Performing openness: how the interplay between knowledge sharing and digital infrastructure creates multiple accountabilities

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Abstract

Purpose – The present study aims to address the emergence of platform-organized open innovation (OI). The research has the two main aims: the first is to increase the understanding of the performance of OI by investigating how the achievements of OI are measured in situated practices from a performative and strategic knowledge management (SKM) orientation. The methodological disadvantages of not pre-given case selection are partially counterbalanced by the second aim of the research, which is to extend existing SKM theory and examine how platforms create knowledge as they include actors and digital devices, thereby potentially redistributing relations of accountability.

Design/methodology/approach – Building on performativity theory, the paper studies how the achievements and knowledge created in OI are managed and evaluated in practice. The case description draws on different sources from a spiral case study, as openness is performed by platform, firm, crowd and innovation intermediaries.

Findings – The paper illustrates how a strategy of digitally enabled openness brings its own issues as platforms enable knowledge sharing and perform a redistribution of accountability. In the heterarchies studied through this research endeavor, managers and their team members were accountable not only to multiple units, or teams, across the organization, but also to the crowd. The case material demonstrates that the ecology of devices and their performative struggles create lateral accountability.

Research limitations/implications – While recent streams of research suggest that the context of OI (i.e. distributed sources of knowledge for innovation) shifts the unit of analysis of organization design from the individual firm to networks of actors organized on platforms, the authors find that the focal firm still remains a key conceptual parameter in SKM research, which, in turn, makes it difficult to capture the suggested radicality of OI.

Practical implications – The authors show, that in practice, the firm has to take into account the performance of the external crowd and at times put resources into its training and education. In heterarchy, distributed authority is assumed to be facilitated through lateral accountability, whereby the traditional principles of vertical authority no longer hold, but rather, managers and their team members can be accountable to multiple units, or teams, across the organization.

Originality/value – The paper develops a performative theory of openness. OI is a model, strategy and socio-material practice whereby digital designs create an ecology of devices that can enact all kinds of openness.

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Ultimately, the current paper proposes that SKM and OI theory need to consider how platforms perform relations of accountability beyond the boundaries of the single organization.

Keywords Accountability, Open innovation, Digital platforms, Strategic knowledge management, Performativity

Paper type Research paper

> Open Innovation starts here.
>
> The Campaign connects Nokia QD and all friend corporations investing in innovations together.
>
> Submit any ideas
>
> (NOKIA Open Innovation Challenge, 2017.)

Innovators rarely innovate alone. Rather, they tend to band together in teams and alliances based on "swift trust," which is nested in communities of practice and embedded in a dense network of interactions (Brown and Duguid, 2000; Laursen and Salter, 2006; Scott and Brown, 1999; Venkitachalam and Willmott, 2017). Different forms of large-scale collaborative creativity, such as OI, crowd sourcing, co-innovation and commons-based peer production, offer new ways of organizing such communities. Sentence constructions, such as the above description "Open Innovation starts here," imply and include performance. However, where is the "here?" In other words, where is performance occurring when organizations use distributed sources of knowledge for innovation?

In contrast to traditional top-down command and control management, OI management has undergone a fundamental change in organizational strategy, which has led to a variety of managerial challenges (Lakhani *et al.*, 2013; Kornberger, 2016). Studies focused on SKM and OI suggest that the basic premise of OI is to manage inflows and outflows of knowledge to improve internal innovation and maximize the external exploitation of innovation (Chaurasia *et al.*, 2020; Cheng and Shiu, 2015; López-Nicolás and Meroño-Cerdan, 2011). New emerging technologies can help organizations create knowledge management (KM) systems that acquire, store or disseminate knowledge (Nascimento *et al.*, 2021; Soto-Acosta and Cegarra-Navarro, 2016). Digital infrastructures are considered antecedents to ecosystems and serve as platforms for collaboration and openness (Aloini *et al.*, 2017). However, the majority of SKM studies have focused on the development and proliferation of the traditional firm (e.g. López-Nicolás and Meroño-Cerdán, 2011; Papa *et al.*, 2020). When SKM literature addresses issues of openness, it highlights relationality and tensions in alliances (Penney *et al.*, 2020), networks (Ferraris *et al.*, 2020) and partnerships (Guerrero *et al.*, 2019) in terms of cooperation, knowledge transfer and sharing between independent units. In contrast to such "hierarchical consciousness" (Hopwood, 1996), recent research (e.g. Lakhani *et al.*, 2013; Kornberger, 2016) suggests that OI shifts the unit of analysis of organizational design from the individual firm to networks of actors organized on platforms. Within firms, KM is based on three dimensions: knowledge acquisition, dissemination and application (Darroch, 2005). Literature on SKM has identified firms' absorptive capacities as essential to their ability to exploit the value generated by dynamic interactions between KM, strategy and emerging technologies (Ferreira *et al.*, 2020; López-Nicolás and Meroño-Cerdan, 2011; Nascimento *et al.*, 2021). However, digital platforms work less by absorbing knowledge and more by evaluating it (through rankings and ratings) and disclosing "new worlds" (Kornberger *et al.*, 2017). Thus, platform organizations are distinct from firms, as they produce and reconfigure knowledge and power in ways that extend beyond managerial control (Flyverbom *et al.*, 2015). To fully capture platform organizations, a different analytical vocabulary is needed.

The present study addresses the emergence of platform-organized OI. This research has two main aims. The first is to better understand the performance of OI and explore how the achievements of OI are measured in situated practices from a performative orientation. The case description draws on different sources from a spiral case study (Gherardi, 2012), as openness is performed by platform, firm, crowd and innovation intermediaries. The methodological disadvantages of not having a pre-given case selection are partially counterbalanced by the second aim of this research, which is to extend existing SKM theory (Eisenhardt, 1989) and examine how platforms create knowledge as they draw in actors and other digital devices, thereby potentially redistributing (Scott and Orlikowski, 2012) relations of accountability. In brief, OI shifts the "loci of innovation" and knowledge from hierarchically structured firms to distributed actors, which, in turn, shifts the unit of analysis from the individual organization. Therein lies the puzzle that this paper addresses: where is OI performed and how is accountability distributed in platform-organized OI?

This paper contributes to existing literature by extending the discussion on how strategy, knowledge, cognition and culture are performed and continuously brought into being through relations between actors and technologies. The performativity concept helps capture a form of knowledge that contributes to the establishment of actions (e.g. strategy) and brings things into being (Revellino and Mouritsen, 2015). Open innovation is a model, strategy and socio-material practice whereby digital designs create an ecology of devices that can enact all kinds of openness. The empirical examples presented in this study run counter to research on SKM. We suggest that digital infrastructures help produce tentative knowledge, questions and possibilities for innovation and action, arguing that SKM and OI theory should consider how platforms affect accountability and further understandings of the socio-materiality of accountability.

The paper is organized as follows. Section 2 presents the literature review, and section 3 discusses the research methodology, fieldwork and process of data collection and analysis. A case study is presented and holistically analyzed in section 4. Lastly, section 5 discusses the field material in relation to theoretical insights, based on which a brief conclusion and suggestions for future research are then outlined.

