Perspective: Leveraging Open Innovation through Paradox

In search of fresh ideas, firms increasingly engage with external contributors in open innovation collaborations. However, research has found that such collaborations frequently fail, and has pointed to conflicting demands of control and openness. On the one hand, firms want controlled and selective participation, clarity of purpose, and a choice of ideas based on their own current capacity and value appropriation strategies. On the other, their external contributors tend to want open and unfettered participation, the creative potential of the idea *per se*, and unrestricted knowledge sharing. This article proposes to shift the conceptual frame from looking at the tensions between control and openness as problems to looking at them as synergies. Drawing on the literature of open innovation and organizational paradox, this article contributes a novel perspective on open innovation that suggests how firms can leverage open innovation collaborations through paradox by shifting between practices based on differentiation and integration.

Keywords: Open innovation, control, openness, conflicting demands, tensions, paradox, integration, differentiation

Practitioner Points:

- Firms can better benefit from the full set of options offered by open innovation when acknowledging tensions between control and openness as beneficial paradoxes.
- Through taking a comprehensive approach to attracting, incorporating, and commercializing external contributions, firms can best understand the dynamics of open innovation paradoxes.
- Firms can manage paradoxes by combining practices of differentiation and integration.

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Introduction

Open innovation is a phenomenon that highlights a shift in innovation from a closed model relying primarily on internal R&D to an open model emphasizing external collaboration and purposive inflows and outflows of knowledge (Chesbrough, 2003; 2006a; Dahlander & Gann, 2010). Open innovation collaborations enable firms to expand their markets, attracting and incorporating external expertise into their own innovation activities as well as commercializing knowledge that they would not have otherwise (Tucci, Chesbrough, Piller & West, 2016). When firms seek to identify their customers' needs and preferences, external contributors can define problems and/or contribute solutions (Bogers et al., 2017). This article uses the perspective of the firm to investigate open innovation collaborations with external contributors, be they individuals (users, creative individuals, professionals) or groups (communities, consortia, crowds) (West, 2014).

Despite the growing popularity of open innovation collaborations, research is divided on whether firms can benefit from them. Some studies have suggested that open innovation collaborations are the next big opportunity for firms to enhance their creativity and fuel innovation (e.g., West & Lakhani, 2008). The argument is that external contributors hold critical, yet tacit, knowledge that a firm can source through participation, interaction, and learning with them (e.g., Dahlander & Wallin, 2006). Sourcing this external knowledge enables firms to create new combinations of knowledge, unlocking significant commercial potential (Dahlander & Frederiksen, 2012; Franke, von Hippel & Schreier, 2006). However, other studies have found that open innovation collaborations can lead to undesirable

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outcomes such as information overload (Koput, 1997; Piezunka & Dahlander, 2015), wasteful ideas (Jarvenpaa & Lang, 2011), the Not-Invented-Here (NIH) syndrome (Antons & Piller, 2015), conflicts over ownership of ideas (Miozzo, Desyllas, Lee, & Miles, 2014), and leakage of critical knowledge to competitors (Henkel, Baldwin, & Shih, 2013; Veer, Lorentz & Blind, 2016).

Accordingly, open innovation scholars have continued to struggle to find effective ways for firms to manage conflicting demands of control of key resources and openness to knowledge sharing (Dahlander & Gann, 2010; Gilbert & Sutherland, 2013; Jarvenpaa & Lang, 2011). Too much control may negatively affect the motivation and creativity of external contributors. Too much openness can put at risk the efficiency and value capture that firms seek from open innovation collaborations (Arora et al., 2016; Raasch, Herstatt, & Lock, 2008; Wang et al., 2017). This article cross-fertilizes open innovation research and paradox concepts used in organization theory (Lewis, 2000; Luhmann, 1993), and develops a novel perspective on leveraging open innovation through paradox.

This article makes several contributions. First, it responds to calls (e.g., Dahlander & Gann, 2010; Lauritzen, 2017; O'Mahony & Lakhani, 2011) for more research on the complementarities and linkages between the opposing poles of control and openness. Our approach shows that the two poles are surprisingly interdependent, and both need to be part of any solution (Lüscher & Lewis, 2008; Stoltzfus, Stohl, & Seibold, 2011). Second, it responds to calls (Faraj, Jarvenpaa, & Majchrzak, 2011; Randhawa, Wilden, & Hohberger, 2016; Stanko et al., 2017; West & Lakhani, 2008), on the one hand, to develop a more comprehensive understanding of open innovation by drawing on other literature streams, and,

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on the other hand, to advance theoretical concepts that might improve the success rates of open innovation collaborations. We propose a comprehensive approach to explaining control-openness tensions throughout the open innovation process, and argue that the notion of paradox shows how synergies can arise from the conflicting demands of control and openness when both control and openness are treated as necessary (Lauritzen, 2017; Lauritzen, Salomo, & La Cour, 2013). Thereby, this article shifts the conceptual framework. It is less useful to see control-openness tensions as problematic dilemmas than it is to see them as productive paradoxes. In addition, we show how differentiation and integration practices can help firms navigate paradoxes across the open innovation process. Finally, we suggest further directions for research into open and collaborative innovation.

The remainder of the article proceeds as follows. First, it identifies three key themes in open innovation collaborations: (1) attracting contributions, (2) incorporating contributions generated through open innovation collaborations into firm innovation activities, and (3) commercializing respective knowledge. Second, it discusses control-openness tensions across these three themes. Third, it introduces paradox as a way to leverage open innovation. Fourth, it illustrates the concepts of differentiation and integration in each theme of open innovation collaborations. Finally, it discusses implications for open innovation and future research directions.

