SPECIAL ISSUE ARTICLE

Who captures value from hackathons? Innovation contests with collective intelligence tools bridging creativity and coupled open innovation

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Balancing value creation and value capture is a fundamental strategic issue for the management of open innovation. Insufficient compensation for created value may hinder the participation of a firm or individual in open innovation. It can thus provide an obstacle to the open innovation process as a whole. Hackathons provide an attractive setting for studying value appropriation in open innovation by actors of different types and with varying bargaining power. We define hackathons as idea competitions on specific topics in the form of a time-limited event. These competitions have gained more popularity throughout the years and have recently become more prominent. Therefore, an abductive empirical study was carried out in an international set-up with multiple embedded cases of hackathons. Results indicate that hackathons offer coupled open innovation processes. The value captured by the initiator of a hackathon in the form of inbound open innovation is balanced by outbound knowledge flows towards participants as well as with sideways knowledge flows between participants, which are a result of the generation of collective intelligence. Collective intelligence is thus identified as an alternative mechanism for value capture from open innovation.

KEYWORDS
collective intelligence, creativity, hackathon, innovation, open innovation, value capture

1 | INTRODUCTION

Open innovation is a very well-studied phenomenon, which generates appropriation challenges and tensions (Ritala & Stefan, 2021). The balance between value creation and value capture is still a fundamental conundrum in theoretical discussions of open innovation (Chesbrough et al., 2018; Marullo et al., 2020). The efforts and assets that contribute to the generation of innovations are not necessarily compensated with a commensurate share of the created value; whereas open innovation is usually beneficial for large firms, smaller entities struggle in this sense (Brem et al., 2017). The incomplete incentives for individuals and small firms to engage in open innovation could lead to a less

than optimal level of open innovation. The challenges regarding value appropriation in open innovation between large firms and individuals are salient in the specific context of hackathons.

Beyond the current hype, hackathons date many years back, at least to the early 1990s. We define hackathons as idea competitions on specific topics in the form of a time-limited event. These events were originally introduced in the context of software development. However, hackathons are not limited to technology innovation but are also used to tackle social and community issues (Chandra et al., 2021). There are many types of hackathons depending on the engagement and motivation levels of the participants and on the openness of the hackathon initiator, as well as the purpose behind the

activity. Hackathons are based on coupled open innovation in that they use reciprocal knowledge exchange to create synergies (Remneland Wikhamn & Styhre, 2019). The selective sharing of information by the hackathon initiator is a must to the success of the hackathon. This is a strategic use of outbound open innovation where firms reveal internally developed knowledge to attract third-party contributors and users (Masucci et al., 2020, p. 3). Hackathons are usually offered by a company that faces a challenge and calls for participation of its ecosystem, with a dominant presence of users or customers as participants, to tackle that challenge. Open innovation at the corporate level, between different companies, is not usually carried out in the hackathon format. Instead, hackathon participants tend to be individuals. In hackathons, therefore, the relationship is usually unbalanced and value capture is rather one sided. Balancing value creation and value capture for each entity in such uneven collaborations may be particularly cumbersome (Marullo et al., 2020).

Before this background, this study aims to understand the opportunities and challenges related to value creation and value capture from open innovation in hackathons. In particular, we ask why hackathon participants agree to create value despite an apparent disproportionate value capture by hackathon organizers. To respond to this research question, the present article describes extant research on open innovation and the construct of collective intelligence as well as on the phenomenon of hackathons. An empirical study is then carried out to understand the impact of open innovation and collective intelligence in hackathons through participant observation of the Open Mêlée Program of the French Association La Mêlée. The latter is an association driving the digital sector in the south of France by supporting the digital transformation of the local community and businesses. The embedded setting allowed us to compare multiple cases of hackathons while maintaining a fixed external context.

2 | THEORETICAL BACKGROUND: OPEN INNOVATION, COLLECTIVE INTELLIGENCE AND HACKATHONS
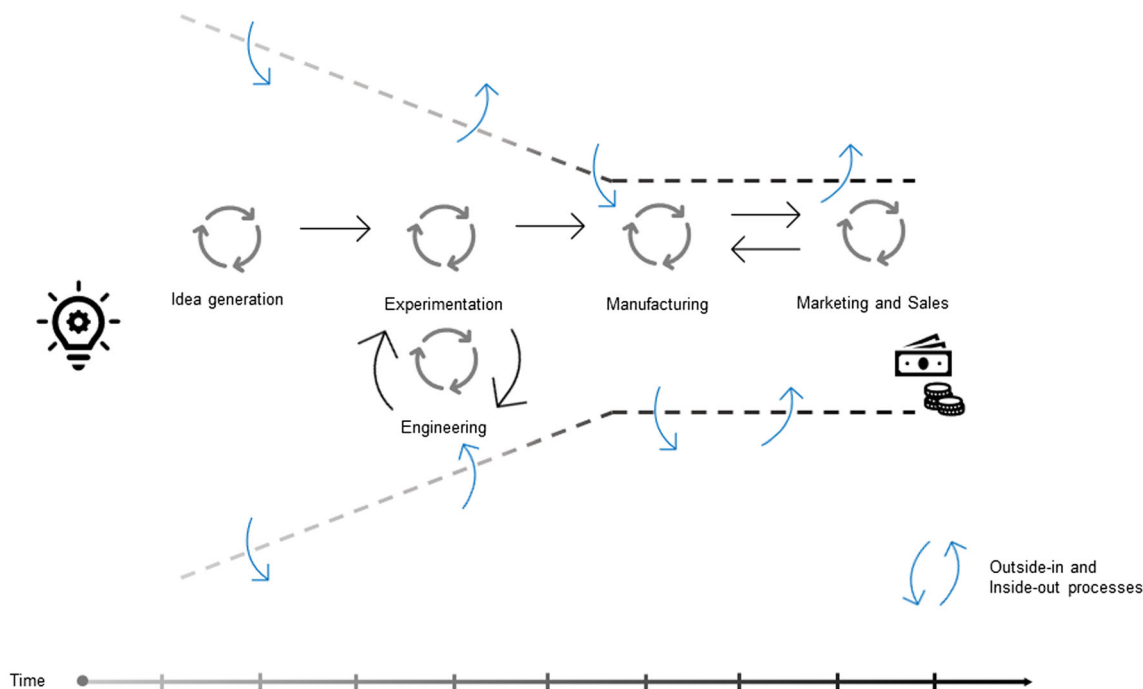
2.1 | Open innovation

According to Schumpeter, innovation includes the dimensions of newness, new market opening and implementation (Schumpeter, 1934). The term innovation thus requires an application or a realization of something new, whether a product, a service or a process. However, the Schumpeterian model is based on an entrepreneur with an important role in the whole process of innovation. Progressively, other actors took part in the process of innovation which became a collective activity (Akrich et al., 1988). This innovation can result from the collaboration of several actors or groups which do not belong to the same organization. Collaboration can be direct or indirect through the use of information and results which actors make available to others. The need to engage in innovation through collaborations with external actors is not a novel notion in itself (Tushman, 1977; Utterback et al., 1977). However, with the event of digitalization, the focus of

this discussion has shifted towards open innovation and digital transformation (Chesbrough, 2003; Dąbrowska et al., 2022; Enkel et al., 2020) where collaboration with clients and external actors has gained more importance (Pelissier, 2011). Open innovation and hackathons have growing relevance also for the success of entrepreneurial ecosystems (Maroufkhani et al., 2018).