Literature review

In the present study, innovation is defined as the generation of novel ideas or combinations of existing ideas and routines that are perceived as new and valuable by individuals and organizations (Nelson and Winter, 1982; Roberts, 1998; Van de Ven, 1986). Open innovation refers to "a distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization's business model" (Chesbrough and Bogers, 2014). Additionally, SKM describes the processes and infrastructures firms employ to acquire, create and share knowledge for the formulation of strategy and decision-making (March, 1987; Zack, 2002). This paper approaches (see Table 1 for a summary) digital OI platforms as infrastructure where the focus of the SKM challenge shifts from the efficient allocation of internal resources to the organization of "the open" (Kornberger, 2016).

Exploitation of external knowledge as strategy

Studies on SKM have examined OI and its capacity to enable firms to explore external knowledge to seize business opportunities or use knowledge to improve in-house innovation processes (Chaurasia *et al.*, 2020; Darroch, 2005; Martinez-Conesa *et al.*, 2017; López-Nicolás and Meroño-Cerdan, 2011; Papa *et al.*, 2020). The exploitation of external knowledge can be considered a strategic activity (Lichtenthaler, 2007), whereby the strategy should be aligned

Concept	Main premises	Underlying assumptions	Exemplary theorists
Strategic knowledge Management (SKM)	A key aspect of the process of knowledge creation and innovation is the ability of the organization to absorb external knowledge – absorptive capacity	Different views on knowledge lead to different conceptualizations of SKM. SKM considers the interaction between technological and intellectual resources essential for organizational survival	Darroch (2005), Ferreira *et al.* (2020), Zack (2002)
Open Innovation	The locus of knowledge and the locus of innovation need not necessarily be the same	The managerial challenge shifts from being focused on the efficient allocation of internal resources to a concern with organizing "the open," i.e. designing structures and systems for coordinating work outside company walls	Chesbrough and Bogers (2014), Laursen and Salter (2006), Kornberger (2016), von Hippel (2005)
Performativity	Performativity is discernible as an unfolding process in which actors, technologies and their environments emerge simultaneously	The potential of a theory to gather strength and prevail is closely related to its ability to involve not only actors but also artifacts and material devices (i.e. texts, documents and technologies)	D'Adderio and Pollock (2014), Revellino and Mouritsen (2015), Scott and Orlikowski (2012)
Digital infrastructure	Digital infrastructures (e.g. platforms) have a relational character (as they create relations people, language, numbers, categories, cultures, practices, artefacts etc.) and need to be understood as ecologies, i.e. dynamic, interacting and overlapping performative struggles between a multiplicity of devices	Change is embedded in technology. Platforms are an alternative mode of organizing economic activity that differs from networks, markets and hierarchies	Kornberger *et al.* (2017), Volkoff *et al.* (2007)
Accountability	Online accountability is based on special claims of the "wisdom of crowds" and "distributed knowledge" produced by social media and other platforms	Social media and other platforms perform a substantial redistribution of accountability transparency can be understood as performative in that it works back upon those subject to it in ways that are often counterproductive or, at least, far exceeds the passive image of a simple making visible	Roberts (2009), Scott and Orlikowski (2012)

Table 1.
Mapping extant research on strategic knowledge management and platform organized open innovation

with other organizational strategies and a clear direction should be set. Lastly, cross-functional collaboration should be fostered to overcome interface problems. The role and degree of "openness" has been described as dependent on firm-specific (internal) factors and environmental (external) factors (Dahlander and Gann, 2010; Laursen and Salter, 2006; Drechsler and Natter, 2012).

The idea of an ecosystem for knowledge sharing recurs in literature (López-Nicolás and Meroño-Cerdán, 2011; Santoro *et al.*, 2018). A core concern of systems is the determination of

an optimal match between technological and social components (Maravilhas and Martins, 2019; Soto-Acosta and Cegarra-Navarro, 2016). For "knowledge engines to run smoothly," Venkitachalam and Willmott (2017) argue that executives need to develop an "informed understanding of what types of organizational knowledge (and how much) can be 'structured' and/or allowed to 'proliferate' in order to sustain both work productivity and innovation capacity toward a harmonious conceptualization of an organization's strategic knowledge management" (p. 316).

These studies are part of a larger research domain that examines distributed sources of knowledge for innovation. However, a "common consensual ground" (Alvesson and Sandberg, 2011) in this domain of literature (KM and OI research) is the coordination and control within and from the perspective of the hierarchical firm. Few studies have addressed the issue of what happens when innovation is "open" (Frishammar *et al.*, 2019). In addition, while infrastructure is often referred to in SKM, infrastructure (whether analog or digital) is largely undefined or examined. In contrast, information system studies argue that digital infrastructures and individuals are continually performed in a web of relations, suggesting that they "produce a lived experience" (Cecez-Kecmanovic *et al.*, 2014, p. 825).

This paper examines studies that address the dilemmas of and tensions between openness and performance. Chen and Vanhaverbeke (2019) argue that external innovation resources do not simply flow into companies, as "open innovation highlights the entire innovation system" (p. 192). A major contribution of OI is, according to Gassmann and Enkel (2004), the perception "that the locus of knowledge and the locus of innovation need not necessarily be the same" (p. 15). According to Halisah *et al.* (2021), knowledge-sharing culture and performance climate comprise two different strategies, and "knowledge and social dilemmas" arise in the interplay between them. Chesbrough and Bogers (2014) have discussed the confusion that can be caused by "complex boundaries" (Lakhani and Panetta, 2007; Vanhaverbeke and Roijakkers, 2013), suggesting that researchers adopt a consistent definition of "open innovation," that distinguishes it from "open collaborative innovation." While SKM research has challenged important assumptions within the OI paradigm and has enriched the debate, existing research remains wedded to the development of the hierarchical firm.

In this context, this paper draws on studies that have adopted different analytical routes. While recent SKM research (Guerrero *et al.*, 2019; Papa *et al.*, 2020; Penney *et al.*, 2020) acknowledges distributed organization and interaction between human beings (e.g. knowledge-sharing culture and tacit knowledge), there has been little focus on the platforms themselves and the relational underpinnings of distributed innovation. For us to address this gap, studies that "look across" (Hopwood, 1996) organizations in which one encounters "heterogeneous, ongoing, overlapping *performative* struggles" (Kornberger *et al.*, 2017) between a multiplicity of devices and people are relevant.

Performativity: conceptual background

Performativity has emerged as a highly generative concept that has inspired social scientists and stimulated theory building across various disciplines, including organizational management (Gond *et al.*, 2016). The breadth of theoretical positions discussed in studies adopting this approach is, at times, overwhelming (Cecez-Kecmanovic *et al.*, 2014). A common denominator in this paper is that the authors (e.g. Orlikowski, Scott and Roberts) tend to build on Judith Butler's work on performativity and accountability.

The study of performativity aims to "illustrate leakage" from or resistance to the generalizations made in ostensive research (Hansen, 2011). Recent studies on platforms have conveyed knowledge through various "judgment devices" or "evaluative infrastructures" (Kornberger *et al.*, 2017; Orlikowski and Scott, 2014). These infrastructures serve as cognitive

aids and visible guideposts when one makes choices (e.g. strategic choices). Performativity is built on an assumption of the notion of performance, but it also suggests that reality is enacted through performance. Inspired by Callon (2007) and MacKenzie (2006), D'Adderio and Pollock (2014) previously demonstrated how modularity theory performs modular organization. Rather than contextualizing an activity by putting something or someone in context, a performative approach "identifies the practices that are constitutive of and implicated in the world" (Orlikowski and Scott, 2014). Feldman and Pentland (2006) related performativity to resistance in their study on the changeability of organizational routines. Using Latour's terms, the authors distinguished between the ostensive and performative aspects of routines, where the ostensive aspects of the routine are "the idea" and the performative aspects are "the enactment" (Feldman and Pentland, 2006, p. 102). Building on this, Volkoff *et al.* (2007) argued that when embedded in technology, organizational elements such as routines and roles acquire a material aspect, in addition to the ostensive and performative aspects identified by Feldman and Pentland.

