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Implementing digitally enabled collaborative innovation: A case study of online and offline interaction in the German automotive industry

Rick (H.L.) Aalbers[1] | Eoin Whelan[2]

[1]Institute for Management Research, Centre for Organization Restructuring, Radboud University, Nijmegen, The Netherlands

[2]Business Information Systems Department, J.E. Cairnes School of Business & Economics, National University of Ireland, Galway, Ireland

Correspondence
Rick (H.L.) Aalbers, Associate Professor of Strategy and Innovation, Institute for Management Research, Centre for Organization Restructuring, Radboud University, Heyendaalseweg 141 6525AJ, Nijmegen, The Netherlands.
Email: r.aalbers@fm.ru.nl

In the context of implementing collaborative innovation, a range of digitally enabled infrastructures impact core organizational activities. Automotive manufacturing is one such industry where competitors now openly collaborate, facilitated through new technologies, in an effort to enhance collective innovation systems. We conducted a longitudinal case study of the first open innovation network in the German automotive industry to determine how online and offline channels interact to fuel firms' joint search for external ideas. Delving into the physical, virtual and cognitive enablers of collaborative innovation, our findings suggest that, while online platforms can help to facilitate knowledge sharing processes that promote collaborative innovation, firms implementing digitally enabled collaborative ideation need to develop additional mechanisms based on stronger offline interactions. As such, our findings contribute to a better understanding of how online technologies can facilitate knowledge sharing processes to enhance collaborative innovation.

KEYWORDS
channel multiplexity, cognitive flexibility, digitally enabled idea selection, digitally enabled open collaborative innovation, idea searching and filtering, offline, online

1 | INTRODUCTION

Collaborative innovation (CI) changes the rules that edict who can access and contribute to the creation of new products and services, uniting various stakeholders including suppliers, customers, users and competitors (Heil & Bornemann, 2018; Najafi-Tavani et al., 2018). Driven by advances in digital platforms, new ways to organize CI have emerged over the years that facilitate the seamless crossing of organizational boundaries. Enterprise social software solutions such as Yammer, Jive and Chatter enable new channels of interaction among employees, customers and management, while facilitating and even democratizing the decision-making process when it comes to collaborative idea scouting and selection. These developments have been accelerated by the COVID-19 pandemic. With the mandated switch to remote working, online platforms may be the sole mechanism for innovation partners to collaborate nowadays.

While interactions through online platforms for the purpose of CI have risen significantly, relatively little is known still about how firms—and their employees—adjust themselves to these changing digital ecosystems (Dahlander et al., 2021; Rangus & Černe, 2019). A tension between the online and the offline workplace may emerge when individuals cross virtual and organizational boundaries as part of their CI endeavours. Thus, further insight is needed on how modern technology facilitates emerging innovation ecosystems (e.g., Autio & Thomas, 2014; Ritala et al., 2013). Post COVID, employees will probably slowly return to working and interacting physically in shared office spaces, instead of solely relying on a digital environment for their functional and creative interactions. Stakeholders need to understand

the limits of online interaction and how offline channels can enhance such initiatives, in order to advance future CI initiatives. In the spirit of recent calls in this journal to delve into the physical, virtual and cognitive enablers of CI (e.g., Leminen & Westerlund, 2019), the objective of our paper is to generate this knowledge. As such, our study is framed along the following research question:

> How does the combination of online and offline channels for inter-organizational knowledge sharing lead to successful searching, filtering and identification of ideas in collaborative innovation (CI)?

In terms of behavioural effects, little research examines how CI participants' interface. Our research provides for a deeper investigation on how such processes are shaped. We use longitudinal data from the German automotive industry where competitors now openly collaborate, facilitated through ICT, in an effort to collectively render competitive momentum for the future. This CI initiative was a non-governmental affair that brought together major global carmakers, such as Daimler, Porsche and Opel, their suppliers, engineering services and consulting companies, as well as research institutes and private inventors to jointly scout and develop innovative knowledge and ideas.

Over a 5-year period, we analyse how offline channels of inter-organizational knowledge sharing interact with online channels in a manner that allows for both trust-enabled knowledge sharing (to overcome competitive tensions) and cognitive flexibility (to prevent crowding) along the different phases of CI. Particularly, we seek to deepen our understanding of the procedures through which parties simultaneously interact across more than one type of channel and how it affects their cognitive capacity to adopt and collaborate in the front-end stage of the innovation funnel, specifically the handover from idea scouting to idea filtering.

Our paper makes a number of important contributions on how the use of collaboration technology changes the way value is created and extracted within and across the boundary of the firm. Contributing to the management literature on CI (Asplund et al., 2021; Baldwin & von Hippel, 2011; Heil & Bornemann, 2018; Najafi-Tavani et al., 2018), as well as the literature on digital technologies in a creativity context (Jarvenpaa & Välikangas, 2020; Pagani, 2013), we reflect upon the conditions under which digital technology can give rise to new opportunities for CI and idea filtering in particular. First, our findings suggest that while online technologies can facilitate knowledge sharing processes in the context of CI, these processes remain strongly dependent on offline interactions, particularly when competitors are involved. This perspective departs from the notion that different channels of interaction are beneficial at different points of the CI process. Instead, we suggest that channel multiplexity, that is, the extent to which two parties simultaneously interact across more than one type of channel with each other, has a substantial and qualitative different effect in comparison to the effects of either in isolation.

Second, we also incorporate a behavioural dimension into the literature on collaborative R&D and innovation, by highlighting the 'why' mechanisms that drive front-end CI performance. Whereas the 'where' of CI refers to online versus offline, the 'why' denotes the partial coopetitive nature of these interfaces and the cognitive flexibility for those assessing the value of what is being exchanged. This insight is of relevance as cognition, and its interaction with the environmental structures that facilitate knowledge exchange, can provide fruitful grounds for new, innovative knowledge to develop (Aalbers et al., 2013; Hautala & Jauhiainen, 2014; Peschl & Fundneider, 2014).

The remainder of paper is organised as follows. In the following section, we provide the theoretical support that underpins this study, namely, digital CI and channel multiplexity. It reviews the different mechanisms at play in the CI process. We then provide details on the case study sites and the methods of data gathering and analysis as we contrast the pertinent aspects of the idea search and filtering phases of the CI process from an ideation juror point of view. In conclusion, we discuss our findings, as well as the limitations and future research avenues.