What is then exactly covered by the term open innovation? 'Open innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology' (Chesbrough, 2003, p. 24). With this initial statement, a line of research was initiated with numerous publications and significant impact on innovation research as a whole. Several companies followed the model of open innovation before the concept was coined by Chesbrough (2003). Nevertheless, the open innovation of the 21st century is characterized by the proliferation of new information and communication technologies on the one hand and the implementation of information flows leaving the company on the other hand (Pénin et al., 2013). Open innovation is the use of inbound and outbound knowledge flows to accelerate both internal innovation and the external usages of innovation. This definition focuses on exchanges between the company's internal and external environments where company-specific ideas can be used by other companies and vice versa, thus contributing to the advancement of innovation.

Gassmann and Enkel (2004) proposed three fundamental steps of open innovation that are commonly used until today. (1) The outside-in process is focused on getting external knowledge from specific stakeholders outside the company boundaries (e.g., suppliers and customers). (2) Regarding the inside-out process: this is a solution to ideas born inside the company that have potential but do not align with the company's core business or strategy. These ideas are subject to be sold or integrated into a different market or as a foundation for a new startup. (3) The final coupled process comes into play when companies believe in collaboration and partnerships with small or big entities employing outside-in and inside-out open innovation to contribute to the prosperity of a business. Another tier of open innovation, the coupled open innovation, is where businesses do not just collaborate with partners but enter into alliances with competitors to maintain business or reach certain market segments. This rationale of the open innovation process is also used by Lazzarotti and Manzini (2009), who propose a theoretical framing based on different modes of open innovation. Here, they also refer to a funnel view of the innovation process, which is shown in the following Figure 1. Depending on the innovation openness, companies exchange information with external environments throughout each of the innovation stages. This exchange of information in an incremental way leads to what is known by collective intelligence. Thus, what is collective intelligence and how does it occur?

Value capture for open innovation in the latter parts of the funnel can often rely on the trade of intellectual property rights in the form of, for example, patents, industrial designs, trademarks or copyrights (Brem et al., 2017). For open innovation in the early parts of the funnel, value capture is much more complex because defining the value of an idea involves more knowledge ambiguity (Ritala & Stefan, 2021).

FIGURE 1 The innovation process funnel (Lazzarotti & Manzini, 2009, p. 620). [Colour figure can be viewed at wileyonlinelibrary.com]

2.2 | Collective intelligence and its linkage to open innovation

Social psychology studies in the 1950s concluded that the results of group collaboration were better than the results of a single individual in that group (Faust, 1959). Each one in the group brings experience and know-how, adding value to the whole group (Lévy, 1994). Collective intelligence, like open innovation, is not a new phenomenon, it even exists in animals such as ant colonies. However, it has grown with remote collaboration between millions of people (Broadbent & Gallotti, 2015), and the importance of the group has gained further momentum. People from different cultures and backgrounds can collaborate on projects and bring new insight to innovation, not only through direct participation but also through social media participation (Wankel, 2016). According to Lévy (1994, p. 29), collective intelligence is a distributed intelligence, constantly enhanced, coordinated in real time, and results in the effective mobilization of skills. This definition is further confirmed by that of Finidori, (2014, p. 79) describing collective intelligence as 'the global brain by the distributed intelligence of our interconnected human minds operating as a neural network …' Both definitions assign value to everyone in the group, in a balanced way and effectively coordinated to arrive at real exploitation of each element. Without this coordination, which resembles a network of neurons, collective intelligence does not exist.

In this context, the concept of creativity plays a key role to foster collective intelligence. Creativity has several dimensions of creative objects (Brem et al., 2016) and can be perceived on different levels (Puente-Diaz et al., 2016) and even in war-zones (Jahanshahi et al., 2020). While creativity is a process of the individual mind, organizational creativity can be as much a result of a creative climate (Cirella et al., 2016; Woodman et al., 1993). Such a climate can be purposely fomented by events such as hackathons that encourage collective creativity. Collective creativity is a momentary, collective process that includes interaction in the form of help seeking, help giving, reflective reframing and reinforcing (Hargadon & Bechky, 2006). The output from collective creativity can turn into collective intelligence thus perpetuating the results of a momentary process such as a hackathon (Huang & Chin, 2018).

Contributors to collective intelligence can include different players from the front end of innovation (Aagaard & Gertsen, 2011), such as employees, customers and experts. Employee-driven innovation has been minted to denominate innovation carried out by employees beyond their job description (Kesting & Ulhøi, 2010). It can target community creation as much as producing specific innovations (Flocco et al., 2022). In this vein of community creation, the involvement of employees in hackathons can include them in a community of practice with participants from different parts of the value chain (Breu & Hemingway, 2002). To this extent, Von Hippel (2005) highlights the role of users of products and services in the innovation process. Von Hippel refers particularly to free access and sharing of the results and the constitution of the innovation community to discuss and to advance the innovation. The idea of openness and that everyone can contribute to innovation is confirmed by Von Hippel's research on the sources of innovation. He suggests that innovation is not limited to manufacturers but on the contrary that it can come from other actors such as suppliers, collaborators and partners and often comes from users (Von Hippel, 1988), hence the importance of involving users and different actors in innovation, for example via

hackathons. A lead user of a product, process or service is a user who has identified needs in relation to that product, service or process long before the rest of the world on the market is aware of and this same user will benefit enormously by the solution provided to these needs (Von Hippel, 1988). Lead users can thus capture value from the collective intelligence generated in an open innovation process as well as from the outcome of this innovation process. In the same context as lead users, participants of hackathons in their early appearance contribute to a collective intelligence in an organized way. Hackathons offer opportunities to engage knowledge users throughout the research process (Cardwell et al., 2021).

2.3 | Hackathon

The term hackathon as it is known now appeared in June 1990, at an event organized by developers of OpenBSD (OpenBSD, 2016). It is a term constituted by the words 'hack' and 'marathon'. Hack is used as tweaking in the sense of exploring and programming inquiry, not as a reference to committing a cybercrime (Briscoe & Mulligan, 2014). One of the activists defines hacking as inspiring, learning and mixing, with the hacker being the one who does the fermentation in his kitchen, and not the robot who repeats the recipe (Zimmermann, 2016). To hack is not to accept to copy, but on the contrary, to hack is to create your own creative recipe. The second word is marathon which is used as a connotation to running, competing and strategizing to accomplish something with limited time and resources. Among the earliest examples of concepts similar to the hackathon are idea competitions or contests. An idea competition is a technique that makes the idea suggestion system more competitive by rewarding the most successful submissions, inside or outside the organization. This reward can be financial or in other forms (Marais, 2010). The first idea contest was 'The Longitude Act', a law of the United Kingdom Parliament that was passed in July 1714. The law offered monetary rewards to anyone who could find a simple and practical method for determining the longitude of a ship (Chao, 2012).

