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Architectures of the commons: collaborative spaces and innovation

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Abstract: The present article aims at analyzing the dynamics of innovation that emerges and develops in some iconic collaborative spaces that are epicenters of a technological or artistic revolution. The study focuses on three cases (the Homebrew Computer Club, the TransMedTech institute, and the elBulli restaurant). The results highlight some important common traits between these collaborative spaces, namely: The dynamics of innovation in these spaces is orchestrated by bottom-up initiatives carried out by informal groups of passionate individuals (called the "commoners" in the contribution) who articulate a series of "innovation commons" to develop their collaborative innovative project. Based on our observations, the dynamics of innovation in the collaborative spaces results from the following sequence of *commons*: 1) *social relationship commons*, 2) *symbolic commons*, and 3) *innovation commons*. Each of these commons corresponds to a collective action governance mechanism over a specific common pool resource which is a key determinant of the innovative project.

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1 Introduction

An important body of work in the literature has shed light on some iconic collaborative spaces for innovation and emphasized their role as epicenters of a technological or artistic revolution. Among these collaborative spaces are the Invention Factory launched by Thomas Edison in Menlo Park New-Jersey (Hargadon & Sutton, 2000), the Daimler Workshop (development of combustion engine automobile) in Stuttgart (Mollenhauer & Tschöke, 2010), the Bombardier garage (snowmobile and other automotive recreational products) in Valcourt Québec (MacDonald, 2012), the Secession building (Art Nouveau) in Vienna (Topp, 2004), the Preservation Hall (jazz) in New Orleans (Carter, 1999), La Martinière (dye chemistry) in Lyon (Nieto-Galan, 2013), le "Bateau Lavoir" (modern painting movements) in Montmartre (Hewitt, 2017), etc. All these historic collaborative spaces, which are associated with major innovations in society, share the following characteristics: a) they were not issued from a top-down decision from a public authority or a private organization, but are the result of a bottom-up initiative carried out by an informal group of passionate individuals; b) they are at the origin of radical new ideas that emerged, developed and flourished in a given location that did not necessarily have a prior history or antecedent in the field or sector; c) they eventually spread from their initial specific location to generate a global ecosystem of innovation.

The innovative journeys that develop in these collaborative spaces have led not only to radical technological or artistic breakthroughs, but also to the formation of rich and vibrant ecosystems of innovation that have a significant impact on society. Though numerous works deal with these collaborative spaces, my view is that there is a lack of theoretical interpretation and framing of the particular model of innovation that supports these collaborative endeavors.

To contribute to bridging this gap in the literature, the present article aims at analyzing the dynamics of inno-

vation that emerge and are developed in such innovative platforms, by focusing on three of these collaborative spaces: The Homebrew Computer Club in Silicon Valley, the TransMedTech living lab in Montreal, and the elBulli Restaurant in Catalunya. I have chosen these three cases for the following reasons: firstly, they have been documented and discussed by different contributions in the literature that have highlighted how these iconic locations in very diverse contexts were at the origin of a technological and artistic revolution that had major impact on society, both locally and globally; secondly, because I had the opportunity to work on these three cases (exploiting a very rich literature in the case of the Homebrew Computer Club, and conducting a series of interviews for the TransMedtech and elBulli cases); and thirdly, because of the diversity (in terms of geographical locations, as well as in terms of type of innovation) that these three cases represent: In the mid 70s, the Homebrew Computer Club located in Menlo Park (California), played an influential role in the development of the microcomputer revolution and was the cradle of the vibrant ecosystem of information technology that developed in the Silicon Valley (Levy, 1984; Petrick, 2017; Abbate, 1999; Furnari, 2014; etc.). Created in 2017, the TransMedTech institute (iTMT) is located within the Sainte-Justine hospital in Montreal (Canada). One of the first and most important living labs situated in a hospital in Canada, the institute uses a collaborative approach to innovate advanced medical technologies (Tremblay et al., 2022a). In the 1990s, the restaurant named elBulli in northern Spain, perched over a cove named Cala Montjoi, in a remote corner of the Mediterranean Sea, became the epicenter of a gastronomic revolution that changed the face of haute cuisine (Svejenova et al., 2007; Opazo, 2012; Capdevila et al., 2018).

Through exploring and analyzing such diverse cases, the objective of this contribution is to highlight common conceptual patterns that capture the innovative processes generated in such collaborative spaces. Previous studies have only partially captured the mechanisms associated with knowledge creation in these specific locations. In particular, we lack explanation of how bottom-up initiatives from communities of local passionate individuals have succeeded in generating a dynamics of knowledge creation that led to the formation of a rich ecosystem of innovation. That is the reason why, the article focuses on the role played in the development of these collaborative spaces by those respective communities of passionate actors. The objective is to understand how such informal groups of actors shaped the process of knowledge creation and generated the formation of an ecosystem of innovation in these localized contexts. The main argument of the contribution is that the dynamics of these processes of innovation rest on the articulation of a series of "innovation commons" (Allen & Potts, 2015) orchestrated by these communities of passionate individuals who progressively craft, nurture, interpret and enact collectively in specific collaborative spaces.

