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Open Innovation With Sensory and Consumer Science: Hackathon as a Tool for Academic Industry-Cooperation

Elena Romeo-Arroyo[1,2] | Davide Giacalone[3] | Christina J. Birke Rune[3] | Agnieszka Kita[4] | Anna Michalska-Ciechanowska[5] | Malgorzata Korzeniowska[6] | Ángel A. Carbonell-Barrachina[7] | Luis Noguera-Artiaga[7] | María Mora[1,2] | Laura Vázquez-Araújo[1,2]

[1]BCC Innovation, Technology Center in Gastronomy, Basque Culinary Center, Donostia-San Sebastián, Spain | [2]Basque Culinary Center, Faculty of Gastronomic Sciences, Mondragon Unibertsitatea, Donostia-San Sebastián, Spain | [3]Department of Green Technology, University of Southern Denmark, Odense, Denmark | [4]Department of Food Storage and Technology, Faculty of Biotechnology and Food Science, Wroclaw University of Environmental and Life Sciences, Wrocław, Poland | [5]Department of Fruit, Vegetable and Plant Nutraceutical Technology, Faculty of Biotechnology and Food Science, Wrocław University of Environmental and Life Sciences, Wrocław, Poland | [6]Department of Functional Food Products Development, Faculty of Biotechnology and Food Science, Wrocław University of Environmental and Life Sciences, Wrocław, Poland | [7]Centro de Investigación e Innovación Agroalimentaria y Agroambiental (CIAGRO-UMH), Miguel Hernandez University, Orihuela, Spain

Correspondence: Davide Giacalone (dg@igt.sdu.dk)

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ABSTRACT

The term 'hackathon' derives from the words 'hacking' and 'marathon' and refers to an event in which participants collaborate and compete to solve a challenge or problem during a relatively short period of time. Originally related to a tech domain, the concept has now extended across fields as a tool to encourage innovation, creativity, and problem-solving within a short time-frame. This paper is based on the experience of an international sensory science hackathon conducted within the framework of the European project SEASONED. A 12-h hackathon was developed to face the sensory-related challenge "The flavors of the world: new trends. How can we be agile researching new flavor trends in different parts of the world?" All proposed solutions should include sensory science methods combined with different disciplines. A total of 26 young researchers with different backgrounds and from different countries, organized in 9 teams, collaborated to propose interdisciplinary research methods to study flavor trends in different cultures, providing interesting ideas to food or ingredients companies. A diverse panel of speakers from various disciplines engaged with participants, enriching the challenge theme with a multitude of perspectives. Beyond the tangible results linked to the challenge, the hackathon encouraged networking, learning, interdisciplinary collaboration, and idea generation. An exit-survey used to collect data from participants proved the high level of engagement and the usefulness of this kind of activity to stimulate innovative thinking and creativity, learn about sensory science, and promote teamwork and interdisciplinary research.

Summary

- This paper highlights a practical application of hackathons in the sensory science domain in which researchers collaborated across disciplines to tackle real-world challenges related to global flavor trends.
- The event was highly successful in not only generating innovative solutions for food and ingredient companies but also fostering interdisciplinary collaboration, networking, and creative thinking.
- The paper is an example of how such hackathons can serve as valuable platforms for solving complex problems and promoting teamwork and learning beyond the tech industry.
- Future work on hackathons in sensory and food science should prioritize follow-up investigations into the implementation of proposed solutions by collaborating companies to evaluate their effectiveness in real-world applications.

1 | Introduction

1.1 | Sensory and Consumer Science in the Open Innovation Ecosystem

Innovation is key in today's competitive escosystem and is crucial for companies to maintain competitiveness and long-term financial success (Bigliardi and Galati 2013; Costa and Jongen 2006). This is especially true in the food and beverage industry where external pressures (e.g., competition, regulations, changing consumer demand) and high failure rates for new products (Salnikova et al. 2019) make innovation and new product development fraught with risks. In recent years, the concept of open innovation has gained traction within the food sector (Traitler et al. 2011; Moskowitz and Saguy 2013; Sadat and Nasrat 2020). Open innovation emphasizes collaboration, knowledge sharing, and leveraging external ideas and resources to drive innovation within an organization (Chesbrough 2003). Unlike traditional closed innovation models, open innovation encourages organizations to look beyond their boundaries and engage with external partners—such as their customers, but also universities and research institutions—to co-create value and bring new products or services to market (Bigliardi and Galati 2013; Bogers 2011; Traitler et al. 2011; Moskowitz and Saguy 2013).