2 | THEORETICAL BACKGROUND

2.1 | Digital collaborative innovation

Research on CI and the broader literature on open innovation has linked online channels to enhanced access to external sources of ideation (Dahlander & Wallin, 2006; Füller et al., 2008; Leminen et al., 2015). Recent work contrasting the usefulness of online open ICT platforms for ideation with more traditional mediums report online users generating higher quality ideas than non-users (Parise et al., 2015; Poetz & Schreier, 2012). However, exposure to a vast amount of distant knowledge, largely as a result of the inclusions of new ICT-enabled channels of ideations, can easily result in 'crowding' (Bergendahl & Magnusson, 2015; Piezunka & Dahlander, 2014). Thus, appropriate knowledge filtering mechanisms must ensure that distant knowledge is not too easily discarded by the scouting organization, while preventing the organisation from overloading of irrelevant information, particularly those individuals tasked with the appraisal of multiple ideas (Whelan et al., 2011). Work on idea scouting that crosses organizational boundaries, for instance, shows that complex boundary spanning opportunities require supplementing structural social capital with a strong relational component and suggest that offline interaction, such as personal feedback, complements online idea initiation (Monteiro & Birkinshaw, 2016; Smits et al., 2015). Prior work on knowledge networks suggest that diverse knowledge can be most effectively assessed by actors that are part of open-specialized networks (Aalbers, 2020; Burt, 2004; Gargiulo & Benassi, 2000; Hansen & Haas, 2001). Such networks allow actors to build on similar knowledge domains, accompanied by shared interpretive schema (Ruger et al., 2021). The redundancies that exist between the information received and the receiver's prior information help actors to

meaningfully interpret diverse and distant knowledge (Ter Wal et al., 2016).

However, organizations with similar knowledge domains are very likely to be competitors, leading to a paradox: knowledge resources of competitors are both similar and complementary, which increases the potential for learning compared with traditional alliances (Bouncken & Fredrich, 2016; Fernandez & Chiambaretto, 2016). In the context of CI, similar knowledge resources can enable competitors to share their existing knowledge and meaningfully assess diverse new knowledge. At the same time, knowledge-sharing in a competitive CI environment creates tensions between rivals (Bouncken et al., 2018; Naqshbandi & Tabche, 2018; Zobel & Hagedoorn, 2020). Thus, in order to make digitally supported CI successful, supporting filtering mechanisms need to be introduced that allow for knowledge sharing among actors from similar knowledge domains. This is where we see the importance of offline interactions which complement online channels for knowledge sharing in the filtering process. Yet little research has focused on the longitudinal dynamics of such processes, that is, if and how online and offline interactions complement each other and which organizational mechanisms facilitate innovative knowledge exchange and evaluation in such a setting (Bouncken et al., 2018; Fernandez & Chiambaretto, 2016).

2.2 | Channel multiplexity

While not broadly portrayed in the creativity and innovation literature, the combination of the offline with the online in the corporate ideation process has received some scholarly attention, particularly in the information systems (IS) domain (Ding et al., 2019; Filiposka et al., 2017; Jarvenpaa & Välikangas, 2020; Mesch & Talmud, 2006). This stream of literature has linked channel multiplexity, that is, the degree to which individuals simultaneously interact across more than one type of channel with each other, to the innovative capacity of organisations (Cross et al., 2001; Wang et al., 2020; Zhang & Venkatesh, 2013). Relationships that are maintained through various media tend to create greater obligation (Ho & Levesque, 2005), and more and/or higher quality information tends to be exchanged (Sias & Cahill, 1998). The implications of multiplex relations that include non-human technological elements still remain largely underexplored nonetheless (Contractor et al., 2011; Wang et al., 2020). As communication within and between organisations has increasingly become digitised, online interaction adds an additional dimension to the layering of an organisation's functional relations. Network theory, and its notion of relational multiplexity in particular, helps to better understand how and why the combination of online and offline channels of inter-organizational knowledge-sharing leads to successful CI. The theoretical argumentation for this is twofold.

First, characterizing the interplay between online and offline communication networks, prior scholarly work suggests the combination of both to allow for complementing resources. Drawing on a field study at a large telecommunication company, Zhang and Venkatesh (2013) report that the combination of online and offline workplace communication networks fuels complementary resources and enhances individual job performance. In an ideation context, being able to shift back and forth between online and offline environments to probe for contextual information should improve idea attention and idea visibility for evaluators. Extending prior work that outlines the complementary effect of combined online and offline workplace communication to the context of CI, we argue that the resulting ease of accessibility to and control over alternative resources of idea screening positively affects innovative outcome. Online and offline interactions thus are both relevant for CI-related knowledge sharing, particularly in the front end of the innovation trajectory. While both the IS and management literatures do examine how online and offline channels of interaction influence innovation activities, these investigations tend to focus on each channel separately, rather than considering how channels co-evolve and influence each other (Spagnoletti et al., 2015; Tortoriello et al., 2012).

Second, prior work on the combination of online and offline workplace communication informs us of the positive effect when it comes to employee job performance. After a review of 83 studies on how ICT affects individual employees, Wang et al. (2020) purport that ICT use should be considered as an interaction between intensity and function. ICT use is more likely to influence job demands and decision-making when it is applied to the technical or task aspects of work (e.g., searching for ideas) and influences relational work design when applied to the social aspects of work (e.g., evaluating those ideas). Where online information access allows for the inflow of more ideas, mere exposure to online channels of interaction are likely to result in increased exhaustion via information overload (Wang et al., 2020; Yu et al., 2018). The option to redirect to offline interaction, next to online interaction, deescalates such individual work pressure, subsequently improving creative idea assessment. Based on this, we argue that while online platforms can help to facilitate knowledge sharing processes in the context of CI, those working in a digitally enabled collaborative ideation context will benefit from additional mechanisms based on stronger offline interactions.

Figure 1 graphically illustrates our notion of *communication channel multiplexity*, illustrating how the availability of two types of communication channels, online and offline, result in three types of ties, those that are purely online based, those that are maintained purely

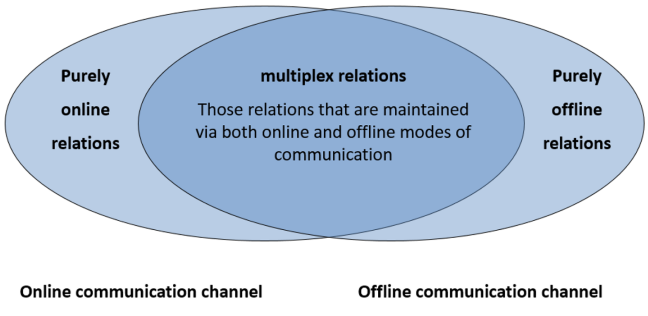

FIGURE 1 Multiplexity of communication channels [Colour figure can be viewed at wileyonlinelibrary.com]

offline, and those relations amongst individuals that are maintained via both online and offline channels of communication.

Research still has to open up the black box of ICT-enabled CI. Existing studies are confined to the spread of highly specific information within limited populations (e.g., Aral & Walker, 2011; Bakshy et al., 2012). Additionally, the role of the open innovation jurors has received limited research attention. As a consequence, our knowledge of how to implement a digitally enabled CI strategy and how collaborative choices by the jurors in such inter-organizational arrangement are made is rather limited.

Drawing from the arguments above, Table 1a provides a conceptual framework that contrasts the pertinent aspects of the idea search and filtering phases of the CI process.

We now consider how this conceptual framework guides the gathering and analysis of data.

