

# Multiplex boundary work in innovation projects: the role of collaborative spaces for cross-functional and open innovation

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## Abstract

**Purpose** – This study investigates the role of collaborative spaces as organizational support for internal innovation through cross-functional teams and for open innovation with external stakeholders. In particular, the study focuses on collaborative spaces as tools for multiplex (i.e., simultaneous internal and external boundary management in innovation projects).

**Design/methodology/approach** – The authors conducted a qualitative study in a multi-divisional organization that set up in its headquarters a collaborative space for collaborative product development. Data were collected through semi-structured interviews and participant observations.

**Findings** – Findings highlight that the relation between expectations and experiences about the collaborative space impact on employees' ability to perform boundary work inside and outside the organization. In addition to the collaborative space's affording role for expectations about hands-on collaborative innovation (space as laboratory), the study also highlights a set of collaboration constraints. These latter are generated by perceived boundary configurations (i.e. degree of boundary permeability and infrastructure in internal and external collaborations) and by discrepancies between expectations (space as laboratory) and actual collaboration experiences in the space (i.e. space as maze, cloister, showcase and silo). We show that space-generated constraints slow down internal and external boundary work for innovation and generate a trade-off between them.

**Originality/value** – Using the process-based perspective of boundary work, the paper connects studies on cross-functional teaming and open innovation through the concept of "multiplex boundary work." It also contributes to the literature on boundary work by showing the challenges of using collaborative spaces as organizational support tools for multiplex boundary spanning.

**Keywords** Cross-functional teams, Open innovation, Relational capabilities, Boundary work, Collaborative spaces, Boundary objects

**Paper type** Research paper

## Introduction

An organization's ability to innovate is often associated with the ability to cross boundaries, be they internal (i.e. by means of cross-functional innovation teams) or external (i.e. by means of



open innovation projects involving external stakeholders). As organizations attempt to cross internal and external boundaries in the search for new innovation-based competitive advantages, generating innovative ideas and ultimately transferring them into the market become increasingly complex (Chesbrough *et al.*, 2006; Clark and Wheelwright, 1993; Edmondson and Harvey, 2018; Thamhain, 2003). Innovation studies usually treat internal innovation and open innovation separately, to highlight their unique challenges and opportunities. In doing so most works have adopted a configurational approach and have tried to identify the characteristics that such collaborations must have to maximize innovation outcomes. For instance, conducting open innovation with diverse stakeholders such as clients, suppliers and users is an opportunity in terms of better knowledge flows, more diverse learning opportunities and timelier and more adequate responses to the market. At the same time, risks include high coordination costs, cultural and professional barriers, opportunism, difficulties to converge towards a common goal and intellectual property rights management (Brown and Eisenhardt, 1995; Jassawalla and Sashittal, 1999; McDonough III, 2000). Similarly, studies on internal innovation suggest that participants' diversity in cross-functional teams may fuel but also seriously deter innovation processes (Edmondson and Harvey, 2018; Holland *et al.*, 2000; Lovelace *et al.*, 2001). Risks concern the complexity of managing multiple actors with diverse backgrounds and channeling them towards the same objectives which in innovation situations are often multi-faceted and ill-defined (Tushman, 1978).

It is noteworthy that organizations often make use of external and internal innovation simultaneously, crossing both functional and organizational boundaries in order to successfully manage their portfolio of innovation projects. However, not only have external and internal boundary spanning for innovation rarely been studied together, but their benefits and challenges have also not been integrated within a common frame. In this work, we focus on the concept of "boundary work" (Carlile, 2004; Faraj and Yan, 2009; Langley *et al.*, 2019) to connect the concepts of internal and open innovation. By multiplex boundary work we refer to those strategies that members of organizations enact to construct, tear down and reshape differences in internal cross-functional teams and in open innovation teams simultaneously. To this regard, we already know that relational capabilities, or the organizational skills required to manage resources shared between heterogeneous stakeholders (e.g. De Silva and Rossi, 2018; Dyer and Singh, 1998) play an important role in successful collaboration for innovation. However, how organizational *members* may leverage relational capabilities to engage in these activities *simultaneously*, and with what consequences for an organization's ability to innovate, still need to be addressed. Importantly, in line with the boundary work framework, we highlight that collaboration boundaries are often managed through concrete tools and creative practices made available by the organization. The literature on creativity and innovation has underlined the fundamental role of physical proximity and shared organizational artifacts (i.e. boundary objects) in favoring boundary work in innovation processes. The implicit assumption is that proximity boosts relational capabilities such as increased attention to others' needs, familiarity, coordination, and spontaneous conversations enabled by face to face encounters and interactions (Bechky, 2003; Kiesler and Cummings, 2002; Koskinen, 2005; Nicolini *et al.*, 2012). Collaborative spaces are physical spaces specifically designed and built to support the creativity of individuals, groups and organizations by leveraging on physical proximity (Capdevila, 2015; Furnari, 2014; Garrett *et al.*, 2017; Oksanen and Stähle, 2013). We are thus concerned with the strategies by which organizations try to enact internal and external boundary work simultaneously, and we inquire about the strategies that allow them to do so, focusing on the role of collaborative spaces as support tools for internal and external innovation.

To this purpose, we conducted a qualitative study in a multi-divisional organization in the food industry that created a collaborative space in its headquarters in order to foster collaboration in both internal and external innovation projects. We studied the impact of the

collaborative space on employees' ability to simultaneously perform internal and external boundary work by comparing their expectations about the space with actual experiences of it. Findings show that collaborative spaces are expected to have revolutionary effects on how employees collaborate across organizational functions and with external stakeholders such as clients, suppliers, consumers and the public press. In particular, by serving as a laboratory (i.e. being plastic, informal and central) the space is expected to tear down internal and external boundaries, affording free knowledge exchanges and an improvement in creativity and knowledge exchange quality. Although we confirm that a collaborative space may afford the alignment between participants' initial expectations and actual experiences, we also show that increasing diversity in collaborations can trigger unexpected constraints that generate a trade-off between participants' ability to perform internal and external boundary work.

In addition to linking studies on cross-functional teaming and open innovation through the boundary work perspective, we propose the term of multiplex (internal-external) boundary work and describe its mechanisms, including the paramount role played by materiality and the role of (perceived) boundary configurations. Drawing on our theoretical contributions, we also discuss implications for how organizations may design feasible spaces for different forms of collaboration for innovation.

### **Theoretical framework**

*Crossing internal and external boundaries to innovate from cross-functional teams to open innovation*

*Internal innovation: cross-functional teams for product development.* Ancona and Caldwell (1992) define a cross-functional product development team as a collection of members of different departments and disciplines brought together under the same responsibility and given the charge not only to make product development decisions but also to provide support for them throughout the organization. Research on cross-functional teams has largely adopted a configurational perspective – i.e. investigated the team compositions and conditions that maximize advantages and minimize disadvantages for innovation outcomes. According to existing studies, participants' diversity – i.e. the personal, organizational and professional differences that members bring along in a cross-functional team, drives both opportunities and disadvantages of collaborative innovation. On the one hand, diversity is shown to increase creativity in the development process. Brown and Eisenhardt (1995) showed that an increase in the amount and variety of information available to design products allows team members to understand the design process more deeply and quickly, such that the overall project performance, learning opportunities and quality of information exchanged are improved. On the other hand, however, studies suggest that diversity of viewpoints may generate and escalate conflict at the team level (Dahlin *et al.*, 2005; Holland *et al.*, 2000; Lovelace *et al.*, 2001). Another frequently mentioned characteristic of cross-functional teams is their being assigned to development projects on a temporary basis. This characteristic may push members to act creatively and overcome rigid roles and organizational structures, on the one hand, but also risks increasing coordination and negotiation costs at the team level, on the other hand. Moreover, cross-functional teams often face high-performance expectations and aspirational goals such as compressing development times, creating new knowledge and enhancing organizational learning. While such expectations may stimulate members to top perform, they may also generate stress and conflict, including scapegoating at the team level or competition for resources (Dahlin *et al.*, 2005; Lovelace *et al.*, 2001).

*External boundary work: open innovation with external stakeholders.* As sources of innovation become more diverse and distributed throughout industries and geographic regions, firms shift the focus beyond their own organizational boundaries, often engaging in collaboration with external stakeholders such as other organizations, clients, consumers,

NGOs and other societal actors to create joint intellectual property (Baldwin and Von Hippel, 2011; Chesbrough 2003a, b; Greer and Lei, 2012; West and Bogers, 2014). Research has discussed open innovation as a paradigm according to which infusing external ideas in product development can provide significant competitive advantage for an organization, especially if aligned with the organization's business model (Chesbrough, 2003a, b; West and Bogers, 2014; Zott *et al.*, 2011). Just as in the case of cross-functional teams, the literature on open innovation has taken a configurational approach, focusing on the type of actors taking part and the form of collaboration taking place, the drivers for participating in open innovation projects, and the characteristics of innovation outcomes (West and Bogers, 2014). For instance, while most research still refers to dyadic collaborations (Bercovitz and Feldman, 2007; Li and Vanhaverbeke, 2009), attention is shifting to innovation networks and innovation communities. These latter are characterized by the presence of a large variety of stakeholders holding different background and abilities to participate to the development process, as well as different incentives and levels of motivation (Baldwin and Von Hippel, 2011). Echoing the findings in the cross-functional team literature, recent contributions identify also a list of disadvantages, such as difficulty in establishing overarching goals, conflict escalation due to diverse backgrounds, high coordination costs due to heterogeneous capabilities and motivations, and the difficulty of incorporating external ideas into a single company's products and services (Baldwin and Von Hippel, 2011; Greer and Lei, 2012; Lifshitz-Assaf, 2018; West and Bogers, 2014). Other studies mention strategic disadvantages at the firm level, including the trade-off between resources donated to project partners and results obtained, or loss of strategic control, information and competitive advantage at the organizational level (Spaeth *et al.*, 2010; Stam, 2009).