Hackathons are thus specific types of idea competitions in the form of an event held by an organization or group of people on a given topic or problem where the participants of different profiles collaborate and cocreate ideas and solutions related to the hackathon topic. The meeting between the participants can be virtual or in person. The duration of the hackathon is limited and generally lasts between 24 and 48 h. This short duration often does not give participants enough time to complete their solutions. Therefore, some organizers adopt a new format of hackathons which is spread over several months (Hackateam, 2016) instead of the typical 24 h. Longer contests allow for a combination of online and offline interaction which foments the bidirectional knowledge sharing required for coupled open innovation (Aalbers & Whelan, 2021). To be successful, some studies suggest that hackathons' limited time needs a totally different development process, not a short compressed one but a new process with minimal coordination and new structure (Lifshitz-Assaf et al., 2021). The collaboration challenges are more prominent in

hackathons with larger audiences, which makes continuous and transparent communication key for an effective and productive collaboration (Flores et al., 2018). Community creation and involvement is another success factor for hackathons related to citizen engagement and collaboration around common goals and social causes (Bertello et al., 2022). The basic elements of the hackathon model emerged from events known as local area network (LAN) where people come together with their computers or game consoles and share a LAN for multiplayer gaming and competing (Briscoe & Mulligan, 2014). The LAN events were held over weekends and included food, a place to sleep and technical support. The participants of LAN events are hackers who believe in sharing, open source, hacker culture and hacker ethics (Cyberpunk Project, 2017). The term hacker itself first appeared in the 1960s when it was applied to a group of pioneer computer geniuses at MIT (Levy, 1984). According to Levy (1984) who studied and frequented the first hackers, they were often modest, discreet, adventurers, visionaries and risk takers. Hackers share and adhere to the 'hacker culture' based on the free access to systems and sharing the progress made by each hacker. Today's hackathon participants are neither necessarily aware of the hacker culture nor computer literate. Some of them do not know what a hackathon is or how it works, but they are attracted by the challenge that this represents and the collaboration on a project that interests them, all in a creative way.

Hackathons were mainly related to computer software (Briscoe & Mulligan, 2014). They were construed as software development events (Topi & Tucker, 2014) focused on computer programming problems but they can also be a 'contest' of pitches or presentation of prototype cases of digital innovation (Leckart, 2018). Hackathons became widespread in other industries involving participants other than typical developers and programmers. With the development of new information and communications technology (ICT) and the need for digital transformation, many organizations have turned to hackathons as an innovation tool. This is an open innovation process because it involves different actors of the business ecosystem. It is based on the creative potential that a group of people can generate in coconstructing together. Hackathons help find solutions to problems in a faster and cheaper way compared with traditional innovation processes. This is emphasized by the abundance of open data and smart city initiatives in both the private and public sectors. Open data hackathons use open data to create new applications and businesses (Kitsios & Kamariotou, 2018). Hackathons, therefore, are low-cost innovation events organized by a host or sponsor to generate ideas around a topic or to find solutions to a problem by interacting with one another for a limited time lasting from a few days to a few weeks. Participation could be limited to a small group of people or open to the public, accompanied by mentors or not where the best ideas and solutions are rewarded with some monetary or nonmonetary incentives. The involvement of mentors and other support has been found critical to the successful execution of hackathons (Kitsios & Kamariotou, 2022). There are two general types of hackathons, classified according to their purpose. The first type is the hackathon, as a meeting place between

participants of different profiles. These participants are federated around a subject where they engage without external constraints, with all freedom of sharing with or without financial compensation, generally for a humanitarian cause such as Code for Cause or Hack-Edu. The second type of hackathons is a contest, where the idea of sharing and engagement is less present. Participation is subject to the rules and conditions imposed by the hackathon initiator or organizer and is usually awarded with prizes. Whereas most hackathons have a single initiator, there are also so-called mega hackathons that agglomerate several initiators (Jaribion et al., 2023). It is thus important for participants to evaluate the intentions of the organizer before responding to a call for participation. Depending on the type of hackathon, different actors take part in the process: organizers or intermediaries, sponsors or initiators, innovators, mentors or coaches, the jury (Franco et al., 2022) and the participants. For example, Hack the Workspace or Hack the Agency fall into this second category of hackathons where there is an initiator, usually a private company, and individual participants. Many governments and state-funded agencies have taken steps to open up their data. They promote the transparency and the provision of useful resources for innovation and social, scientific and commercial development as well as public participation (Boy, 2015), such as the creation of Etalab in France (Goeta, 2017). As a result, public institutions organize more and more civic hackathons. These coder marathons aim to prototype and develop software solutions for important public and social challenges (Ermoshina, 2013) or participate in public decisions about projects affecting their day-to-day life such as the involvement of the residents of Toulouse, France, in imagining the route of a new metro line through a hackathon initiated by CNDP (2017). To fight problems of a large scale such as the COVID-19 pandemic, the European Innovation Council (EIC) launched a hackathon with a vast number of participants (Bertello et al., 2022).

The hackathon can be seen as a new supplier channel. Instead of purchasing services, through standard channels, businesses use hackathons by mobilizing multiple participants to solve their problems (Johnson & Robinson, 2014). Then, the purchase cycle, the price and the approach are all different. Furthermore, the guarantee of results is unpredictable with no refund policy. This way of supply becomes more serious if the initiator of the hackathon were a government agency. Most of the research on hackathons studied the phenomenon as an event and or a project related to innovation. Although value creation is one of the main purposes of organizing a hackathon, the previous literature does not explain the value capture for each actor in the short term and the long term. The collective intelligence was not tackled together with open innovation in the context of hackathons. We find hackathons are a useful setting for studying value creation and value capture in open innovation because they are clearly defined events with power-imbalanced actors. The empirical study is therefore expected to uncover mechanisms for value capture in unbalanced relationships in the idea generation. Specifically, we aim to understand why hackathon participants create value in this apparently disadvantageous situation and if there are alternative value capture mechanisms at play.

3 | METHODOLOGY

The objective of this study is to understand the mechanisms of value creation and value capture from open innovation in hackathons. The subject of hackathon is relatively new, and the mechanisms at work need to be identified. Due to the exploratory nature of this research, qualitative methods are most appropriate with an abductive theorizing that alternates theoretical and empirical insights (Dubois & Gadde, 2002). The article intends to reflect particularly upon value capture in early stages of the innovation funnel. Because this requires an in-depth understanding of the value capture of each actor, a multiple, embedded case study approach was chosen. Embedded case studies are several cases in the same context. The embeddedness thus permits controlling for a number of external and contextual factors and hence renders a clearer contribution from the comparison of several cases (Eisenhardt, 1989). Therefore, a case of a hackathon intermediary was identified as an 'extreme case' (Yin, 1994). The organization chosen is such a case because it has many years of experience, combines different actors and has different people doing hackathons. As the goal of this research was to gain a deeper understanding of the role of hackathons and to gain a better understanding of the rationales behind them, this approach is following the logic of Eisenhardt (1989).