Open innovation collaborations: attracting, incorporating, and commercializing

To deepen understandings of open innovation collaborations, from ideation to commercialization, we derive three key themes from open innovation literature. These themes

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are interdependent and highlight the lack of sharply-defined boundaries within a fluid process such as open innovation. First, the theme of *attracting* refers to engaging contributors in open innovation efforts by providing incentives (see Lerner & Tirole, 2002; Lilien, Morrison, Searls, Sonnack, & Hippel, 2002; West & O'Mahony, 2008). Second, the theme of *incorporating* involves integrating contributions generated through open innovation collaborations into the focal firm's innovation activities by directing and coordinating those contributions (see Dahlander & Piezunka, 2014; Foss et al., 2011; Lakemond, Bengtsson, Laursen & Tell, 2016; Markus, 2007). Third, the theme of *commercializing* means value capture and the appropriation of knowledge created through open innovation collaborations (see Almirall & Casadesus-Masanell, 2010; Belderbos, Cassiman, Faems & Leten, 2014; Wang et al., 2017; Laursen & Salter, 2014).

When it wants to develop a new product or modify an existing one, a firm may seek to *attract* external contributors in order to expand and renew their knowledge base. One strand of research on open innovation and user innovation has investigated how to invite specific lead users into firms (Lilien et al., 2002; von Hippel, 1986) and how to motivate external contributors to freely reveal and share their ideas (Hertel, Niedner, & Herrmann, 2003; Krogh, Haefliger, Spaeth, & Wallin, 2012; Lerner & Tirole, 2002). Motivation can include (1) intrinsic motivation, such as altruism and fun, (2) internalized extrinsic motivation, such as reputation and learning, and (3) purely extrinsic motivation, including career benefits and payment (Krogh et al., 2012). Alexy and Leitner (2011) found that extrinsic motivation, such as monetary rewards, has a positive effect on external contributors' total motivation. However, other studies have argued that extrinsic motivation might push out contributors'

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free sharing of knowledge (e.g., Osterloh & Rota, 2007), and that the focal firm's control can discourage and decrease external collaboration (e.g., Shah, 2006; Wang et al., 2017).

The firm can also provide a platform or interface for collaborative innovation, which can enable external contributors to experiment and innovate on their own. In this way, open innovation collaborations between the firm and external contributors take the form of structured interactions. Examples include physical settings, such as when firms organize lead user workshops (Herstatt & von Hippel, 1992), and online settings, such as when firms host user communities (Jensen, Hienerth, & Lettl, 2014; Jeppesen & Frederiksen, 2006) and facilitate innovation contests (Adamczyk, Bullinger & Möslein, 2012; Terwiesch & Xu, 2008).

Looking at firms' structured interactions with external contributors, a second strand of research has used absorptive capacity literature (Cohen & Levinthal, 1990) to discuss how firms can *incorporate* external knowledge into internal capabilities and resources (Dahlander & Piezunka, 2014; Foss et al., 2011; Lakemond et al., 2016). This strand of research has highlighted issues with sourcing users' or consumers' knowledge owing to its tacit nature, i.e., the "stickiness" of user or consumer knowledge (von Hippel, 1994), as well as issues with employees' reluctance to accept the value of outsiders' contributions, i.e., the NIH syndrome (Antons & Piller, 2015). To address these issues, this strand of research has discussed directing and coordinating contributors through rules (Markus, 2007), user-friendly design tools (von Hippel & Katz, 2002), frequent communication (Srikanth & Puranam, 2011), training (Salter, Ter Wal, Criscuolo & Alexy, 2014), and structure, as well as leadership styles (O'Mahony & Ferraro, 2007).

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Finally, a third strand of research has investigated how firms can *commercialize* jointly-generated knowledge and capture the returns from open innovation collaborations. This topic raises issues of appropriability and knowledge disclosure (Belderbos et al., 2014; Holgersson, Granstrand & Bogers, 2018). While open innovation collaborations seem generally beneficial for a firm's innovative activities (Laursen & Salter, 2006), opening up the innovation process may also expose the firm to value appropriation challenges and imitation threats (Cassiman & Veugelers, 2002; Foege, Piening, & Salge, 2017; Henkel et al., 2013). Accordingly, research has debated whether formal appropriation mechanisms (in contrast to free revealing) encourage or hinder open innovation (Alexy, George, & Salter, 2013; Laursen & Salter, 2014; Zobel et al., 2016). The next section shows how studies have explored control and openness across the themes of attracting, incorporating, and commercializing in open innovation collaborations.

Control-openness tensions in open innovation collaborations

Though firms increasingly involve external contributors in their innovation efforts, they often find it challenging to navigate the conflicting demands of controlling key resources and fostering open participation and knowledge sharing (Dahlander & Gann, 2010). For example, Wang et al. (2017) found that a firm's control of resources through patenting may discourage external contributors from sharing knowledge with the firm. Similarly, open and/or autonomous innovation communities that emerge from users on a voluntary basis appear more successful at attracting new members than "gated" or firm-hosted innovation communities with limited access to the development process and a greater emphasis on firm

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control (Dahlander & Magnusson, 2005; Shah, 2006; West & O'Mahony, 2008). In addition, studies have found that less restrictive licenses tend to attract more external contributions to an open innovation collaboration (Fershtman & Gandal, 2007; Stewart et al, 2006). Moreover, if external contributors feel that the innovation process is non-transparent, or that they have little influence on it, they may claim unfair treatment, which can damage the firm's reputation (Lauritzen, 2017). However, encouraging openness may lead to an excessive number of contributions, which increases the risk of missing the ideas that have the most potential (Dahlander & Magnusson, 2005; Jarvenpaa & Lang, 2011; Piezunka & Dahlander, 2015). Additionally, making organizational resources available to outsiders makes intellectual property (IP) difficult to protect and exploit (Cassiman & Veugelers, 2002; Henkel et al., 2013).