*Performing boundary work in cross-functional teams and open innovation*

Summarizing, despite adopting similar perspectives grounded in a configurational approach, internal and external boundary work for innovation are often treated separately in the innovation literature, as cross-functional teams, and open innovation, respectively. Interestingly, a few studies suggest that configurations of diversity -be they internal or external- do not explain by themselves innovation performance, such that more attention must be paid to relational capabilities that allow organizational members to leverage diversity in collaborative innovation. Following a relational view, relational capabilities are defined as the capacity of an organization to purposefully create, extend, or modify its resource base by demonstrating willingness and ability to partner with stakeholders across boundaries (Dyer and Singh, 1998; Helfat and Peteraf, 2003). Different components of relational capability have been highlighted (e.g. De Silva and Rossi, 2018; Johnsen and Ford, 2006). For instance, De Silva and Rossi (2018) identify three macro-types of relational capabilities. Structuring capability regards an organization's ability to set up ex ante structures such as contracts, mutually accepted frameworks or platforms to facilitate collaboration. Alignment capability refers to partners' ability to align their goals, objectives, and practices (e.g. partners' effective leveraging of knowledge and experience, their ability in project management and coordination). Finally, communication capability denotes the ability to maintain dialogue and find consensus (see also Bäck and Kohtamäki, 2015; Capaldo and Petruzzelli, 2011; De Silva and Rossi, 2018; Gulati and Sytch, 2008; Perkmann and Salter, 2012). However, by focusing on the *type* of relational capabilities needed, many studies in these macro areas have not shed light on the way relational capabilities are leveraged by organizational members in collaborative innovation. An exception is constituted by the study of Swan *et al.* (2007) who propose to switch attention from relational *capability* to relational *processes*. The authors highlight that the success of collaboration in interorganizational partnerships depends on partners' ability to align interests, expectations and commitments during a collaboration, by negotiating aspects such as credibility, values and perceptions in their everyday work. The configurational approach then can be complemented by studying boundary deployment – i.e., the process of blurring boundaries between

capabilities developed and nurtured within a firm and those developed through external relationships (Hakansson and Gadde, 2001; Swan *et al.*, 2007).

In advancing the literature on relational capabilities, then, and in clarifying how R&D collaboration occurs simultaneously across internal and external boundaries, a central role is played by boundary management processes. These refer to strategies enacted by members of a team to obtain information and resources from diverse sources, to initiate interactions with, and respond to communications from, other parties inside and outside the organization, despite differences. In innovation studies, research on boundaries is still in its initial stages. For instance, Boscherini *et al.* (2010) talk about the boundary management strategies that can help firms to identify, plan, and manage a pilot project for open innovation and Koskinen (2005) about the ability to recognize and correctly use boundary objects to overcome innovation barriers. However, studies on boundary work conducted in other settings suggest that there is no “correct” way to use a boundary object, and that boundary objects are often created and re-created ad-hoc, instead of waiting to be planned or recognized by project members. For instance, it has been shown that individuals can leverage diversity in highly creative ways, acting as resourceful strategists that simultaneously defend and tear down functional boundaries (Bechky, 2003; Carlile 2002, 2004; Edmondson and Harvey, 2018; Kellogg *et al.*, 2006; Majchrzak *et al.*, 2012; Ungureanu and Bertolotti, 2018).

Therefore, focusing on transitions between breaking and defending boundaries, or on interplays between setting up and interpreting boundary objects may further help understand the dynamics of collaborative innovation, especially when analyzing internal and external collaboration together. To shed light on these issues, we further turn our attention to the literature on the role of collaborative spaces as organizational support tools for boundary work.

#### *The role of collaborative spaces for boundary work and innovation*

Increasing evidence suggests that the success of cross-functional innovation teams depends on organizations’ ability to provide support and facilitation. This can happen, for instance, by creating collaboration structures such as new organizational roles, project brokers, collaboration contracts or appropriate climates for learning and innovation (De Silva and Rossi, 2018; Donnellon, 1993; Dougherty, 1992; McDonough III *et al.*, 2001). While many studies have traditionally focused on the role of contracts and brokers for R&D collaboration, more recently attention has shifted to informal collaboration structures and in particular to collaborative spaces for cross-functional work (Cabral and Van Winden, 2016; De Vaujany *et al.*, 2019; Garrett *et al.*, 2017; Ungureanu *et al.*, 2018b).

The creation of collaborative spaces within organizations is based on the assumption that face-to-face contact has a positive impact on the propensity of individuals with different backgrounds to interact and exchange ideas (Narula and Santangelo, 2009; Oksanen and Stähle, 2013), thus favoring the development of creative collaborative communities (Garrett *et al.*, 2017; Ungureanu *et al.*, 2018a). It is interesting to notice that collaborative spaces have the potential to meet the double challenge of internal and external collaboration for innovation (Ungureanu *et al.* 2018b, 2020). In cross-functional teams, proximity increases the chances of spontaneous knowledge exchange, fast decision making, timely responses to the needs of others, creativity and market success, while isolation and geographical distribution have the opposite effect (Ambos *et al.*, 2016; Meyer *et al.*, 2011). Regarding open innovation, studies on “third places” such as co-working and makers’ spaces show that actors from different organizations are encouraged to pursue creative outcomes thanks to absence of hierarchical structures, flexibility and freedom. At the same time, they also enjoy some typical advantages of the organizational life like access to networking opportunities and

participation to the social life of a community (Gandini, 2015; Howell and Bingham, 2019; Spinuzzi, 2012).

As highlighted above, studies on collaborative spaces have also adopted a configurational approach, correlating physical features of spaces and affordances for innovation (e.g. “open space” and “informality”). However, the same studies acknowledge that the role of organizational space in innovation behavior is still ambiguous and that practical attempts to control informal interaction in organizations through workspace design often result in failure (Fayard and Weeks, 2007; Pearce *et al.*, 2016; Ungureanu *et al.*, 2019). To this concern, researchers highlight the need to study the relationship between organizational space and organizational boundary management.

Specifically, it has been argued that the materiality of spaces is essential for organizational members to accomplish common projects because it co-locates them in the same dimension, encourages them to explore each other and enables them to create a common tangible ground for mitigating differences (Elsbach and Pratt, 2007; Van Marrewijk and Yanow, 2010). Yet, physical spaces can also act as barriers whenever participants feel threatened inside a cross-functional project. It results that although the material dimension of spaces matters, what we usually refer to as materiality does not derive from the use of spaces itself, but from the entanglement between material artifacts and social action – the myriad of interpretations, intentions, goals and expectations that individuals project towards collaborative spaces as well as towards each other (Carlile *et al.*, 2013; Leonardi, 2012). For instance, layouts of organizational spaces (walls, doors, furniture, colors, and sizes) will combine in unique ways with the symbolical, affective, ethical or ideological connotations given to them by users, becoming ad hoc tools for innovation projects. A compartmented but modular space may protect participants and allow them to have open meetings in the idea generation phase of a development project, on the one hand, but also to find concentration and privacy in subsequent phases of idea elaboration and refinement (Elsbach and Pratt, 2007).

In conclusion, many studies explore the configurational properties of teams for collaborative innovation, the configurational properties of collaborative spaces, and their impact on innovation outcomes. To expand this literature, we propose a switch from configuration to processes (Edmondson and Harvey, 2018). We propose to pay closer attention to the uses of boundary spaces in cross-functional and open innovation, especially in relation to individuals’ need to perform multiplex (i.e. internal and external) boundary work and to their innovation outcomes. A focus on multiplex boundary work processes not only can help us understand how internal and external boundaries are managed jointly in innovation projects, but also contribute to the call in the boundary work literature for a deeper understanding of multiple boundary spanning (Langley *et al.*, 2019).

## Data and methods

### *Context: FoodCorp’s collaborative space*

We draw on empirical evidence from a six-months field study to explore the role of a collaborative space set up inside an organization aiming to promote internal (cross-functional teams) and external (i.e. open innovation teams) projects for product innovation.

The context studied is a multinational group in the food industry, fictitiously labeled FoodCorp. Founded in 1870s in Italy as a food shop, today FoodCorp is a world leader in the food market in different segments, with estimated three billion turnover and approximately 8,000 employees across the world, counting more than 25 production sites and exporting to over 100 countries worldwide. As a benchmark in production and distribution processes, FoodCorp also invests in continuous innovation. Among FoodCorp’s strategic goals are those of pursuing product and process innovation for expanding its market share, reducing environmental impact, and promoting healthy lifestyles. Traditionally, FoodCorp’s

innovation projects adopted a “phase and gate” model that divided the development process into neatly distinct stages such as scouting, design, testing and validation, industrialization and launch, separated by decision points (i.e. gates). While such organization allowed for both efficient specialization and collaboration, it also lacked flexibility, undermining the creativity of the single participants and the overall innovativeness of the projects. Consequently, FoodCorp set up in 2015 a collaborative space within its headquarters to propose less constrained collaborations between organizational functions, and between headquarters and local branches, in addition to increasing interaction with external stakeholders. The collaborative space (from now on, CS) was designed and managed by the Research and Development Department of the Group, and commonly hosted work-teams composed of employees from company’s multiple departments and offices, clients, suppliers, consumers, consultants, opinion leaders, bloggers, journalists, master’s students and researchers. Each project team was called upon to solve a need or to optimize a product, or a process, within projects that lasted from several weeks to more than a year. The CS was created following a ‘smart urban’ style. It occupied a former factory building that was owned and operated by FoodCorp. It was set up as an open space with minimalist design furnishings based on recycled materials. Given the focus on interactive and hands-on collaborative sessions, the furnishings of the space were for the most part mobile, so that the actors involved could change the space layout according to emergent needs at each session of use. In 2016, more than 200 people from different countries (Zimbabwe, UK, Congo, Canada, Colombia, Italy) and the most varied skills, from communication to marketing through design and sales, participated in innovation-related projects within the CS. FoodCorp is currently also trying to test the new approach to innovation in other local offices in Sweden and the United States.

*Research design and data collection: a grounded theory approach*

We conducted a 6 months field study in FoodCorp and we defined a qualitative case study in accordance with the grounded theory approach which implies iterations between data collection, data analysis and theorizing (Strauss and Corbin, 1998).

We collected data continuously in the time span between February 2018 and June 2018, and sporadically in the period from June 2018 to September 2019 (i.e. we entered and exited the contexts 5 times for various research purposes such as new rounds of thematic exploration, confirmatory analyses of the coding scheme, managers’ follow-up requests and verification of the final model with the CS managers and users). We employed multiple data sources to support our theory building process, specifically, semi-structured interviews and participant observations. We collected more than 60 h of observations in the field and we conducted 31 semi-structured interviews.

*Semi-structured interviews:* The semi-structured interviews were conducted face-to-face and have an average duration of 110 min. The interviews were organized around a set of open-ended questions following an interview protocol that focused on issues related to expectations, perceptions, management and use practices of the CS. We interviewed 24 persons internal to the organization, coming from six different functional areas and seven externals, including actors from other organization and master’s students. 58% of informants were females. All interviews were fully recorded and transcribed. Table 1 summarizes key characteristics of the informants involved in the data collection.