For this, data were collected based on the different hackathons (events), the observations and informal conversations with the participants, the meetings with the initiators and an intermediary. The studied intermediary is called La Mêlée. It is a not-for-profit association in Toulouse, France, that promotes the digital transformation of different ecosystem partners. La Mêlée defines hackathons as 'an open innovation approach organized in the form of a collaborative workshop that stimulates the collective intelligence. This allows the emergence of needs around a specific theme and to respond to these needs by co-designing innovative projects'. Since its inception, the association has supported many companies in their digital transition through various activities and programmes depending on the maturity level of the supported company and/or its adoption of new technologies. The hackathons are one of the activities as part of the open innovation programme called 'Open Mêlée'. Several hackathons have been organized in France on topics as diverse as education (HackEdu), civic engagement (Hack the city), startups (Startup Bus), big data (ISEG) and so on. The empirical study was carried out through participant observation of the Open Mêlée Program. One of the authors took part in three hackathons, namely, Hack the Workspace, Hack the Agency and the Metro Line 3 cartography workshop. Data were collected through client briefings; developed communication plans focused on social media pre-event, during event and post event; the process for each hackathon orchestrated by design-thinking coaches; the course of workshops–hackathons and informal interviews with participants. The setting allowed comparing multiple cases of hackathons while maintaining a fixed external context. In addition to the observation of the project management and execution of the three hackathons by La Mêlée team, the study evaluated the expectations of different professionals about hackathon outcomes. It also examined the nature of value creation and value capture in hackathons.

TABLE 1 Details of the studied hackathons.

Name	Hack the Agency	Hack the Workspace	Third line
Date	17 March 2016	22–23 June 2016	30 November 2016
Duration	1 day	2 days	1 day
Initiator sector	Banking	Real estate	Transport
Initiator type	Private	Private	Public
Objective	Reinvent the different uses of the bank branch	Reinvent the work space and imagine office of the future in 2040	Represent, map and simulate the third metro line project
Key drivers	Innovation: Digital banking eliminated in-person banking and the bank is looking to repurpose the usage of branch space.	Innovation: The job market and the office space are in evolution. It is necessary to anticipate these changes, to think about how we can adapt our product and service offer to changing ways of working, to the connectivity of people, buildings and objects.	Government policy: In France, certain public projects that reach a specific budget should be discussed with the citizens.
Themes	Pedagogy and training Children/students Seniors Business creation Work Territorial dynamics Rurality Social link Solidarity	Smart and Simple Comfort and Efficiency Reception and Welcoming	Transport/mobility Urban planning/socio-economy Environment/landscape/heritage
Format	In-person	In-person	In-person but later the projects are made available online for discussion
Number of participants	20	44	25
Gender	75% men and 25% women	60% men and 40% women	Not available
Team composition	Typically, teams of 4 members whereof 3 men and 1 woman.	Typically, teams of 7 members of which 4 men and 3 women.	Typically, teams of 8 members.
Participant skills	Mix of bankers, clients, seniors, students, …	Mix of architects, designers, students, …	Not available
Problem statement	1. Pedagogy and training: How to get organized to be able to explain the bank to customers? 2. Children/students: How does my bank branch become an actor in my student life (search for accommodation, internships, jobs, etc.)? 3. Seniors: How does my bank branch provide a place for seniors to stay 'connected' to today's world? 4. Business creation: How does my bank branch assist me and coach me in the creation and development of my business? 5. Work: How does my bank branch help me work (practice)? 6. Territorial dynamics: How can the bank federate the expectations of the local actors and consumers? 7. Rurality: How can my bank remain active and present in my rural area? 8. Social link: How can I make my bank branch a place for civic meetings?	1. How to be #HappyAtWork? 2. How to foster comfort and efficiency at work? 3. How to optimize someone's time and increase productivity? 4. How to imagine a smart and simple daily life at the office? 5. How to make the reception an unforgettable moment?	1. Which maps do you consider to be the most enlightening for the public debate? 2. What questions, what issues do they answer? 3. Would it be appropriate to continue this work after the public debate? How, with what tools?

(Continues)

TABLE 1 (Continued)

Name	Hack the Agency	Hack the Workspace	Third line
	9. Solidarity: How does my bank branch contribute to developing and maintaining solidarity within its geographic community?		
Generated ideas	1st prize: Open the bank for nonbanking services in rural areas including meetings or coworking. 2nd prize: Services around business creation, based on the exchange of successful experiences between the clients. 3rd prize: An educational project where clients explain to each other the different banking services based on their interactions.	1st prize: A connected box in the 'Smart and Simple' category provide staff with the basic tools they need for a meeting, for example, projector, speaker and webcam. It works with a mobile application and helps staff finding available meeting rooms in real time. 2nd prize in the 'Comfort and Efficiency' category uses personalized data, for example, temperature, light, software, music and a modular work space solution, to let the employees adapt their space to their own preferences. 3rd prize in the 'Reception' category, a pass that offers the company visitors services, including accommodation, transport and concierge services.	Eleven maps were shortlisted as follows: Comparisons of current and future journeys and durations. Railways in service and not in use. Existing facilities for cycling trips. Mobility flows for all transport modes. Inframunicipal population density by age group. Inframunicipal population density by socioprofessional categories. Secondary and higher education. Median tax revenue by neighbourhood. The third line project and natural risks. Representation of neighbourhoods in relation to the future metro line. The local and global issues of the third metro line.
Prizes	Monetary (EUR 3000, EUR 2000 and EUR 1000)	Monetary (EUR 10,000, EUR 5000 and EUR 3000) and in-kind (incubation with offices in GA group headquarter)	NA

We combined three research tools in this study. First, participant observation was carried out both as a participant of the intermediary team in organizing the event including attending the meetings with the initiator and as a participant in the hackathon and cocreating with other participants new solutions in response to the hackathon challenge. Second, we conducted unstructured interviews with different actors, for example, organizers, initiators and participants on topics such as their true intentions of organizing a hackathon or participating in one. People with a participant role were selected as per their availability. In each hackathon, we were able to talk to up to 20% of the participants with different job roles ranging from executive to students. We maintained communication with organizers and initiators during the entire process.

An overview of each hackathon is provided in Table 1 in terms of name, date, duration, initiator sector, initiator type, objective, key drivers, themes, format, number of participants, gender, team composition, participant skills, problem statement, generated ideas and prizes. These variables mainly relate to value creation in the hackathon process. The generated ideas give a hint regarding value capture by the organizer in terms of intellectual property, and the prize sum relates the monetary value capture by participants and the generated ideas.