Drawing on the pioneering works on commons by Ostrom (1990) and the recent interpretation of her work by Allen and Potts (2015, 2016; Potts 2019), we aim in this contribution at interpreting the formation of a radical process of innovation that is the result of a collective and cooperative dynamics of transformations and commoning experiments orchestrated in such collaborative spaces by communities of passionate actors. The article, which reflects on the creative nature of these collaborative spaces, also refers to the temporality of spaces and questions the permanent or temporary role of spaces in the formation of innovation.

2 On "innovation commons"

The theories that explain the formation of high-technology innovation mostly rely on the analysis of top-down initiatives such as the public funding of research projects, the impacts of military spending, the key role of an anchor firm, the positive externalities of research resulting from a dense innovation system, or the spin-offs from university research. These theories do not generally attribute the rise of high levels of entrepreneurship and innovativeness to cooperation and collaboration, especially a collaboration mode that is issued from bottom-up initiatives carried out by an informal community. In such a perspective, these top-down initiatives mostly rely on the organization of specific local clusters of activities to trigger the innovation processes they initiate. For instance, the location of the Manhattan project in Los Alamos (Szasz, 1992), the development of the aeronautic cluster in Toulouse (Longhi, 2005), the emergence of the videogame ecosystem of innovation in Montreal driven by the anchor firm Ubisoft (Cohendet et al., 2021), the locational concentration and specialization of the emerging biotech industry as knowledge externalities created by anchor tenant firms (Feldmann, 2005), etc., are examples of innovative localizations shaped by diverse initiatives from public as well as private formal entities. Without denying the importance of these examples, I consider that these representations fail to take into account the collaborative modes in some important innovative spaces that result from bottom-up initiatives carried out by an informal community.

Increasing contributions to the literature (Bathelt et al., 2004; Amin & Cohendet, 2004; Grahber, 2004; Storper, 2005; Lorenzen & Mudambi, 2013; Von Krogh & Geilinger, 2014; Cole & Barberá-Tomás, 2014; Grandadam et al., 2021; Cohendet et al., 2021; Buchholz & Bathelt, 2019; etc.), have emphasized the role of diverse informal communities in the dynamics of knowledge formation at the local level. In the same vein, some recent articles highlight the role of grassroots initiatives in tackling some of the challenges that drive transformational change (Seyfang & Smith 2007; Smith & Stirling 2018; etc.). However, this rich literature does not specify the precise modalities of orchestration of the process of innovation by local communities of passionate individuals and the specific role of the collaborative spaces.

To add to this literature, in this contribution we propose reconsidering the conceptual framework of the processes of innovation that develops in such collaborative spaces by introducing non-traditional support mechanisms in the form of a dynamic sequence of innovation commons orchestrated by communities of passionate individuals. The notion of innovation commons draws on the pioneering work of Ostrom (1990, 2009), who defined commons as a "collective action governance mechanism over a common pool resource shared by the members of a community ("the commoners") who jointly manage the use and access to this resource as well as its preservation or development" (Zimmermann, 2020).

While Ostrom's work (1990) focused on the importance of the collective management of natural resource commons as a reaction to the "tragedy of the commons" (Hardin, 1968), Allen and Potts highlighted, through the notion of innovation commons, that the institutional origin of new technologies may be related to "self-organizing groups of technology enthusiasts who develop effective governance rules to pool distributed information resources. The 'innovation commons' alleviates uncertainty around a nascent technology by pooling distributed information about uses, costs, problems and opportunities" (Allen & Potts, 2016, p.1), which reveal innovative opportunities and reduce uncertainty in innovative processes.

Though offering rich emergent institutional solutions when entrepreneurs try to solve a collective action problem ("how to cross the valley of death") by pooling innovation resources to reduce uncertainty, the notion of innovation commons developed by Allen and Potts faces two limitations when applied to the development of innovation by diverse communities in collaborative spaces. Firstly, as underlined by Dekker (2020: p. 663–664): "*Potts overlooks the importance of 'places', something that has received ample attention in the study of creative communities and scenes. From the Parisian salons (Impressionism) to the Viennese coffeehouses (Sezession) and from the mixed cultural clubs of New Orleans (jazz) to the metros of New York (graffiti), specific places gave birth to scenes and new genres. Potts has lots of interesting things to say about a culture of innovation in which 'the new' is tolerated, but he pays virtually no attention to the importance of meeting places and their characteristics, although innovation policy for the creative industries has long recognized the importance of place, from Richard Florida's creative cities to the more recent emphasis on place-making". Secondly, Potts and Allen focus on diverse types of shared resources related to innovation commons: shared knowledge, shared* technical knowledge (and associated physical resources) that describe the new idea or technology for facilitating the technological-scientific discovery process, and shared resources that define the entrepreneurial opportunity associated with a new technical idea for facilitating the entrepreneurial-market discovery process.