TABLE 1a Idea identification in collaborative innovation

Collaborative innovation process stage:	Stage I: Searching	Stage II: Filtering
CI stage objective	• *Searching and enabling new ideas beyond firm and industry boundaries* • *Exchange of divergent insights*	• *Selection of ideas* • *Testing against/ exchange of convergent insights*
Channel multiplexity objective	• *The online complements the offline for broad knowledge scouting and inter-organizational collaboration* • *Facilitates volume and novelty of ideas/knowledge exchanged/broad exposure of jurors*	• *The offline complements the online for inter-organizational knowledge sharing and (intra-and inter-organizational) contextual idea evaluation* • *Efficient communication between juror and ideators tasked with selection*
Type of knowledge exchanged and major risk	• *Type: Creative* • *Approach: Divergent, drawing on ideas unconstrained by a shared organizational norm* • *Scope: From beyond the boundaries of the collaborating organizations* • *Risk: Crowding might lead to distant knowledge being discarded too quickly by jurors*	• *Type: Rational* • *Approach: Convergent, testing against the shared organizational norm* • *Scope: Testing towards knowledge pockets from within the boundaries of the collaborating organizations* • *Risk: Difficult to filtering valuable ideas from invaluable ones without tapping into the day-to-day 'offline' organization routines*
Mechanisms at play for CI jurors in handling new ideas	• *Cognitive flexibility required from jurors to allow for sufficient openness for novel ideas* (Amabile, 1983; Mednick, 1962; Ashford & Buyens, 2011)	• *Feedback and support required for jurors to further clarify and assess the idea in how it can develop to the benefit of the organization* (Perry-Smith & Mannucci, 2017)

3 | METHODOLOGY

3.1 | Research setting

To study the underlying dynamics of online–offline interactions, we adopt a single case study design. We gathered data from the first publicly visible CI initiative in the German automotive industry, referred to as the automotive innovation network (AIN). The AIN represents a unique case (Yin, 2009) to us as it offers the opportunity to study how different carmakers collaborate with the joint aim of finding new ideas beyond the boundaries of their firms and industries, supported by the use of ICT.

The AIN was founded in 2009 and represented a loosely coupled, project-based network of over 60 official member firms, although a much larger number of companies became active in AIN projects. The AIN aimed to bring together firms, institutions, entrepreneurs and private inventors interested in developing automotive innovations. To become a member of the network, firms need to pay an annual membership fee. The network's founder and manager loosely initiated and coordinated activities into different working groups. Rather than studying the network as a whole, we focus on the most active working group in terms of regular meetings and number of participants from an early stage of our research. The so-called 'innovation scouting' working group, which we refer to as the CI working group, was tasked with finding new ideas and technologies from outside the boundaries of the automotive industry. The CI working group maintained a healthy emergent culture due to the fact that all individual members participate on a voluntary basis. Both face-to-face and conference call meetings were a regular feature of the CI working group over the study lifespan.

The CI working group was characterized by heavy fluctuation in memberships, but our constant interaction with the group allowed us to identify a core group of five carmakers. Except for one carmaker who joined later in 2010, the circle of carmaker representatives remained stable and consistently active (based on email exchange and meeting participation).

3.2 | Data collection and analysis

The main phase of data collection extended over a period of 5 years (2007–2011). We used three main data sources: (1) email data, (2) semi-structured interviews, and (3) field observations. We

collected all relevant information from key members of the AIN and their interactions and attended the network's specific project meetings and the network's annual two-day automobile summit.

3.2.1 | (1) Email data

We were granted access to the complete email correspondence of one of the core members of the CI working group, an innovation manager (coded as CAR4) from one of the car manufacturers. The data contained over 1500 emails with other members of the CI working group. These emails included the recipients' lists and, in most cases, the whole conversation history as well as attachments such as meeting minutes, strategy papers and presentations. We complemented the email data with data from the web-portal hosted for the open collaborative innovation competition (OCIC). These data were transformed by the organisers of the OCIC into a database and then exported to an excel file that contained detailed information on the idea submitters, a brief description of their idea, technical specifications and proof of product validation. This information was also available to the jury. In addition, the email data contained the initial evaluations of all jury members that formed the basis for discussion within the jury before a final decision on the winners of the competition was made.

3.2.2 | (2) Interviews

We conducted a series of telephone and onsite interviews with key actors of the CI working group at two stages. Table 1b provides an overview. A semi-structured instrument guided the interviews, ensuring that all topics of interest were covered. Depending on the background and position of a particular interviewee in the network, we asked for the evolution of the CI group over time, CI practices, the involvement of particular actors in projects, and perceived outcomes. Additional interviews with innovation managers of two carmakers were conducted in 2016 to clarify some final questions that evolved during the revision process of this paper. The interviews—17 in total—typically lasted 60 min and were taped and transcribed afterwards. Informal talks with experts, as well as with key informants from the CI group, helped us to increase the validity of our data, including a series of such interactions as we observed the various working group meetings reported in Table 1b.

3.2.3 | (3) Field observations

From the beginning of the AIN initiative, we were included in the general mailing list and received invitations for all meetings. Meetings attended were documented by our team and field notes were written-up within 24 h of the meetings.

TABLE 1b List of core interviews and meetings attended

Year	Meeting attended	Interview partner
2007	• CI working group meeting • Annual automobile summit	
2008	• CI working group meeting • CI working group meeting • Annual automobile summit	
2009	• CI working group meeting • Annual automobile summit	• AIN Network Manager • Daimler Innovation Manager • Porsche Innovation Manager • Mazda Innovation Manager • Ford Innovation Manager • Edag Executive (jury) • TMG Consultant (jury) • ESG Executive (jury) • Materna Executive (jury)
2010	• CI working group meeting • Annual automobile summit	
2011		• AIN Network Manager • Daimler Innovation Manager • Porsche Innovation Manager • Mazda Innovation Manager • Ford Innovation Manager • Opel Innovation Manager
2016		• Mazda Innovation Manager • Opel Innovation Manager

3.3 | Data analysis

The three sources of data informed our analysis in different ways: the most extensive source was the email data. Based on this set, we first drafted an extensive case report on the formation and development of the working group and the CI community over the period of 5 years. For each year, a timeline was compiled with all major events that were important to understand the major dynamics around the OCIC. For each major event, we coded the channels of interaction as online (i.e., emails and web) or offline (i.e., telephone conference and face-to-face). This allowed us to observe an evolution of channel multiplexity from mainly online interactions to an increased complementarity with offline interactions. Once we had a better understanding of the history of the OCIC, we used the interview data to provide a more interpretative account of the major events from the perspectives of the core actors. Additionally, our own meeting minutes served to validate some of the interpretations made by our interviewees and provided important background information.