Although the literature on open innovation in the food domain is limited, several case studies illustrate its effective use by food companies to e.g. obtain ideas for new products (Moskowitz and Saguy 2013), make use of external research labs (Sadat and Nasrat 2020), upskill a company's workforce (Lazaro-Mojica and Fernandez 2021), and improve the sustainability of their products and processes (Bogers et al. 2020).

Central to this paradigm shift is public-private collaborations between companies and academia (Lazaro-Mojica and Fernandez 2021). In this context, universities (or other public research and education providers) serve as hubs of knowledge creation and research excellence, while companies bring industry expertise and resources to the table. By partnering with universities, companies gain access to cutting-edge research, specialized expertise, and emerging technologies that they may not possess internally. This collaboration is particularly beneficial for small and medium-sized companies (SMEs) who otherwise only have a limited budget and capacity for R&D activities (Lazaro-Mojica and Fernandez 2021; Sadat and Nasrat 2020).

Similarly, universities benefit from industry collaborations by gaining real-world insights, funding, and opportunities for their research to have tangible impacts on society (Pronk et al. 2015). Collaboration with companies provides students and young researchers with opportunities to engage with industry challenges and gain hands-on experience. Through internships, collaborative research projects, and industry-sponsored initiatives, students have the chance to apply their academic knowledge to real-world problems, which has been shown to promote effective learning, especially in an applied field like food science education (Giacalone 2016; Oliveira and Cardoso 2021; Mshayisa 2022). Also, exposure to industry practices helps students develop sought-after skills, leading to higher employability (Oliveira and Cardoso 2021; Lazaro-Mojica and Fernandez 2021).

Overall, collaboration between companies and universities is integral to the open innovation paradigm, enabling organizations to leverage external knowledge, expertise, and resources to drive innovation, while also providing valuable learning opportunities for the next generation of food professionals. Notwithstanding, there remains a pressing need for more extensive experience with open innovation within the food industry, especially when it comes to SMEs (Sadat and Nasrat 2020).

1.2 | Sensory Hackathons: Bridging the Gap Between Industry and Academia to Foster Food Innovation

Against this background, this paper focuses on a new emerging tool for open innovation: Hackathons. The term 'hackathon' is a portmanteau of the words 'hacking' and 'marathon' and refers to an event in which participants engage in rapid and collaborative engineering over a relatively short period of time (Marko et al. 2015). Hackathons initially emerged as internal events within companies, such as Facebook, which began hosting such events internally in 2006 and reportedly holds more than 50 year (Terdiman 2016; Uffreduzzi 2017). Originating within the tech domain, the concept has now extended over to fields as diverse as healthcare, banking and insurance, real estate, transport, urban planning, and more (Poncette et al. 2020; Feldmann and Teuteberg 2021; Attalah et al. 2023—see Rys 2023 for an overview).

Hackathons, typically organized by hosts or sponsors, encourage innovation, creativity, and problem-solving within a specific time frame (Attalah et al. 2023). Participation may be restricted to a select group or open to the public, often guided by mentors, and may culminate in the recognition of the most promising ideas or solutions through various incentives.

Within the context of open innovation, companies can collaborate with academic institutions to host hackathons, inviting students to tackle topics of their interest. Therefore, hackathons

can constitute a flexible and cost-effective platform for innovation (Attalah et al. 2023), providing opportunities for students to work on topics of their choice (Shcherbak and Arabuli 2021), enabling them to tap into students' innovative potential while fostering valuable learning experiences for the participants.