However, in their contribution, little is said about the dynamics of these diverse resources and how the "commoners" as groups of knowledge-driven agents linked together by a common goal, a common cognitive framework and a shared understanding of their work, orchestrate these resources through time.

3 The choice of the three case studies

This article is based on three case studies (Yin, 2009). The qualitative case study approach (Eisenhardt, 1989; Yin, 2009) was deemed appropriate to provide a deeper understanding of collaborative spaces of innovation orchestrated by groups of passionate individuals (the commoners) that constitute the main unit of analysis of the contribution. The choice of the Homebrew Computer Club is explained by the very rich literature on the subject (Levy (1984); Abbate (1999); Wozniak (2007), Furnari (2014); Petrick (2017); etc.) that provides a myriad of details on the history of this collaborative space, the role of key actors, the rules governing the functioning of the club, and the reasons the Homebrew Computer Club closed in December 1986). Also, I had the chance to listen to Steve Wozniak presenting in Montreal at a conference on the origin and the dynamics of the Homebrew Club (on Feb 17th, 2015). The choice of TransMedTech results from a series of about 80 interviews conducted with the participants in the activities of the institute during a study (Tremblay et al., 2022a) I was responsible of which in the recent years. The inter-

views aimed at analyzing the history of the foundation of the institute and of its mode of functioning. In the case of elBulli, I conducted a series of interviews with a dozen of its former chefs at the Alicia Foundation in a suburb of Barcelona (a center, co-founded by Adria, that is dedicated to technological innovation in gastronomy). I also had the opportunity to interview Ferran Adria in 2018 at the University of Barcelona. The data collection was complemented by secondary sources of online and offline publications on Adrià and elBulli.

Based on this data collection, the objective of the following sections is to understand the processes of local formation of ideas and innovation in the three collaborative spaces (Homebrew Computer Club, TransMedTech and elBulli). My view is that this formation results from a dynamic sequence of different commons orchestrated by communities of diverse passionate actors who engage in collective action and develop rules to generate, share and govern innovation resources. Tracing the formation of this sequence of commons will highlight the simultaneous dynamics of the main dimensions of the commons: the dynamics of the resource pools (what is shared and used in common), the dynamics of the commoners (the community of people contributing to, drawing on and depending on the pools), and the dynamics of the common's frame of regulation (governance and equity enacted by that community around those common resources).

The literature on the dynamics of collaborative spaces emphasizes that their orchestration relies heavily on the ongoing and enthusiastic engagement of an active core of passionate individuals who care about the development, preservation and ongoing enrichment of these commons and who contribute to the development of diverse institutional rules and arrangements for managing these shared resources. In this article, I refer to this active core as "commoners", in reference to Ostrom, who uses this term to emphasize the members of a community who take care of the shared common resource. A careful examination of the literature on the dynamics of collaborative spaces reveals that the main objectives and cognitive mechanisms of the commoners evolve over time as their collaborative endeavor matures. The commoners are strongly involved as a core group of active members in different successive types of communities who gather the ideas, skills and various types of knowledge necessary to achieve their objectives.

More specifically, the cases of Homebrew, TransMedTech and elBulli suggest the following sequence for the dynamics of commoners and associated commons: a) Initially, the commoners emerge as a core group from a "professional community" (Amin & Roberts, 2008: 257) and contribute to the formation and maintenance of a social commons based on the openness and active cross-fertilization of a network of like-minded professionals; b) Once this foundation of relationships is established, the commoners become involved as the core of a form of "epistemic community" (Cowan et al., 2000) that elaborates a shared vision, a "symbolic commons" (Bowers, 2004), to create a collaborative space to develop their innovative objective, to forge a collective identity and mobilize support from different sources; c) Finally, once the collaborative space is functioning, commoners become involved in diverse communities of practice to manage, preserve, and enrich a number of "innovation commons" (Allen & Potts, 2015). In this phase, the issue of the permanent or temporary role of spaces in the formation of innovation is clearly a key one.

4 The emergence phase of the collaborative space: the development of a professional community and the formation of a social commons

In the emergence phase of the groups of passionate individuals at the origin of the three iconic collaborative spaces that have been selected, one can notice a common characteristic: each of these groups is issued from a specific professional community that combines specialized knowledge acquired through extended periods of research and training, institutional trust based on standards of professional conduct, the sharing of common experiences and values, an interest in radical innovation stimulated by contact with other communities, etc. (Amin & Roberts, 2008). These professional communities reflecting a strong local culture nurture a *social commons* (Helfrich & Haas, 2009) focused on promotion of dense relationships and mutual help between the diverse members of the community. The following paragraphs detail the conditions of emergence of these respective professional communities:

– The Homebrew Computer Club was a group of young enthusiasts who met in Menlo Park, California between March 1975 and December 1986. This informal group played an influential role in the development of the microcomputer revolution: several computer entrepreneurs emerged from its ranks, including Steve Jobs and Steve Wozniak. The club, which led to the birth of many software and personal computer companies,

such as Apple, is considered as the local epicenter of the digital revolution in California ("the crucible for an entire industry", according to McCracken, 2013). The Homebrew community emerged through the informal gathering of local talents belonging to a broader community of technically minded hobbyists who were at that time in California sharing a hacker culture that protested the war, and anything related to the war, such as the computer labs funded by the US Department of Defense. According to Levy (1984) these hackers were "adventurers, visionaries, risk-takers, [and] artists" rebelling against centralized computing and bringing together different types of competencies and knowledge (electronic enthusiasts, computer amateurs, technically minded hobbyists, digital hackers, engineer-hippie professionals, etc.). Such a diverse gathering of activists who challenged the centralized computing status quo shared the same professional interest to trade parts, electronic circuit, and information pertaining to "do it yourself" construction of personal computing devices.

– TransMedTech came about when a number of researchers and practitioners affiliated with different Montreal academic institutions and hospitals became convinced that in order to develop the next generation of medical technologies for complex diseases, a new interdisciplinary, collaborative and open approach was needed. Beginning in 2010, the group held meetings and exchanged ideas on the subject. Gradually, a community was formed that was made up of members who share the same interests and have the same respect for standards of professional conduct. They were particularly convinced of the growing role played by intermediation devices (such as incubators, hackerspaces, makerspaces, tech-parks, hackathons, etc.) that articulate the knowledge of heterogeneous actors in the healthcare ecosystem. Among this close-knit community of passionate researchers and practitioners, iTMT's current CEO, a professor at Polytechnique Montreal, was introduced to the importance of collaborative innovation during his doctoral studies while working in a laboratory located in a hospital (Montreal, Canada). Within the members of the community, there were also two executive managers of CHUSJ in Montreal (the Sainte-Justine University Hospital Center, a mother and child university hospital) who contributed to create a climate of trust between the community and the management of this hospital, which was banking on innovation as a key value for the institution.
– In the 1980s, a community of passionate Catalan chefs (Adria, Lutaud, Casanas, Xatruch, etc.), among whom Ferran Adria from the restaurant elBulli in Cala Montjoi was the most enthusiastic, was aiming to adapt and recreate traditional Catalan and Spanish recipes with a new *haute cuisine* approach. Convinced of the high value and potential of the Catalan gastronomy and culture, their objective was to challenge the hegemony of the *Nouvelle Cuisine* that emerged in France in the 1960s and gained worldwide acclaim (Rao et al., 2003). As a community, these passionate chefs respected high standards of professional conduct and shared common experiences and values. They started accumulating specialized knowledge acquired through extended periods of research and training by regularly visiting French restaurants as customers to get inspiration. Then, through the social contacts gained in those gastronomic trips to France, they undertook in-service traineeships in some of the best three-star French restaurants, willing to learn, test, and absorb the best practices from these prestigious places. They also agreed to follow the rules and standards of major gastronomy critics associations, particularly the Michelin Guide. As Capdevila et al. (2018: 535) underline, the group "translated the meaning and significance of external sources of knowledge into local interpretative frames, by developing global pipelines with multiple selected distant environments that constantly fed the interpretation of local knowledge".

The examination of the three cases reveals that at the origin of the three iconic collaborative spaces, a common characteristic is the formation of a group of passionate individuals belonging to a larger community of professionals reflecting their local culture and sharing the same interest for radical innovation. In each of the three cases, the group of passionate individuals we focused on (the commoners) positioned itself as an active core group of their respective professional communities and made significant efforts to increase the potential of knowledge-sharing and collective learning of the wider community by promoting a spirit of solidarity between the different members. In particular, the commoners took great care to ensure that all the dimensions of this mode of collaborative learning were brought together and available to all members ("who shares the same interest," "who has the skills," "who knows," "who can help," etc.).

As the number of members was growing in each of these professional communities, the more experienced members wanted to increase the potential of knowl-

edge-sharing and collective learning of the wider community by promoting a spirit of solidarity between the different participants (for instance by facilitating the work of new participants by connecting them with potentially helpful contacts from their personal networks). The efforts undertaken in each of these professional communities translated as the development of a *social commons* (Helfrich & Haas, 2009) mainly focused on the active opening of personal networks and on the conceptualization and promotion of relationships between the diverse members of the community. According to Willis (2012), the main attributes inherent to such social commons are consensus, equity, moral legitimacy, and transparency in decision-making. As a rich and diverse resource pool that has been developed collectively, "the social commons is important to everyone in the community and belongs in common ownership. It is not an asset that should be subjected to top-down control and exploited by one group or individual to the detriment of others" (Willis, 2012:118). This fundamental relationship between the community and the associated commons is highlighted by Helfrich and Haas (2009:9): 'Managing common pool resources in a practical sense requires a community that becomes aware of its relationship to the resources in a social context and names the resources as its own – a community that claims them, a community that presses for and helps, enforce rules to respect this co-ownership'.