Across the three key themes of open innovation collaborations, Table 1 shows that the demands of control and openness are in conflict, and hence are difficult to satisfy at the same time.

INSERT TABLE 1 AROUND HERE

Open innovation studies have typically applied a dilemmatic either/or perspective on control-openness tensions, implying that those tensions should be resolved by weighing the costs and benefits of each choice and deciding which one is most advantageous (cf., de Wit, 2017). From a dilemmatic perspective, control-openness tensions pose problems to the innovation process, because they refer to an impossible choice: you are damned if you do (emphasize control, for example), and damned if you don't. Table 1 shows that when firms address control versus openness as a dilemma, they face innovation barriers such as

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ineffective collaboration (due to limited and discouraged contributors), claims of unfair treatment, information overload, wasteful ideas, NIH syndrome, and leakage of firm IP to competitors. All these can lead to reduced creativity and mediocre products. The next section introduces *open innovation paradox* as a more beneficial perspective on open innovation.

Open innovation paradox: A new perspective on open innovation

Although most open innovation studies have applied a dilemmatic either/or approach to control-openness tensions, as illustrated in Table 1, recent studies (e.g., Dahlander & Gann, 2010; Faraj, Jarvenpaa, & Majchrzak, 2011; Henkel, Baldwin, & Shih, 2013; Jarvenpaa & Lang, 2011) have begun to recognize that both control and openness are legitimate and vital for innovation to flourish. This line of thinking resonates well with notions of paradox (Lewis, 2000; Poole & Van De Ven, 1989; Schad, Lewis, Raisch, & Smith, 2016). Paradox thinking offers a radically different perspective on the dynamics and implications of tensions. Although paradoxes incorporate contradictory elements, they can be more productive than mere contradictions because of their self-referential character: each pole of the paradox enables and reinforces the opposing pole (Lewis, 2000). Thus, among scholars who have applied the concept of paradox to tensions between opposing poles, such tensions not only can coexist over time but can also be mutually reinforcing and complementary, thereby enabling synergies that encompass the simultaneous presence of contradictory elements (Lauritzen, 2017; Schad et al., 2016; Smith & Lewis, 2011). Paradoxes cannot be avoided or resolved, but will always reappear (Smith, 2014; Smith & Lewis, 2011). Due to their persistence, paradoxes force firms to constantly rethink their managerial coping

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mechanisms—which can, however, be productive, in the sense that it can fuel new thinking and innovation (Teubner, 2006). Krippendorff (1984, p. 51) said it this way: "paradoxes paralyze an observer and may lead either to a collapse of the construction of his or her world, or to a growth in complexity in his or her representation of this world." Hence, the core premise of paradox is not problem solving but navigating coexistence (Janssens & Steyaert, 1999; Lauritzen, 2017; Lauritzen et al., 2013).

In the context of open innovation collaborations with external contributors, when control and openness seem like a zero-sum game, yet firms realize they need to employ both, the control-openness dilemma can transform into a paradox (Stoltzfus et al., 2011). Thus, we propose:

Proposition 1: *Open innovation paradoxes become apparent when firms perceive control and openness as conflicting yet equally important in the key themes of attracting, incorporating, and commercializing.*

In contrast to an either/or approach (as depicted in Table 1), paradox thinking implies dealing with both poles—in this case, control and openness—simultaneously. When firms recognize control-openness tensions as paradoxes, they are equipped to face the following three thematic issues: (1) How can we restrict access to the innovation process AND provide unfettered opportunities for contribution?, (2) How can we clearly define the problem to be solved (drawing on current knowledge) AND encourage "out-of-the-box" thinking

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(experimenting with new knowledge)?, and (3) How can we protect AND share knowledge and jointly developed intellectual property?

Extending recent work on paradox in open innovation (e.g., Arora, Athreye & Huang, 2016; Bogers, 2011; Laursen & Salter, 2014), this article explains how open innovation paradoxes unfold in and across the key themes, i.e., attracting, incorporating, and commercializing, and can be managed in practice.

How can firms navigate open innovation paradoxes?

As a preliminary step in navigating paradoxes, scholars have used the notion of *accepting* to emphasize the importance of recognizing opposing poles as both separate and interdependent (e.g., Lewis, 2000; Poole & Van de Ven, 1989; Smith & Lewis, 2011). According to these studies, accepting enables actors to live and thrive with tensions, and develop a more sophisticated understanding of coexistence that values synergies and opposing elements (Lewis, 2000; Smith, 2014; Smith & Lewis, 2011; Smith & Tushman, 2005). Accepting enables actors to "actively resist the temptation to achieve intellectually driven closure" of tensions (Beech et al., 2004, p. 1323), thereby engaging with or embracing the paradox (Lewis, 2000). However, research has also found that embracing paradox requires a combination of practices which reflect both differentiation and integration approaches. Paradox scholars (e.g., Andriopoulos & Lewis, 2009; Jarzabkowski, Le, & Van de Ven, 2013; Lewis & Andriopoulos, 2013) have emphasized that differentiation and integration complement each other to the extent that when either one is employed without the other, it becomes a liability to the process. Table 2 illustrates differentiation and integration practices, including their implications for the innovation process.