The present study utilizes research by Silvana Revellino and Jan Mouritsen, who build on Butler's interpretation of performativity. Performativity is, according to these authors, a "pervasive movement that proceeds from one stage to another when new information excites the development of even further technologies for provoking and making things real" (2017, p. 454). Inspired by D'Adderio and Pollock (2014), the present study treats knowledge in the form of OI theory as exciting information.

The literature on SKM and OI performance suggests that performance is linked to openness (Laursen and Salter, 2006). This openness relates to an organization's ability to exploit external knowledge and is identified more in traditional innovation performance (Adams *et al.*, 2006) as part of an organization's innovation culture (Dziallas and Blind, 2018). It has further been argued that a move from firm-centric innovation to OI requires a change in culture (Chen and Vanhaverbeke, 2019) that balances hierarchy with heterarchy. Building on Volkoff *et al.* (2007), we consider this transformation in culture to be embedded in technology. This approach to organizational change occurs through a three-stage cycle in which the ostensive, performative and material organizational elements and routines interact differently at each stage.

Lastly, the material consequences of platforms must be considered, such as knowledge sharing and production. Knowledge sharing appears to have both positive and negative consequences and can reconfigure relations of accountability through increased transparency (Flyverbom *et al.*, 2015; Roberts, 2009; Scott and Orlikowski, 2012). Stark (2009) described two features of heterarchies that enable innovation: distributed intelligence, coordinated through lateral accountability and organizing dissonance, which enables "productive friction" by recognizing and managing the interplay between multiple, competing evaluative principles. On the topic of lateral accountability in KM systems (i.e. platforms), Messner's (2009) discussion on the limits of accountability and whether more accountability is always unambiguously desirable is also useful. It has further been observed that on platforms, individuals (e.g. managers) have a strong lateral accountability relationship to external peers whose knowledge they use. Building on Roberts' work, Messner argues for socializing accountability. The pre-occupancy with the development of the hierarchical firm identified in KM studies could become problematic if we only recognize hierarchical forms of accountability where "individuals take it for granted that their value and worth depends upon their position within the organizational hierarchy and upon the fulfillment of imposed targets" (Messner, 2009, p. 942). To be accountable means to be accountable to someone else, and to reduce the notion of accountability to the justification of one's own actions for one's own sake is to misconstrue accountability.

Research methodology

The present study explores a case in an effort to provide empirical evidence for the concept of OI. The spiral case study differs from the linear school (Piekkari and Welch, 2018) of Gioia *et al.* (2013) and Eisenhardt (1989). According to Gherardi (2012), this methodology allows technologies to be more vocal by adopting "ethnography of objects" (Bruni, 2005, p. 25) that enables the performativity of technology to be studied as it emerges in situated practices. In a spiral case study, the research moves between different levels (e.g. innovation intermediaries, technology, managers and institutions) and by studying several cases within a specific research setting is capable of capturing the micro-level inter-connections between the various components of the practice, after which the focus is shifted to exploration of the macro-level connections, i.e. the effects of engaging in the practice.

Iteratively, we conduct an in-depth inquiry (Table 2) into different, not pre-determined (Gherardi, 2012) units of analysis and then expand the focus to other locations by tracing the emerging relations. Nicolini (2009) has described this strategy as a "zooming in" and "zooming out of" practice.

The present research was started in 2017 as an ethnographic (Kozinets, 2002) project. The authors took part in the Nokia Open Innovation Challenge (NOIC) to understand how the company organized its OI process. Inspired by Martin Kornberger (2016), we subsequently tried to understand the organization's use of platforms through the framework described in Kornberger's study on OI design. This framework highlights (1) interface design, (2) the design of architectures of participation and (3) the design of evaluative infrastructures. The findings from our previous research indicated that the crowd was only able to experience the interface of the OI platform, and the relative "absence" (from a submitter's point of view) of the latter two resulted in a modification of the original framework in line with the analytical inference described by Dubois and Gadde (2002). We saw this "anomaly" as an opportunity to modify existing theories on platform-organized SKM.

The literature review guided our initial coding (Timmermans and Tavory, 2012) along the dimension of performance in terms of SKM and innovation culture. The empirical framework was modified because the boundary of the set of relevant cases shifted (Ragin, 1997) as empirical material from "innovation intermediaries" (i.e. providers of digital infrastructures of platforms) was gathered. As for the data used in this study, we studied blogs, corporate case studies, webinars and white papers on the websites of platform providers. In addition, interviews served as the main form of data collection. A total of 10 interviews were conducted and each lasted between 45 and 60 min. After the interviews, we conducted further inquiries via email and LinkedIn in order to seek clarifications and updates. The interviews were conducted online in a semi-structured format and focused on common challenges in OI. The main group of interviewees comprised OI community managers and chief executives.

Ideas for this paper were formulated while the first author was in the field collecting data. Through weekly discussions about the ongoing fieldwork, performativity emerged as a theoretical lens through which to approach the complex interaction between platforms, intermediaries and crowds. The fieldwork phase helped us develop context sensitivity, which, in turn, helped us conceptualize the OI platforms as both mediating devices and as an "ecology of devices," according to Kornberger *et al.* (2017). This helped us explore how innovation platforms emerge in practice and why they should not be classified as a monolithic ideal of an entity or system but rather as an ecology of devices designed by organizations, such as Hype and YouNoodle, to enhance the performance of firms that have implemented OI.

To test the robustness of the concept, we revisited the Nokia case to understand OI processes in practice. This phase of our work lasted two years, during which we studied two additional NOIC annual challenges. Eight interviews were conducted with managers responsible for NOIC. During the interviews, we used the same semi-structured template as was used with the innovation intermediaries. In addition, we dug deeper into dilemmas (i.e.

Table 2.
Core case study data

	Individual interviews/ #interviews (2017–2019)		Positions	Observations (2017–2018)	Corporate white papers, case studies, events, videos and webinars (2010–2019)	Reports	Websites/ Press	Email
OI Innovation Intermediaries (#5)	8/10		Executive Vice President, Co-Founders, Executive Manager, CEO and Community Facilitator (2)		68	7		15
Global technology Company	3/6	2 group-interviews	Project Manager and Community Managers	1	4	3		23
Methodology	Analytical Interview	Kreiner and Mouritsen (2005)		Nethnography Kozinets *et al.* (2014)	Qualitative Content Analysis (QCAs) (Hsieh and Shannon, 2005)	QCA	Q	
TOTAL	18			1	72	10		28

central elements of actual practice; Kreiner and Mouritsen, 2005). The interviews and exploration of dilemmas enabled us to construct "counterfactual images of practice" that subsequently made the "factual practice significant" (Kreiner and Mouritsen, 2005). Interviewees were asked to provide examples of successes, failures, problems, concerns, challenges, insights and surprises. Further inquiries were regularly made via email for clarifications and updates.