Third, a single-question questionnaire was added to the registration form asking 'Why would you like to participate?'. We grouped the responses regarding the motivation of the participants for joining a hackathon in Table 2. These data contributed to our understanding of participant value capture.

TABLE 2 Motivation of participants for joining hackathon.

Motivation	Share of participants
Innovation and/or discovery	9.5%
Topic of interest	8.5%
Contribution	3.6%
Career development	3.6%
Collaboration	3.6%
Work requirement	2.4%
Follow-up to previous hackathon stage	2.4%
Concept and/or approach	2.4%
Networking	1.2%

4 | RESULTS

The studied hackathons, in the case of La Mêlée, are organized in partnership with the initiator of the hackathon where La Mêlée brings its experience in organizing such events and mobilizing the entrepreneurship ecosystem through its large network. This develops new ventures (Pittz & Hertz, 2018, p. 221). La Mêlée plays an intermediary role as a boundary organization (Seravalli & Simeone, 2016). As an intermediary, the organization employs different orchestration mechanisms or micropractices to facilitate the occurrence of open innovation processes (Cirella & Murphy, 2022; Schepis et al., 2021). The internal team 'Open Mêlée' is responsible for helping the initiator to determine the topic of the hackathon and derive the different

problems that the hackathon aims to tackle. La Mêlée informs the initiator about the process, communicates about the event, recruits participants and provides coaches to accompany the participants in their collaborative work and design thinking. La Mêlée generally mobilizes several members of the ecosystem to participate in the hackathons it organizes. After observation of different profiles of participants, three main ones were identified: first, employees of the company that is initiating the hackathon, and second, experts in the subject. They can be consultants, researchers, freelancers or employees of other companies, and third, the general public composed of partners, customers, students and others.

At La Mêlée, Hackathons were organized in three steps. Initially, a Barcamp was conducted to brainstorm and collect new ideas coming from the participants in a raw format. Then, an expert workshop with the initiators, experts and coaches was employed to select ideas, discuss and reformulate them into clear challenges to be tackled in the hackathon phase. Finally, a hackathon of 24 h of collaboration was organized to find possible solutions to those challenges. Below, we describe each of the three studied hackathons in detail.

4.1 | Hack the Agency

In the context of digital disruption in the banking sector, the Banque Populaire Occitane (BPOC) launched the first collaborative open innovation project with La Mêlée to identify future uses of the bank's different branches that witness fewer clients due to digital banking, exploring new needs and encourage new internal work methods.

The bank is determined to adopt innovative, participatory work methodologies that are more open to the outside world while promoting, internally, initiative taking. A hackathon was therefore organized with the aim to exploit and implement the ideas. BPOC has 215 branches, and in the digital age, customers visit bank branches less and less. The bank wants to be digital but to maintain this human contact with customers. Hence, they wondered how they could optimize and find other usages for the different branches' space. The seven teams were led by coaches from La Mêlée, to assess public expectations and imagine new modes of banking suitable to the public and modern life. Participants were recruited voluntarily. Customers were invited to participate via a banner on the bank's website and employees via their respective departments.

One of the authors had the opportunity to participate by joining one of the groups as a participant. To break the ice, the session started with some music as participants walked in a circle and as soon as the music stops, everyone engages in a 1-min conversation with the person next to them. Everyone remembers a word from the conversation and marks it on a post-it. They walk again and when the music stops everyone talks with someone nearby but this time answering the question 'what does money mean to you?' The subsequent question was 'what does money really (really) mean to you?' The second step was to fill a tree (drawing) with ripe and rotten fruits. The fruits are post-its on which participants wrote the things we like about the bank, imagining that those are the good fruits and the

things they do not like were the rotten fruit fallen on the ground. The third type of post-it (fruits) is that of things that annoy participants and is us and that we put in a basket next to the tree. The purpose of this exercise is to let participants express their needs and problems. Participants have the freedom to raise any kind of issues that will be addressed later on. The third exercise was based on the forced connection technique. For each team, there was an object: a skateboard, a wallet, a flip-flop, a card payment terminal, a piggy bank and so on. With the help of the facilitators, the teams imagined fictional representations of target users, that is, personas, who could possess this object then described them, gave them a name, a job and a relationship with the bank and afterward present the persona in 3 min. Finally, the teams would imagine this same person in 2050 and describe them by drawing six moments of one of their typical days. The persona should contact the bank at least once and go to the branch at least once. After making the 3-min presentation in front of the other participants, each team would record the presentation in front of the camera. The teams were formed based on the themes making sure to have diverse profiles within each group. Thus, in each team, there were BPOC employees, customers and finally other actors from the bank ecosystem. One of the participants did not know there was a banker in that team and gave bad feedback about the bank. This resulted in a conflict which was diffused by the facilitator.

At the end of this ideation Barcamp, the BPOC processed the materials with the coaches and design-thinking professionals to synthesize and select the most relevant needs concerning the BPOC priorities and reformulate these needs in the form of nine challenges or issues. These challenges were shared on social media and other platforms to encourage participants to find solutions to the challenges and issues. There were also prizes of €3000, €2000 and €1000.

The hackathon phase then followed, with five teams who chose the challenges they wanted to work on. Two groups on the pedagogy and training challenge, one group on rurality, another on students and one on business creation. The hackathon was spread on 2 days. The teams worked late, but no one spent the night at La Mêlée camp. Each team created a solution and prepared a presentation or prototype for the pitches. They all had assistance in preparing the pitches which lasted 5 min each. After deliberations, the three winners were announced. Then, the BPOC surprised the participants with the decision to support all five projects, including those that did not win. Post hackathon, the teams were invited to the BPOC headquarters to discuss a work schedule on the solutions.

Project initiators generally think that the hackathon is a response to the problems presented and that at the end of the hackathon, they will have something concrete, but this is not often the case. The hackathon is just the first phase of collective reflection. The communication department of the BPOC, which is centralized in Paris, did not actively communicate about the event apart from the press release made jointly with La Mêlée and a few retweets. There was no openness in terms of sharing the result with the public. For example, a YouTube channel was created for the event, but its use remained private.

4.2 | Hack the Workspace

Real estate is witnessing a big digital and services revolution. The office building, whether it is today or tomorrow, should be pleasant to work in and connected to its environment. Within this context, the GA group, promoter and builder of connected smart buildings wanted to redesign the workspace. The objective is to make the life of employees at work as simple and as efficient as possible. For visitors, the reception should be fluid and personalized. Hence, GA partnered with La Mêlée to organize a 'Hack the Workspace' hackathon. A first workshop was conducted to think about potential services GA group could offer to the users of its buildings to adapt to the evolution of working methods and the connectivity of people, buildings and objects. Three major challenges were identified through this workshop: to promote human relations, to customize the reception and to make everyday life easier. To this extent, three different scenarios were contemplated: (1) that of the employee who leaves home to go to the office, parks there, enters the building, works there, has lunch, has a coffee, rests there, meets colleagues, organizes or attends meetings; (2) that of the visitor who comes to a GA building for a meeting, parks there, waits at the reception, attends meetings and leaves; (3) that of the collaborator who goes to a GA building to work there on an ad hoc basis and for whom the path is substantially the same as that of the employee except that it is punctual and occasional.