According to the grounded theory approach, the interview protocol was continually adjusted during the research. Simple open questions included: “Describe innovation projects in FoodCorp”; “Describe the collaborative space”; “Why and when do you use the collaborative space?”; “Describe an innovation project in which you participated in the collaborative space.” Some questions entering into more details, guided from respondent’s answers, included: “Who do you collaborate with more often in the collaborative space, and why?”; “What are some

Functional areas	Role description / mission in the CS	Informants	Years in the Org
CS Managers	Space management and innovation project design: open innovation design; collaboration process facilitation, applied collaboration sessions, space design, space planning, coordination of both internal and external innovation projects	2 (female)	>10 (1) <5 (1)
HR	Plan, manage and evaluate operations of the Human Resources department, including knowledge management, talent development, organizational welfare programs etc.	1 (female) 1 (male)	>10 (2)
Marketing	Research, determine, examine and evaluate demand for new and existing products, targeted campaigns and promotional strategies, market research interface	4 (male)	>10 (3) <5 (1)
Quality	Coordinate and manage all the quality control and prevention activities of a production process, to ensure that all product process meets internal and external standards	1 (female)	>10
R&D	Research and development in technological innovation related to improving products and production processes or creating new ones; with other functions define new product specifics and follow new product industrialization; manage org. knowledge for innovation	8 (female) 6 (male)	>10 (12) >5 (2)
Sales	Plan, organize, direct, control and evaluate the activities of companies and departments involved in commercial, industrial, institutional, e-business and wholesale sales activities	1 (female)	>5
External stake holders	Masters' students working under supervision on specific innovation challenges launched by the organization Business consultants on open innovation implementation using design thinking method Customers (retailers) invited to contribute to specific new product development projects	5 (female) 2 (male)	<1 (7)

**Table 1.**  
Key aspects of data  
collection: informants'  
details

collaboration-for-innovation challenges you faced inside and outside the CS?; "How do you manage differences during innovation projects and how satisfied are you about what you accomplished during CS sessions?"; "Can you describe a meaningful innovation project in which team differences were managed with satisfying/unsatisfying results?"

*Participant observation:* During the in-residence period inside FoodCorp we also conducted participant observations of many occasions. We observed our first meetings with the CS manager, and 8 episodes of FoodCorp's work life (3 observations of open work spaces in FoodCorp, 2 observations of the meeting rooms adjacent to the CS, 1 observation of a guided tour to the pilot R&D production plant, 2 observations of R&D offices). Moreover, we conducted 5 observations of the CS: 3 observations of collaborative sessions organized in the CS, 2 observation episodes of external stakeholders (i.e. master's students) working in the CS on a project assigned by FoodCorp. Finally, we also conducted observations during feedback and follow-up sessions with our informants at the end of the project. About 80% of the observations were conducted by the first two authors who checked field notes and discussed them after each observation episode. The remaining was conducted by a research assistant who worked under the supervision of the first author.

#### *Data analysis*

We analyzed our data following the grounded theory methodology (Strauss and Corbin, 1998) which is particularly useful for investigating arguments that provide insufficient theoretical guidance for a deductive approach, and for showing how, rather than why, processes occur



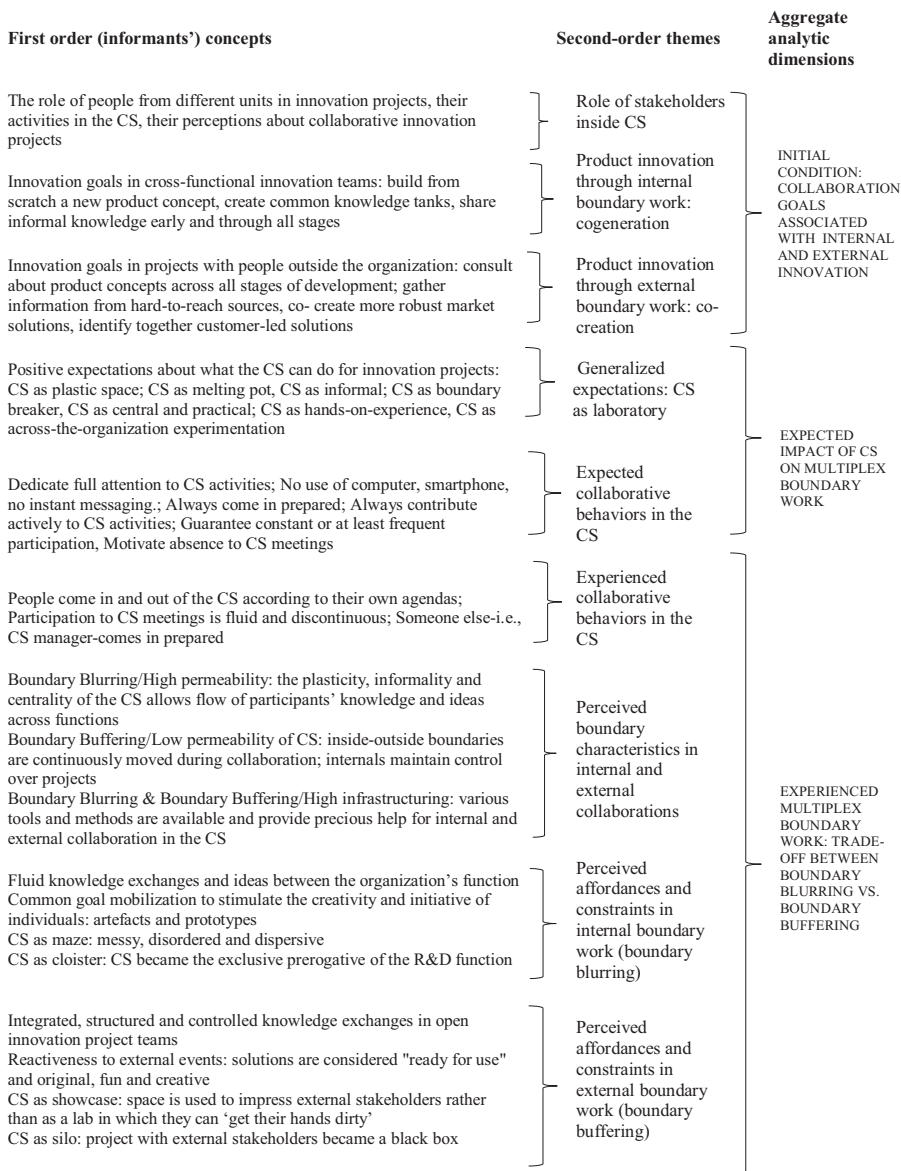
and unfold (see also [Sousa and Hendriks, 2006](#)). Prior studies using a qualitative grounded theory approach to cross-functional innovation and open innovation ([Dougherty and Takacs, 2004](#); [Jassawalla and Sashittal, 1999](#); [Leonardi, 2011](#); [Seidel and O'Mahony, 2014](#); [Swan et al., 2007](#)) were additionally used as sensitizing devices for data collection and analysis.

After we transcribed interviews and observations into field notes, we imported them into an integrated database. In the beginning, we read independently the transcripts to identify original terms and phenomena in the data, group them into categories, and generate first order (informant centric) concepts. We regularly met to analyze sets of two or three transcripts, discuss our independent coding, and agree on first-order concepts. Specifically, during the first rounds of coding we identified several aspects related to our research questions such as perceived influence of the CS for collaborative innovation (negative and positive perceptions and feelings about the space), expectations about CS features and about collaboration with others, perceptions about collaboration differences (i.e. boundary perceptions) and references to strategies for managing collaboration differences (i.e. boundary work strategies, for instance, boundary blurring and boundary buffering). Then, by separately clustering convergent categories at a higher level of abstraction, we looked for relationships among first-order concepts to identify theoretical categories (i.e. second-order themes). Specifically, in a following round we perfected our coding scheme by grouping the aforementioned open categories into second ordered themes. For instance, the first order categories regarding informants' expectations about what the CS could do for innovation projects (CS as plastic space; CS as melting pot, CS as informal; CS as boundary breaker, CS as central and practical, CS as hands-on-experience, etc.) were grouped under the second-order theme "Generalized expectations: CS as laboratory." Similarly, informants' expectations about their colleagues' behavior in the CS (dedicate full attention to CS activities, no use of computer, smartphone, no instant messaging; always come in prepared; motivate absence to CS meetings, etc.) were grouped under the second-order theme "Expected collaborative behaviors in the CS." In a following phase, we further grouped the second-order themes into theoretical aggregates. For instance, the two aforementioned categories were grouped under the label "Expected impact of CS on multiplex boundary work." As a final step in our coding, we identified relationships between second-order themes and aggregate theoretical dimensions. To do so, we coded for critical incidents regarding the aforementioned categories, specifying frequency (things happen often or seldom) and causation (one appears to cause another) ([Saldaña, 2015](#)). After further refinement, we connected the previously identified categories following a process-oriented perspective ([Langley et al., 2019](#)) and organized the model in three stages showing how the organization manages internal and external boundaries with the help of a collaborative space. [Figure 1](#) provides a representation of the three levels in our data structure.

Throughout the coding process, we met frequently to discuss about the themes we had identified independently and to solve disagreements. We used the Nvivo software to perform all the stages of coding. To validate our model, we organized two meetings, one with the CS managers and one with the CS managers and eight informants who agreed to give us feedback on the model. We took extensive notes of their comments and suggestions and we modified the grounded model to account for the new information. For instance, we refined our connections between categories in the model, and came up with new information regarding a pivotal category in our model (i.e. perceived trade-off between internal and external boundary work).

## Findings

To better illustrate our empirical evidence, we anticipate our grounded model in [Figure 2](#). In the next sections we provide evidence for the different categories of the model.



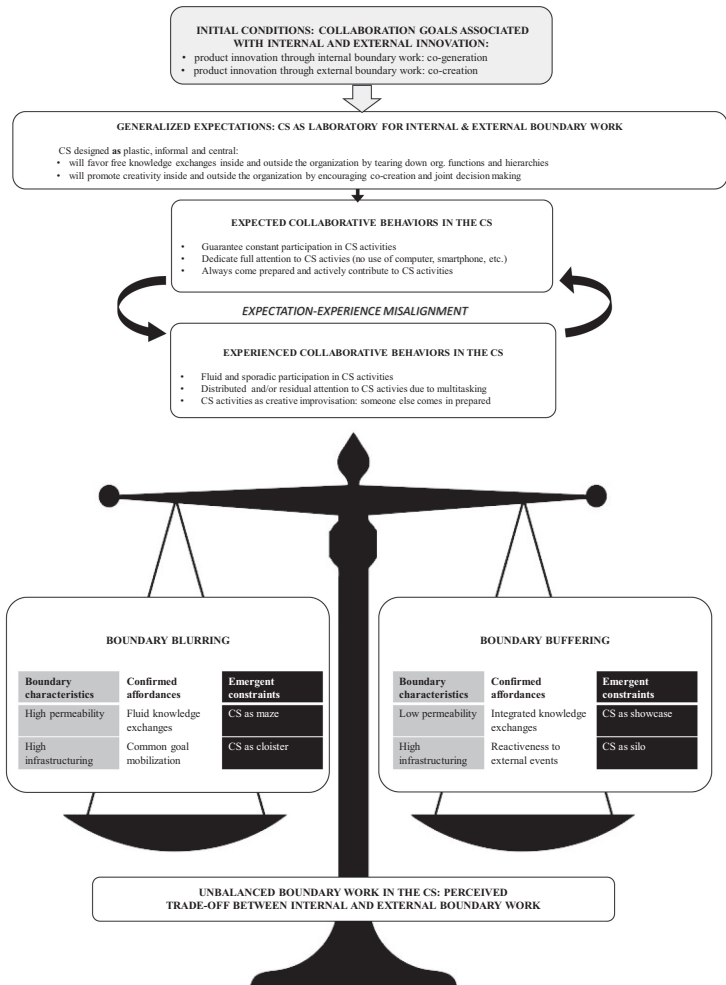
**Figure 1.**  
Data structure of the  
grounded model

*Initial conditions: collaborative goals associated with internal and external innovation*

At the origins of the process that we investigate lies FoodCorp's pressing need to overcome pre-existing processes for product development by trying to "de-structure the product innovation processes in place" and overcome "product development bureaucracy," as many informants explained to us. When we entered into the field, therefore, we identified a pervasive rhetoric regarding the need to embrace change in the development process, leveraging, in addition to the "stage and gate" model, on the alternative approach of design thinking, based on participative and iterative product development. As the manager of the CS

EXPECTED IMPACT OF  
CS ON MULTIPLEX  
BOUNDARY WORK

EXPERIENCED  
MULTIPLEX  
BOUNDARY WORK  
IN THE CS



**Figure 2.**  
A grounded model of the role of collaborative space as organizational support for internal and external boundary work in innovation projects

explained to us, the CS was designed according to the design thinking approach and aimed to pursue two interrelated goals: innovation through internal co-generation and innovation through co-creation with external stakeholders.