As explained in the following sections, the dynamics of innovation in the three respective collaborative spaces results from a sequence of drastic changes in the cognitive objectives of the commoners. These changes are accompanied by the involvement of the commoners with different new communities. However, as they orchestrate the dynamics of innovation by developing new forms of interaction with different new stakeholders, the commoners maintain strong links with the professional communities they emerged from, and they their innovative endeavors benefit from the social commons associated with such professional communities.

5 The mobilization phase to implement the collaborative space: the development of an epistemic community and the formation of a symbolic commons

Once the social commons were consolidated, the groups of passionate individuals in each of the three cases started considering moving from sharing ideas and reinforcing professional relationships to focusing on their visionary project and finding ways to test their innovative ideas. Their main cognitive objective thus shifted toward the elaboration of a common vision accompanied by a declaration of intent, expressing the breaking of established rules in order to collectively produce radical new knowledge. The choice of an iconic space for developing their collaborative innovation projects is part of the common vision proposed by the commoners. Such spaces of collective learning and experimentation combine inviting physical infrastructures, an emotional dimension based on mutual trust, symbolic rituals, and a culture of belonging in order to favor spatial mobilization and alignment of participants in pursuit of the innovative objective of the community.

Thus, in each case the commoners were at the origin of the formation of a new community that can be described as epistemic, according to the definition of Cowan et al. (2000: 234). This community aimed at bringing together important actors who adhered deeply to the values and vision of the commoners. Naturally, the credibility of the members played a determining role in the attraction of this community. This recognition of the community gave confidence to potential investors, both public and private, in projects that often seemed too risky to finance. There were key moments where the deliberate creation of a local buzz contributed to generating global pipelines (Bathelt et al.,1984) as foreign corporations, attracted by the potential of these collaborative spaces, started investing in the innovative hubs.

As detailed in the following paragraphs, these epistemic communities have contributed to developing and maintaining a "symbolic common" (Bowers, 2004) based on the intention to frame the vision and objectives of a collective endeavor, in order to provide research directions and a field of experimentation accessible to community members. The "common" in this case is driven by a collective goal that goes far beyond individual goals.

– The first meeting of the Homebrew Computer Club, a gathering of 32 participants (the core group of com-

moners), was held in Silicon Valley on a rainy night in March 1975. The meeting took place in Gordon French's two-car garage in San Mateo County on the occasion of the arrival in the area of the first MITS Altair 8800 microcomputer. As Gordon French put it, such an emblematic location, which was a distinctive symbol of collaborative space in Silicon Valley, gathered "the damned finest collection of engineers and technicians that you could possibly get under one roof" (Fred Moore, Lee Felsenstein, Bob Marsh, Bob Albrecht, Alan Baum, Stephen Wozniak, etc.). The common vision of these individuals, all of whom were passionate about hardware, was to collectively build computers and make them more accessible to everyone, so that people could get computers into their homes to study, to play with, and to create with. The gathering generated so much enthusiasm that the community decided the group should meet every fortnight. During the second meeting, the group chose the name Homebrew Computer Club and decided to edit the club's newsletter, which became extremely influential in the formation of the electronic culture of Silicon Valley by spreading the group's common vision and initiating the idea of the personal computer. As Levy (2010:212) underlines, "much of the experience that did exist in the world was centered in that meeting room, which was now the auditorium at the Stanford Linear Accelerator (SLAC). It was four months after the first casual meeting of the club, and its membership had grown almost tenfold. The little club formed by Fred Moore and Gordon French had grown to something neither could have imagined. It was the vanguard of a breed of hardware hackers who were "bootstrapping" themselves into a new industry—which, they were sure, would be different from any previous industry. The microcomputer industry would be ruled by the Hacker Ethic".