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Paradox literature has shown how paradoxical approaches deal with tensions by assigning opposing poles to different temporal, spatial, or structural areas; this is called differentiation (Adler, Goldoftas, & Levine, 1999; Poole & Van De Ven, 1989; Smith & Tushman, 2005). In a similar vein, open innovation studies have described how the tension between control and openness can be dealt with by separating control and openness efforts across hierarchical positions (Rolandsson, Bergquist, & Ljungberg, 2011), staff (Boudreau & Lakhani, 2009), software modules (Henkel et al., 2013), information narratives, and temporary roles enacted by employees and/or external contributors in open innovation collaborations (Faraj et al., 2011; Lüttgens et al., 2014; Salomo & Gemunden, 2010). For example, Faraj and colleagues (2011) showed how a controlled "front" narrative can be used in online communities to inform both the public and the community of the general state and performance of the community, such as by sharing with the reader the work being developed by the community and the general terms of membership (Faraj et al., 2011: 1232). While such a front narrative can provide convergence and direct the efforts of external contributors, an open "back" narrative can take place away from the public and display chaos rather than order. The back narrative may take place in more private areas such as on a comment page, on private forums, and in private messages, allowing for disagreement, incomplete convergence, and ambiguity.

Consequently, differentiation allows competing frameworks to enact distinct behaviors simultaneously by separating conflicting efforts and tasks (in the present example, those related to control and openness) into separate information narratives, technical modules, formal positions, and temporary roles. In addition, keeping opposing poles separate

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strengthens focus and reduces the risk of confusion because it upholds a strict distinction between control and openness. Thereby, differentiation honors the distinct benefits of each, and prevents conflictual interactions (Jay, 2013; Smith & Tushman, 2005). Nevertheless, as differentiation does still present the two poles as opposing and irreconcilable by requiring separation in time, space, and structure, an emphasis on differentiation can limit potential synergies by fostering isolation, encouraging some preferred innovation mode, and restricting coordination between varied efforts (Adler et al., 1999; Beech et al., 2004; Jay, 2013; Poole & Van De Ven, 1989; Smith & Tushman, 2005). See Table 2.

As the complement of differentiation, integration appears to provide an antidote to its limitations, as integration recognizes the mutually reinforcing and complementary effects of the opposing poles by employing them simultaneously in time and space. Lüscher and Lewis (2008) facilitated integration in the context of their action research at the Danish Lego Company. In this respect, they helped managers read the complexity of tensions arising from a major organizational change and articulate conflicting demands, which were complicated by ambiguous communications and contradictory emotions. Open innovation studies have also shown how external assistance, such as an innovation intermediary (Howells, 2006) can help a client firm acknowledge paradoxes by exposing and mediating between conflicting demands arising from open innovation collaborations (e.g., Lauritzen, 2017; Sieg, Wallin & von Krogh, 2010).

Paradox scholars have described how integrative approaches actively deal with tensions by reconciling the two poles—that is, creating a novel synthesis (Jay, 2013; Poole & Van de Ven, 1989). This is also termed "transcending" (Seo, Putnam, & Bartunek, 2004; Stoltzfus,

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Stohl, & Seibold, 2011) or "accommodating the paradox" (Jarzabkowski, Le, & Van de Ven, 2013; Smith, 2014). These studies have shown how managers can introduce new language, "linguistic hooks," (Jay, 2013, p. 155) that reframe paradoxical elements as interdependencies rather than mere contradictions. Likewise, open innovation studies have found that firms can combine "degrees" of internal and external sources of innovation (Dahlander & Gann, 2010), and balance conflicting demands with respect to the particular organizational context and goals (Jarvenpaa & Lang, 2011).

Given the complexity and potential confusion arising from the coexistence of conflicting demands, though, seeking integrative solutions may lead to inertia or "stuckness" in decision making—a state in which actors reflect on their situation and realize that anything they do will have counterproductive effects (Jay, 2013). As integration approaches seek to balance tensions through compromise, such as by positioning the opposite poles as extremes on a continuum and pushing for an appropriate balance (e.g., Dahlander & Gann, 2010; Gilbert & Sutherland, 2013), they tend to dilute the intensity of each pole. For example, Lauritzen (2017) found that as an external consultancy mediated the opposing interests of external contributors and its client firms in the innovation process, firm employees acted with less discipline and external contributors acted less passionately and creatively. As a result, the firm did not leverage the creative potential of the paradox, as its use of integration reduced the distinct benefits of control and openness. Thus, integration approaches fail to leverage the advantages of paradoxical logic (Clegg, da Cunha, & e Cunha, 2002; Lewis, 2000), which points to the need for combining integration with differentiation in order to overcome individual limitations of each (see Table 2). While differentiation honors control and

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openness as equally important yet distinct and fully separate elements, integration emphasizes their complementarities through blending their opposite aspects.

Extending previous paradox studies that argue for combining differentiation and integration (e.g., Jarzabkowski et al., 2013; Lewis & Andriopoulos, 2013), we posit that a combination of differentiation and integration is needed in the open innovation process to treat control and openness as fully distinct and separate, while at the same time as fully complementary. Thereby, we propose that when firms combine differentiation and integration, they can benefit from paradoxical thinking by harnessing the distinct benefits of control and openness, while also supporting their mutually reinforcing aspects. We argue that engaging with paradox requires to combine (1) distinct control efforts, (2) distinct openness efforts, and (3) integrative efforts. Thus, we propose:

Proposition 2: *If firms engage with open innovation paradoxes, they will combine and use both differentiation and integration by distributing distinct control efforts, distinct openness efforts, and integrative efforts within and across the key themes of attracting, incorporating, and commercializing.*

Figure 1 shows *accepting* as the preliminary mindset for applying paradox thinking. In particular, it illustrates how firms must combine and use both differentiation and integration to benefit from the potential of open innovation paradoxes.

INSERT FIGURE 1 AROUND HERE

Leveraging open innovation through paradox: illustrations

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This section provides examples of differentiation and integration approaches in each theme of open innovation collaborations.[1] The examples illustrate how firms can approach control-openness tensions as productive paradoxes rather than problematic dilemmas by using differentiation and integration, thereby, leveraging the potential of open innovation.