In relation to internal co-generation, even if FoodCorp had always manifested great attention to cross-functional interaction for product development, the degree of involvement of each function was significantly different across phases, such that the R&D had a dominant role over the first phases, and the other functions came in later in the process, often for validation purposes. Conversely, the new design thinking method was considered a “democratic” approach capable of better encouraging all members of the organization to share ideas and visions about new product development from the earliest stages of a project, this way mobilizing all company resources and exploiting different knowledge and expertise across the organization.

Let's say that we see the design thinking sessions in the CS as the beginning of everything. We tend to use them in projects that have not entered the phase and gate process yet. The goal is to create the next innovation platforms, for example, the protein platform, it's not an R&D project yet, it has not entered phase and gate, so this is the moment to push for co-generation (. . .) the method is more about pure innovation, let's say, pulling out the most brilliant ideas out there, and giving everybody in the organization the opportunity to contribute, not just R&D technicians. (Informant 15, R&D)

Internal collaboration sessions were often promoted by the R&D unit which launched a challenge to other organizational functions such as marketing, HR, quality, digital transformations and sales, and organized the working sessions with those who accepted to participate.

Similarly, external projects also had the main goal of fostering innovation but by pursuing co-creation with external stakeholders. This implied that outsiders like retail customers, consumers, suppliers, consultants, researchers, and students, were no longer seen as mere validators of the products developed internally; Instead, they were expected to actively contribute to their creation, for instance by providing input based on their own needs and knowledge of the market, and by working with FoodCorp side by side to develop integrated, and mutually feasible solutions for the market. For these reasons, informants referred to this type of innovation as "embedded" and defined it as the most challenging but also the most rewarding initiative of the organization. In practical terms, external collaboration implied the mobilization of an internal promoter (in informants' words, "sponsor") who launched a challenge to both internal and external actors and coordinated with the CS management to plan and organize design thinking sessions for the project.

The embedded project is characterized by the fact that it involves a team of external people, let's call them consultants, who are invited and work together with an internal team on a project that is designed and assigned to us by the organization. For instance, now we are working with R&D people and experts in other five functional areas. At the end of the day the goal is to reach a high level of idea integration as the project moves forward (Informant 2, external user)

#### *Expected impact of collaborative space on internal and external boundary work*

In terms of expectations about the role of the CS on internal and external boundary work, we refer not only to the objective for which the CS was designed and built by the organization, but also to the desiderata that each user had about how the CS would have contributed to their work within the organization, and to the behaviors expected from other participants in the development process. From such standpoint, we found that the physical characteristics of the CS were stably and recurrently associated with users' expectations about their collaboration, as well as with the innovation outcomes they hoped to generate.

*Generalized expectations: CS as laboratory for internal and external boundary work.* In line with the declared purposes of FoodCorp's CS, the generalized expectations were that the space served as a melting pot – or "boundary breaker", as some informants termed it – gathering contributions from people with different backgrounds, goals and interests, and allowing them to express freely and to build on each other's inputs without the pressure of formal constraints. The informants often referred to the CS as a laboratory with three distinct features: centrality, plasticity and informality, and explained how insiders and outsiders could have taken advantage of these features to engage in radically new ways of collaboration.

First, the CS was located in an area of the central building that belonged to the R&D function. The area had high traffic and was situated not far away from the cafeteria, but it was also somewhat separate from the offices and the adjacent production plant. According to informants, such petition expressed CS's openness towards the outside and its potential to

stimulate creativity in everyone, immersing them in a "different environment from the traditional office," while also giving them the opportunity to "reach the venue within minutes."

Second, the CS was seen as plastic because it was designed by the organization as a "creativity temple" for the changing needs of users and visitors alike. For instance, the layout was easy to transform such that users could easily switch between closed offices, semicircle working stations and open areas for presentations.

Third, the CS was perceived as highly informal in its layout and furnishings – i.e. bright, colorful, comfortable and friendly. Our informants expected such features to allow free knowledge exchanges as well as more participated and less hierarchical decision making about the project, leading to faster development processes and thus solving, this way, a main problem of the traditional phase and gate process. These features are summarized in the following excerpt:

[...] the fact that it's modular can have many advantages, not only the area can be modified according to the specific needs of each group, but it can be both an active idea lab and a space for reflection where to finally stop running and start thinking. Importantly, an open and easy area allows you to engage in spontaneous talks with colleagues, you know, just have some plain conversation, beyond roles, hierarchies and stuff like that, just bringing people together freely. Or it can be just a huge open space where to make big things happen. To me it's a place where things will happen, where you can cook new recipes, try things, experiment. (Informant 5, R&D)

Despite the different collaboration goals that FoodCorp had set internally and externally, the CS was seen as a laboratory capable of equally tearing down internal and external boundaries, encouraging co-creation, fostering joint decision making and creating value both inside and outside the organization.

*Expected collaborative behaviors in the CS.* The generalized expectations mentioned above led to the formation of more specific expectations about how others should have behaved in the CS, described next.

*Maintain constant participation in CS activities.* First, informants explained that the design thinking activities promoted in the CS are effective if the team created upfront is heterogeneous and preserves its heterogeneity throughout the development project. This implies that team members, be they internal or external to the organization, must actively participate to all the project meetings and sessions organized in the space (especially when the project develops across multiple sessions).

*Dedicate full attention to CS activities (no use of computer, smartphone, etc.).* CS is experienced by FoodCorp employees as an "analogical space." In fact, since employees report often feeling overloaded by collaborative technologies available in the company (e-mail, instant messaging, videoconference), they explained that taking some time off from the workstation would have helped them reduce stress and work overload, and re-appropriate of some time to think out of the box. Consequently, the CS management encouraged participants to enter the CS without their laptops and smartphones, and avoid working simultaneously on other projects, so that there would be no interruptions or fragmentation of the teamwork during sessions.

*Always come prepared and actively contribute to CS activities.* According to participants, for a successful session in the CS it is essential that all participants, be they members of the organization or external members, come in prepared and actively contribute to projects' activities. The following excerpt exemplifies the three expected behaviors mentioned earlier:

Here in the CS we intend to stay analogic, just put away all the distractions, like answering-emails and being-on-the-phone, which everybody is doing during meetings. We do not want that here, we want people to come in and participate with all their senses, having body and mind present in the

same place, at the same time (...) Also, for projects to evolve, there must be commitment and continuity, some motivation to see the group's ideas grow (...) (Informant 11, CS Manager, R&D)

*Experienced internal and external boundary work in the collaborative space*

Experiences about boundary work refer to the way people actually use the CS to shape and shift their work boundaries, both internally and externally. We compared actual experiences with the goals and the expectations described above. To this purpose, we distinguished between the following sub-categories: experienced collaborative behaviors in the CS, experienced collaboration affordances and constraints of the CS, and experienced internal-external boundary work in the CS, each presented in a following section.

*Experienced collaborative behaviors in the CS.*

*Fluid and sporadic participation in CS activities.* Informants often complained about the sporadic participation of their colleagues to the CS activities, explaining that a typical problem of projects launched in the CS was the gradual decrease of the participation rate over time. Users explained that the first sessions were always actively participated. As the project unfolded, sessions became less and less participated, despite participants' continued engagement to participate. This way, teams gradually lost their heterogeneity, which, as explained above, was considered the main strength of the CS approach.

As far as my project is concerned, I noticed that participations were not constant, or at least, the most constant people were from R&D or from Quality. Others were often absent, be it for work problems, be it for other reasons, it was obvious that they prioritized their own work and checked in only when they had time. (Informant 1, R&D)

*Distributed and/or residual attention to CS activities (multitasking with computer, smartphone, physical presence).* Both CS users and the CS management complained about the lack of active participation and attention proven by many CS users, which, in their view, was attributable to their unwillingness or impossibility to remain offline during CS sessions. Specifically, many informants lamented that teammates were unable to break from work technologies as they stepped in the CS. For instance, CS users came in and out of the sessions to answer calls or make quick interventions in other meetings scheduled at the same time. Also, while users usually avoided bringing their laptops in, they often used their smartphones to answer emails or instant message about other work commitments. Thus, the ideal behavior of keeping an offline status while in the CS was often violated and attention to CS activities was often fragmented.

Sometimes there were problems because next to us there are meeting rooms and there were people coming in and out. Later on, it resulted they were also attending some other meetings, or people going out to answer calls and staying on the hallway for half an hour, or even for hours in a row (...) it's understandable and it happens to everyone but if it distracts the attention from the project activities it becomes slightly disturbing. (Informant 3, R&D)

*CS activities as creative improvisation (someone else –i.e., CS manager– comes in prepared).*

Additionally, informants complained that CS users usually "had a hard time doing their homework" as one of our informants termed it – i.e., respecting commitments taken from one session to another, for instance doing a cost analysis for a potential product to be launched with different scenarios, or contacting customers in emergent markets to ask for feedback about desired product features. According to the managers of the space, many people came in unprepared because CS sessions were widely seen as exercises in creative improvisation where mere presence and willingness to work with others on new ideas were sufficient conditions for active participation. The organizing aspects, on the other hand, were delegated to the CS managers who had the responsibility to maximize participants' creative outputs.