Despite the potential of this approach, literature on hackathons in food science is sparse. The only published paper we could find on this topic was a paper by Tucci et al. (2018) using open-science sourced data from repositories like USDA and EFSA in hackathons to foster corporate open innovation and crowdsourcing activities. However, more experience is needed, especially in response to concrete case studies from food companies.

Situated within this context, the present paper aims to illustrate the effectiveness of hackathons through an in-depth case study focusing on a challenge provided by food companies. The hackathon focused on sensory and consumer research, a subfield of food science, dedicated to understanding how humans perceive and respond to food and beverages (Prinyawiwatkul et al. 2023). Sensory and consumer research is crucial for understanding consumer preferences and choices, thus serving as a linchpin in the open innovation ecosystem for food companies (Moskowitz and Saguy 2013), and providing valuable insights into how ingredients, formulations, and processing parameters influence the sensory profile of products (e.g., Giacalone 2018; Ruiz-Capillas and Herrero 2021). This knowledge helps product developers tailor formulations to align with specific sensory-based consumer segments, increasing the likelihood of market acceptance and success. Integrating sensory and consumer research into the innovation process is widely acknowledged in the food industry, especially in connection to reducing the risk of new product failures (Costa and Jongen 2006; Dijksterhuis 2016; Giacalone and Jaeger 2023). While traditionally such research has been primarily accessible to large companies with significant R&D resources (Giacalone 2018), the emergence of hackathons offers an opportunity for companies of all sizes to engage in open innovation and leverage the collective expertise of diverse participants. Therefore, exploring the intersection of hackathons and sensory/consumer research presents an ideal focus for our investigation.

2 | Materials and Methods

2.1 | Sensory Hackathon: Topic and Overall Approach

Hackathons can be broadly categorized into two types (Attalah et al. 2023). The first type consists of a collaborative forum where participants from diverse backgrounds convene around a specific topic, unrestricted by external limitations, and are free to share their ideas with or without financial incentives. In contrast, the second type of hackathon functions as a contest, with less emphasis on collaboration and sharing. The first kind of hackathons is most often sponsored by public institutions, e.g., in support of humanitarian causes, whereas the second type is most often encountered in hackathons organized by private companies. Participation in these contests is governed by rules and conditions set by the initiator or organizer, typically offering prizes to winners. Our sensory hackathon adopted the "contest" format as this was deemed more relevant for the company sponsor and because elements of competition and gamification have been positively associated with learning in food science education (Giacalone 2016).

The topic of the hackathon was proposed and agreed upon by the consortium members: 'The flavors of the world: new trends'. How can we be agile in researching new flavor trends in different parts of the world? Under this headline, the aim was to foster innovative approaches to understanding flavor evolution across diverse societies and cultures, a critical consideration for food companies seeking to develop compelling products. Participants had to collaborate and propose innovative ideas on how to research these new flavor trends. The hackathon was held in Donostia-San Sebastián (Spain) at Basque Culinary Center facilities in Tabakalera (LABe) on November 25th and 26th, 2023. The chosen space was an open co-working area that participants were free to use during the whole event. Once the challenge was presented, participants were randomly assigned into 3-member groups to present their joint methodological solution.

The program for the hackathon is given in Figure 1 and discussed in detail in the following sections. The event included inspirational talks and working time, as well as resting periods for the different groups to interact and meet other participants (Figures 2 and 3). The event culminated in a dynamic solutions presentation, where the randomly assembled teams showcased their innovative approaches to flavor trends research. A jury composed of four judges decided the winner's solution, which received a €3000 prize sponsored by the company Carmencita. (Alicante, Spain) a Spanish spices company that decided to participate in this event to promote research and sensory science (Figure 4).

2.2 | Structure of the Hackathon

The sensory science hackathon was divided into 2 days with a total duration of 12 h: one full day (8 h) and one-half day (4 h). The event kicked off by welcoming the participants, introducing the challenge, and providing the rules for the event. The following set of rules was given to the participants:

- Be present, be punctual. The absence of a team member without justification—especially during the talks—means the team will be disqualified from winning the prize.
- You only have 10 min to present your solution on Sunday. Exceeding this time and using the other team's will penalize your team.
- You can ask the mentors' team for advice; we are here to help, but not to propose our own ideas.
- Be fair, be kind, learn something new, and have fun!