We coded the interviews and minutes by grouping phrases, sentences or paragraphs into codes and categories in an inductive fashion. This first phase of coding was followed by axial coding where we generated more abstract codes, deleted and merged codes (Strauss & Corbin, 1990). During this stage, we started to connect our inductive codes to established constructs from our preliminary theoretical framework. In this phase, the initial open codes were translated to specific themes. The axial codes that emerged formed the overarching categories at a higher level of abstraction (Strauss & Corbin, 1990). The axial coding was conducted by two members of the research team and discussed with the third author until any disagreements would be resolved. To validate our findings on the underlying mechanism in the CI process, the results of our case study were presented to and discussed with the full assembly of members of the CI working group in 2008 and later on also with the core group of five carmakers in 2012. While most of our interpretations were confirmed by our interviewees, the personal discussions also helped to resolve remaining misunderstandings about the case. Finally, we used the additional interviews conducted in 2016 as an opportunity to validate our final interpretations and obtain retrospective reflections from two core participants on why the integration of ideas obtained from the OCIC proved to be so difficult for the carmakers.

The following section provides a more detailed case description of the complementary roles of offline and online channels along the CI process. Unpacking the searching phase in the CI process, we review the role of both online and offline channels at the initial stage of the OCIC, examining if and when online and offline channels become more interlinked and result in channel multiplexity as grounds for idea search. We provide exemplar quotes to support our interpretation of events and the underlying mechanism that drives multiplex use of channels in collaborative innovation, particularly related to new idea search. We describe the evolution of the CI idea search trajectory over time, observing the transitioning of the car-manufacturers' open innovation network over a period of 5 years from initiation to maturity. We also found an overall trend of outside-industry actors among the winners of the online innovation competition, which could indicate that the search for distant ideas outside the industry was indeed successful. Through internet search we checked the websites of all winners to identify whether they (a) were already active in the automotive industry through supply or consulting activities or (b) whether they had no pre-existing industry affiliation because they were active in other industries or because the venture was new. We also counted research institutes, universities and private inventors to the second group of 'non-automotive' actors.

Tables 2a and 2b provide an overview on the evolution of the open collaborative innovation competition that here serves as our case study. Table 2a provides an overview of the number and idea themes submitted over time as well as the juror composition over time. Table 2b outlines the Open Collaborative Innovation Competition (OCIC) timeline of key events and preferred interaction formats.

TABLE 2a Overview AIN open collaborative innovation competition (OCIC) history

Year	Theme clusters	Number of submissions	Size of jury	Composition of the jury	Composition of winners of OCIC
2007	Not specified	150	20	OEMs (10) Suppliers A (2) Suppliers Non A (0) Service (4) Others (4)	22 Automotive 8 Non-automotive[a]
2008	1. Health and wellness in the automobile 2. Navigation and Infotainment 3. CO_2 reduction, lightweight construction and new materials	170	31	OEMs (11) Suppliers A (3) Suppliers Non A (2) Service (4) Others (11)	24 Automotive 6 Non-automotive[a]
2009	1. Comfort and functionality 2. Navigation and infotainment 3. CO_2 reduction, lightweight construction and new materials 4. Flexible production	320	45	OEMs (15) Suppliers A (2) Suppliers Non A (6) Service (8) Others (14)	18 Automotive 12 Non-automotive[a]
2010	1. Interiors communication and IT in the car2. Eco innovation—new ways of CO_2 reduction 3. Efficient and flexible production	400	8	OEMs (6) Service (2)	12 Automotive 18 Non-automotive[a]
2011/2012	1. Powertrain and electrification communication and mobility 2. Material and manufacturing 3. Design and interior	460	8	OEMs (6) Service (2)	14 Automotive 16 Non-automotive[a]

[a]Non-automotive actors are universities and research institutions, private inventors, and firms with an industry affiliation other than automotive.

TABLE 2b OCIC timeline of key events and preferred interaction formats

2007	Chosen interaction format	Timeline of events related to the idea evaluation process
26/02	Telephone conference with 12 members of the OI working group (among them CAR 3, 4, 7)	Discussion of the evaluation criteria and proposals for jury members. The telephone conference is followed by a voting by email which of two versions (separate criteria for product/process or general criteria) are to be chosen. The majority votes for the use of more general criteria.
12/03	Telephone conference with 12 members of the jury and organizers	Final decision on evaluation criteria
15/03	Internal email exchange at CAR4 between innovation manager (IM) and technical development (TD)	Internal evaluation of a submitted innovation
30/05	Internal email CAR4	Internal evaluation of a submitted innovation
31/05	Internal email CAR4	Internal evaluation of a submitted innovation
05/06	Email CAR3 to jury before 'last call'	Based on the compiled list CAR3 decides to undertake a pre-check before the final call
05/06	Telephone conference	'Last call' with OEM representatives and interested members of the jury to decide on the winners of the OIC
20/06	Email CAR3 to CAR5, CAR7, and CAR4	CAR3 proposes a closed meeting to discuss the future direction of the OI working group and evaluate the merits of the OIC.
26/07	OI working group meeting	Evaluation of INA 2007 and discussion of the innovation scouting portal, decision to focus further on the OIC
27/09	OI working group meeting	Discussion of improvement for OIC 2008, decision to introduce clusters for 2008
2008		
27/05	Meeting of the jury	22 of 33 jury members attended the meetings to discuss their evaluations of the submissions within their cluster
30/05	Internal email CAR4 from TD	Evaluation of the idea submission on 'mental headrest'
10/10	Telephone conference with NM, CAR1 and CAR4	Clusters 1, 2, and 3 will remain the same, a new cluster 4 is to be set-up that is explicitly addressing research institutes and universities, and cluster 5 on radical innovation will be discarded and postponed to 2010.
15–17/10	Email exchange between carmakers and NW	Decision to set up an alternative fourth cluster on 'lean and efficient production'
27/10	Email of CAR3 to others	Revised version of 4 clusters with the request for the others to provide their comments in order to avoid any discussion on the next OI working group meeting
05/11	OI working group meeting	Agreement on four clusters and appointment of leader for cluster 4
2009		
18/02	Meeting OIC winner 2008 with CAR1 and CAR4	Further investigation of the mental headrest technology

TABLE 2b (Continued)

2007	Chosen interaction format	Timeline of events related to the idea evaluation process
02/04	Email speaker of the jury to jury	Specification of evaluation criteria for the OIC
25/06	Meeting of the cluster leaders	Discussion number and winner per cluster
02/07	Internal email CAR1, CAR3 and CAR4	Discussion about the future of the OIC
30/07	Meeting cluster speakers with PM and NW	Redesign of the OIC for 2010
2010		
11–20/03	Email exchange between PM and cluster leaders	Cluster-specific evaluation criteria
11/05	Meeting steering committee in Frankfurt	Formation and meeting of steering committee for OIC 2010: CAR7, 1, 4, 3, CC
08/09	Meeting of the steering committee	Discussion evaluation procedure submissions
26/09	Email jury speaker to cluster leaders	Request for pre-check of evaluations for each cluster
28/10	Meetings of the cluster leaders	Discussion of the pre-checks

4 | FINDINGS: THE EVOLUTION OF CHANNEL MULTIPLEXITY IN THE CONTEXT OF A COLLABORATIVE INNOVATION COMPETITION

4.1 | Initiation (Year 1)—Setting up an open collaborative innovation competition (OCIC)