Thus, behaviors such as systematizing, supporting or validating the creative ideas generated during the CS sessions were rarely performed by a project's team members. As some users explained, the CS was often associated to the first phase of the development process (idea generation) and dissociated from more structured activities that belonged to the phase and gate model. Consequently, many users expressed their concern about the gratuitous experience provided by the CS ("CS as play time") which they saw at odds with business usefulness:

This is really a problem, the fact that they are relying too much on us and on our organization. I feel this is sometimes also an excuse to come in less prepared (...) we are trying to get this message through to everyone who participates in CS sessions (...) Another thing I noticed is that we have an increasing number of visits to the CS, like colleagues bringing in customers and suppliers to say, hey, look at this cool place that FoodCorp developed to encourage innovation (...) It's bringing us a lot of popularity but also feels at odds with what is supposed to happen here. (Informant 11, CS Manager, R&D)

This interview excerpt suggests that also in relation to interactions with external stakeholders, the CS's original purpose to become an aggregation place became distorted during use.

*Experienced multiplex boundary work: from boundary blurring to boundary buffering.* As described above, we identified a set of discrepancies between the expected and the experienced behaviors of CS users. The misalignment between the two generated a set of consequences for how boundaries were perceived and, subsequently, for how the CS was experienced in terms of affordances and constraints for internal and external boundary work, respectively. We distinguish between two boundary characteristics: permeability -i.e., extent to which boundaries regulate flow and movement of participants' knowledge and ideas and infrastructuring - i.e., extent to which boundaries align participants' different tools and methods and mobilize them towards a common goal. We show that these two boundary characteristics lead to different types of perceived affordances and constraints for boundary work, which in turn push individuals to enact two different boundary work strategies: boundary blurring for internal projects and boundary buffering for projects with external stakeholders.

*Boundary blurring: confirmed affordances for internal co-generation.*

*High boundary permeability: fluid knowledge exchanges.* Users stated that their experiences with the CS were consistent with many of their initial expectations. The CS, through its possibilities in terms of plasticity, informality and centrality, promoted high boundary permeability: fluid exchanges of knowledge and ideas between the organization's business functions. For instance, employees of FoodCorp distinguished the CS experience from that of working in a "traditional open space." While the latter certainly allowed fluid knowledge exchanges among colleagues, it did not favor creativity via heterogeneity of backgrounds and expertise because people who stably worked together tended to have similar thoughts and similar mental patterns in problem solving. The CS, by contrast, was not only a think tank, but also a neutral terrain which brought together people from different departments and encouraged them to express their thoughts and opinions fluidly and without constraints. To this purpose, informants often explained to us how the modular layout of the CS and its mobile furnishings allowed them to blur functional and hierarchical barriers and exchange knowledge freely and informally, for instance by sitting down in the CS kitchen in front of a cup of coffee, by creating new prototypes and recipes during organized cooking sessions, or by retreating in a corner of the CS living area to have more private conversations and resolve divergences:

We take for granted that we are locked up in functional categories, or that the VP does not know what the R&D researcher is doing, and vice versa. But as we moved together in this flexible space, we

realized it was not exactly true. Perhaps usually we are not so mixed as we were in the CS, so we do not have the chance to let our armors down. As we got together, each of us could freely talk about his or her own reality and see whether the others understand it nor not. It's a great opportunity for free knowledge and experience exchange, maybe this is the part I like best about the CS. (Informant 5, R&D)

*High boundary infrastructuring: common goal mobilization.* Internal boundary infrastructuring refers to those tools and methods being mobilized within the CS to focus the collaboration on a common goal. In addition to furnishings designed to stimulate creativity, the space offered many objects for the construction of artifacts and prototypes (for example post-its, Lego blocks, colored pencils, sheets, glue, scissors, twines, etc.). Using tools and artifacts during collaborative sessions increased the perception of cohesion among users coming from different functional areas. As a consequence, informants reported feeling closer to colleagues with whom they worked in the CS compared to colleagues in other functional areas whom they met in other organizational locations (i.e. meetings, open spaces, showrooms). Additionally, they reported having more tools to navigate differences, for instance compromising about product features or development times, or eliminating differences in their approach to product development to focus on the needs of the organization rather than the needs of their own organizational departments.

The environment (of the CS) is very different from everything else we have in FoodCorp, so it takes you out of the normal logics of the organization. It's a mix of structure and destructure, even physically speaking, you have many configurations in the same area. This gives you more flexibility in managing projects and in bringing an individual contribution to the project. I also feel there are lots of tools to help us, like blackboards, monitors and roundtables, and then all the materials used to create something can give a lot of inputs, for sure (. . .). The positive side is that building a prototype in real time can teach us how to communicate better (. . .) focus on what the customer or the consumer need, and not on what the Marketing, the R&D or the Finance believe it is best (. . .). (Informant 7, R&D)

*Boundary blurring: emergent constraints for co-generation.* We also found a set of emergent constraints deriving from users' experiences of the CS versus their initial expectations. Specifically, informants often associated the high permeability and high infrastructuring described above to the risk of losing control on what happened in the CS. Participants perceived the exponentially increasing heterogeneity of the knowledge, projects and interests hosted by the CS as threatening. Interestingly, while affordances were perceived in terms of collaboration opportunities (see section above), collaborative threats were formulated in terms of CS characteristics. Two concerns were voiced: that the CS was becoming a chaotic area ("a maze") and, at the same time, to avoid chaos, that it was becoming a forcedly isolated space ("a cloister").

*High boundary permeability: CS as maze.* Since space was experienced by internal users as always moving and constantly transforming, it was also perceived as being highly heterogeneous and thus messy, disordered and dispersive. For this reason, it was compared to "a maze." In particular, the manifold events hosted were difficult to follow through time, such that projects became black boxes even for the project teams. Additionally, the fact that team compositions were always changing increased the feeling of opacity of what was going on (i.e. "the CS has much more going on than anyone can keep track of" as one of the informants termed it), and left users disoriented about who was in charge of what, as exemplified in the following excerpt:

In my view, there is a lack of privacy and a lack of structure there (in the CS)(. . .) and I think it's because there's so much going on, people coming in and out, some having private conversations, others having a conference or working on a prototype, groups laughing, screaming, joking, someone else walking down with an important client or even the President. . . sometimes it's chaotic. The main



problem I see is that you cannot know what's going on there unless you're there, you do not know if there's some free space, what the others are doing, what projects are going on, you'd need a map to navigate that, so you always need to ask the CS managers. (Informant 12, Quality)

*High boundary infrastructuring: CS as cloister.* Associated to the above concerns, our informants also voiced the concern that, to avoid chaos, the CS was under the exclusive control of the R&D function. Given the heterogeneity of backgrounds and interests around each project, CS activities needed to be carefully planned and organized. Since the employees from the R&D department had set up the space in an area that previously belonged to their department, they were actively managing the site and all its activities. Additionally, since most CS activities were centered around product innovation topics which were seen as R&D *competence*, the CS was described by many of our informants as the “R&D's cloister.”

Since usually there's so much going on, there's more and more planning behind it [the CS], it seems a bit like the R&D cloister, you always need to go through [name of CS manager] to get access, so spontaneous meetings are rarely the norm (. . .) (Informant 18, R&D)

Not only did people outside R&D perceive the collaborative space as owned by R&D, but also people working in R&D identified the space as theirs and instrumental to achieving their work objectives. These dynamics further strengthened the identity of the space like an “R&D cloister” instead of common space for innovation.

*Boundary buffering: confirmed affordances for external co-creation.* With respect to external collaboration, participants experienced low levels of boundary permeability and high levels of boundary infrastructuring, with both affording and constraining effects. Even if users felt encouraged to freely exchange knowledge with outsiders and have higher reactivity to external events, they also felt more exposed to external threats, and thus more vulnerable. This ambivalence led to the strategy of boundary buffering: tearing down external boundaries to enable collective action, on the one hand, while also maintaining control on common activities in order to direct them towards preferred courses of action. As follows, we detail the affordances and constraints of the boundary buffering strategy.

*Low boundary permeability: integrated knowledge exchanges with outside.* As far as open innovation is concerned, we found that the CS was associated with richer and more integrated exchanges between internal and external stakeholders. However, while in internal collaborations boundaries were torn down (i.e. blurred), the exchanges with external participants were more structured and remained under the control of internal participants. Specifically, FoodCorp employees maintained control over the purpose of each project with external participants, and played also a significant role in setting sub-goals and directions for the latter. For instance, informants explained how they used external stakeholders such as students and panels of consumers to come up with radically new product ideas, or to perform preliminary market researches. Participation, however, was always guided by internal stakeholders who decided if and to which extent to use insights from outsiders. As a consequence, boundaries were never set aside, and roles between internal and external stakeholders were never blurred, but rather “buffered” – i.e., used strategically to reach one's goals and maintain distinctiveness:

I found particularly useful having students come in and work on projects. Basically, we give them challenges and some structured conditions and they must come up with some radically new solutions (. . .) they have a fresh mindset and manage to see things that are invisible to our expert eye. They ask a lot of questions, even if some of them are easy or obvious, they make us think through things we normally take for granted. Having also external experts that know what they are talking about because they have experience in this stuff, has been added value as well. (Informant 15, R&D)

Thus, while inside-outside boundaries were continuously moved during collaboration in the CS, they were also re-established as the project evolved and moved across stages, such that FoodCorp maintained wide control over open innovation projects.

*High boundary infrastructuring: reactivity to external events.* Just as in internal collaboration, the modular layout and furnishing of the CS were seen as useful tools for open innovation. There was, thus, a generalized belief that the CS made available tools and methods that encouraged the project team to focus on a common goal. Specifically, users manifested the belief that living the CS and participating in design thinking sessions – including prototyping or conducting market research together – had afforded more consumer-awareness, more user-centric solutions and greater cohesion with people outside the company. Additionally, the solutions were considered more “ready to use” and therefore more “original, fun and creative.”

*Emergent constraints for boundary buffering due to controlled co-creation.* Also, in regard to external organizational boundary work, we identified constraint patterns. The following two constraints, CS as a showcase and CS as a silo, were associated to low boundary permeability and high infrastructuring, respectively.

*Low boundary permeability: CS as showcase.* Since internal participants maintained control over boundaries with outsiders, they also controlled the way in which the latter experienced the CS. For instance, our informants often referred to critical incidents in which FoodCorp’s managers brought suppliers and customers for visits in the CS. The goal was to convey the image of FoodCorp as an innovation pioneer, by impressing visitors thanks to the innovative aspect of the CS, but without actually allowing them to get immersed in the CS activities. While most of the informants we interviewed considered that using the CS as a showcase was a superficial and inappropriate practice, they also explained that it continued to be frequently employed:

We continue to use it as a showroom yes, it’s a way of telling others we’re not just an ordinary stiff multinational, we are informal and creative because we use post-its all the time (laughs). I will confess something that is really embarrassing, I even had to attach fake post-its a couple of times just to show what they wanted to see. (Informant 11, CS Manager R&D)

*High boundary infrastructuring: CS as silo.* Similarly to what happened in internal innovation projects, open innovation projects were perceived as restricted and opaque to the rest of the organization. There was little visibility about which external stakeholders entered the CS, when, and why. Even less was known about the outcomes of the projects in which externals were involved. We appraised that it had never happened that a project challenge was launched by external stakeholders, as it had never happened that a project team was composed by more than one or two external stakeholders. This was also due to the fact that external stakeholders were always invited by internal employees to participate in CS activities (see discussion of low boundary permeability above). Therefore, open innovation projects with external stakeholders often became black boxes for the rest of the organization, or “silos” as our informants termed it.