To consider the different theoretical and conceptual frameworks, we "cased" (Timmermans and Tavory, 2012) the empirical material in different theoretical formats (Ragin, 1997). In the last phase, focused coding was employed, and the empirical material was categorized into ostensive, performative and material categories of organizational performance. We scrutinized these focused codes repeatedly to evaluate which ones best explained the empirical phenomenon. Performativity theory, particularly Olga Volkoff and her colleagues' theorization on technological embeddedness and organizational change, emerged as a useful theoretical lens. According to their theory, ostensive aspects guide actors and enable them to account for or refer to their performances, and performative aspects can help to create, maintain and modify ostensive aspects; the material aspect of the digital design circumscribes these interactions (Volkoff *et al.*, 2007). During this phase, the development of openness, which combines both a knowledge sharing culture and platforms to enable OI, emerged as a topic of significant interest.

Findings: OI interweaves a multiplicity of performances and accountabilities

This section explores OI and its evolving system of digital infrastructures, with which multiple communities of practice interact. The report *A Maturity Model for High Involvement Innovation* published by Hype (an innovation intermediary) begins with a contemplation of the concept of an "innovation imperative:"

> It's a simple message – innovation matters. In today's environment, organizations need to change (and keep on changing) what they offer the world and the ways they create and deliver that.

Statements such as these are common in the field of OI and can be expected given that this learning material also functions as a form of marketing communication for the providers of platforms and other software. However, after over 70 years since the publication of Schumpeter's seminal text, it is striking that academic literature utilizes the same rhetoric (e.g. Ferreira *et al.*, 2020). This rhetoric could be considered a linkage between the theoretical and empirical realms; however, this paper builds on a performative lens, drawing on the idea that theories and models are not simple descriptions of a setting but are powerful engines that can profoundly transform the contexts they describe (MacKenzie, 2006; Revellino and Mouritsen, 2015). This chapter is structured as follows. First, the actors producing the ostensive and material aspects of OI are introduced. Then, the text shifts into a discussion of the interaction between specific actors and their performative dynamics and struggles.

Innovation intermediaries produce the ostensive aspects of OI

Digital infrastructures are central to OI. Hype, 100%Open, Spigit (Planview), Planbox and Imaginatik offer digital infrastructures and other OI services to organizations moving toward distributed models of innovation, such as LEGO, Exelon, PWC, Crisis, Unilever, Citi, Pfizer, Siemens, UNHCR and Nokia.

The present study's analysis of empirical material suggests that intermediaries create rules, routines and other artifacts that build accounts for the ostensive aspect of OI. The ostensive aspect "guides, accounts and refers" (Feldman and Pentland, 2006), but how clients actually perform is, as one interviewee stated, all "about different subject matter."

Furthermore, as intermediaries embed organizational elements into digital infrastructures, a material aspect is also acquired. For example, one account CEO said as follows:

> The beauty of a platform is that it can be distributed through or accessed through different channels. And the beauty of a well-designed challenge is that it is transparent. The design principle around effective challenges is: "How do you make visible what is invisible?"

Platform organization solves two of four central problems of innovation identified by Van de Ven (1986). Transparency solves the human challenge of managing attention, as well as the structural challenge of managing part-whole relationships. In interviews with both CEOs and OI community managers, they reflected on their own and others' work (including their clients) and identified external crowd-members' knowledge of OI software and platforms. These interviews also pointed to dilemmas in practice; the informants observed that innovation programs and challenges fail because they lack transparency and fail to close the loop between the identification of a problem and resolution of the challenge or the assessment and prioritization of results. One CEO described a well-designed loop as a "trust cycle" that "guarantees credibility and accountability." They further explained the importance of closing the loop with the crowd, explaining that one should say, "Thank you for your ideas. This is incredibly interesting. This is what we're going to do with this thing now."

Transparency addresses how easily participants can follow and understand what is occurring in the collaboration. Different crowds require different KM. Additionally, on the topic of crowds, two common practical concerns surfaced during the interviews. The first was Intellectual Property (IP) protection, and the second was connected to accountability. External crowds are, according to several interviewees, reluctant to give up their IP rights. Furthermore, according to one interviewee, external crowds may have specific expectations as follows:

> If you're going to invite somebody in to be part of a crowd, and they're an external entity, especially your customers, you need to do something with the ideas that they submit. So that sets an expectation that companies do not always want to be held accountable to.

The intermediaries legitimate some performances as appropriate to OI routines, and statements of achievements related to factors, such as absorptive capacity and innovation culture, serve as guides for clients. In principle, open cultures imply trust; however, during the research, we also noted contradictory statements that described external crowds as creating "noise" and "nonsense." For example, one interviewee explained as follows:

> We connect individuals with large organizations. We can get big people to sign non-disclosure agreements or small people to sign up for, or whatever it takes to make sure small people do not feel exploited, and big people get what they need in the end.

The division between "big" and "small" people points to dilemmas in the actual practice of SKM in heterarchies. Other interviewees also spoke to the performance of OI. With the support of intermediaries on digital infrastructures, peers produce what clients need. A dilemma might arise because OI communities can also hold "big" people accountable, feel exploited and produce "nonsense."

Technologies configure the ostensive and material aspects of OI

One way of managing "nonsense" and making visible what is invisible is through the use of rankings and ratings. All the interviewees described different digital evaluation infrastructures where contributors (Figure 1) and contributions were rated, noting that it is "useful to get a sense of what people like." Value is connected to standard criteria, including votes, star ratings, comments, replies, approval ratings and expert reviews. For example,