This hackathon aimed to dissect the uses and connectivity of GA offices to offer a coherent ecosystem of interfaces and communicating objects to offer the smoothest possible journey and the services best suited to each of the targets. La Mêlée followed the same steps as for all hackathons. The GA project therefore followed a similar process to that of BPOC. First, a Barcamp was held to identify five related challenges. Then, during the hackathon phase, teams imagined personas according to the three targets of employee, visitor and collaborator and each worked on one of the five challenges. The winning teams were awarded a chance to be incubated by the GA Group and received financial support of €10,000 for first place, €5000 for second and €3000 for third place. The GA group relied heavily on communication and was very active on Twitter with new tweets and with retweets of La Mêlée.

4.3 | Third line

The final studied hackathon was a mapping workshop regarding the third line of the Toulouse metro. This was more of a civic hackathon organized by the National Commission for Public Debate with Eclectic Experience and La Mêlée. For major projects, in budget and socio-economic stake, such as the project of the third Toulouse metro line, French law requires that this project will be the subject of a public debate with participation in the decisions. The inhabitants can give their opinions on the project and to this extent several workshops, meetings and discussions were organized to gather 10,000 views on this project. The initiator of the project is a public organization that is different from other projects. The course of the workshop was similar to the Barcamp, but the initiator did not want to use the term hackathon and preferred a cartographic workshop. As the event approached, however, there was an implicit acceptance of the term hackathon used by the initiator in the hashtags on Twitter. This hackathon did not include prizes but relied on participants' interest in the socio-economic implications of the project. Eleven solutions were shortlisted for use by the Third line project.

4.4 | Cross-case comparison

When we examine common themes across the studied hackathons, we find that only one or a few ideas that are relevant and meet the initial need of the hackathon were retained, that is, those that were selected by the jury and won a prize. These selected ideas were, however, not all concretely implemented. The very few implemented ones need more time and phases of studies and experimentations before they could see the light. As discussed with one of the participating innovation managers, the success of innovation is very much tied with owning and defending the idea internally. There has to be a champion to carry on with the idea through different phases of the innovation process. In this context, the process of innovation related to the hackathon is incomplete. Some consider the hackathon as a creative session with just a new name as one initiator reports: 'Actually it's what we used to call a "creative session" ... updated to current taste;) A curious era where all that is needed is to change the name of things or to empty the words from their sense to appear "in" as some have said ... Does tinkering with the language make it more effective?' We can see resistance from some groups to this new phenomenon. One of the hackathon initiators at La Mêlée, while accepting the approach of the hackathon, chose to name it 'workshop' instead of 'hackathon'. It seems that the term 'hackathon' has not yet been accepted by this initiator. In summary, our case indicates that a hackathon is more of a creative session than an open innovation session.

Collective intelligence is the result of interactions between participants in a hackathon. However, participants struggle to capture value from a project, especially when public institutions deploy hackathons to solve so-called public problems. The prize sum alone was not large enough in our cases to warrant the significant investments in terms of time and effort that participants contributed to the innovation process. Rather, in our interviews, participants appear to appreciate the innovation process in itself and to consider as a large part of their compensation the collective intelligence of which they form part. Some stated that the objective of their participation was group thinking and interest in the subject as translated as 'I am addicted to work carried out in a think tank' or 'Because I feel concerned by the subject' or 'To share ideas and brainstorm together to adapt to the change'. A combination of prizes, contacts and collective intelligence appear to motivate individual participation.

The following Figure 2 is an attempt to classify the observed processes across the different hackathons within the introduced innovation funnel process thinking. Hackathons give specific input to the idea generation process with their output, in many instances even with concepts beyond an idea stage. Placed at the beginning of the
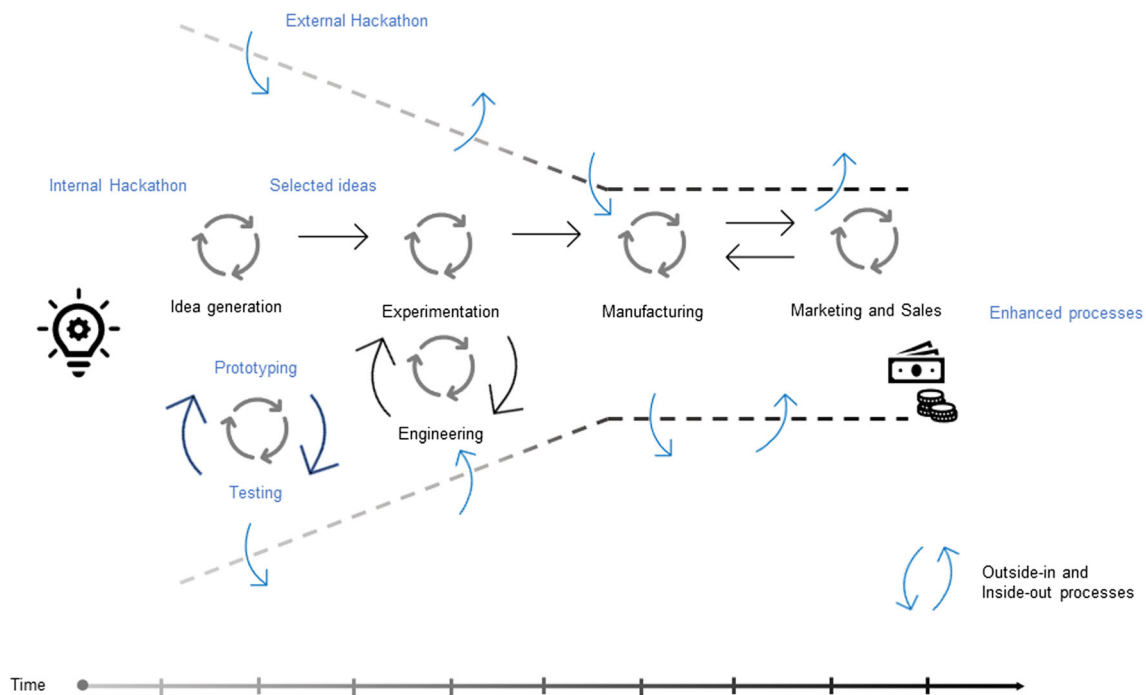
FIGURE 2 Hackathon classification within the innovation funnel processes (own illustration, based on Lazzarotti & Manzini, 2009, p. 620). [Colour figure can be viewed at wileyonlinelibrary.com]

innovation processes, hackathons can accelerate innovation and save time (Flores et al., 2018). The coupled phase of prototyping and testing in hackathons is a shorter mechanism for the experimentation and engineering process. The internal hackathons are also a new element that highlights the collective intelligence that happens inside the company intending to boost the innovation process.