Actually, we are not very informed about what happens in embedded projects and how many we have out there. (Name of CS manager) calls us and asks “Do you want to do some activities in the CS? We discuss together the areas in which we could do something there, perhaps others do the same. But all the other projects with internals or externals, I do not know them, actually, I do not know what people are working on in there at the moment (. . .) It would be a good idea to let people across the organization know what is happening there, just to break this sort of black box (. . .). (Informant 20, HR)

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*Unbalanced boundary work in the CS: perceived trade-off between internal and external boundary work*

The emergent constraints to internal and external boundary work were perceived as complications that required increasing efforts and attention from participants. Both managers and users, internals and externals, argued that the CS was a “sensitive arena” where boundary work seemed “unbalanced.” Two elements were frequently mentioned to indicate trade-offs between internal and external boundary work: limited resources for collaborative innovation in general and need for additional time to achieve successful boundary management. The fact that the space was used in unexpected ways (i.e. as maze, cloister, showcase, and silo) made participants acknowledge that increasing efforts were needed to make the CS more congruent to initial expectations. Consequently, they explained that they had underestimated the time and attention resources necessary to perform successful multiplex boundary work. As exemplified by the following field notes, focusing on doing internal boundary work “the right way” automatically directed resources in that direction and withdrew them from doing external boundary work. In the same way, as employees focused on external boundary work, they felt they were not able to perform internal boundary work effectively, so they preferred to focus on one at a time because of limited resources available.

In my opinion the CS is probably now conceived more as a company space and not just an R&D space as it was initially, so we are doing some progress, we are moving ahead but it takes time [. . .] In the beginning [the CS] was more of an alien, now it has involved so many business functions so I would say that in a short time we built a good reputation and also a certain credibility and knowledge of our tools and work practices, so I would say that everyone feels part of the CS or in any case many in the company feel part of the CS. For me it remains that it's a complex tool that when used internally it does not connect us with the outside world, I do not know if it is a limit, but in short [. . .] it seems that what we give to the internal work it takes away from the external work [. . .] in any case both surely will require more effort and practice. (Informant 15, R&D)

Also, informants often appeared unsatisfied about the level of progression in both internal and external boundary work. Significantly, at the end of our research project, we conducted a debriefing with the informants and asked for feedback on the findings in our grounded model. While they fully agreed with our findings and indicated internal and external boundary work efforts as a critical issue in how the CS was perceived within the organization, they also appeared convinced that conducting successful collaborative product development took significant time. For instance, they manifested their conviction that the first three years of CS functioning marked just the beginning of a long journey made of trials and errors, in which outsiders and insiders would have learned to know each other better, built on previous successes and failures, and developed more robust and functional collaboration schemes.

According to me, the physical space is an important aspect and it must provide a lot of support for collaboration, but the interpersonal aspects are the ones that make the difference at the end of the day. If we're not able to work out internal differences, how can we do it with important customers like (name of FoodCorp's retail customer)? Also, as we bring in a client, can we also deal with inter-functional wars successfully? These are things that we must still figure out in the next years, and I believe enthusiasm will play a huge part in making individual efforts come through. (Informant 14, R&D)

Summarizing, we refer to unbalanced boundary work to describe the condition in which an organization attempting to perform product development through multiplex (i.e. simultaneous internal and external) collaborations experienced both internal and external boundary work as more effortful than initially expected. The acknowledgement that multiplex boundary work requires more resources leads to an experienced trade-off between the ability to focus on internal boundary work and the ability to perform external boundary work.

## Discussion

Our analysis, summarized in the grounded model of [Figure 1](#), has several theoretical implications. First, we suggest that the affordances and constraints related to an organization's attempts to engage in both internal and external innovation can be better understood when treated together, as *multiplex boundary work*. Our model highlights that the outcomes of highly heterogeneous innovation project teams depend not only on how individuals decide to leverage different types of diversity (i.e. internal and external) but also on the difficulties they encounter in dealing with both simultaneously. Adopting the theoretical lens of boundary work, the study brings to the fore the paramount role of collaborative spaces and of several boundary work mechanisms in individuals' ability to act collaboratively in innovation projects with high diversity. Next, we comment on each mechanism.

### *The mediation of Collaborative Spaces in expectation-experience misalignments regarding collaborative innovation*

The study highlights a paradoxical mechanism according to which the support tools that an organization makes available to help its members face the complexities of innovation processes may end up constraining collaboration if participants develop illusionary expectations of success regarding those tools, because expectations could clash with actual experiences. We have shown that material collaborative spaces have the potential to raise expectations of success. In FoodCorp, the image of the collaborative space as "innovation laboratory" stimulated individuals' expectations about collaborative innovation, projecting them in a future where cross-functional and internal-external boundaries could have been easily dismantled and free knowledge exchanges would have become the norm. However, we also testified the perils and illusions of such mechanism (see the expectation-experience misalignment). We thus conclude that when support tools for collaborative innovation are seen as "shortcuts" for "express" collaboration, negative consequences may emerge because of underexplored and underestimated dynamics of actual collaboration.

Studies focusing on the role of co-localization and innovation have concluded that spatially localized collaboration is benefic for innovation because it increases relational capabilities by reducing opportunistic behaviors and improving knowledge transfer between partners ([Gulati and Sytch, 2008](#); [Narula and Santangelo, 2009](#)). However, in line with the socio-material perspective in boundary work ([Leonardi, 2012](#); [Nicolini et al., 2012](#); [Okhuysen and Bechky, 2009](#); [Orlikowski and Scott, 2008](#)), we draw attention to the grey shades of co-localization and highlight the important but overlooked relation between how *individuals* perceive the material features of a space and how they perform boundary work. While we confirm that co-localization triggers interaction in collaborative innovation projects, and that configurational features of collaborative spaces often emphasized in the innovation literature – e.g. centrality, modularity and plasticity – may stir expectations about successful collaboration ([Bechky, 2003](#); [Boscherini et al., 2010](#); [Carlile, 2004](#); [Koskinen, 2005](#); [Ungureanu et al., 2018b](#)), we suggest that developing high expectations because of co-localization may be a risky process. So far, the few innovation studies addressing boundary objects as structuring tools for innovation have either focused on their physical features ([Boscherini et al., 2010](#)) or highlighted the ways in which they are interpreted during innovation projects ([Koskinen, 2005](#)). The general idea has been that structuring tools are unambiguous and can be univocally set up, planned, and managed to maximize innovation performance ([Barley, 2015](#)). By contrast, our study goes beyond the established configurational approach. We draw attention to the ambivalence of collaborative spaces and suggest that collaborative spaces for open innovation often generate both affordances and constraints for collaboration. To this purpose, we emphasize that the material features of the CS act as a "scaffold" (i.e. container) for individuals' expectations about complex innovation projects, and not as the drivers of innovation themselves ([Edmondson and Harvey, 2018](#)). We have shown that expectations about setting up a

laboratory for free and fluid knowledge exchanges were in contrast with other four emergent perceptions of the CS: as maze, cloister, silo and showcase. Based on these findings, we argue that the role of collaborative spaces in complex innovation projects may be less straightforward than suggested by innovation studies. For instance, instead of promptly recognizing boundary objects and using them effectively to maximize innovation outcomes (Boscherini *et al.*, 2010; Koskinen, 2005), individuals may often engage in trial and error processes in which objects' usefulness is first imagined (i.e. lab), then undergoes conflicting perceptions (maze, cloister, silo and showcase) and finally becomes actively edited and reconfigured as the collaboration in the innovation project evolves (Bechky, 2003; Carlile, 2002; Edmondson and Harvey, 2018; Edmondson and Nembhard, 2009; Nicolini *et al.*, 2012). While this process of trial and error may eventually turn out beneficial for an organization's relational capabilities, our study indicates that it requires time and may be punctuated with moments of delusion and stagnation that the participants may not be ready to handle.

#### *Multiplex boundary work strategies in open innovation projects*

While previous literature on innovation teams paid particular attention to team configurations, we propose an attention shift to *boundary configuration processes*. A main contribution of this study is to explain *how* boundary work happens in innovation projects operating across "multiplex boundaries": collaborative configurations that allow simultaneous work on multiple boundaries with different characteristics. In doing so we also shed light on how different relational capabilities may support and sustain such processes. The study identified two boundary characteristics, i.e. boundary infrastructuring and boundary permeability, and showed that the same collaborative space can lead to the emergence of different perceptions of boundary configurations. While the CS was seen as a viable tool for structuring collaboration across internal *and* external boundaries, internal boundaries were perceived as highly permeable whereas external boundaries were seen as impermeable and thus difficult to cross. As previously pointed out, recently De Silva and Rossi (2018) grouped the relational capabilities identified in the literature into three macro-areas: structuring, alignment, and communication capabilities, showing that they play different roles depending on the degree of collaboration necessary for R&D development. Projects requiring lower degrees of collaboration such as knowledge acquisition projects are particularly facilitated by collaboration structures designed ex-ante such as contracts, collaboration frameworks or platforms. Projects with higher degrees of collaboration benefit significantly from the development of alignment mechanisms, and all projects benefit from communication capabilities (see also Gulati and Sytch, 2008). Our findings contribute to this line of research by discussing collaborative spaces as tools for developing relational capabilities, and by showing why structuring is not sufficient in projects requiring high degrees of collaboration, and especially in projects crossing multiple boundaries simultaneously. First, since internal and external boundaries require different spanning efforts and capabilities, using the same spanning tool does not cancel such differences, despite participants' hopes and expectations. In our study, while internal and external projects were carried out within the same space, external collaborations were still perceived as more difficult, such that individuals tried to maintain greater control than in internal projects (i.e. boundary buffering versus boundary blurring). The consequence here documented is that simultaneous boundary spanning may create a trade-off between participants' internal and external boundary work resources – i.e. attention and relational efforts. In cases of multiplex boundary spanning, then, focusing on structuring capabilities may not be enough; to accomplish the potential of collaborative spaces for innovation, more effort should be devoted to developing alignment and communication capabilities.

*Implications for practice.* In terms of managerial implications, our study draws attention to the promises, advantages and disadvantages of collaborative spaces for innovation.