When *attracting* contributors, firms should seek both to restrict external access to the innovation process AND to incentivize participation in open innovation collaborations. A firm can use differentiation to ensure control and efficiency in one subunit by attracting contributors of a specific profile (e.g., professionals) through the aid of purely extrinsic motivation such as career benefits and payment AND promote openness-related values about participation in another subunit by inviting any creative individual who is motivated by altruism and fun to solve the problem. Through distributing competing forms of motivation, and attracting different contributor profiles, such as professionals and hobbyists, in different subgroups, in the firm and/or online, the firm can enact and focus distinct contributor behaviors simultaneously. For example, professionals may appear more appropriate for more well defined problems while hobbyists tend to show a higher level of intrinsic motivation and appear more engaged in participating in activities that involve experimentation and out-of-the-box thinking (Jeppesen & Frederiksen, 2006). To avoid the liability of sole differentiation, the firm can add integrative efforts in a third subunit, where a mix of professionals and hobbyists can experiment together on a given problem (cf., Lauritzen et al., 2013).

When *incorporating* external contributions into firm capabilities and resources, firms can combine levels of efficiency and creativity in the innovation process through integration

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approaches, such as addressing control-openness demands in messages crafted with a dual meaning (Argyris, 1988; Andriopoulos & Lewis, 2009). For example, when communicating the problem to be solved, firms can draw attention to firm resources and current constraints and, at the same time, encourage experimentation and out-of-the-box thinking (e.g., Lauritzen, 2017). Thereby, firms can benefit from combining creativity with efficiency–encouraging both novelty and alignment with firm structures (cf., Jarvenpaa & Lang, 2011). Yet integration practices might also lead to stuckness in decision making (Jay, 2013), such as leaving contributors puzzled about whether to emphasize the novelty of their contributions or ensure their applicability and alignment with current firm processes and channels in order to receive the desired rewards and acknowledgement for their efforts.

As the supplement to integration, we again point towards *differentiation* and splitting control and openness efforts in time, such as through guided role play (cf., Lewis & Andriopoulos, 2013). Firms can use guided role play among contributors to, first, gain insight into market needs and product constraints (thus ensuring efficient control and direction of solutions), then pull away from the constraints to explore new domains (directing attention towards openness and experimentation), and, finally, return to evaluate winning ideas against project constraints. Through guided role play, firms can thus (1) temporally separate (a) routine-based tasks, which hone skills, and (b) more explorative activities, and (2) stretch capabilities so that individuals switch sequentially between emphasizing (a) control and (b) openness while rotating across project phases.

While differentiation can thereby help a firm (1) maintain the distinction between control and openness and (2) emphasize focus on their distinct aspects, the firm may also experience

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limited coordination between these varied efforts, such as lack of alignment between explorative and exploitative project phases. As a result, the firm may fail to take notice of the creative potential of external perspectives and input. For example, the firm may emphasize current constraints and existing product knowledge and ignore novel product-design requests from external participants (Olson & Bakke, 2001; von Hippel, 1986). Moreover, conflicts may arise between firm employees and external contributors (Lauritzen, 2017; Antons & Piller, 2015).

When this happens, firms can again seek the benefits of integration, such as using external assistance to mediate between conflicting demands (Luscher & Lewis, 2008; Zogaj, Bretschneider, & Leimeister, 2014) and arranging socialization activities between employees and external contributors, such as events, dinners, and workshops. An innovation intermediary (Howells, 2006; Sieg et al., 2010), such as an external consultancy, can help firms read the complexity of conflicting demands between creativity and efficiency and mediate contradictory emotions and multiple meanings among the firm and external contributors, such as "translating" creative ideas into firm jargon and aligning them with known constraints, thereby aiding coordination between the collaborating partners (cf., Lauritzen, 2017). In addition, socialization activities can support coordination, counteract us-them distinctions, and help actors think and act in the context of conflicting values and goals by fostering shared values and cultivating a shared identity (Bartlett & Ghoshal, 1997; Beech et al., 2004; Lewis & Andriopoulos, 2013).

Finally, in relation to *commercializing*, this article has argued that firms should both share and protect their knowledge, so that they both create and appropriate value. As shown by

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Henkel et al. (2013), differentiation practices, such as IP modularity, can enable firms to divide their IP across two separate (software) modules: one with a code that is highly protected and under firm control, and another that is relatively unprotected (e.g., open source). Thus, from a technical perspective, modularity allows tasks to be worked on in parallel. Firms can prevent crucial knowledge from leaking to competitors, while, at the same time, benefit from the exchange of other knowledge and from the creation of value—recognizing that "controlling too much of the system's IP is problematic if it deters innovation by others. But controlling too little—or the wrong parts—may prevent the focal firm from capturing value or expose it to the risk of hold-up" (Henkel et al., 2013, p. 66). Still, distinguishing between firm employees who have full access and external contributors who have restricted access to firm knowledge may create an emotional divide between the two parties with external contributors feeling excluded from the innovation process. If external contributors perceive such a divide, a polarization between them and the firm may arise, preventing innovation progress, because each party becomes fixated on its own beliefs and tasks, and might even block the other party from attaining its goals (Jarzabkowski et al., 2013; Lewis & Smith, 2014; Seo, Putnam, & Bartunek, 2004). Thereby, a firm and external contributors may become reluctant to engage in compromise about ownership of ideas and IP. A firm may assert its need to make a profit despite evidence that this would oppose the needs of its external contributors. This stance can trigger those contributors' frustrations, resulting in problems such as so-called "shitstorms" that they initiate online in response to perceived unfair treatment (Lauritzen, 2017).