To introduce the challenge, the following example was given:

- How can we develop new foods for different markets? Imagine that a Spanish food company wants to export snacks to Singapore with flavors that are trendy and successful in this market. What flavors could the company use? Which research methods and tools (from sensory science and other disciplines) can be used by the company to

SATURDAY, 25TH NOVEMBER - DAY 1	
Registration and Welcome	
9:00 – 9:15	Participant registration and materials distribution.
9:15 – 9:30	Welcome and hackathon introduction (schedule, rules), challenge and prize presentation by **Carmencita**.
Ideation phase	
9:30 – 10:00	Invited speaker – Edgar Chambers IV, Ph.D. 'Crosscultural perception and sensory science'
10:30 – 11:00	*Coffee break while assembling hackathon teams.*
11:00 – 12:00	Teamwork: Ideation session and proposal of solutions.
12:00 – 12:30	Invited speaker – Matías Ávila. 'Data science for flavor'
12:30 – 13:30	Teamwork: Idea development.
Lunch break	
13:30 – 15:00	*Lunch break.*
Teamwork	
15:00 – 15:30	Invited speaker – Joshua Evans, Ph.D. 'Innovation is Multiple: experimenting with fermentation traditions for flavor, biodiversity, and sustainability'
15:30 – 17:00	Teamwork: Idea development.
17:00 – 17:30	*Coffee break.*
17:30 – 18:00	Invited speakers – Carolina Chaya, Ph.D. and Amparo Tárrega, Ph.D. 'The sensory science community in industry and academia'
18:00 – 19:30	Teamwork: prototyping, testing, data collection.
SUNDAY, 26TH NOVEMBER - DAY 2	
Ongoing development	
9:30 – 10:00	Invited speaker – Rick Schifferstein, Ph.D. 'From sensory evaluation to food design: theory, methods & tools'
10:00 – 11:45	Ongoing work on projects, refinements, and presentation rehearsals.
Final presentation	
11:45 – 13:30	Solutions presentation: each team presents their solution (10 min) to the jury and the audience.
13:30 – 14:00	Jury deliberation.
Awards and closing	
14:00 – 14:15	Announcement of winners and prize award by **Carmencita**.
14:15 – 14:45	Closing ceremony and acknowledgments.

FIGURE 1 | Program of the sensory hackathon.

be agile and have a trustworthy results? Could you give us some examples of the results?

After the welcome and kick-off session, the participants were assigned to nine randomly formed groups and started working on the challenge. Five different working sessions were alternated with the five presentations from the invited speakers. Coffee, drinks, and food were served during the day to promote interaction moments among participants. The chronological structure for the sensory hackathon, including a detailed description of the different phases, is shown in Table 1.

2.3 | Participants

The sensory science hackathon was advertised through the SEASONED project website (www.seasonedproject.eu), the partners' own websites, and targeted communication to the target groups which comprised master's students, doctoral students, and young researchers (up to 7 years after obtaining their PhD degree) in any field linked to food science (for full information refer to Supporting Information, Part 1). A total of 35 individuals signed up for the hackathon, with 26 eventually attending, representing 10 different nationalities. According to Data Protection Laws, written consent was obtained from all attendees.

2.4 | Mentorship and Invited Speakers

The involvement of mentors to provide support from domain experts has been identified as important for the successful execution of hackathons (Kitsios and Kamariotou 2018). Senior members of the SEASONED project with extensive expertise in sensory

FIGURE 2 | Snapshots from the event showing participants working together and engaged in the challenge.

and consumer science and/or food science acted as mentors and were available throughout the whole event to engage with participants and provide professional sparring. Additionally, the working sessions were interspersed with 30-min keynote talks by invited speakers, meant to inspire the participants on different topics of broad relevance to the challenge. These were delivered by internationally renowned speakers: Edgard Chambers (topic: cross-cultural issues in sensory and consumer testing), Matías Ávila (data science and machine learning), Joshua Evans (sustainable food innovation), Rick Schifferstein (food design), Amparo Tárrega, and Carolina Chaya (industrial applications of sensory science).