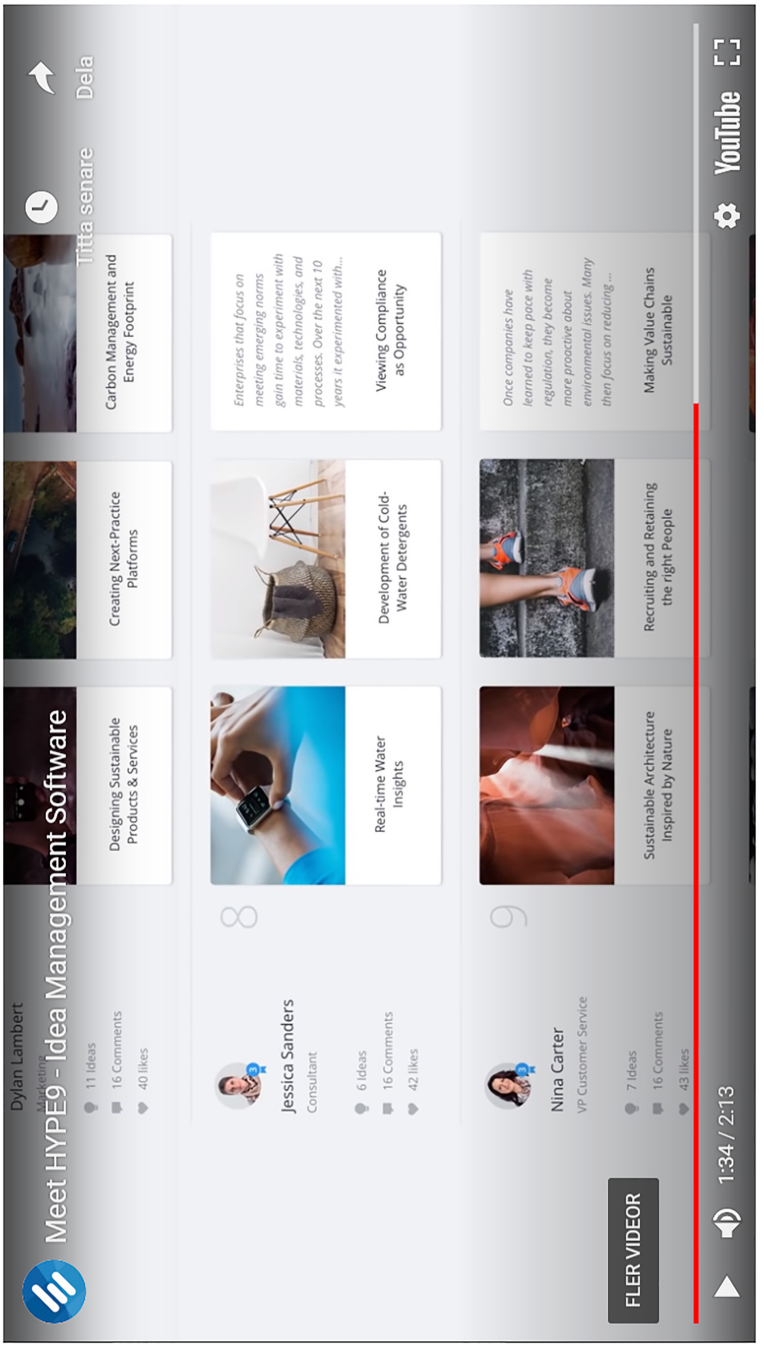


Figure 1.
Reviews of contributors to challenges (Hype website)

Spigit offers a crowd-based prediction tool for organizations to "truly make better business decisions based around the combination of human intelligence and data." The wisdom of the crowd presents another challenge; crowd biases and herd behavior were generally identified as problems in the actual practice of OI. One respondent suggested that more "interesting ideas" may be "less obvious," and may, therefore, attract fewer votes, "so you need to apply an additional level of evaluation of that idea." Hype offers an example of additional levels of evaluation wherein the evaluation is based on an intuitive and direct comparison of two ideas at a time (Figure 2). This tool focuses on efficiency, rather than on innovation as something "new." The "less obvious" ideas often represent new and potentially disruptive innovations. The platform collects data, but the challenge that remains is how these data can be analyzed for SKM.

As previously discussed, a quantified evaluation does not necessarily lead to performance, particularly when an organization is looking for something "outside the box."

Some data are significant, but as, one interviewee observed, data can be "dark, fragmented and incomplete." The question then is how these data can be made sense of. Controlling the outcome of OI is difficult, as, according to Revellino and Mouritsen (2017), the "pervasive movement" of innovation extends innovation into spaces beyond those originally forecasted. This idea suggests that knowledge and the value of innovation are not stable objects but are rather relational and social.

A key performance indicator for intermediaries was innovation culture (i.e. how openness is measured). In the interviews, the achievements of OI were described in terms of how organizations and peers engage in knowledge sharing, transparency, iteration and dialogue with internal or external crowds (Figure 3). The intermediaries create templates for behavioral and normative goals, which Feldman and Pentland (2006) refer to as "guiding."

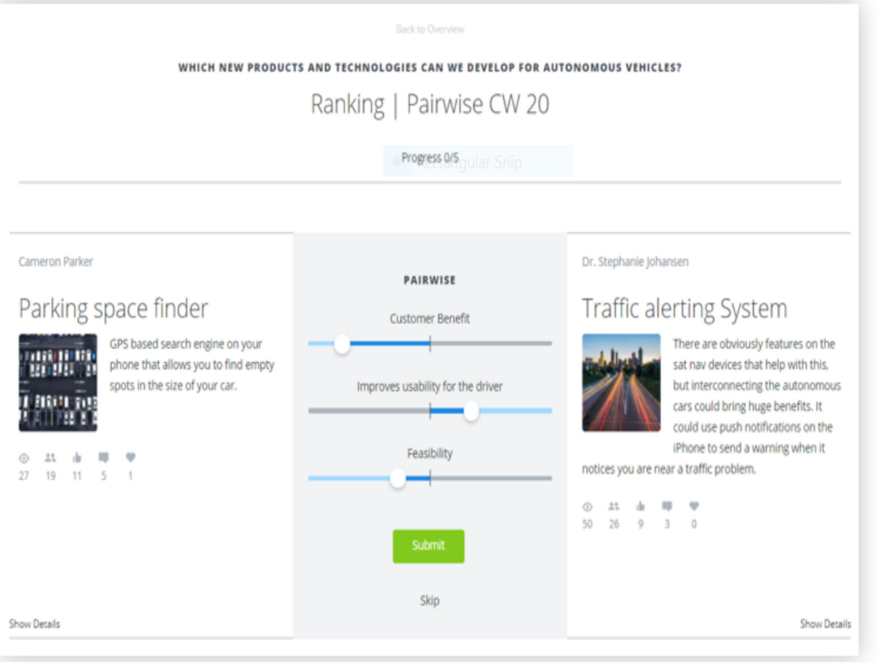


Figure 2.
Example of OI evaluative infrastructure (Hype website)

Figure 3.
OI culture: example of indicators measuring culture (Planbox website)

The platforms bring a material aspect to the ostensive aspects produced by the intermediaries and help monitor performances but do not, as in the routines described by Feldman and Pentland, "enforce compliance." Rather, crowds are "nudged," as community managers participate in the iteration of innovations by either forming communities around certain ideas or helping to refine ideas that are merely "the bare bones." The facilitators "probe, test and question" and can also bring ideas to the project team when challenges arise. Furthermore, they can let the crowd work on less obvious ideas. One interviewee stated, "We're actively exploring with the crowd." This suggests that both the loci of knowledge and management of it may be outside the firm, which supports Gassmann and Enkel's (2004) claim that organizations that emulate an OI approach must be prepared to transform their "solid boundaries into a semi-permeable membrane that enables innovation to move more easily between the external environment and the company's internal innovation process." In this study, we propose that the platform is this membrane and that it can be conceptualized as an infrastructure. In terms of the material aspect, organizational change is open to a wider ecosystem of peers.

Performativity: the firm interacting with the ostensive and the material aspect of OI

In this section, we zoom into a specific innovation challenge to build a better understanding of situated practices and the way in which accountability is distributed in OI.

The Finnish company Nokia is the world's largest provider of telecommunications technology, with more than 92,000 employees, net sales of €21.9bn, and over €4.1bn in research and development (R&D) investments. Distributed innovation processes have been part of Nokia's strategy for a decade. One of the interviewees explained as follows:

> Even though this [NOIC] is about open innovation, I have been working with internal innovation where we also use a distributed methodology. There is no centralized innovation management.