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To avoid such situations, we argue that firms should complement their differentiation approaches with integration. For example, an innovation intermediary can mediate between the firm and external contributors, e.g., by finding language to frame the collaboration in terms of common goals, such as improved products and user experience. Such language—also known as linguistic hooks—can raise awareness of interdependencies and mutual interests between the firm and external contributors, as opposed to competing interests relating to formal procedures and ownership (cf., Jay, 2013). As a supplement to IP modularity, selective revealing (Alexy et al., 2013) can work as an integrative practice by encouraging an "appropriate" mix between knowledge sharing and protecting. Selective revealing describes the balancing act of partially disclosing relevant knowledge (i.e., enough to trigger interest and a basis for collaboration), while maintaining some of it as a secret (i.e., critical knowledge that is needed to fully understand the solution and/or product) (Alexy et al., 2013; Henkel, 2006; Henkel et al., 2014).

Figure 2 illustrates the implications for open innovation when firms use differentiation and integration in isolation, and highlights the synergies that may arise from their combination.

INSERT FIGURE 2 AROUND HERE

Building on this figure, we posit that when its organizational culture is mature enough to foster a more holistic understanding of tensions as paradoxes, a firm can leverage the innovation potential of open innovation collaborations by fueling innovation synergies, as also depicted in Table 2.

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Proposition 3: *When firms engage with open innovation paradoxes, they can fuel synergies through an improved ability to read complexity, to coordinate between varied efforts, to cultivate shared values/goals/identity, while also maintaining emphasis on distinct behaviors and efforts that allow for refinement of skills and focus in decision-making.*

Implications and future research directions

This article provides a starting point for future research in open and collaborative innovation to revisit the management of tensions that arise from the conflicting demands of control and openness in open innovation collaborations. Cross-fertilizing open innovation research and paradox literature, this article introduces a novel perspective on supporting open innovation through paradox, which we believe can improve the success rates of these collaborations. In quest of appropriate linkages between the opposing poles of control and openness (cf., Dahlander & Gann, 2010; O'Mahony & Lakhani, 2011), we explain how the two poles are connected and how both need to be part of the solution. This section discusses the implications of this conceptual work and point to future research directions.

Although open innovation research has provided valuable knowledge about how to *attract* contributors to open innovation efforts or how to efficiently *incorporate* contributors into firms' innovation activities, both these themes of attracting and incorporating as well as the main actors, i.e., firms and external contributors, have usually been studied in isolation, and their interactions have largely remained unexplored (Hienerth, Lettl, & Keinz, 2014; Piezunka & Dahlander, In Press: 2019). In addition, we have little insight into what happens inside the firm that helps or hurts its ability to exploit external contributions and leverage

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open innovation (Tucci, Chesbrough, Piller & West, 2016). To fill these gaps and advance theoretical concepts in open innovation research, scholars have called for multilevel approaches (e.g., Bogers et al., 2017; Stanko et al., 2017). In response, this article builds upon the limited body of research that has stressed the dynamic and synergistic nature of open innovation collaborations (e.g., Faraj et al., 2011; Jarvenpaa & Lang, 2011; Lauritzen, 2017), and highlights relational aspects between firms and external contributors. While our perspective has the firm as its focal level of analysis, our paradox perspective draws attention to the multilevel nature of conflicting control-openness demands that involves interdependencies between the main actors and the key themes of open innovation (i.e., attracting, incorporating and commercializing). For example, a firm level decision to encourage openness in the ideation part of the innovation process is likely to raise challenges for individual employees, which might require new strategies to avoid detrimental behaviors, such as the NIH syndrome (Antons & Piller, 2015). Likewise, a firm's decision to emphasize control when deciding which ideas to reject might decrease contributors' engagement and stop new contributors from interacting with that firm (Piezunka & Dahlander, In Press: 2019).

Contributing to discussions about the role of differentiation and integration in paradox management (e.g., Andriopoulos & Lewis, 2013; Jarzabkowski et al., 2013; Waldman & Bowen, 2016), this article proposes that if firms engage with open innovation paradoxes, they will combine distinct control efforts and distinct openness efforts with integrative efforts within and across the key themes of attracting, incorporating, and commercializing. Accordingly, this article posits that firms can manage open innovation paradoxes by treating

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control-openness demands equally as *fully conflicting* (i.e., maintaining their clear distinction) and *fully complementary* (i.e., combining and blending their opposite aspects). Thereby, this article argues that, more than "both/and" thinking, paradox implies an *"either/and"* logic, where "either" points to fully conflicting elements while "and" points to complementary and mutually enabling elements (see also Li, 2016).

The previous section has illustrated how managers can navigate open innovation paradoxes in practice by combining differentiation and integration, see also Figure 2. As such, paradox thinking has radical implications for decision-making since firms need to find resourceful ways to accommodate conflicting demands by combining control and openness efforts. For example, when it comes to selecting ideas for further development, a firm can combine control efforts with openness efforts, simultaneously, by clearly deciding which ideas to reject and support, respectively, while also ensuring transparent feedback. In this respect, Piezunka and Dahlander (In Press: 2019) found that the writing and linguistic style of an explanation matters and that individual rejections can in fact help firms keep contributors engaged and generate more ideas.