In order to widen the scope of their in-house search activities, a group of carmaker representatives (Porsche, Opel, Daimler and Mazda), all active in the broader context of the AIN, decided to initiate the innovation scouting group. The group organized offline activities that consist of regular meetings, hosted at the facilities of one of the members, every 2–3 months. The group soon attracted a growing number of diverse participants, and at first, any newcomer who was interested in the topic was welcome. The main motive for participation was the increasing necessity to get access to innovation from outside the traditional automobile industry and complement in-house innovation scouting initiatives:

> This group was a really new initiative as there was no existing forum at that time where carmakers would talk so openly about innovations. That also seemed like a contradiction, as everyone was trying to get ahead of the others in this regard. (interview with CAR1)

Competitive tensions started to surface early on however. After the first three meetings, there was growing frustrations among the organizers, as no firm representative was willing to share insights into their firm-internal innovation scouting methods, which was one of the original aims of the group:

> Our industry is very secretive. Nobody talks about anything here and there is always the fear that you might give away too much information about what your firm is currently working on. (interview with CAR 5)

As a result, the discussions during the meetings soon moved to the question how to best access outside industry ideas and find hidden gems; conjured by a picture of the 'genius amateur inventor' who was supposedly located somewhere 'out there in the Black Forest'. Several possible solutions were discussed, and an awareness grew that traditional offline procedure would not suffice. Among them was the development of a joint website with open calls for specific innovations or technical solutions. This idea was soon abandoned however, as the carmakers deemed it problematic if their competitors would understand what technologies they were specifically searching for. As a result of these discussions, the group soon agreed on an online idea competition. This competition should be based on an open call for a product, solution or prototype that are either novel or in use in industries other than automotive. The first open collaborative innovation competition (OCIC) was born and officially brought to life on 25 January 2007 when the web-portal went online.

A jury of 20 innovation experts was officially formed with 10 carmaker representatives and 10 representatives from suppliers and other firms and institutions from the automotive industry. No official prize was awarded, but the 30 best innovations were given a highly visible forum at the annual automobile summit where AIN members and other representatives of the German automobile industry gathered, on 15 June 2007. The first round of the open CI competition was considered a success by the organizers, not just in terms of the number of new ideas (150 submissions) but also in terms of the diversity, as over 40% of ideas came from outside the automotive industry.

At the same time, problems of evaluating the diversity of ideas became apparent early on:

> We received submissions from a lot of countries. And the network manager started to translate the web portal in all sorts of different languages, (…) and he thought we could just pick up innovations from all these countries. The problem was, however, that there was no filter how ideas were scouted for. There was no quality control. If you only produce a website, everyone can put their sweet dreams in there (…). (interview with CAR5)

> I think it is positive that through the online innovation competition we reached our aim to increase submissions from outside the automotive industry. At the same time, I find it very hard to make sense of these ideas, as I am not an expert for all technologies described here. (e-mail CAR4 to CAR1, 2, 3)

The jury agreed on using general evaluation criteria (consumer value, breadth of applicability in the vehicle, maturity of the innovation in its current field of application, expected product life duration of the innovation, sustainability and customer acceptance) instead of more specific ones to allow for more openness for radical and unconventional ideas. All of the 20 jury members were requested to evaluate each of the 150 submissions independently by filling in a score based on predefined evaluation criteria. At first, jury members sent around their scoring results by email in excel files, which did not turn out to be an effective way to perform the evaluations:

> Our use of Excel-files was rather mechanical. We were too polite to question each other's evaluations. If someone thought an idea was great and I did not, then this could be due to different reasons that were unknown to me. Maybe someone liked the idea because he or she thought it fits well in their product portfolio. Thus, we did not really try to convince that person that this idea might not be good but we simply put all our evaluations in the list and compiled an overall ranking. (interview with CAR4).

As a result, the overall evaluation results of the jury were anything but consistent:

> Looking at the individual evaluations of the submissions I recognize a huge variance that might lead to the outcome that some of the ideas score lower in the overall rating. This variance might distort the actual potential of an idea. (email CAR3 to CAR1, 2, 4)

Moreover, despite the official claim to search for new and 'disruptive' ideas, the evaluations were clearly biased towards already established ideas, which obtained the highest scores:

> Concerning the process of the evaluation of submissions it is striking that the oldest ideas that are already known and discussed in the automotive industry get the highest scores. This is of little surprise but the question remains how we can filter out the subtler ideas that can promise new ways of consumer satisfaction. (email CAR1 to jury)

As a further result, there were a lot of 'familiar faces' among the winners in the first year of the competition:

> In the first year, we were rather broadly looking for innovations from other industries. Then we got this colourful mix of innovations. But the jury just couldn't handle this diversity (…) and we ended up in the automotive sector again! And it is of no use for us if an automotive supplier like SKF submits their idea because someone from my company is very likely to already know it! (interview with CAR3)

Thus, the first round of online innovation competition succeeded in inviting the desired volume of new ideas from outside the industry, but the subsequent online procedure of evaluating these ideas proved to be problematic. The cognitive rigidities of jurors led to the selection of winners that were mainly coming from familiar domains (22 versus 8).

4.2 | Refinement (Years 2–3)—Growing offline interactions to complement online channels

After the experience of the first year of the COIC, three theme clusters (1. Health and wellness in the automobile, 2. Navigation and Infotainment, 3. CO_2 reduction, lightweight construction and new materials) were defined for the next round of the OCIC in 2008 to structure the inflow of submissions and make the evaluation process more manageable. Still, the diversity of ideas was hard to assess for the jury members, and one OEM representative addressed the four other carmaker representatives via email to indicate the need for action:

> (…) I do feel that there is a strong need to discuss those cases in a telephone conference where the jury is unable to make an evaluation when there is no expertise for the submitted topic on our side or when the submission lacks sufficient description. (email CAR1 to CAR2, 3, 4)

As an operational outcome, the carmakers' representatives engaged in repeated phone conferences after they exchanged their initial assessment of the submitted ideas by email, to make sense of the divergent assessment of their colleagues. In this process of discussing unfamiliar technologies and ideas, the carmakers were able to share and benefit from each other's experience with different technologies:

> It was not easy to evaluate these ideas … partly because some of the jurors had a very narrow expertise and were only knowledgeable regarding one specific area. We, as innovation managers, possess broader expertise but even for us it was difficult to competently evaluate each and every idea. But this is why the joint discussion with the other jurors was helpful – because we all covered different areas of expertise. (interview with CAR3)

> [...] The firm-specific competencies are very different. [CAR4], for example, has much more experience how the physical condition of the driver could be monitored than we do in this area. My firm, on the other hand, has a lot of experience with electric mobility (…), so others can benefit from this. It is a general truth that big carmakers have already tried a lot. (interview with CAR1)

The process of pooling firm-specific expertise helped to make sense of ideas that were hitherto foreign to the automotive context and thus improved the speed of reaching consensus in the second round of the innovation competition (2008). Even though the number of automotive actors was higher than the number of non-automotive ones (24 vs. 6), this can mainly be ascribed to the introduction of theme clusters that led to an increase of submissions from inside-industry actors. The positive effect of increased offline interactions can be seen in the decreased divergence of the jury members' initial idea assessment of all jury members that were exchanged via email. However, even though offline channels were used complementary to online channels—mainly to gain clarification of the assessment of other jurors—interactions only became truly multiplex in the next episode of the OCIC, as it reached maturity (Ideation round 3).