This topic has generated high resonance in the managerial world if we consider that demand for flexible workspace solutions from corporate clients increased by 21% in 2018 worldwide and that at the end of the same year 14% of employees at large companies used some sort of collaborative space to manage business processes (Communion Cowork, 2019). Not only do we suggest that managers must pay significant attention to potential misalignments of expectations and experiences of collaboration in complex innovation projects, but we also highlight the dangers associated to considering collaborative spaces as shortcuts for managing diversity in collaborative innovation projects. While we acknowledge the affordances of collaborative spaces for innovation, we also draw attention to the possible pitfall that collaborative spaces, by symbolizing freedom of exchange and informality, may generate high expectations about collaboration in complex innovation projects. We also draw attention to the importance of foreseeing possible trade-offs between innovation projects developed through cross-functional teams only, and open innovation projects involving also external stakeholders, and suggest that ordering and prioritizing boundary work may be a safer and more viable strategy for organizations that use both innovation methods.

Even if we have documented a trade-off between internal and external boundaries we also suggest that such trade-off is not necessarily a fatal flaw if the organization invests in a complex portfolio of relational capabilities (see also De Silva and Rossi, 2018; Dyer and Chu, 2003). As a collaboration evolves, conditions and partners' needs may change, requiring them to change the direction of the project (Swan *et al.*, 2007). This requires in turn the development of alignment and communication capabilities, above and beyond the capability of getting individuals together and co-localizing them in the same space (i.e. structuring). We have shown that in complex projects with high degrees of heterogeneity organizations may be tempted to overemphasize structuring capabilities at the expense of alignment and communication capabilities that take more time and effort to develop. However, our findings also suggest that it is paramount that organizations dealing with multiplex boundary projects consider all three types of relational capabilities together.

As far as the societal implications of our study are concerned, it has been already recognized that the main societal benefit of sharing economy and sharing platforms is community well-being, by means of the development of social ties and social inclusion, which in turn lead to relational benefits such as users' engagement, trust, solidarity, and commitment towards other members of the community. In other words, be it co-generation by members of a specific organization (employees) or co-creation with external stakeholders such as customers, consumers and the local community, one of the main beneficial effects of collaborative innovation at the social level is the development of social capital (e.g. Davlembayeva *et al.*, 2019). Accordingly, the collaborative space here analyzed can be interpreted as an organizational mean to promote and enhance these sharing mechanisms by leveraging social capital, and reinforcing experiences of participation, inclusion and commitment. Thus, one societal implication of our study is that organizations may promote collaborative innovation processes of and thus contribute to relational benefits and social well-being of both their internal members and their (local) community by embracing the open innovation and co-working approach, thus also opening up to their external environments. However, our study also suggests that such positive societal impacts may be jeopardized if the trade-offs faced by actors involved in multiplex boundary work are left unmanaged. To gain benefits in terms of well-being, both for companies' employees but also, by extension, for external actors, sharing processes of co-creation and open innovation must be supported by organizations with adequate resources. Our findings suggest that support organizational strategies must shift from providing material tools such as spaces, platforms and other infrastructures, to sustaining the development of relational capabilities (i.e. alignment and

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communication) through adequate mechanisms such as incentives schemes, time and effort management training, organizational climate reinforcement, just to name a few.

### **Limitations, future directions and managerial implications**

This study is not without limitations. Since our study relied on a single case study in a multinational organization operating in the food industry and having a high focus on innovation, our findings have limited generalizability. We thus call for future research on simultaneous internal and external boundary work in settings that are either highly similar or different from this study (e.g. SMEs, project-based organizations, public organizations, NGOs). We also highlight the promising direction of investigating boundary processes in open and/or cross-functional innovation projects, rather than the configuration of the project teams itself. Future research on multiplex boundaries are thus highly welcome. In a seminal study, Mary Douglas (2003) discussed boundaries as dangerous areas of tension that are constantly pushed forward by individuals who try to reach safer harbors. We have seen that high diversity can be interpreted as both a sign of danger and as an opportunity. Future studies would need to clarify when and if high diversity always causes trade-offs between different types of boundary work. Also, given that the collaborative space in our study is still undergoing transformation and since most of our informants declared that they “needed more time and effort to make collaboration work” (informants’ words), we cannot exclude the possibility of a subsequent realignment between expectations and experiences. Further longitudinal research in innovation projects could clarify if the strategies observed in FoodCorp were permanent or marked just a transition stage towards more efficient strategies of multiplex boundary work.

In sum, in line with other studies in the innovation and the boundary work literatures, we have testified an effortful process of boundary work in complex projects of collaborative innovation (Edmondson and Harvey, 2018). The assumption that spanning thick internal and external boundaries simultaneously is worth the effort from team members, while highly plausible, has yet to be fully examined. To this purpose, we need to further our understanding of the contingent benefits of team member interactions during cross-boundary teaming. Correlating collaboration behaviors and collaborative spaces should give us a better picture of the processes that are supporting or impeding multiplex boundary spanning.

### **References**

- Ambos, T.C., Ambos, B., Eich, K.J. and Puck, J. (2016), “Imbalance and isolation: how team configurations affect global knowledge sharing”, *Journal of International Management*, Vol. 22 No. 4, pp. 316-332.
- Ancona, D.G. and Caldwell, D.F. (1992), “Bridging the boundary: external activity and performance in organizational teams”, *Administrative Science Quarterly*, Vol. 37 No. 4, pp. 634-665.
- Bäck, I. and Kohtamäki, M. (2015), “Boundaries of R&D collaboration”, *Technovation*, Vol. 45, pp. 15-28.
- Baldwin, C. and Von Hippel, E. (2011), “Modeling a paradigm shift: from producer innovation to user and open collaborative innovation”, *Organization Science*, Vol. 22 No. 6, pp. 1399-1417.
- Barley, W.C. (2015), “Anticipatory work: how the need to represent knowledge across boundaries shapes work practices within them”, *Organization Science*, Vol. 26 No. 6, pp. 1612-1628.
- Bechky, B.A. (2003), “Sharing meaning across occupational communities: the transformation of understanding on a production floor”, *Organization Science*, Vol. 14 No. 3, pp. 312-330.
- Bercovitz, J.E. and Feldman, M.P. (2007), “Fishing upstream: firm innovation strategy and university research alliances”, *Research Policy*, Vol. 36 No. 7, pp. 930-948.

- Boscherini, L., Chiaroni, D., Chiesa, V. and Frattini, F. (2010), "How to use pilot projects to implement open innovation", *International Journal of Innovation Management*, Vol. 14 No. 6, pp. 1065-1097.
- Brown, S.L. and Eisenhardt, K.M. (1995), "Product development: past research, present findings, and future directions", *Academy of Management Review*, Vol. 20 No. 2, pp. 343-378.
- Cabral, V. and Van Winden, W. (2016), "Coworking: an analysis of coworking strategies for interaction and innovation", *International Journal of Knowledge-Based Development*, Vol. 7 No. 4, p. 357.
- Capaldo, A. and Petruzzelli, A.M. (2011), "In search of alliance-level relational capabilities: balancing innovation value creation and appropriability in R&D alliances", *Scandinavian Journal of Management*, Vol. 27 No. 3, pp. 273-286.
- Capdevila, I. (2015), "Co-working spaces and the localised dynamics of innovation in Barcelona", *International Journal of Innovation Management*, Vol. 19 No. 3, p. 1540004.
- Carlile, P.R. (2002), "A pragmatic view of knowledge and boundaries: boundary objects in new product development", *Organization Science*, Vol. 13 No. 4, pp. 442-455.
- Carlile, P.R. (2004), "Transferring, translating, and transforming: an integrative framework for managing knowledge across boundaries", *Organization Science*, Vol. 15 No. 5, pp. 555-568.
- Carlile, P.R., Nicolini, D., Langley, A. and Tsoukas, H. (2013), *How Matter Matters: Objects, Artifacts, and Materiality in Organization Studies*, OUP Oxford.
- Chesbrough, H. (2003a), "The logic of open innovation: managing intellectual property", *California Management Review*, Vol. 45 No. 3, pp. 33-58.
- Chesbrough, H.W. (2003b), *Open Innovation: The New Imperative for Creating and Profiting from Technology*, Harvard Business Press, Cambridge, MA.
- Chesbrough, H., Vanhaverbeke, W. and West, J. (2006), *Open Innovation: Researching a New Paradigm*, Oxford University Press on Demand, Oxford.
- Clark, K.B. and Wheelwright, S.C. (1993), *Managing New Product and Process Development: Text and Cases*, Free Press, New York.
- Communion Cowork (2019), "The Statistics and positives", online report, available at: <https://communioncowork.org/statisticsandpositives>.
- Dahlin, K.B., Weingart, L.R. and Hinds, P.J. (2005), "Team diversity and information use", *Academy of Management Journal*, Vol. 48 No. 6, pp. 1107-1123.
- Davlembayeva, D., Papagiannidis, S. and Alamanos, E. (2019), *Mapping the Economics, Social and Technological Attributes of the Sharing Economy*, Information Technology and People, Vol. ahead of print, doi: 10.1108/ITP-02-2018-0085.
- De Silva, M. and Rossi, F. (2018), "The effect of firms' relational capabilities on knowledge acquisition and co-creation with universities", *Technological Forecasting and Social Change*, Vol. 133, pp. 72-84.
- De Vaujany, F.-X., Dandoy, A., Grandazzi, A. and Faure, S. (2019), "Experiencing a new place as an atmosphere: a focus on tours of collaborative spaces", *Scandinavian Journal of Management*, Vol. 35 No. 2, p. 101030.
- Donnellon, A. (1993), "Crossfunctional teams in product development: accomodating the structure to the process", *Journal of Product Innovation Management*, Vol. 10 No. 5, pp. 377-392.
- Dougherty, D. (1992), "A practice-centered model of organizational renewal through product innovation", *Strategic Management Journal*, Vol. 13 No. S1, pp. 77-92.
- Dougherty, D. and Takacs, C.H. (2004), "Team play: heedful interrelating as the boundary for innovation", *Long Range Planning*, Vol. 37 No. 6, pp. 569-590.
- Douglas, M. (2003), *Purity and Danger: An Analysis of Concepts of Pollution and Taboo*, Routledge, New York.