The move to OI began in 2010, when innovation was organized around the Nokia Research Center, unit-based R&D, globally networked university cooperation, OI and venture funds. At the time, OI was already becoming a fashionable catchword among leading technology innovators, but Nokia regarded itself as a pioneer of the approach (Steinbock, 2010). The firm's innovation culture surfaced both during the interviews and through other sources. Nokia's acquisition of Alcatel Lucent and the addition of Bell Labs (later Nokia Bell Labs) positioned the company as an "innovation powerhouse" in next-generation technology and services. Absorptive capacity is also a significant factor to consider; Vuori and Huy (2015) have noted that Nokia "lost" the smart phone market due to underperformance in this category in the period between 2005 and 2010. Nokia's underperformance resulted from top managers' over-optimistic capability perception. They had an inaccurate understanding of Nokia's capabilities, and their decisions regarding resource allocation to various innovation processes were "decoupled from organizational reality" (Vuori and Huy, 2015, p. 36). Thus, a challenge for Nokia, both as an object of research and for the organization, is that perceptions of the company are colored by its earlier problems. This makes research into Nokia's OI even more interesting.

The NOIC is an annual global competition through which Nokia seeks to source innovative technologies, products and solutions "that can change the world."

> All over the world, there are good initiatives and start-ups coming up with great ideas. However, it is very difficult to find them. And of course, these events are one way to find out what is happening around the world/ . . . / There is always this generic, "looking around thing" that shows that we are not a closed community.

Interviewees frequently discussed accountability and the need to perform "openness," describing the positive attitude needed to search for external ideas and tech, as well as the

open boundaries and all other organizational capabilities reflecting on OI culture. Hype, one of the intermediaries used by Nokia, described the relationship between the firm and platform as follows:

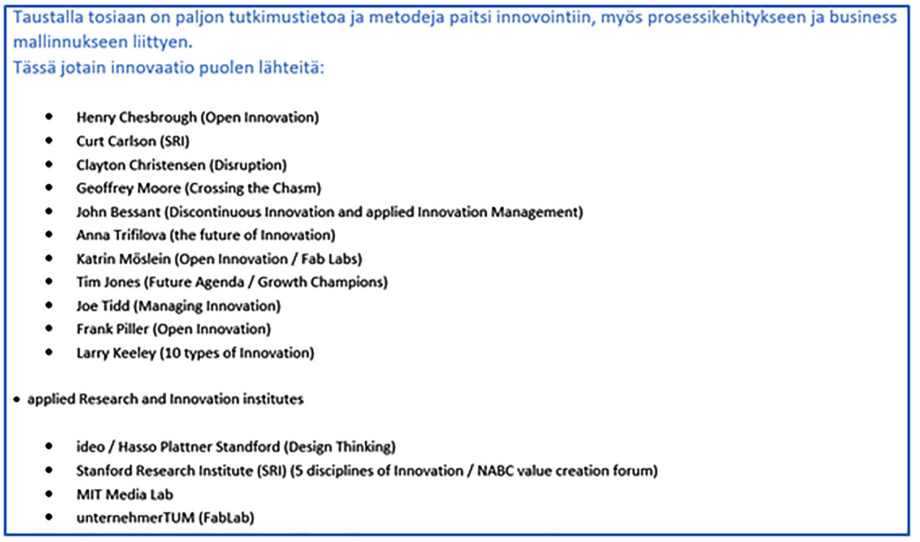
> In my experience, organizations will typically start by building programs and potentially using digital platforms to support them. Software platforms are especially useful because they provide scale, transparency, the ability to store and research knowledge and ensure governance and accountability. When deployed using the right guidance and incentives, platforms amplify meaningfulness.

This response suggests that the difficulties and problems encountered in an OI ecosystem can be avoided entirely or promptly resolved with the help of a platform on which members have a shared purpose.

Throughout the research process, several seminal texts and OI authorities were mentioned in conversations and emails with interviewees. Managers working for both intermediaries and Nokia were experts on OI, and some were PhD students and postdocs. One email included the following list as an illustration of Nokia's innovation process and business modeling (Figure 4).

The list includes both theories and practices (e.g. Piller, IDEO and Christensen) that combine KM and strategic foresight. Thus, the list illustrates how OI theory performs an OI organization, confirming the theory of performativity (Callon, 2007; MacKenzie, 2006). In the case of Nokia, a change in culture was needed, as the company lacked a "common language" for its innovation activities. According to one interviewee, research on the changing landscape of innovation helped the organization find such a language. A case study on Nokia and Hype also referred to "Chesbrough" and "Lakhani" as inspirational sources in the journey toward the development of a "new innovation culture."

Tools for SKM and OI were also identified, and a tool for measuring the changes in culture, the "internal innovation culture index," was introduced. These findings reflect theories on how organizational elements, such as routines, roles and data, become embedded in technology (Volkoff *et al.*, 2007). Their material aspect interacts with and affects the ostensive and performative aspects. Figure 5, a document produced by Hype, illustrates the interaction


Taustalla tosiaan on paljon tutkimustietoa ja metodeja paitsi innovointiin, myös prosessikehitykseen ja business mallinnukseen liittyen.
Tässä jotain innovaatio puolen lähteitä:

- Henry Chesbrough (Open Innovation)
- Curt Carlson (SRI)
- Clayton Christensen (Disruption)
- Geoffrey Moore (Crossing the Chasm)
- John Bessant (Discontinuous Innovation and applied Innovation Management)
- Anna Trifilova (the future of Innovation)
- Katrin Möslein (Open Innovation / Fab Labs)
- Tim Jones (Future Agenda / Growth Champions)
- Joe Tidd (Managing Innovation)
- Frank Piller (Open Innovation)
- Larry Keeley (10 types of Innovation)

- applied Research and Innovation institutes

- ideo / Hasso Plattner Standford (Design Thinking)
- Stanford Research Institute (SRI) (5 disciplines of Innovation / NABC value creation forum)
- MIT Media Lab
- unternehmerTUM (FabLab)

Figure 4.
Illustration of OI theory performing a firm (Screenshot of email)

Figure 5.
Interaction between performative (Nokia) and material (Hype) aspects (Corporate case study)

between performative and material aspects. As is clear, Nokia and Hype intended to "create an innovation culture at Nokia, review innovation platform" in 2015, which indicates an attempt to launch "cultural change," as described by Feldman and Pentland. (2006).

In line with Volkoff *et al.* (2007), the platform had to be redesigned because "that interaction is constrained/enabled and moderated by the material aspects" (p. 843).

Nokia did not specifically measure its innovation culture at the time of our research because, as one interviewee explained, "Those KPIs do not surface, anymore." There did not seem to be a need for this indicator; instead, the company measured "cultural coherence," where innovation is considered as part of a bundle of performances supporting the organizational culture.

In terms of OI and accountability relationships, a difference identified in Nokia's internal innovation was the management of diversity (i.e. "difficult, impossible … easy" ideas). The NOIC uses rating and ranking mechanisms, though only for internal knowledge exploitation. There is little transparency in the evaluation, and the NOIC does not communicate assessment criteria to the submitters. An expert jury conducts the ratings, and the intermediaries provide the infrastructure for evaluation. As is displayed in Figure 6, the uniqueness of an idea is evaluated based on how the idea compares to what already exists in

Figure 6.
Judging view of assessment of innovativeness and strategic fit (PowerPoint presentation presented in interview)

the field. Relative quality improvement ranks lower than the quality "fresh," while "unique" receives the highest score of 3. The platform then organizes the ideas according to an average and detailed score, as is demonstrated in Figure 7.