Another interesting contrast as ideas moved from the first stage to the second is the further emphasis of both formal and informal team interaction. Where ideas were largely individually evaluated under the initiation phase of the competition, providing individuals with the opportunity to experiment and the confidence that their ideas will be valued, the refinement phase introduced a need for stronger team-based interaction amongst the jurors as part of their endeavours to filter out the most promising ideas. Particularly during this refinement phase, idea convergence came to the fore as more of a collective team-based juror process, where idea evaluation converges based on more frequent formal and informal back and forth between jurors and other members of the CI community. For instance, based on the onsite interviews with key actors during this stage of the ideation trajectory, various instances of informal interaction took place via offline channels to test for idea viability.

To test new ideas against the organizational norm, feedback and support were gathered to further clarify and develop the specific idea to the benefit of the organization. Such an observation is in line with prior work on idea divergence and convergence as ideas pass along the ideation funnel, being exposed to further organizational scrutiny (Perry-Smith & Mannucci, 2017). The combination of both online and offline channels of interaction, at this stage, allowed for more efficient communication amongst the jurors tasked with selection. Through the process of pooling their firm-specific expertise, the telephone conferences helped to make sense of foreign ideas. Through our discussions, we identified critical events where information was successfully or not successfully exchanged. The outcome of these observations is an observed pattern where offline starts to complement online interaction as a means to gauge idea viability amongst the team of jurors as ideas move down the idea selection funnel. The relevance of reaching out for idea viability via offline interactions to complement online channels as ideas get refined, for instance, is further illustrated by the following quote of an Innovation Manager, as she signals some of the hurdles to be taken before ideas 'land' for further refinement:

> Each week ideas sent to me by private inventors pile up on my desk …. I am not saying that there could be no idea of value among them but it would require a lot of goodwill and effort to filter them out. (interview with Innovation Manager, CAR1)

> (…) small inventors (…) don't have a clue what is happening at the OEM and what the OEM is really in need of – even if they have a good idea they can't validate it and present it in a manner to get the interest of the OEM. (…) If someone sends me a 40-pages patent description, I have to be willing to read through (it). (nterview with Innovation Manager, CAR3)

An additional challenge for innovation managers who received these ideas was that the Technical Development departments of their firms were following strict technological roadmaps and thus less open for new ideas from outside:

> One needs to understand that people in Technical Development are usually working in a channelled way based on predefined technological roadmaps. They are working on a technical task in a highly structured way, with clear milestones and targets. If something new comes along that is completely off-track, things are always difficult. They have limited interest to deal with new subjects. (interview, Innovation Manager CAR3)

So for an idea to pass into idea refinement, there is a need to provide further context to an idea, to render traction and interest amongst those who may deem these online ideation additions as disruptive to their current activities. Classical consensus building and idea championing fares well by (in)formal offline interaction.

4.3 | Maturity (Years 4–5, Ideation round 3)—Channel multiplexity to unlock external knowledge

While interactions in the first year of the competition mainly took place by telephone and email, gaining further traction during the second year (Idea refinement), the role of face-to-face interactions became even more important from 2009 onwards. The frequency of meetings increased, at least for our circle of five carmakers as they started to organize additional meetings in a 'closed circle', next to the official meeting with the other jury members. This was partly due to the growing success of the innovation competition with a steadily increasing number of submissions each year that resulted in a higher frequency of telephone conferences and coordination meetings to distribute the administrative tasks and joint decision-making activities. At the same time, there was also growing dissatisfaction of the carmaker representatives with the situation in the innovation scouting group that was still characterized by fluctuation in membership and what was often referred to as 'freeriding' behaviour of members who just wanted to stay informed without making their own contributions. Frustrated by this experience, the innovation manager from carmaker 3 started an email exchange with his colleagues from CAR1, 2, 4, and 5 under the heading 'Entre Nous' where he suggested an informal meeting in the evening before the next official group meeting to discuss 'the future of the innovation scouting group'. After this meeting, the carmaker representatives decided to stay involved in the official group and continue to carry out their organizing activities for the competition, but the 'Entre Nous' meeting became the start of a series of informal meetings that institutionalized as the 'Innovation Roundtable'. In these additional meetings, the five carmakers discussed any issues regarding the OCIC with each other first before raising them in the official meeting with the CI scouting group. These informal meetings helped the five carmaker representatives to establish a leading position inside the network.

The regular physical meetings also helped to build the necessary trust between the participants and allowed them to openly share their own views on a technology that was up for evaluation and actively engage with the views of others to overcome competitive friction:

> We have come to known each other over the years and have developed trustful relations. And we were all professional enough to understand which themes might be too awkward for the other because they are confidential. (…) You never had the impression that anyone crossed a line because we naturally developed some implicit rules of the game how to handle sensitive topics. (interview with CAR1)

At the same time, a common understanding formed that innovation ideas potentially linked to competitive advantages are not to be shared with the group:

> And when we talked about certain themes, for example about the electric drive train, then it has been not a big secret that every OEM has it in its pipeline. Daimler has one, BMW has one, Porsche, VW and Audi have one as well. When you compare the roadmaps the issue differs with respect to the product segment, high, middle, low class and to the point of market introduction. We never talked about such issues. Market introduction of technologies are a taboo. (interview with CAR3).

Intensifying interactions in terms of both frequency and channel multiplexity—email, telephone conferences and physical meetings became fully intertwined at this stage—supported the process of increasing cognitive flexibility:

> The challenge was that we were dealing with ideas in a very premature stage, that we could not fully grasp and where you can easily end up with different opinions regarding their value. I always found it extremely enlightening if one of us would defend an idea and say: 'I understand this differently, you can actually use this for this, I could imagine that this will influence that ….' And then suddenly I realized, ok, I have not really thought of this before. So that was really an interesting dynamic going on. (interview with CAR 2)

Once the five carmaker representatives exchanged their views on the evaluation of the submissions and felt more confident in the quality of their assessments, they would discuss their assessment in a separate meeting with the remaining members of the jury:

> The meeting with all jury members in one room were really useful as everyone had a different approach. From a firm perspective, you always run into danger to think too one-dimensionally because of branding issues. In the jury, you had different suppliers, carmakers, all together who were all thinking from different angles. Thus, the chances of a more differentiated perspective became much higher. (interview with CAR4)

This process helped to increase the number of new ideas that were filtered from the OCIC:

> There was an increase in quality of the competition from year 1 to 2, and from year 2 to 3. We did find a lot of interesting ideas that we did not expect to find. This is not only because the competition attracted more submissions from different countries but also

> because the quality of our assessment improved over the years. (interview with CAR3)

Thus, the multiplexity in interaction not only helped to improve sense-making of diverse ideas but also to increase cognitive flexibility among those that were evaluating the ideas. This led to successful filtering and identification of the most promising ideas from beyond the boundaries of the automotive industry. This is also reflected in a higher share of winners from outside the industry (i.e., private inventors and universities), as opposed to firms from the automotive industry that were dominating the competition in the first 2 years.