– In September 2017, the TransMedTech Institute was created as a collaborative space located within a university health center: Ste Justine Hospital (CHUSJ) in Montreal. It was the result of an initiative from a group of members of the professional community detailed in the preceding section, who agreed on a shared vision of creating a living lab in a real-world setting. Their "manifesto" was to radically change research practices in the medical field by creating living lab structures in hospitals to support the development and integration of cutting-edge medical technology solutions, validated directly in the clinical environment and respecting the highest normative standards of support and accreditation. The group of funding members chose to locate the living lab within the CHUSJ, building on the privileged relationships that the co-founders had developed over the years with the CHUSJ's medical teams. The co-founders of iTMT benefited from the recognition of their peers and that of the entire academic and scientific community, which gave them the legitimacy to convince some thirty key partners in the field to join their project. The localization within Ste Justine hospital was made possible thanks to a major grant from the Apogee Canada Research Excellence Fund, the Ministry of Economy and Innovation (MEI) and the Fonds de recherche du Québec (FRQ).
– The mission of the iTMT is to develop and validate new generation medical technologies in order to contribute to their transfer and effective implementation in the health care system and/or in the medical technology industry. In addition to its research programming in three specific areas, cardiovascular diseases, musculoskeletal problems and cancers, the institute provides: 1) funding for technology platforms supported by highly qualified professionals (HQP); 2) support for projects related to scientific research in innovative medical technologies; 3) scholarships and training courses for students; and 4) support for R&D through the recruitment of professors and the creation of funded research chairs. More recently, the institute is supporting entrepreneurship through the "Innovators in Residence Program" (which is a unique health innovation support program consisting of a residency in a clinical setting for entrepreneurs and management students).
– In 1987, the group of chefs working at elBulli restaurant with Ferran Adria started developing a radically new approach to gastronomy. As Capdevila et al. (2015: 28) underlined, "a visit to Nice radically changed Adrià's approach to cuisine when Chef Jacques Maximin told him that "creativity means not copying". This simple sentence had a strong impact on Adrià, who decided to start focusing on creativity and on finding his own identity. From then on, Adrià has been dedicated to the development of a new concept of cuisine, driven by methodical and profound introspection". Such a new common vision shared by the team of chefs at elBulli began an intense period of creativity and research, with an in-depth exploration of the connections between science (in particular chemistry) and cooking, supported by a manifesto that highlights the breaking of the rules and a departure from former practices of gastronomy. This "techno-emotional" new movement in cooking also led Adrià and his team to explore new relationships between artistic disci-

plines and gastronomy in order to find inspiration and offer unique experiences to customers, such as using deconstruction principles from architecture to invent new ways of presenting dishes. Catalunya thus became the epicenter of a revolution in gastronomy that had a world-wide influence. The creative work of Adrià and his colleagues led to elBulli earning three Michelin stars in 1997 and the title 'Best Restaurant in the World' from Restaurant Magazine in 2002, and from 2006 to 2009.

Thus, in each case the formation of an epistemic community orchestrated by the commoners was instrumental in developing a new movement in their respective innovative domains. The emblematic collaborative spaces chosen by the local groups of commoners were inherently parts of this common vision. The respective commoners paid particular attention to the promotion, image, emotional signification and culture of belonging which are attached to such spaces. Their intent was to deliberately create a buzz in order to favor spatial mobilization, attract new members, and find new forms of support and financing from public authorities as well as from international corporations.

In each of the three cases, the shared cognitive efforts initiated by the commoners contributed to the building of a "symbolic common", through the progressive elaboration of the common vision of the community, and the mobilization of the multiple and varied stakeholders around the issue of clarifying research orientation and reinforcing its meaning. In the case of the Homebrew Computer Club for instance, the dynamics of exchanges between the different passionate members of the club progressively contributed to modifying the main cognitive objective of the community. Initially focused on computer hacking, the group progressively aimed at developing personal computers and making computers more accessible to everyone. With regard to TransMedtech, the pandemic crisis has contributed to changes in the common vision of the community, with an increased emphasis on the safety of caregivers and patients, and on the growing need to develop innovative solutions more quickly with sometimes frugal means. In the case of elBulli, while at the beginning the group of chefs was tempted to concentrate their research on molecular gastronomy, they progressively shifted their main objective to the development of the techno-emotional movement in cooking. This category of symbolic commons ensures on the one hand the mobilization of researchers on shared strategic subjects, and on the other hand contributes to attracting key players (ranging from diverse institutions, the academic community, public funding agencies, and business and industry sectors) who adhere deeply to the values and vision of the commoners.

6 The implementation phase of the collaborative space: the development of communities of practice and the formation of innovation commons

Building on the initial impetus of the commoners, and on the existing commons (social commons and symbolic commons), the implementation of the collaborative spaces allows the formation and development of communities of practice, which accumulate shared experiences and circulate best practices in the respective chosen domain of innovative activities. The functioning of these communities of practice are facilitated by the co-location of people and institutions, cultural traditions, and specific conventions. Such a context has fostered the development of a series of "innovation commons", a rule-governed shared resource space for solving an important problem or discovering opportunities inherent in sharing tangible and intangible resources that contribute to innovation. These innovation commons can be defined as collective action governance mechanisms on dynamic bases of knowledge assets that are maintained and enriched by collective debates and experiences. Allen and Potts (2016) refer to these as "innovation commons" because the "common pool" of resources is not the technology itself, but the information and knowledge about the technology that then facilitate its development and transformation into an innovative solution.