Overall, this perspective article seeks to spotlight arguments in the preexisting domain of open innovation, to stimulate research reflexivity, and to show the potential for changing conceptual frames to better explain persistent tensions arising from increasingly complex situations of organizational life. Following scholars who suggest that paradox can enable the next generation of organization and management theory (Lewis & Smith, 2014; Schad et al., 2016), we propose paradox thinking as a novel approach to open innovation that can resolve ongoing controversy about the potential of external collaboration for innovation and shed

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light on new management practices, such as the dynamic use of differentiation and integration practices (Fig. 2). The three propositions are merely starting points for reconsidering theory and research in open innovation, where persistent control-openness tensions force firms to tackle conflicting demands simultaneously. In a systematic exposition, this article explains what open innovation paradoxes are and why they appear. It discusses when and where open innovation paradoxes emerge in open innovation collaborations (Proposition 1), how firms can navigate them (Proposition 2), and what the anticipated outcomes are of a firm's paradoxical approach (Proposition 3). Thus, this article offers researchers and managers a comprehensive process for understanding and navigating open innovation paradoxes.

Clearly, research is needed that can rigorously assess whether the innovation synergies we propose bear out in practice, and what unanticipated negative outcomes may emerge when encouraging paradoxes. This article has focused on firms' open innovation collaborations with individual external contributors (users, creative individuals, professionals) and groups of external contributors (communities, crowds). While this focus adds to current literature that mostly investigates open innovation projects with value chain partners (Randhawa et al., 2016; Tucci, Chesbrough, Piller & West, 2016), we encourage future empirical researchers to find out how far our propositions apply to other forms of open innovation collaborations, including emphasizing outbound and non-pecuniary forms of open innovation where control-openness tensions might be even more prevalent in relation to knowledge protection and value appropriation.

Building upon a multilevel understanding of open innovation collaborations, this article

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proposes a future research agenda for multilevel investigations. Firms need to address conflicting demands of control and openness across distinct levels, from the individual and group levels to the firm level. Taking our work further, future researchers could clarify in more detail how firms can combine differentiation and integration in their dealing with open innovation paradoxes, and whether unintended outcomes, such as limited creativity, stuckness in decision making, and conflicts over ownership of ideas, can constitute warning signals about excessive reliance on differentiation or integration (Table 2). Some research has suggested that due to the complexity of innovation collaborations between different partners, there is a tipping point at which the cost of incorporating external sources of innovation exceeds the value of exploiting it (Belderbos, Faems, Leten, & Looy, 2010; Laursen & Salter, 2006). Consequently, scholars could examine how using paradox to innovate affects the costs and overall firm resource requirements for open innovation collaboration. Finally, in order to encourage permanent changes to established routines, firms may choose to reward employees and external contributors for actively engaging in paradox management (see also Jay, 2013; Olson & Bakke, 2001). Future studies could investigate ways to encourage paradox management and find out whether a paradox mindset can be taught, for example through game-based training, as suggested by Beech et al. (2004) and Lauritzen (2017), and how such learning can be transferred from the individual to the project and firm levels.

Endnotes

1. The following analysis is only for illustrative purposes. As mentioned in the discussion of the key themes, neither are there clear boundaries between the identified themes, nor can they be understood in isolation.

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Table 1. Control-openness tensions as dilemmas and related innovation barriers in open innovation collaborations with external contributors

Problem: Control versus openness	**Dilemma: Either/or**	**Innovation barriers**	**Key articles**
Attracting How can we motivate contributors to generate and freely share ideas?	Should we restrict access to the innovation process or provide unfettered opportunities for contribution?	The firm may fail to motivate contributors The firm may attract too many contributions, which may lead to information overload	Alexy & Leitner, 2011; Dahlander & Piezunka, 2014; Hertel et al., 2003; von Krogh et al., 2012; Lerner & Tirole, 2002; Lilien et al., 2002; Shah, 2006
Incorporating How can we direct the external input to explore relevant solutions?	Should we clearly define the problem to be solved (drawing on current knowledge) or encourage out-of-the-box thinking (experimenting with new knowledge)?	The firm may fail to exploit the creative potential of external input The firm's emphasis on control in decision-making may spark external claims of unfair treatment Uncritical and wasteful ideas may be generated that may contribute to information overload or "blindness" Internal blockages such as NIH syndrome that may contribute to developing mediocre or over-commercialized products	Dahlander & Piezunka, 2014; Markus, 2007; O'Mahony & Ferraro, 2007; Lakemond et al., 2016; Lauritzen, 2017; Antons & Piller, 2015; Voss et al., 2011
Commercializing How can we exploit jointly generated knowledge?	Should we protect or share knowledge and jointly developed intellectual property?	Ineffective collaboration due to discouraged contributors The firm may risk leakage of its IP and knowledge to competitors	Alexy et al., 2013; Cassiman & Veugelers, 2002; Holgersson et al., 2018; Arora et al., 2016; Bogers, 2011; Laursen & Salter, 2014; Wang et al., 2016

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Table 2. Differentiation and integration approaches and related outcomes

Approach	Definition	Examples	Outcomes as innovation barriers	Outcomes as innovation synergies	Key articles
Differentiation Distribution	Dealing with tensions by separating poles temporally, spatially, or structurally.	Guided role play Subunits IP modularity	May foster isolation, encourage a preferred innovation mode, and limit coordination between varied efforts May fuel NIH syndrome and new conflicts	Allowing focus and reducing risk of confusion Honoring distinct behaviors, efforts, and skills	Beech et al., 2004; Poole & Van de Ven, 1989; Smith & Tuschman, 2005; Henkel et al., 2013; Faraj et al., 2011
Integration Confronting Reconciling Combining/ Balancing	Dealing with tension by directly addressing the sources of tension, combining the benefits of both poles, and/or balancing to reach a golden mean.	Messages with dual meaning Socialization activities External facilitation Reframing through fresh language/ linguistic hooks Selective revealing	"Stuckness" in decision making The intensity of the opposite poles is diluted and the distinct benefits of each pole are never fully realized and exploited Limited creativity and mundane, over-commercialized products	Fostering shared values/goals/identity Aiding coordination Helping actors read complexity	Dahlander & Gann, 2010; Clegg et al., 2002; Jarvenpaa & Lang, 2011; Jay, 2013; Lauritzen, 2017; Lüscher & Lewis, 2008; Jarzabkowski et al., 2013; Poole & Van de Ven, 1989; Seo et al., 2004

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Figure 1. Navigating the open innovation paradox: combining differentiation and integration practices.