5 | DISCUSSION

The study allows us to understand the relativity and subjectivity of the value captured by each of the hackathon actors where the initiator gets potential solutions to the problems along with new ideas that might emerge (inbound open innovation) while participants enrich their knowledge, network and visibility (outbound knowledge). The diversity of participants and the level of openness are important factors in the success of the hackathon and the richness of ideas and solutions to the problem.

5.1 | Hackathon as an open innovation tool

Hackathons as tools for open innovation have been gaining momentum for several years. The term innovation is associated with hackathons, as such events often lead to innovative ideas. In practice, we find that the hackathon process is divided into two phases; prephase ideation where abundant ideas on the subject are generated so that these ideas are integrated into the second phase which is the

hackathon itself. The goal is then to prototype the generated ideas (Granados & Pareja-Eastaway, 2019). The ideation step and even the hackathon cover only a small part of the innovation process. Innovation takes place only when these ideas are being realized. Therefore, the hackathon is a step of a long innovation process because the ideas that rise from hackathons are usually not concretized during the event. Hackathons may thus be more of a creative session than an open innovation session, even if the hackathon is a result of an open innovation approach by the initiator. From the cross-case comparison, we see that even though there are common themes to how organizing firms use hackathons, there are also differences in the extent to which organizers embrace the concept of hackathons. Firms that are more mature in terms of open innovation may more effectively manage different knowledge inflows and outflows (Enkel et al., 2011). There is thus firm-level heterogeneity in the extent to which the organizers' conceptualization goes beyond that of a creative session and encompasses a wider set of open innovation mechanisms.

Nevertheless, a hackathon is a powerful tool to boost innovation (Flores et al., 2018). Using design-thinking methodology, for instance, helps to create solutions in a very short time, compared with the traditional innovation process. It is also a mobilization tool for internal teams to reach some tangible results with the participants in a quick way and to justify the activity itself. The outcome can fuel the innovation process with more concrete ideas to go through the innovation phases and perhaps reach the marketing phase. The mechanisms for integrating external knowledge must be adapted to the phase of the innovation process (Eslami et al., 2018). Yet commercialization is not always the objective behind the hackathon. In some of the studied

cases, the objective was to find solutions to improve a situation or find creative ways to repurpose the use of a company asset. The use of hackathons can be transposed from the ideation phase and extended to all the phases of innovation either to test some ideas or even in the marketing phase when choosing a name of a product or a packaging colour.

A hackathon is a relatively old phenomenon but has grown in the past few years without academic literature on the subject. This void has been filled by the media using jargon that does not analyse concepts and is sometimes contradictory. We therefore ground the empirical phenomenon in the innovation literature, in particular, the literature on open innovation and collective intelligence. The hackathon is only a phase of open innovation. It is a creative session, above all, with ideas that need to be put in place and tested. Based on the experience of La Mêlée, the rest of the innovation process is carried out within the initiator. Hackathons thus decidedly are an open innovation phenomenon, although just one of many ways to introduce openness in the innovation process.

5.2 | Coupled open innovation in hackathons

Whereas idea competitions as mentioned earlier are generally processes of inbound open innovation, hackathons are processes of coupled open innovation with knowledge flows both exiting and entering the focal firm. In Figure 3, we note that the company initiator involves some of the staff in the hackathon as participants to contribute or as coaches to guide the innovation process. There are also participants or witnesses from other companies because the hackathon is
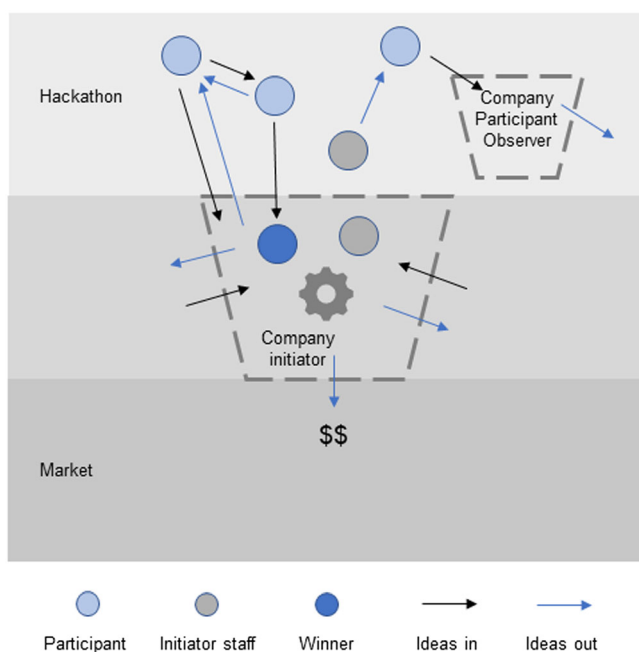
FIGURE 3 The role of hackathons in open innovation processes (own illustration). [Colour figure can be viewed at wileyonlinelibrary. com]

public. These companies could benefit from outside-in open innovation. The selected winning ideas could have different paths, but assuming that the initiator is committed enough to take these ideas to the next phase, the generated ideas could either be used internally to enhance processes or embedded in existing innovation projects or be implemented and then commercialized to the market.

Hackathon is considered to be a form of open innovation where several participants coming from different organizations, having varying expertise and experience, work together to achieve results that go beyond the reach of internal R&D. Therefore, the hackathons we study also included sideways open innovation between participants in the ecosystemic innovation process. The different approaches put forward during a hackathon hence serve as input not only to the focal firm but also to other participants in a sideways open innovation. This is the principle of hackathons: Innovation improves when different participants with heterogeneous backgrounds participate (Hitchen et al., 2017). The hackathon thus contains elements of both inbound, outbound and sideways open innovation and creativity. Creativity happens when one achieves an outcome that is new, practical and adapted to the environment and time when this takes place (Sternberg & Lubart, 1995).

There are different points of view regarding the objectives that the hackathon initiators would like to achieve in the context of the three hackathons organized by La Mêlée. One of these initiators was cautious about sharing information with the general public on social media even when aware that the social media channel Twitter was the main communication tool of La Mêlée. To not communicate freely enough about the hackathon and to not share the details of the event or the ideas that are generated from it go against the communication objectives of La Mêlée as an organization that promotes digital collaboration and open innovation. Another hackathon initiator, on the contrary, used the hackathon as a communication tool to generate attention around the company by focusing on the communication. This initiator was therefore as serious about meeting the goals of innovation as he was about supporting the ideas that came out of it. Hence, the hackathon might have different objectives besides being a tool for open innovation. For some initiators, those with a more defensive protection strategy the hackathon is only a source of inbound open innovation, whereas others adopt a more collaborative strategy and make efforts to make it a coupled open innovation process by both receiving and emitting knowledge.