Then, the operating SKM can be read in conjunction with the evaluative infrastructures described by Kornberger *et al.* (2017, p. 9). It creates relations between actions, behaviors and preferences "to engineer possibilities of a match." In the case of the NOIC, the match is not mutual; rather, it is done according to the firm's "strategic fit." Disruptive innovations are largely disbanded, as it is difficult to obtain commitment within the organization for something that is "really outside the box." Nonetheless, the NOIC invests some effort into finding internal contacts with similar interests that could work on the disruptive innovation with the start-up. The interviews also indicated that absorptive capacity indicators create dilemmas in practice (Kreiner and Mouritsen, 2005). As disruptive innovations are difficult or even impossible to realize, good performance in terms of absorptive capacity may mean pursuing less radical ideas that present more of a strategic fit: "/ . . . /yes, we might have missed a few start-ups with very good ideas if the jurors decide that ok this is not in line with what we are doing now." "/ . . . /So to catch the fish, we might lose some good fish."

During the research process, it became clear that the start-ups' capacity to bring ideas to fruition was a key factor for the NOIC. Questions related to the management of crowds or communities were largely dismissed as irrelevant. This was striking, as these same questions resonated well with the intermediaries and elicited detailed discussion.

Discussion

A performative perspective is useful in understanding how actors behave in a world characterized by risk and uncertainty, as they need not be "correct" or "accurate" in their projections of complex emergent phenomena. The way in which the organizations reviewed in this paper focused their efforts can, according to Orlikowski and Scott (2014), be considered an enactment of a constituted world. In other words, one interviewee from Nokia speaking on the reasoning behind the use of OI described as follows:

> It's because it's kind of hype thing at the moment. So, everybody is organizing open innovation and it's of course, it's something that just must be there even though the reasoning is maybe a little bit vague but still (laughter).

Entities like Nokia and Hype, which engage in the new practice of OI, know that their efforts are part of a larger ecology of relationships and interactions among heterogenous actors. In terms of accountability, the findings of the present study (summarized in Table 3) affirm Scott and Orlikowski's (2012) theory that OI platforms redistribute accountability to meet increased demands for transparency. This research also expands on theory developed by Gassmann and Enkel (2004) and Kornberger *et al.* (2017), suggesting that platforms are

Rank	Entry	Judge progress	Weighted average score	Innovativeness: Is this idea unique (by technology, business model or design)	Strategic fit: Where do you believe this submission would help Nokia?	Business potential: Is the value proposition convincing?
3	[redacted]	43 of 75	1,78	2,23	1,62	1,48
11	[redacted]	39 of 75	1,45	1,3	1,46	1,58
15	[redacted]	39 of 75	1,32	1,66	1,17	1,12
17	[redacted]	39 of 75	1,16	1,23	1,05	1,2
9	[redacted]	41 of 75	1,56	1,9	1,26	1,51
5	[redacted]	40 of 75	1,7	1,8	1,47	1,85
8	[redacted]	40 of 75	1,59	1,55	1,55	1,67
6	[redacted]	40 of 75	1,64	1,65	1,45	1,82
1	[redacted]	41 of 75	2,02	2,31	1,82	1,92
10	[redacted]	41 of 75	1,49	1,95	1,14	1,39
21	[redacted]	38 of 75	1,06	1,23	0,84	1,1

Figure 7.
Example of weighted score (judge's view from PowerPoint)

	Findings	Consequences
What does open innovation (OI) do?	OI is a model, strategy and socio-material practice through which digital designs create an ecology of devices that can enact and enable all kinds of openness	OI is a matter of how peers and firms mobilize OI elements on platforms in different situations and how OI elements are related, connected and allowed to do certain things but not others
Where is open innovation performed?	The interplay between OI theory, crowd and platforms perform the firm	SKM may make crowds ontologically absent when the knowledge is translated into products. However, managers still feel that they are going to be held accountable to the crowd
	Knowledge sharing and productive friction is performed on OI platforms	Firms can argue away different types of accountabilities by embedding hierarchical organizational logic in platforms so that accountability is not evenly distributed, creating a lack of mutual accountability
How is accountability distributed in open innovation?	Managers and their team members are accountable to multiple units, or teams, across the organization, but also to the crowd	Managers and peers can be held accountable as long as their digital reputation trail on the platform exists

Table 3. Consequences of socio-materiality in terms of the distribution of accountability (brief summary of findings)

proposed as a membrane on which infrastructure is conceptualized. It is here in this infrastructure, with its ecology of devices, where organizational transformation that is open to a wider ecosystem of peers occurs.

Our observations partly confirm SKM and OI theory (Chaurasia *et al.*, 2020; Papa *et al.*, 2020; Santoro *et al.*, 2018) that knowledge can be managed effectively in innovation ecosystems, as they ensure that no good ideas are wasted. Strategic fit seems to limit knowledge exploitation, leading disruptive innovations to be disregarded. The Nokia exemplar confirms and illustrates the challenges companies face in achieving harmonious SKM as described by Venkitachalam and Willmott (2017). Hyper controls and structures in the organization impede radical and disruptive innovations. However, focusing on the focal firm as a parameter for OI becomes problematic when the material aspect, technology, is considered. The evaluative infrastructures on platforms allow for combinations of structuration and proliferation of knowledge that move between the external environment, the crowd and the company's internal innovation process.

In this study, we argue that platforms and OI theory perform the OI organization. Chesbrough and Boger's (2014) distinction between "open innovation" and "open collaborative innovation" is irrelevant to the KM system (i.e. to platforms). Platforms can do both; OI is a model, strategy and socio-material practice through which digital designs create an ecology of devices that can enact and enable all kinds of openness. This idea has been given little attention in SKM scholarship. Our paper consolidates theory by D'Adderio and Pollock, arguing that OI organization emerges over time as the outcome of performative struggle.

Chesbrough and Boger (2014) previously explained causal models in which OI elements predict value creation for the firm. However, to identify where OI was being performed, the present research returns to the original and, at the time, radical revelation that innovation performance may happen outside of the hierarchical consciousness of the firm. In contrast to earlier studies on SKM and OI, the present study examines questions of accountability when OI platforms create knowledge, as they draw in actors and other devices. The question of

openness is, from a performative perspective, a matter of how peers (including firms) mobilize OI elements on platforms in different situations and how OI elements are related, connected and allowed to do certain things but not others. To answer Dahlander and Gann's (2010) original question, "How open is innovation?" one must examine a firm's strategy in which openness is given meaning. The problem with decoupling collaboration from OI is that the indicators identified for successful OI performance are measures of collaborative capability and competence. In this study, we have found that, in practice, firms must consider the performance of the external crowd and must, at times, invest resources into their training and education. Codification (López-Nicolás and Meroño-Cerdan, 2011) as a KM strategy becomes problematic in OI. When the crowd is first invited to a dialogue and then made ontologically absent when the knowledge is translated into products, managers still feel that they are going to be held accountable to the crowd. Absorptive capacity, while "actively exploring with the crowd," goes both ways. In terms of strategy, the use of external knowledge for a firm remains a question of acquisition, dissemination and application. However, in line with Kornberger *et al.*'s findings (2017), the present study argues that evaluative infrastructures "relate," "evaluate" and "disclose," which has consequences for managers, a firm's strategy, and external actors. The knowledge produced is tentative. Knowledge sharing on platforms draws in actors that the evaluative infrastructures assess as aligned with the firm's strategy. Thus, platforms disclose openness, without which OI could not operate. They create "an openness wherein things and people can show up" (Kornberger *et al.*, 2017).