In graphical summary of the collaborative ideation trajectory outlined above, Figure 2 summarizes the CI idea generation and filtering process over time in relation to the preferred interaction channels, illustrating the role of multiplexity in the CI process as it matured over time.

Although some fluctuations took place over time, the core group has remained stable until today. These ties were largely rooted, however not restricted, to the personal level. In one case, one representative changed his position within the firm, yet his successor was able to seamlessly take over the role and effectively participate in the further group meetings.

The ongoing offline discussion among the OEMs also soon made clear, that there was a general consensus to stop the engagement in the wider innovation scouting group, but to continue regular meetings in the smaller circle. The group decided to rename itself the 'Innovation Roundtable' to stress its independence from the former context. Today, the group encompasses seven members and wishes to keep the composition stable. The internal discussions at this turning point also forced each participant to reflect on the firm individual benefits of the working group:

> Of course when you hit a crisis like we did last year, you start to think more critically about how to go on. It speaks in favor of the group that we didn't stop. Because everyone of us came to the conclusion that there is a favorable balance between what you give and what you get. [...] This casual get-together between OEMs and innovators, that is truly valuable. You get to know things that you would have not learnt on your own or only under considerable time and effort investments. (interview with CAR1)

The Innovation Roundtable activities were still existent at the time of writing this paper. The true value of this joint activity was seen in the filtering of distant knowledge:

> I think the Innovation Roundtable is a valuable additional activity for our firm-internal innovation scouting. It is mainly a tool for categorizing, evaluating, and prioritizing innovations. (interview with CAR2)

5 | DISCUSSION

Online communities create new form of CI. They hold the potential to change how organizations harness knowledge and their capability to innovate. In the context of implementing CI, a range of digitally enabled infrastructures impact core organizational activities. By examining how online and offline channels interact to fuel firms' joint search for external ideas in a consortium of major competitors in the German automotive, this study provides insights into the knowledge sharing processes in CI. As an important but understudied area in creativity and innovation research—our study points to the role of channel multiplexity as facilitator for effective knowledge scouting and filtering. With particular focus on the juror role in digitally enabled CI, our findings suggest that while online platforms can help to facilitate knowledge sharing processes even between competitors, they remain strongly dependent on complementary offline interactions. Using a time window that tracks the instances of external and internal engagement with CI over time, our study unpacks the jurors' efforts to assimilate CI-driven ideas. Positioning the temporal task of a juror and the overall juror assembly as managerial instruments open for organizational orchestration, our case study shows that offline channels can meaningfully complement online channels in the filtering phase and avoid undesirable crowding effects.

In the transition from ideation to idea filtering, offline channels of interaction between idea jurors are needed, as it allows for trust-enabled knowledge sharing (to overcome competitive tensions) and

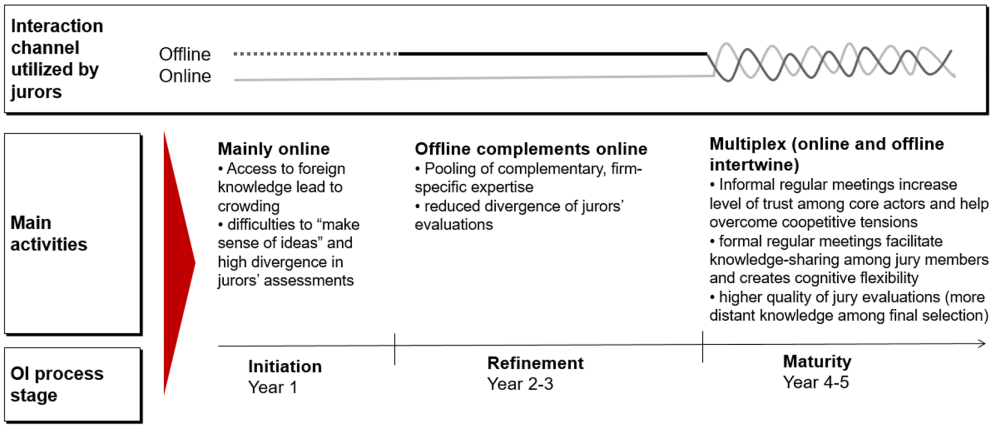

FIGURE 2 The CI idea generation and filtering process over time [Colour figure can be viewed at wileyonlinelibrary.com]

cognitive flexibility (to prevent crowding) in order to support the digitally enabled CI platform. Specifically, our longitudinal study of the first inter-firm CI initiative in the German automotive industry makes clear that online knowledge sharing requires complementary offline knowledge sharing activities as ideas are assessed for their potential to progress from idea search to idea integration. Focusing on the idea-filtering phase, our findings indicate than an idea's successful passage depends on the juror's ability to change frames and activate different insights, particularly during the filtering phase of the CI process. Idea appraisal—illustrated throughout the filtering phase in our study—is a process that benefits from the combined use of online and offline channels of interaction in particular. As ideas progressed through the filtering phase, a gradual move from online channels (email) to offline channels (telephone, face-to-face meetings) became apparent. Those evaluating the ideas were better able to overcome the initial cognitive rigidities that characterized their evaluation processes at the search stage, gaining a new perspective on ideas that were generated online (e.g., Perry-Smith & Mannucci, 2017).

Based on these insights, our contribution is twofold. First, in line with recent work on the organizational antecedents behind coopetitive collaboration for innovation (cf. Bouncken et al., 2018; Fernandez et al., 2018; Mention, 2011), we considered the knowledge sharing preferences amongst those involved. In reply to recent appeals to further explore the organizational and collaborative mechanisms facilitating innovative knowledge exchange and knowledge evaluation in coopetitive settings (Bouncken et al., 2018; Fernandez et al., 2018) our findings suggest channel multiplexity—the extent to which two parties simultaneously interact across more than one type of channel with each other—has a substantially different effect on CI evaluation outcomes in comparison with the effects of either in isolation. In pursuit of a better understanding of how online technologies can facilitate knowledge sharing processes in the context of CI, we identify ICT-enabled knowledge exchange as a complementing factor, not a substituting one, to the offline process of inter-firm idea appraisal. We show that complementary offline interactions are necessary to overcome coopetition amongst those involved in the collective appraisal of CI rendered ideas. While physical and virtual environments may provide for a fruitful basis for collaborative R&D (Leminen & Westerlund, 2019), innovation research commonly focuses either on ICT-enabled interaction or traditional offline interactions, but has largely ignored their combined effect. We believe our study is the first to apply the multiplexity lens to the online/offline interaction processes in an innovation context (Aalbers et al., 2014; Phelps et al., 2012). Thus, we add to both the creativity and CI literatures as we provide for a more fine-grained understanding of how and when online communities facilitate to collaborative open innovation initiatives.