2.5 | Judging Criteria and Evaluation of the Proposed Solutions

The final step of the event consisted of the team presenting their solutions to a jury (Table 1). Each team had 10 min for the presentation, and the jury could ask one clarifying question to each group. The evaluation criteria, which were explained to the participants during the hackathon introduction, included feasibility and ease of implementation by the company donating the challenge, Jesús Navarro S.A. (Spain). Other aspects taken into consideration included time management, clarity of the solution, structure, and engagement during the presentation. The jury was made up of four members: two R&D professionals from Jesús Navarro S.A. (Spain) and two members from the SEASONED project. The event concluded with an award ceremony where the winning team was announced and received a €3000 prize sponsored by Carmencita.

2.6 | Follow-Up Event Evaluation

Feedback from the participants was collected a few days after the hackathon through an online survey. The survey included several questions:

- Overall satisfaction with the sensory hackathon (9-point scale from "not at all" to "extremely satisfied")
- Degree of agreement with the following statements (9-point Likert scale from "Disagree strongly" to "Agree strongly") (Likert 1932)
  - The sensory hackathon was useful for stimulating innovative thinking and creativity.
  - The talks given by the speakers contributed to providing different perspectives and insights.
  - The talks given by the speakers added value to our project design.
  - The interactions with the mentors added value to our project design.
  - Teamwork was key during the sensory hackathon.
  - The sensory hackathon significantly contributed to my personal learning and skill development.

FIGURE 3 | Keynote speakers, jury members, and mentors for the sensory hackathon.

– Overall organization, satisfaction with the catering, and the likelihood of recommending this type of activity to other young researchers (5-point scale from "poor" to "excellent")

3 | Results and Discussion

3.1 | Excerpts From Solutions Developed by the Teams

The hackathon focused on how to explore and research new flavor trends around the world using an agile research methodology, and nine groups of participants proposed different approaches. Each group worked on developing innovative solutions within the given timeframe, demonstrating the potential of collaborative efforts linked to sensory science and consumer research (Figure 2). The different solutions proposed by the nine teams are summarized below:

1. Analyzing the volatile composition of traditional and new foods to distinguish between the key aromas that could be used to mimic innovative and typical/traditional. The group proposed connecting these results with the concept of "cultural identity" later investigating the emotions that could evoke "nostalgia" or innovative-linked feelings through sensory experiences. By creating products that connect with consumers on an emotional level, this approach can foster brand loyalty and drive customer engagement. One of the studies referenced by this group to support their methodological approach was the study of Nestrud et al. (2016) to provide an efficient method to measure the emotional response elicited by foods.
2. Conducting surveys or interviewing local chefs to identify the most popular flavors of trendy restaurants, and then training consumers on utilizing these flavors in everyday cooking guided by cookbooks and e-books. By leveraging the expertise of local chefs, this solution aims to ensure that new products are aligned with current culinary trends, increasing their acceptance in the market.
3. Developing a tool or platform to gather consumers' food preferences, using surveys that seek to collect their ideas and expectations. The responses are used to train an AI that will be later used to predict consumers' responses when a new flavor is to be launched to a specific market. This approach highlighted the importance of considering consumer feedback during the product development process, ensuring that new products are designed to capture consumers' opinions.
4. Developing a mobile App that captures consumers' responses when tasting a sample product that is delivered when a consumer uses some delivery service (e.g.: Uber Eats). The App would allow consumers to specify their preferences, order food, and receive complimentary samples of new products while providing feedback through

FIGURE 4 | The winning team received the award at the end of the event.

online surveys. This method would integrate the interaction with the consumer into the identification of preferences and opinions to be added to the new product development process, offering real-time insights into consumer preferences.

5. Using natural language processing tools to analyze restaurant menus, helping companies decide on the level of flavor innovation to pursue, considering haute cuisine an example of a high level and retail a low level, and stating the risks and assumptions associated with different datasets. This solution emphasized data-driven decision-making in the flavor innovation process.