– The main meetings of the Homebrew Computer Club were held at an auditorium at the Stanford Linear Accelerator Center (SLAC), where the participants ("a mélange of professionals too passionate to leave computing at their jobs, amateurs transfixed by the possibilities of technology, and techno-cultural guerrillas", Levy 1984) started working on improving the Altair 8800 with the objective to make low-cost computing by sharing their experience, circulating best practices, exchanging tips, promoting talk shops, advancing the state of the art, freely distributing the source code, bringing all available expertise, and doing their best to fill all technical knowledge vacuums. As a coherent community of practice, the members of the Homebrew Club paid great attention

to how to formally organize meetings and events in the main amphitheater, but also to hold important informal discussions in the bars, pubs and grills surrounding the SLAC. These informal gatherings fostered a strong culture of shared experimentation and contributions that paved the way for entrepreneurial discoveries. Rapid beta-testing, prototyping, and the possibility of having the most expert criticism available at any moment added to the success of this unique innovative collaborative experiment, which was in complete contrast with what the big industrial players were doing. The Homebrew Computer Club was at the origin of many microcomputer companies (Osborne Computer, Apple, Cromemco, Byte Shop, Morrow Design, Processor Technology, etc.) that transformed the whole electronics industry and forced the awakening of other companies to the demand for low-cost computers in the home.

However, the Homebrew Computer Club ceased its activities in December 1986. Many reasons may be given to explain the end of this unique collaborative experience. The first one is the emergence and launch of successful computer companies by members of the club who quit the club to dedicate their time to manage these new corporations; the second one is a "cognitive exhaustion" of the commoners who had to a large extent reached their innovative objective; another reason is related to potential conflicts between the members of the club when facing the issue of property rights. As illustrated by the well-known "Open Letter to Hobbyists" by Bill Gates (Gates, 1976), who blamed the members of the Club for violating the copyright of commercial software programs, reaching a common agreement concerning property rights was a challenge that poisoned the virtuous dynamics of the community and provoked the "institutionalized termination" of the collaborative project (Lundin & Söderholm, 1995).

– At the iTMT, the unique position of the institute within the hospital gave the scientific teams a fine and intuitive understanding of the challenges and practices of the institutional medical environment and privileged access to the medical teams and hospital facilities.

Progressively, the iTMT management team has developed a governance framework and operating principles that are aligned with the common shared vision. Thus, stakeholders can simultaneously examine the technical and performance aspects of the medical technology and intervene during development. Regulatory alignment with international standards was considered a priority from the outset, as was the assessment of potential markets, involving a definition of the business model (BMC) in order to determine the viability of a given project and ensure that research teams are equipped with a complete roadmap for the valorization of their technology. The iTMT brings together regulatory experts, market analysts, intellectual property protection professionals, medical device evaluators, patients and user groups, industry, etc. Diverse communities of practice emerged within the living lab on each of these issues to establish a standardization and a regular evaluation of the best practices. For partner companies, these structured processes and alignment with international standards and regulations greatly mitigate risk and consolidate the value of the medical technology developed.

In this perspective, one of the advantages highlighted in the interviews and resulting from the iTMT's Living Lab activities is to enable projects to get through the *'Death Valley'* phase of innovation (Ford et al., 2007). Given that the path from a discovery resulting from basic research to a commercial product or process is long and exposes itself to the difficulty of implementing, accelerating, and commercializing an innovation project, a particularly difficult period is when a technology is not yet mature enough for industry but is already too applied to be academic. Innovators and investors thus regularly assert that there is a transition phase between basic research and the commercialization of a new product, known as *Death Valley*. This term is used as a metaphor to describe the relative lack of resources and expertise in this area of development. The metaphor suggests that there are relatively more resources on one side of the valley in the form of research literacy and grants, and on the other side in the form of commercialization expertise and resources and equity funding, but that there is a severe lack of resources in between, when prototyping and real-life, on-site experimentations are becoming key to ensuring the translation of a proof of concept into an actual functional innovation, equipped with a relevant business model (Tremblay et al., 2022b).

– In the elBulli restaurant, the intense period of creativity and research triggered by the "techno-emotional" new movement led to the creation of a multitude of new recipes (more than 1,500 within 10 years). The team of chefs working with Adria exchanged new ideas and best practices on a regular basis. These exchanges of knowledge were facilitated by cataloguing and systematically classifying recipes created by Adria (in *Léxico científico gastronómico,* elBulli 2006). This offered a common knowledge platform for the

collective endeavor. This period of intense creativity also led to a major change in the way the restaurant was managed: from 1987 onwards, the restaurant would close for six months in the winter to dedicate time to creativity and research in another emblematic space: the elBulli Taller, located near the famous La Boqueria market in Barcelona. In the summer months, the team worked in the elBulli restaurant in northern Catalunya, serving the newly created dishes to the restaurant's clients. They would take into account the customers' reactions, critiques, and advice in order to progressively improve the production of the dishes. The team of chefs thus invented new practices and new ways to organize the activities of a restaurant through a form of organizational ambidexterity (O'Reilly & Tushman 2008) that had a strong impact on the way innovative restaurants are managed.