Second, in an attempt to bring behavioural explanations to our understanding of the CI process, our case study illustrates how cognitive flexibility can be facilitated through channel multiplexity. Cognitive flexibility, defined as the ability to shift schemas and cognitive categories, has been identified as a prime mechanism to build trust-enabled knowledge sharing (Amabile, 1983; Mednick, 1962). Idea generation depends upon divergent thinking and novel associations (Berg, 2016; Perry-Smith & Mannucci, 2017). However, while the current focus in the broader creativity literature lies on the importance of cognitive flexibility of those who generate new ideas (Perry-Smith & Mannucci, 2017; Zhou et al., 2009), less focus has been put on the ability to shift between several cognitive schemas of those that search and filter ideas, that is, those who decide if the idea has value (Amabile, 1983; De Stobbeleir et al., 2011). Our study illustrates that cognitive flexibility requires complementary offline knowledge sharing activities among those that search for distant knowledge if they want to avoid the crowding problem. By shedding light on cognitive flexibility as a supportive mechanism, we establish an important link to the established CI literature, which highlights the importance of 'absorptive capacity' of organisations (Cohen & Levinthal, 1990; Whelan & Teigland, 2013). At the micro foundation of the firm, absorptive capacity requires individuals to be capable to open up to novel insights, demanding cognitive flexible behaviour.

In terms of practical implications, our findings suggest that management can harness the effectiveness of those filtering for successful ideas, the jurors in our case study, by accommodating a complementary offline platform for interaction. Although the online innovation competition had a global scope and attracted submissions from a growing set of countries, the participating carmakers and other juror members enjoyed the advantage of close geographical proximity. In fact, most of the member companies were located in Central and South Germany which allowed juror members to attend the regular physical meetings with relatively low investments regarding travel cost, time, and overcoming time differences. The regular offline interactions facilitated the type of deep trust among the closer circle of jurors (i.e., the carmakers), and the real-time interaction with the wider circle of jurors (i.e., suppliers and other automotive firms) that was necessary to improve the idea filtering process. The experiences in the recent Covid pandemic raises the question, however, if digital CI strategies can be equally successful if they were organized with a circle of geographically dispersed actors that is restricted to online channels such as video conferencing only. Implementing a digital implementation trajectory, successful implementation strategies need time to mature as this longitudinal German automotive case study portrays.

A deep understanding of individual-level network dynamics is critical for implementing strategy and organizational change (Hung, 2002; Lynch & Mors, 2019; Vogel, 2005). Yet strategizing in a digital world frequently commences without much concern for the offline. Simultaneous and consistent offline interaction enabled the closer circle of jurors to improve the filtering of truly valuable of ideas, suggesting the effectiveness of a technology platform to rests on more than just the technical specifications (cf. Denyer et al., 2011). Such close offline interactions should be central to any digital strategy initiatives.

6 | LIMITATIONS AND FUTURE RESEARCH AVENUES

Our study is not without some limitations, which also presents opportunities for future research to advance our work. First, participants in our

study used email almost exclusively to collaborate and share knowledge. As different communication platforms offer differing affordances, it may not be possible to generalize our findings to networks communicating through social media platforms such as wikis, social networking sites, blogs, forums or instant messaging. For example, Leonardi and Treem (2012) theorize four social affordances—visibility, persistence, editability and association—represented by social media. They also note that email only enables some of these affordances. Email has high editability (users can carefully craft messages prior to sending), persistence (users who can save, store and search through their own messages), but does not easily enable association (creating ties with other users) or visibility (viewing the communications of others). Thus, future studies should use the affordances lens to better understand how different online communication mechanisms influence knowledge exploration and exploitation in organizations.

Second, our study was strictly in the search and filtering process of new and distant ideas and less on firm-internal integration success of these ideas. The integration of innovation in a mass-produced product like automotive is not trivial and requires extensive application engineering and testing to comply with strict passenger safety standards. It remained unclear until the end of our study as to what extent ideas scouted through the online competition were actually integrated in new models of the member carmakers. We echo Dong and Wu (2015) in that firms need to develop implementation capabilities to filter and exploit the voluminous ideas afforded by online innovation platforms. In the current study, we did not focus on objective measures of 'success' of the CI initiative, but instead relied on subjective statements of interviewees regarding their personal satisfaction with the outcome of the competition and the quality of the evaluation process. Nevertheless, it would be desirable if future studies would make use of existing, more refined measures to assess the quality of ideas submitted to online idea competitions (e.g., Blohm et al., 2011).

As a third and final limitation our study is based on a single case of an CI network in the automotive industry. Innovation processes for automotive are structured in quite a unique way. We argue, however, that the problems we address in our study—such as the necessity to deal with the difficulties of filtering distant ideas (Piezunka & Dahlander, 2014)—are universal to all CI initiatives. Nevertheless, we highlight the need to extent the study of CI to more industry contexts to further increase the external validity of the concept.

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ORCID


Rick (H.L.) Aalbers https://orcid.org/0000-0002-9461-7591

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AUTHOR BIOGRAPHIES

Dr. Rick (H.L.) Aalbers is an associate professor of strategy and innovation at Radboud University, the Netherlands. He earned his PhD in Business and Economics from the University of Groningen. His main research area is on collaborative innovation strategies and organizational change, with special interest in conditions of sudden intervention and shock. His work has been published in *Research Policy*, *Long Range Planning*, *Journal of Product Innovation Management*, *Journal of Engineering and Technology Management*, *MIT Sloan Management Review*, *Management Decision* and *British Journal of Management*, among others. His *Sloan Management Review* contribution won the *2013 MIT Richard Beckhard Memorial Prize*. He is grant (co)holder on a number of other national and international science grants and founder of the Radboud Centre for Organization Restructuring. Rick currently serves on the editorial board of *Journal of Management Studies* and is the principal investigator on a Marie Curie ITN grant called FINDER, www.thefinderproject.eu, a EC funded research program that explores technology driven collaboration between fintechs and incumbents in the financial services domain.

Dr. Eoin Whelan is a Senior Lecturer in Business Information Systems at the National University of Ireland, Galway, Ireland. He is also a visiting professor at the Institute d'Economie Scientifique et de Gestion (IESEG), France, and a visiting researcher at Stellenbosch University, South Africa. His research explores the psychology underlying engagement with interactive digital media such as smartphones, social networking sites, fitness tracking apps and online gambling and gaming sites. In other words, how do different attributes of digital media interact with the person's motivations, personality, beliefs, cognition and situation, to influence the processes and outcomes such as well-being, conflict and performance. His publications have appeared in *Information Systems Journal*, *Journal of Information Technology*, *European Journal of Information Systems*, *MIT Sloan Management Review* and *R&D Management*. The findings of his research have also been featured in mainstream international outlets such as Forbes, Financial Times, Fortune, Reuters, Irish Independent and the Irish Times. Eoin serves on the editorial boards of the *European Journal of Information Systems* and *Information & Organization* and has previously led special issues in top basket information systems journals. He also regularly consults corporations on matters relating to his research.

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