6. Analyzing flavors in the snacks category, considering "trendy" those barely present or included in a few brands, and "traditional" the ones that appear as common in many brands of the snacks category. This group also proposed using statistical analyses to determine which flavors belong to different price categories. This approach can help companies target specific market segments more effectively by aligning product offerings with consumer expectations based on price.

7. Programming AI-powered software to provide real-time, 365-day updated information by gathering data from social networks, media, websites, blogs, and popular cookbooks. This solution leverages the power of AI and big data to stay ahead of emerging flavor trends and consumer preferences.

8. Combining anthropology and sensory sciences to explore territories through innovative flavor exploration. This includes using qualitative methods such as text mining software and multifactor analysis, alongside quantitative methods like polarized rate-all-that-apply. This holistic approach could integrate cultural insights with scientific analysis, providing a comprehensive understanding of flavor trends.

9. Finally, the last team proposed determining the emotions elicited by different flavors using social media datasets. They aimed to categorize this data to identify commonalities and determine successful flavors and trends. By analyzing consumer emotions (Nestrud et al. 2016), this solution could help companies create products that evoke positive feelings among different kinds of consumers, thus enhancing consumer satisfaction among e.g. emotional, social, and restrictive eaters (Van Strien et al. 1986).

Noteworthily, the proposed solutions varied quite significantly. Most likely, the heterogeneity of participants' profiles, ranging from gastronomes and anthropologists to food technologists and data scientists, contributed to the diverse and innovative nature of the proposals. Their collective efforts focused on conceptualizing methodological solutions that, while in their nascent stages, had the potential to transform the way companies and mature researchers approach these kinds of challenges.

TABLE 1 | Detailed structure of the sensory hackathon.

Hackathon phases	Description
Welcome and kick-off	Opening remarks; introduction of mentors, and jury; presentation of the challenge and main rules of the hackathon.
Team formation	A spontaneous team formation exercise, where participants were randomly assigned to three-person groups and given a brief introduction period.
Working sessions	Time for participants to work on their solutions. Mentors and speakers were available for guidance and support during these sessions.
Keynote speakers' sessions	Experts talks and sessions that provided participants with valuable insights and practical guidance to tackle the hackathon challenge.
Final presentations	Time for the teams to showcase their solutions, 10-min presentations.
Judging and evaluation	Assessment of the solutions presented by the teams, or their representatives, by a jury.
Closing ceremony	Announcement of winners, acknowledgment of participants, and closing remarks.

3.2 | Feedback From the Company on the Usefulness of the Solutions

The jury, comprising industry experts and academic researchers, evaluated the solutions on criteria of creativity, scientific quality, technical feasibility, and finally relevance for the sponsor company (Carmencita), emphasizing the practicality of implementing these ideas in real-world settings. The presentations underscored the importance of agile and adaptive research methods in keeping pace with rapidly changing consumer preferences. The sponsor company expressed particular interest in several solutions, highlighting their potential to be integrated into current R&D processes. The winning solution was the first one mentioned in Section 3.1, whose solution centered around analyzing volatile compounds and connecting the results to cultural identity and emotional product profiling. Their proposal to analyze volatile compounds and connect the results to cultural identity and nostalgia demonstrated a clear, structured, and innovative approach grounded in proven methodologies (specifically gas-chromatography and the Essence profile method). By effectively addressing both technical and consumer engagement aspects, their solution was well in line with the challenge and also scored high on feasibility for the sponsoring company (e.g., because they already have capabilities for volatile analysis).

Aside from the winning solution, the company's feedback to the proposed solutions was overwhelmingly positive and emphasized the value of incorporating diverse perspectives and interdisciplinary approaches in developing innovative solutions. They appreciated the practicality of the proposed methodologies and their potential to address real-world challenges in flavor research and product development. The company also noted that the collaborative environment fostered by the hackathon allowed for the integration of sensory science with data analysis, marketing strategies, and cultural insights, providing a well-rounded approach to innovation.

