, values - that are socially constructed. This theorization provides an explanation for issues related to sharing knowledge between actors coming from different knowledge domains that are constructed on different sets of structures and that become boundaries to knowledge sharing. Finally, we discuss the puzzles in understanding knowledge construction across these boundaries and the process of building a community that could potentially integrate multiple knowledge domains and collectives.

Based on the puzzling aspects of this literature, that are related to understanding the collective dynamics of innovation, we built a conceptual framework shedding light on the capacities, impact, challenges and practices related to specific collaborative innovation approaches (or spaces). The model – that is presented in figures 1 and 2 – is built on four axes, each of them working as a continuum.

The first axis deals with *the level of engagement of actors in the collective*. This axis of level of engagement move from the level of *crowd* – that is the lowest level of engagement – to *community* – that is the highest level of engagement. We conceptualize the level of *crowd* as a group of individuals with different characteristics (Arolas, Gonzalez Ladron de Guevara, 2011) that do not necessarily know each other and who are loosely bound together by structural social practices (Wexler, 2011). The *community* level of the continuum is built on the literature on communities of practice. Individuals, through a process of peripheral participation (Lave and Wenger, 1990) become members of the collective. They learn from others, observe others, becoming more than participants, but actual members of a collective that is structured around shared practices and identities, artefacts, a joint enterprise and a mutual engagement.

The second axis introduces a categorization of the level of application of knowledge from *theoretical* to *practical*. In one of the poles (*theoretical*), there is the purely abstract knowledge that refers to actions of thoughts (Wacker, 1998) at the conceptual level. At its opposite, there is the *practical* knowledge that engages individuals in the action of doing, in the application of knowledge in their daily actions.

The third axis presents different levels of stickiness of knowledge in practice based on Carlile (2002) characterization. First, "knowledge is *localized* around particular problems faced in a given practice" (Carlile, 2002). Through specialization, individuals become more efficient in solving a specific set of problems in a given context. The knowledge constructed in these practices may be easily transferable from one similar practice to the other. Second, knowledge is *embedded* in practice. "The word embedded suggests an archeological image as to why knowledge is hard to articulate or real, knowledge accumulated in the experiences (Taylor, 1992) and know-how (Harper, 1987) of individuals engaged in a given practice." Individuals in their daily actions build up experiences that become automatic ways of doing and solving problems. So, these individuals may not be able to explain, share and transfer (Carlile, 2004) their knowledge associated with these automatic ways of doing things since the archeological accumulation of this knowledge in their practice is not easily accessible. Third, knowledge is *invested* in the practice. Through successes in solving problems in their daily actions, with specific methods and know-how, knowledge accumulates in the experiences but also gets solidified because of its valorization in practice. Indeed, knowledge becomes valued for its efficiency and other successful attributes pushing individuals to stick with the knowledge they are used to mobilizing.

The fourth axis – *the integration of knowledge domains* – was implied throughout our literature review and model description. This axis is aligned with the level of stickiness of knowledge in practice which increases in complexity as the number of actors coming from different knowledge domains or practices participate and interact. The fourth axis then covers the *number* of actors (organizations, communities, individuals) with different practices and knowledge domains, from a *homogeneous* to *heterogeneous* collective as well as the level of interaction of these different practices in their activities. The integration of a more heterogeneous collective becomes more challenging in terms of knowledge boundaries. However, in some cases, such as at the level of engagement of the crowd, heterogeneous actors do not have to interact even if multiple knowledge

domains are represented, meaning that knowledge boundaries become less challenging in managing the collaborative innovation process.

This modelization of the collaborative spaces and their relations to knowledge and engagement with collectives shed light on boundary practices that are facilitated and challenges that occur in these spaces. The visual representation of our framework (figure 2) draws 12 cubes that represent the challenges and practices related to the collaborative innovation approaches mobilized. We present six practices based on Carlile 3-T framework (Carlile, 2004) – *transferring, translating, transforming* – upon which we added three practices - *co-transferring, co-translating and co-transforming* - --where actors mobilize these practices in an interactive and collaborative manner. *Transferring* knowledge occurs between actors sharing localized practices that support the process of sharing knowledge between them. For transferring to occur without complications, stable conditions must exist, such as a common lexicon that represents clearly and thoroughly the knowledge that needs to be transferred. *Translating* is needed when new actors, coming from different practices, do not share the same norms, values, language and visions, creating a sort of fuzziness around the interpretations of situations. In this context, different actors have different interpretations about the same issues, challenges, realities which makes it more complex to share knowledge between them. The process of *transforming* aims at dealing with the different interests of actors. It recognizes that actors are invested in their practices, and so they may face consequences when they need to learn and transform their knowledge. Indeed, new knowledge in one domain may have a negative impact on other actors coming from different knowledge domains. Mirroring these three practices in a "co" perspective means that we keep the same conceptualization of the three practices we just presented, but suggest that these practices may occur in partnership – that is in a collective and interactive relationship rather than in a transmitter-receptor process.

We then present the approaches of *crowdsourcing*, *hackathon,* and *maker/hacker space* to show how our framework allows to understand and conceptualize specific approaches. Actors that are willing to mobilize and/or develop collaborative innovation approaches then can deeply understand what is vested in these approaches, theorize the potential of each of the approach and select what approaches to promote for their own purposes and innovation challenges.

We conclude by presenting how innovation has changed towards collaborative dynamics. Far from being linear and simple, innovation engages complex and interdisciplinary realities with different scopes and various scales. The increasing importance and reliance on collaboration in innovation practices and research shed light on the co-construction issues where many actors with various and sometimes diverging interests and values contribute their knowledge, resources and experiences in the development of common projects. Consequently, it is important to emphasize the relational and dynamic conceptualization of these collaborative innovation approaches. Indeed, considering the various challenges related to knowledge construction and various innovation stages, these approaches are not self-sufficient in regard to capability development and innovative outcomes. These collaborative approaches should be connected and developed relationaly with the contextual challenges that actors are facing in regard to knowledge construction. Collaborative innovation approaches also provide means to opening the evaluation and valuation of innovation across the whole value chain of innovation. Taken together, the benefits of collaborative innovation present major improvements in regard to creating and supporting positive outcomes for organizations, communities and citizens.

However, collective innovation does raise issues related to ownership. It raises questions on how to generate and manage outputs that are co-produced by organizations and the public as well as to whom the Intellectual Property (IP) belongs. Even if we don't address specifically these issues, we provide a conceptualization allowing the understanding of the negotiations, translations and transformations of each involved actor's goals, interests and visions. Our analysis then provides a socialization perspective on these issues and highlights practices that may support the management of these key challenges to innovation development. Finally, we did not fully address the topic of technological platforms supporting collaboration. These platforms do play an increasingly important role in collaborating across knowledge boundaries. However, we believe that the theoretical implications of our conceptualization could support the construction of more contextualized technological platforms that answer today's innovation challenges.