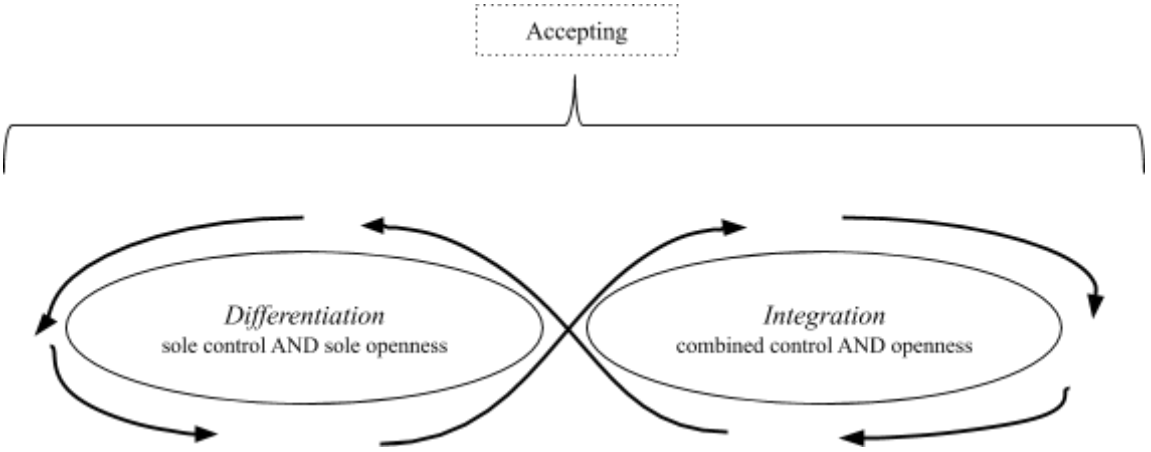

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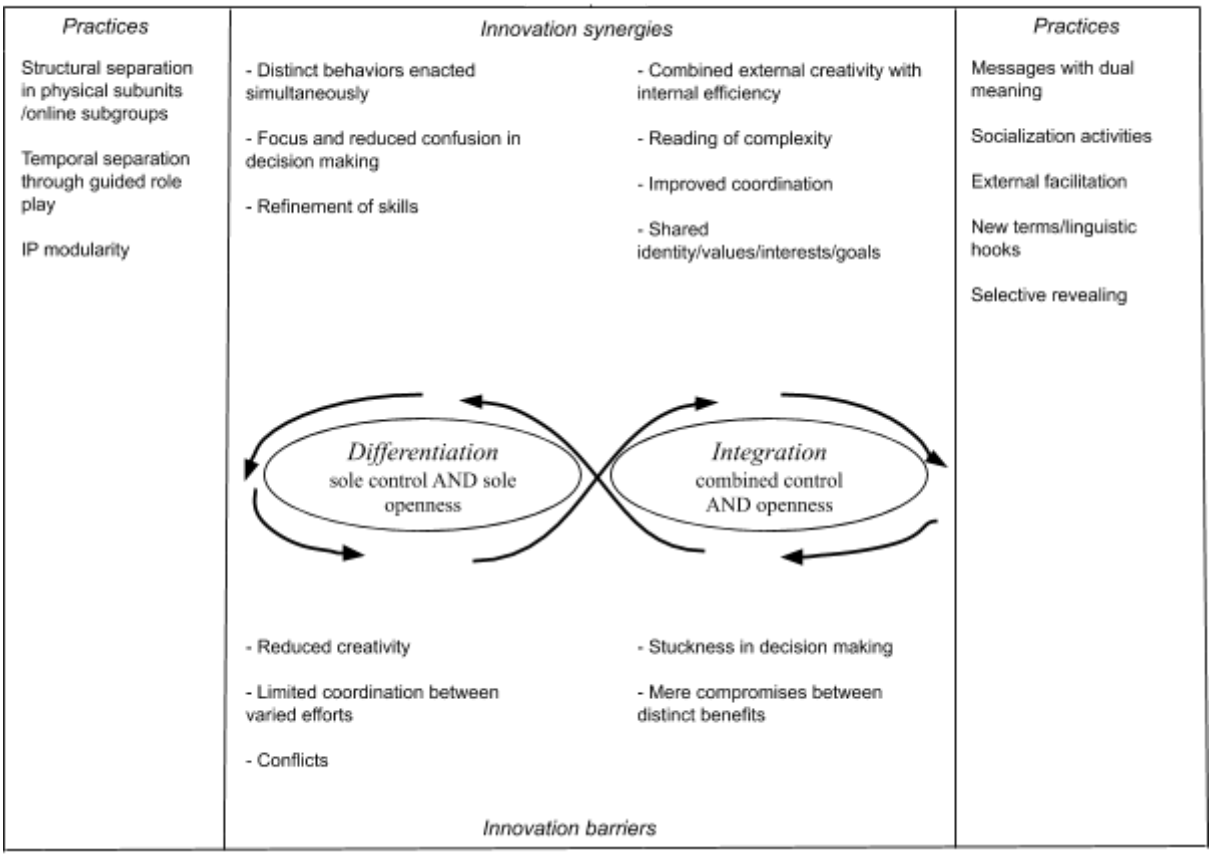
Figure 2. Leveraging open innovation through paradox: illustrations.



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