TABLE 2 | Participants' feedback ($N = 26$) after the event (mean and standard deviation).

Item	Score
Overall experience (1–9)	
How much did you enjoy the sensory hackathon?	8.3 ± 1.1
Specific aspects (1–9)	
The sensory hackathon was useful to stimulate innovative thinking and creativity	8.2 ± 1.2
The talks given by the speakers contributed to providing different perspectives and insights	8.5 ± 0.6
The talks given by the speakers added value to our project design	7.6 ± 1.6
The interactions with the mentors added value to our project design	7.7 ± 1.5
Teamwork was key during the sensory hackathon	8.1 ± 1.7
The sensory hackathon significantly contributed to my personal learning and skill development	7.9 ± 1.3
Logistics and organization (1–5)	
Rate the overall organization of the sensory hackathon	4.5 ± 1.0
Rate the catering service during the sensory hackathon	4.5 ± 0.8
How likely would you recommend participating in this kind of events to other young researchers?	4.7 ± 0.6

3.3 | Feedback From Participants on the Experience of the Sensory Hackathon

Positive feedback from a post-hackathon survey (Table 2) indicated high participant satisfaction. Participants reported thoroughly enjoying the experience and found it valuable in fostering innovative thinking and creativity. All aspects assessed in the survey, including teamwork and the benefits of interacting with mentors, received high scores, highlighting the overall success of the initiative. Generally, the high participants' satisfaction reflects previous reports from the literature on student hackathons (e.g., Shcherbak and Arabuli 2021) and on the use of practical case studies in food sensory science (e.g., Giacalone 2016).

3.4 | Reflections on Hackathons as a Tool in Academia-Industry Collaborations

Hackathons have emerged as a valuable tool for fostering academia-industry collaborations (Lazaro-Mojica and Fernandez 2021; Tucci et al. 2018), and the experience of the sensory hackathon documented here demonstrates its usefulness in the context of food science. The hackathon format promotes networking, learning, interdisciplinary collaboration, and idea generation, making it an effective platform for innovation. In order to maximize the benefits of hackathons in such collaborations, it is essential to adhere to best practices and avoid common pitfalls. According to our experience, these best practices could be summarized in several Do's and Don'ts as listed below.

Do's:

- Encourage diverse participation: Embrace participants from various disciplines within food science to nurture a broad spectrum of ideas and viewpoints.
- Provide mentorship: Involve senior researchers and industry experts as mentors to offer guidance to participants and enhance the quality of solutions.
- Incorporate real-world challenges: Utilize authentic industry problems to ensure the relevance and practicality of the solutions developed during the hackathon.
- Promote collaboration: Foster opportunities for participants to interact, exchange ideas, and collaborate effectively, fostering a dynamic and synergistic environment.
- Offer incentives: Recognize and reward the most promising ideas to incentivize participants and acknowledge their contributions.

Don'ts:

- Overly restrict creativity: Avoid imposing excessive constraints on participants, as this can inhibit creativity and hinder innovation.
- Neglect follow-up: Establish a mechanism for follow-up and potential implementation of the solutions generated during the hackathon to ensure continuity and impact.
- Ignore feedback: Actively solicit and incorporate feedback from participants to iteratively improve future iterations of the hackathon.
- Underestimate preparation: Recognize the importance of thorough planning and organization in ensuring the success and effectiveness of the event.