- Dyer, J.H. and Chu, W. (2003), "The role of trustworthiness in reducing transaction costs and improving performance: empirical evidence from the United States, Japan, and Korea", *Organization Science*, Vol. 14 No. 1, pp. 57-68.
- Dyer, J.H. and Singh, H. (1998), "The relational view: cooperative strategy and sources of interorganizational competitive advantage", *Academy of Management Review*, Vol. 23 No. 4, pp. 660-679.
- Edmondson, A.C. and Harvey, J.-F. (2018), "Cross-boundary teaming for innovation: integrating research on teams and knowledge in organizations", *Human Resource Management Review*, Vol. 28 No. 4, pp. 347-360.
- Edmondson, A.C. and Nembhard, I.M. (2009), "Product development and learning in project teams: the challenges are the benefits", *Journal of Product Innovation Management*, Vol. 26 No. 2, pp. 123-138.
- Elsbach, K.D. and Pratt, M.G. (2007), "4 the physical environment in organizations", *The Academy of Management Annals*, Vol. 1 No. 1, pp. 181-224.
- Faraj, S. and Yan, A. (2009), "Boundary work in knowledge teams", *Journal of Applied Psychology*, Vol. 94 No. 3, p. 604.
- Fayard, A.-L. and Weeks, J. (2007), "Photocopiers and water-coolers: the affordances of informal interaction", *Organization Studies*, Vol. 28 No. 5, pp. 605-634.
- Furnari, S. (2014), "Interstitial spaces: microinteraction settings and the genesis of new practices between institutional fields", *Academy of Management Review*, Vol. 39 No. 4, pp. 439-462.
- Gandini, A. (2015), "The rise of coworking spaces: a literature review", *Ephemera*, Vol. 15 No. 1, p. 193.
- Garrett, L.E., Spreitzer, G.M. and Bacevice, P.A. (2017), "Co-constructing a sense of community at work: the emergence of community in coworking spaces", *Organization Studies*, Vol. 38 No. 6, pp. 821-842.
- Greer, C.R. and Lei, D. (2012), "Collaborative innovation with customers: a review of the literature and suggestions for future research", *International Journal of Management Reviews*, Vol. 14 No. 1, pp. 63-84.
- Gulati, R. and Sytch, M. (2008), "Does familiarity breed trust? Revisiting the antecedents of trust", *Managerial and Decision Economics*, Vol. 29 Nos 2-3, pp. 165-190.
- Hakansson, H. and Gadde, L.-E. (2001), *Supply Network Strategies*, John Wiley and Sons, Chichester.
- Helfat, C.E. and Peteraf, M.A. (2003), "The dynamic resource-based view: capability lifecycles", *Strategic Management Journal*, Vol. 24 No. 10, pp. 997-1010.
- Holland, S., Gaston, K. and Gomes, J. (2000), "Critical success factors for cross-functional teamwork in new product development", *International Journal of Management Reviews*, Vol. 2 No. 3, pp. 231-259.
- Howell, T. and Bingham, C. (2019), *Coworking Spaces*, Kenan Institute Working Paper, Chapel Hill, NC.
- Jassawalla, A.R. and Sashittal, H.C. (1999), "Building collaborative cross-functional new product teams", *Academy of Management Perspectives*, Vol. 13 No. 3, pp. 50-63.
- Johnsen, R.E. and Ford, D. (2006), "Interaction capability development of smaller suppliers in relationships with larger customers", *Industrial Marketing Management*, Vol. 35 No. 8, pp. 1002-1015.
- Kellogg, K.C., Orlikowski, W.J. and Yates, J. (2006), "Life in the trading zone: structuring coordination across boundaries in postbureaucratic organizations", *Organization Science*, Vol. 17 No. 1, pp. 22-44.
- Kiesler, S. and Cummings, J.N. (2002), "What do we know about proximity and distance in work groups? A legacy of research", *Distributed work*, Vol. 1, pp. 57-80.

- Koskinen, K.U. (2005), "Metaphoric boundary objects as co-ordinating mechanisms in the knowledge sharing of innovation processes", *European Journal of Innovation Management*, Vol. 8 No. 3, pp. 323-335.
- Langley, A., Lindberg, K., Mørk, B.E., Nicolini, D., Raviola, E. and Walter, L. (2019), "Boundary work among groups, occupations, and organizations: from cartography to process", *Academy of Management Annals*, Vol. 13 No. 2, pp. 704-736.
- Leonardi, P.M. (2011), "Innovation blindness: culture, frames, and cross-boundary problem construction in the development of new technology concepts", *Organization Science*, Vol. 22 No. 2, pp. 347-369.
- Leonardi, P.M. (2012), "Materiality, sociomateriality, and socio-technical systems: what do these terms mean? How are they different? Do we need them?", *Materiality and organizing: Social interaction in a technological world*, pp. 25-48.
- Li, Y. and Vanhaverbeke, W. (2009), "The effects of inter-industry and country difference in supplier relationships on pioneering innovations", *Technovation*, Vol. 29 No. 12, pp. 843-858.
- Lifshitz-Assaf, H. (2018), "Dismantling knowledge boundaries at NASA: the critical role of professional identity in open innovation", *Administrative Science Quarterly*, Vol. 63 No. 4, pp. 746-782.
- Lovelace, K., Shapiro, D.L. and Weingart, L.R. (2001), "Maximizing cross-functional new product teams' innovativeness and constraint adherence: a conflict communications perspective", *Academy of Management Journal*, Vol. 44 No. 4, pp. 779-793.
- Majchrzak, A., More, P.H. and Faraj, S. (2012), "Transcending knowledge differences in cross-functional teams", *Organization Science*, Vol. 23 No. 4, pp. 951-970.
- McDonough, E.F. III (2000), "Investigation of factors contributing to the success of cross-functional teams", *Journal of Product Innovation Management: An International Publication of the Product Development and Management Association*, Vol. 17 No. 3, pp. 221-235.
- McDonough, E.F. III, Kahnb, K.B. and Barczaka, G. (2001), "An investigation of the use of global, virtual, and colocated new product development teams", *Journal of Product Innovation Management: An International Publication of the Product Development and Management Association*, Vol. 18 No. 2, pp. 110-120.
- Meyer, K.E., Mudambi, R. and Narula, R. (2011), "Multinational enterprises and local contexts: the opportunities and challenges of multiple embeddedness", *Journal of Management Studies*, Vol. 48 No. 2, pp. 235-252.
- Narula, R. and Santangelo, G.D. (2009), "Location, collocation and R&D alliances in the European ICT industry", *Research Policy*, Vol. 38 No. 2, pp. 393-403.
- Nicolini, D., Mengis, J. and Swan, J. (2012), "Understanding the role of objects in cross-disciplinary collaboration", *Organization Science*, Vol. 23 No. 3, pp. 612-629.
- Okhuysen, G.A. and Bechky, B.A. (2009), "10 coordination in organizations: an integrative perspective", *Academy of Management Annals*, Vol. 3 No. 1, pp. 463-502.
- Oksanen, K. and Ståhle, P. (2013), "Physical environment as a source for innovation: investigating the attributes of innovative space", *Journal of Knowledge Management*, Vol. 17 No. 6, pp. 815-827.
- Orlikowski, W.J. and Scott, S.V. (2008), "10 sociomateriality: challenging the separation of technology, work and organization", *The Academy of Management Annals*, Vol. 2 No. 1, pp. 433-474.
- Pearce, B., Hinds, P., Altman, H.T., Thomason, B., Vaerlander, S. and Li, K. (2016), "What happened to my office? The role of place identity at work", in *Academy of Management Proceedings: Academy of Management Briarcliff Manor*, NY, Vol. 10510, p. 11983.
- Perkmann, M. and Salter, A. (2012), "How to create productive partnerships with universities", *MIT Sloan Management Review*, Vol. 53 No. 4, pp. 79-88.
- Saldaña, J. (2015), *The Coding Manual for Qualitative Researchers*, Sage, London.
- Seidel, V.P. and O'Mahony, S. (2014), "Managing the repertoire: stories, metaphors, prototypes, and concept coherence in product innovation", *Organization Science*, Vol. 25 No. 3, pp. 691-712.

- Sousa, C.A. and Hendriks, P.H. (2006), "The diving bell and the butterfly: the need for grounded theory in developing a knowledge-based view of organizations", *Organizational Research Methods*, Vol. 9 No. 3, pp. 315-338.
- Spaeth, S., Stuermer, M. and Von Krogh, G. (2010), "Enabling knowledge creation through outsiders: towards a push model of open innovation", *International Journal of Technology Management*, Vol. 52 Nos 3/4, pp. 411-431.
- Spinuzzi, C. (2012), "Working alone together: coworking as emergent collaborative activity", *Journal of Business and Technical Communication*, Vol. 26 No. 4, pp. 399-441.
- Stam, E. (2009), *Entrepreneurship, Evolution and Geography: Papers on Economics and Evolution*, No. 0907, Max-Planck-Inst. für Ökonomik, Jena.
- Strauss, A. and Corbin, J. (1998), *Basics of Qualitative Research Techniques*, Sage publications, Thousand Oaks, CA.
- Swan, J., Bresnen, M., Newell, S. and Robertson, M. (2007), "The object of knowledge: the role of objects in biomedical innovation", *Human Relations*, Vol. 60 No. 12, pp. 1809-1837.
- Thamhain, H.J. (2003), "Managing innovative R&D teams", *R&D Management*, Vol. 33 No. 3, pp. 297-311.
- Tushman, M.L. (1978), "Technical communication in R & D laboratories: the impact of project work characteristics", *Academy of Management Journal*, Vol. 21 No. 4, pp. 624-645.
- Ungureanu, P. and Bertolotti, F. (2018), "Building and breaching boundaries at once: an exploration of how management academics and practitioners perform boundary work in executive classrooms", *Academy of Management Learning & Education*, Vol. 17, No. 4, pp. 425-452.
- Ungureanu, P., Bertolotti, F., Mattarelli, E. and Bellesia, F. (2019), "Making matters worse by trying to make them better? Exploring vicious circles of decision in hybrid partnerships", *Organization Studies*, Vol. 40, No. 9, pp. 1331-1359.
- Ungureanu, P., Cochis, C., Rodighiero, S., Bertolotti, F., Mattarelli, E., Montanari, F., Rinaldini, M. and Scapolan, A.C. (2018a), "Innovating onsite or coordinating online? An exploration of how knowledge practices shape the onsite and online collaboration interplay across the lifecycle of collaborative communities", *CERN IdeaSquare Journal of Experimental Innovation*, Vol. 2, pp. 22-29.
- Ungureanu, P., Deborah, R. and Giustiniano, L. (2018b), *How Does Organizational Space Help Organizations Cope with the Challenges of Ambidexterity and Continue to Innovate? A Space Reorganization Experiment in a Transitioning Organization*, CERN IdeaSquare Journal of Experimental Innovation, Vol. 2 No. 1, pp. 38-45.
- Ungureanu, P., Bertolotti, F., Mattarelli, E. and Bellesia, F. (2020), "Collaboration and identity formation in strategic interorganizational partnerships: an exploration of swift identity processes", *Strategic Organization*, Vol. 18 No. 1, pp. 171-211.
- Van Marrewijk, A. and Yanow, D. (2010), *Organizational Spaces: Rematerializing the Workaday World*, Edward Elgar Publishing, Cheltenham.
- West, J. and Bogers, M. (2014), "Leveraging external sources of innovation: a review of research on open innovation", *Journal of Product Innovation Management*, Vol. 31 No. 4, pp. 814-831.
- Zott, C., Amit, R. and Massa, L. (2011), "The business model: recent developments and future research", *Journal of Management*, Vol. 37 No. 4, pp. 1019-1042.

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