5.3 | Hackathon as collective intelligence

Beyond the question of terminology, and whether the hackathon is an open innovation or a creative workshop, it is thus worthwhile to take into consideration the degree of openness in a hackathon at different levels and the degree to which the hackathon initiator is ready to reveal and share information in outbound knowledge flows, to ensure the success of the hackathon and obtain satisfying results that would solve the problem. On the other hand, the willingness of the participants to be engaged and to share their knowledge with each other

and with the initiator must be considered. The hackathon initiator might be unknown to participants, and the real objectives behind the hackathon are not revealed, except for the information that is selectively shared when promoting the hackathon itself to recruit participants. This strategy of outbound innovation is used to attract collaboration with different actors of the ecosystem (Masucci et al., 2020, p. 3), where the intermediary such as La Mêlée plays a big role in stirring the ecosystem and inciting the collaboration.

The principle of open innovation in the hackathon context is that there are benefits from the creative emulsion of a community in a regulated sharing environment. However, the initiation of hackathons by organizations towards individuals is not always balanced. Hackathons appear to be more advantageous to the organizations initiating the hackathon than the individuals who participate in those hackathons. There may also be constraints and challenges related to the degree of openness. Innovation performance benefits when open innovation is coupled, that is, there is both inbound and outbound open innovation in a two-way process (Greco et al., 2015). The apparent deficit in knowledge flows towards the hackathon participants may however be compensated by sideways open innovation among participants and the contribution of hackathons in expanding participants' professional networks and embedding them in an innovation ecosystem (Visscher et al., 2021). The impact of sideways open innovation in innovation ecosystems may thus explain the success of hackathons and more generally contribute to our understanding of seemingly unbalanced knowledge flows in coupled open innovation. Multilateral open innovation is therefore a fruitful avenue for further research. We propose that the value captured by the initiator of a hackathon in the form of inbound open innovation is balanced with outbound knowledge flows towards participants and with sideways knowledge flows between participants.

Hackathons motivate participants to create value by forming part of a collective intelligence, with initiators capturing the lion's share of the generated value. Still, the value captured through forming part of this collective intelligence appears to incite participation by individuals. Hackathons are organized in a context of open innovation where companies open their doors and involve external bodies and users in their innovation process, but hackathons can also be organized without the need for companies to open their doors. Company or internal hackathons are an extension of the hackathons where participants are only the employees of a company (Rosell et al., 2014). Research around this type of hackathons is even more scarce than the public hackathons (Nolte et al., 2018), and their objective could be innovation as in the case of the Facebook-like button created in an internal hackathon in 2007 (Dickey, 2013) or to enhance collaboration and teamwork (Sadovykh et al., 2019). Community creation is then an important aspect of such employee-driven innovation efforts (Flocco et al., 2022) and for the value creation of participants in general. However, in the studied cases, community building is more a participant interest, than something which is consciously promoted by the organizers. By framing the hackathon as a momentary event of collective creativity rather than a lasting development of collective intelligence, organizers are missing out on creating the additional value for participants.

Hackathon participants could acquire knowledge and build a community out of this collective intelligence experience. Participant roles and diversity also shape the innovation project and the topic of the hackathon. Everyone contributes according to their abilities (Tang et al., 2021, p. 218). If the outcome is selected by the hackathon initiators, participants could also gain some compensation in the form of a prize. However, it is the hackathon initiator that benefits most from the generated value. This is confirmed by the concession of intellectual proprietary to the hackathon initiator. In such a context, the partnership terms born out of this open innovation are not reciprocal. This indicates that hackathon participants create value by forming part of collective intelligence, whereas initiators capture most of the generated value. Collective intelligence requires a group of individuals and a certain openness to be able to exchange and accumulate experiences to achieve an effective mobilization of competencies. Hackathons pull together a multitude of actors to generate collective intelligence. As opposed to other open innovation methods, the generation of collective intelligence results in shared assets through which all represented parties may capture value. Therefore, increased efforts in community building by the hackathon organizers are likely to yield more or more involved participants, that is, increased value creation during the event. Organizations do not always have the resources or the connections that are necessary to reach many participants or to find the right partners that are required in their innovation process. The role of innovation intermediaries such as La Mêlée can be threefold: as a broker for problem-solving, a broker for the transfer of technology or a node in an innovation ecosystem (Agogué et al., 2013). La Mêlée coaches facilitate knowledge exchange between organizations that initiate the hackathons and the community by managing knowledge boundaries between the different team members (Randhawa et al., 2017).

6 | CONCLUSIONS

The main implication of this article for the literature on open innovation is the identification of alternative value capture mechanisms in unbalanced interfirm relationships. Particularly in the early stages of the innovation funnel, value is not always captured in the form of tradable intellectual property rights but rather as more ambiguous and embedded knowledge (Ritala & Stefan, 2021). The collective intelligence itself is then considered a suitable compensation by participants for their contributions in the innovation process. This explains a perceived balance between value creation and value capture in open innovation beyond monetary retribution (Chesbrough et al., 2018; Marullo et al., 2020). For theory on collective intelligence, this research contributes the idea of collective intelligence as a mechanism for value capture that balances contributions to value creation, for example, in crowdsourcing approaches.

This study has several implications for practice. Hackathons are a very practical concept, and a better understanding of how to balance value creation and value capture in this type of open innovation will enable initiators to design win–win situations in terms of value

capture. We found that there are implicit forms of value capture such as the generation of collective intelligence. The extent to which the collective creativity generated during a hackathon can be perpetuated into collective intelligence will then impact the value received by participants, and community-building efforts become central to support this type of value capture. Further, if hackathon initiators and organizers can specify the precise benefits that participants can receive in addition to monetary prizes, the distribution of value capture will be clearer and more attractive for participants. From the publicly organized hackathon, we have seen that such benefits can also include having a say in the implementation of public policy. The benefits can be emphasized both in the implementation of hackathons and in the communication of potential benefits to participants, thereby attracting more participants as well as more effort from each of those participants.

6.1 | Limitations and future research

This study could hence be extended towards, for example, value capture in hackathons with social purpose, which is especially relevant in times of crisis such as the COVID-19 pandemic or the European energy crisis where openness and collaboration are needed. It would be also interesting to see studies in an international context and with gender-related insights on how hackathons are perceived. We have witnessed successful hackathons, accelerated innovation processes and highly creative adaptation and repurposing in the context of the open innovation. Last but not least, hackathons might also merge with other related forms, for example, online tools for crowdsourcing, which also offer interesting future research opportunities related to the leveraging of collective intelligence for open innovation (Karachiwalla & Pinkow, 2021).

This paper aimed to foster an understanding of value creation and value capture from open innovation in hackathons. It analyses who organizes hackathons, who participates in them, with what purpose and in what context. The results obtained are yet to be confirmed by quantitative studies using a larger and more diverse set of data. Different cultural contexts might offer interesting insights for future research, as may longitudinal studies. Still, the findings form a basis for future research on the subject and show the usefulness of the concepts of collective intelligence and open innovation to understand empirical phenomena.

DATA AVAILABILITY STATEMENT
Data are available on request from the authors.

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