The sensory science hackathon showcased the potential of hackathons as a valuable tool for fostering academia-industry collaborations in the field of food science, particularly in sensory and consumer research. By bringing together participants from diverse backgrounds within food science, the event facilitated a rich exchange of ideas and perspectives. This diversity of expertise was instrumental in generating innovative solutions to the challenge of researching new flavor trends around the world. Such interdisciplinary collaboration is in line with the principles of open innovation, emphasizing the importance of knowledge sharing and leveraging external ideas and resources to drive innovation (Chesbrough 2003; Traitler et al. 2011). Sensory and consumer research is crucial for understanding consumer perception of foods, influenced by many variables (Giacalone 2018; Ruiz-Capillas and Herrero 2021; Prinyawiwatkul et al. 2023). Because of the connection of different disciplines (e.g., marketing, psychology, food science) in sensory science, innovation in its methods may benefit from innovative and interdisciplinary approaches such as the one presented in this manuscript. The event also emphasized the importance of collaboration and cross-disciplinary thinking in addressing complex sensory challenges. This environment facilitated a stimulating exchange of insights, knowledge, and innovative approaches between early-career researchers and senior researchers from both industry and academia, fostering a bridge between emerging talent and established expertise, crucial for the advancement of sensory research. Such collaborative efforts are essential for driving forward innovation in the food industry and addressing the evolving needs and preferences of consumers (Costa and Jongen 2006; Giacalone and Jaeger 2023).

The involvement of mentors, including senior researchers and industry experts, provided valuable guidance and expertise to the participants, enhancing the quality of the solutions developed. This mentorship aspect aligns with previous studies highlighting the importance of mentorship in hackathon settings (Kitsios and Kamariotou 2018). Additionally, the incorporation of real-world challenges, exemplified by using industry problems provided by food companies, ensured the relevance and applicability of the solutions generated during the hackathon (Traitler et al. 2011).

While the sensory science hackathon showcased the potential of hackathons as a valuable tool for fostering academia-industry collaborations in the field of food science, it is important to acknowledge certain limitations of the hackathon format. First, the short time frame inherent in hackathons, while conducive to rapid idea generation and solution development, may limit the depth and thoroughness of the solutions produced. The time constraints could have hindered the exploration of more complex or nuanced approaches to the identified challenges. Furthermore, the study did not address the long-term follow-up or actual implementation of the solutions, which is critical to assessing their real-world impact and effectiveness.

Another potential issue is that the consent form's terms regarding the collection and use of information could elicit some ethical considerations. For instance, in the sensory hackathon we conducted, participants agreed to their ideas being used for research and dissemination within the SEASONED project; however, their understanding of these permissions might vary. Concerns may arise regarding the ownership and attribution of intellectual property rights, as participants may not fully comprehend how their ideas might be utilized beyond the immediate context of the hackathon. The disclaimer stating participants retain IP rights “unless otherwise agreed upon in writing” may raise further concerns as it leaves room for the possibility of their ideas being exploited or misappropriated without proper recognition or compensation.

Being aware of and addressing these potential issues in future hackathons is crucial. Careful consideration of ethical issues ensures event integrity and fairness. Despite these limitations, it is worth reiterating that the experience was overall positive for all parties involved and confirmed that hackathons can be potent catalysts for academia-industry collaboration, driving innovation in sensory and consumer science. Adherence to best practices ensures their effectiveness as platforms for research advancement and industry problem-solving.

4 | Conclusions

This paper discussed the use of hackathons in the sensory science domain. The argument put forth in this paper is that hackathons can serve as valuable platforms for solving complex problems and promoting teamwork and learning—beyond their traditional domain in the tech industry. To demonstrate the applicability of the hackathon format to the field of food science, we presented a practical case study focusing on a "sensory hackathon" in which researchers collaborated across disciplines to tackle real-world challenges related to global flavor trends. A stimulating exchange of insights, knowledge, and innovative approaches took place between early-career researchers and senior researchers from both industry and academia at the hackathon, fostering a bridge between emerging talent and established expertise, crucial for the advancement of sensory research. Emphasizing creativity and problem-solving skills, the event aimed to promote teamwork and the inclusion of sensory science methods in the solution. The sensory science hackathon was a huge success, bringing together a diverse group of people from different backgrounds to tackle a food science challenge to which sensory science could significantly contribute. Throughout the event, participants' enthusiasm and creativity were evident, and their innovative solutions could have a significant impact on the field of sensory science. The hackathon emphasized the importance of collaboration and cross-disciplinary thinking in addressing complex sensory challenges. More comprehensive and effective solutions that address the needs of both consumers and industry can be developed by bringing together individuals with diverse expertise.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The authors have nothing to report.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section.