The findings demonstrate accountability relations on platforms as a socio-material configuration of strategy (i.e. challenges formulated by firm plus innovation intermediaries), platform (designed by innovation intermediaries) and external crowd, wherein the entities engaging in OI are accountable to the crowd. Technology embeds a multiplicity of accountabilities into organizations. Relations of accountability are understood according to innovation intermediaries and OI theory as issues of KM and transparency enabled by digital infrastructure. In this ideal of transparency, platforms guarantee that anyone can observe how organizations and people, as well as "technologies, their boundaries, properties and identities" (Cecez-Kecmanovic *et al.*, 2014), are continuously performed. However, there still remains a question as to the consequences of socio-materiality (Orlikowski and Scott, 2014) in terms of the distribution of accountability.

The field study has also revealed how the desire to make inter- and intra-dependence visible leads to the development of a culture of innovation. This study has illustrated the theory on the impact of organizational culture on KM systems and processes and their link with organizational performance (Chaurasia *et al.*, 2020; López-Nicolás and Meroño-Cerdan, 2011). However, control increasingly works through culture, and the transparency ideal enabled by digital infrastructure also regulates identities by producing particular cultural and normative conditions for human conduct (Flyverbom *et al.*, 2015). Crowd accountability and IP were often presented as intertwined in the interviews, and it was suggested that crowds could also be held accountable for the evolution and result of a contribution posted on an OI platform. In one interview, an external crowd member was likened to an author who owned an idea and could be confronted on it, as the "author is accountable to the rest of the community." Such responses are interesting, as they point to a practice whereby OI builds on the expectation that the author is open and shares knowledge, while also being responsible for the idea in a process that involves both serendipity and "relational drift" (Revellino and Mouritsen, 2015). These observations invite questions on both the limits of traceability and accountability, as we expect the author to measure up to multiple and conflicting accountabilities, which is in itself ethically questionable. A dimension of temporality is also introduced into disruption and innovation, as IP is a way to end an author's accountability, but transparency could also imply that an author is held accountable as long as their digital reputation trail exists (i.e. for a long time).

Conclusion

The present study has answered calls made by Kornberger *et al.* (2017) and Stark (2009) to extend previous research's analytical focus from hierarchical settings to the heterarchical. Our study has consolidated Scott and Orlikowski's (2012) theory of a presumed shift to a strategy of digitally enabled openness, which brings its own issues, as platforms relate actors and perform a redistribution of accountability.

Implications for practice

This field study has brought to light the various SKM dilemmas faced by managers and intermediaries when balancing business strategy and openness. Thus, this study complements theory on social dilemmas (Halisah *et al.*, 2021) in SKM practice. Knowledge sharing and productive friction (Stark, 2009) is performed on platforms, but, as firms interact with the ostensive and material elements of OI, they appear to become increasingly hierarchical. The present research extends this theory by addressing accountability. The material aspect of OI frames accountability, configuring the intelligible identity as accountable in certain "regimes of truth" (Butler, 2001). In the case of Nokia, internal sponsors and trained and educated finalists give better accounts to the NOIC jury. In terms of accountability, multiplicity does not pose problems if the evaluative infrastructures enable diverse accounts, which they often do. A dilemma occurs when OI peers face multiple demands of accountability (Messner, 2009), where the accountable-self lacks alternative ways to express accountability. In the heterarchies we studied through this research endeavor, managers and their team members were accountable not only to multiple units, or teams, across the organization, but also to the crowd. We argue that the reluctance to be held accountable that enables a firm to build different levels of openness on platforms be understood as a problem of conflict between hierarchical and lateral accountability systems. Based on this understanding, devices concentrate observations in certain ways, and their representations make certain properties become determinate (Barad, 2007), while others are specifically excluded (Orlikowski and Scott, 2014) since they do not fit the strategy. Firms can argue away different types of accountabilities by embedding hierarchical organizational logic in platforms so that accountability is not evenly distributed, creating a lack of mutual accountability. In line with Flyverbom *et al.* (2015), we interpreted transparency in definitions of OI as a productive force that is both "*conditioned upon* and *conditions* a host of relations, actions, and norms for conduct." Being open is, from firms' perspective, vital for employee and customer satisfaction, accountability and legitimacy. The narrative of achievements (Corvellec, 1996) produced by definitions of OI are conditional according to those doing OI; therefore, they can be understood as "exposed" in Messner's (2009) sense of the term. Peers are also "mediated" and must speak "several languages at the same time" (Messner, p. 931), which can result in conflicting accountabilities and thus new managerial challenges.

Our findings on the performative aspect of OI shed new light on existing SKM theory and add to a growing body of knowledge that indicates that apparatuses, such as platforms, are performative, as they organize performative practices. However, our empirical observations suggest that, in practice, socio-material devices are not always able to organize and "close the loop" with the crowd engaging in the performance.

Limitations and future research

With respect to our study's limitations, we note that our research was focused only on a snapshot in time and that the findings may have been different had the study been conducted over a longer period. More firms could also have been included; but for reasons of idiosyncrasy and context, we focused on one. The case studied here illustrates the difficulty in

pushing innovation performance beyond firms' "hierarchical consciousness." Prior research has considered paradoxical tensions (Jarvenpaa and Wernick, 2011) in OI and navigating paradox as a mechanism for change and innovation (Jay, 2013). During our research, paradox took the form of dilemmas in the practice of OI. As has been demonstrated, factors like openness and absorption produce performative struggles, and further research on the design of management control for "distributed authority" (Stark, 2009) could be considered.

By considering both innovation intermediaries and a firm, the present paper has examined practices of openness as transparency, as well as practices of relative openness characterized by opacity. Nokia's "openness" performance is a careful balancing act that combines transparency and opacity in an effort to create excitement and curiosity about their new products and innovation culture. Nonetheless, this transparency is performative, and different framings of OI create overflows (Callon, 2007) and work back on those subject to it (Roberts, 2009), which, in turn, invites new questions on accountability relations. According to Hultin (2019), responsibility, viewed from a socio-material perspective, is the ability to be responsive to the possibilities of becoming in each moment, where one has to ask, "Is this what I am doing?" or "Did I do that?" However, as Schumpeter (1947) observed 70 years ago, disruption can take considerable time to reveal its true features and the ultimate effects of performance of an innovation. One might then ask, as we do in the present study, what the limits of accountability in heterarchies are.

A final research direction that we recommend for the future is issues of trust. Two global megatrends, also identified by Nokia, are augmented intelligence and (platform-enabled) distributed trust. If OI is to create and manage openness, wherein things, ideas and people can show up, the challenge for both platform organization and research is how to account for instances in which members of the crowd move outside the platform's calculations and metrics. In this study, there were stories of accumulation and regeneration, of innovations not "showing up," as "tracking is not always easy" and great ideas becoming part of something bigger or being sold in a bundle of products or services. This is in line with Revellino and Mouritsen's (2015) observation of a "drift" that calculative devices and innovation co-produce. Our empirical observations also suggest system trust for managing this drift and making such traces visible. A new generation of platforms combined with internet of things and artificial intelligence could be the solution. Our concern with such accounts of future performance is that they separate notions of the social and material and have predefined views of boundaries and properties. We believe that these ideas represent fruitful opportunities for future research.

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