Despite these successes, Adrià voluntarily closed the restaurant in July 2011, at a moment when elBulli (which could accommodate only 8,000 diners a season) was at the peak of its reputation, with more than two million requests on the waiting list. Some speculate that it was due to financial reasons, given that the restaurant was regularly losing money. Another potential reason is a form of "cognitive fatigue". As Capdevila et al. (2018, p.534) underlined, in the late 90s the team of chefs at elBulli entered "a period of 'creative excess', where the search for a new episteme extended beyond the frontiers of pure gastronomy to encompass different artistic creative aspects and experiences, including architecture, sculpture, contemporary art, music, and theatre".

The examination of the three cases confirms the critical role played by the commoners using the respective collaborative spaces to initiate diverse communities of practice that paved the way to the success of these innovative endeavors. In all the cases, significant outcomes in terms of new startups, new innovative products, or new recipes and methods result from the efficient orchestration of all the innovation commons, which were made accessible to the participants of the innovative projects.

The three cases also reveal some challenges and limitations that such collaborative spaces are facing. These obstacles are of different origins: First, when startups emerging from these collaborative places are created, those entrepreneurs who were enthusiastically working in the innovative spaces may quit the collaborative hub to manage their new ventures, without "giving back" to the space they benefitted from. Second, there may be difficulties (risk of conflicts) in implementing some types of innovation commons which are close to market achievements, in particular property innovation commons as happened in the Homebrew Computer Club after the publication of Bill Gates's letter to the hobbyists. Third, there may be a form of cognitive fatigue among the commoners associated with the collaborative space, as was seen in the case of elBulli. Such obstacles explain the temporality of these collaborative spaces and the fact that most of them had to close and cease functioning.

However, even in cases when the collaborative space had to close, the entrepreneurial spirit and values shared by the diverse participants of these collaborative endeavors led them to overcome the geographical boundaries of these spaces and initiate new collaborative movements in the region, or even on a global scale, and contribute to forming an ecosystem of innovation (Schäfer & Mayer, 2019). As an example, after the closing of the elBulli restaurant, many of the chefs who were working opened creative restaurants, in Catalunya as well as in many different international locations (Beijing, London, etc.), diffusing the values and principles of the techno-emotional movement. In the case of TransMedtech, many researchers underlined that the experiences they had with collaborative projects during their participation in iTMT have had a significant impact on the ways they are now transferring these practices in their current research activities. In the case of the Homebrew Computer Club, after the closing of the collaborative space in 1986, the passionate techno-geeks who were experimenting there contributed to the creation of the vast electronic ecosystem of the Silicon Valley.

Thus, while the intimate localization in the collaborative spaces certainly mattered in the initial phases of the respective processes of innovation, the breadth of knowledge creation and the passion to collectively innovate acquired by the participants in such spaces paved the way to transcend the local boundaries of these innovative hubs and contributed to the emergence and formation of a much wider ecosystem of innovation.

7 Discussion

This contribution aims at understanding the dynamics of innovation that emerged and developed in innovative collaborative spaces by conducting an in-depth analysis of three of these iconic cases: The Homebrew Computer Club in Silicon Valley, the TransMedtech Institute in Montreal and the elBulli restaurant in Catalunya. The lessons learned from these three case studies suggest a reconsid-

eration of some key elements of the traditional literature on collective action. As von Hippel underlines (2005; 11), "the collective or community effort to provide a public good—which is what freely revealed innovations are—has traditionally been explored in the literature on "collective action" (such as in Olson, 1989, or Ostrom, 2010)". Our view is that the results of the case studies adds to the literature on collective action in highlighting the role of a core group of passionate individuals (the commoners), the way they initiated specific community dynamics, and their orchestration of a series of commons to develop their collaborative innovative project.

As emphasized by Helfrich et al. (2009:9), "managing common pool resources in a practical sense requires a community that becomes aware of its relationship to the resources in a social context and names the resources as its own – a community that claims them, a community that presses for and helps, enforce rules to respect this co-ownership". Thus, there is no commons without members of the community who assume concrete responsibility for the management of shared resources. There can be no collective assumption of responsibility without strong communication among community members, without a high degree of acceptance of rules, reciprocity and cooperation, and without a functional and transparent decision-making process. In such a perspective, a careful analysis of the three cases has highlighted the central role played in each of these cases by a core group of passionate individuals (called the "commoners" in the article) who took care of the common shared resources and orchestrated the dynamics of innovation in these collaborative spaces through the articulation of a series of commons (social commons, symbolic commons, and knowledge commons, in the cases which have been examined).

The results of the case-studies suggest that the dynamics of each of the core groups of commoners in their innovative efforts is characterized by major changes in their main cognitive motives along the different phases of the innovative projects. In the emergence phase, each of the group of commoners is issued from a professional community whose cognitive focus is on forging dense relationships and mutual help between members sharing the same professional culture. Then, when they agreed to initiate their visionary project and find ways to test their innovative ideas, the core group initiated an epistemic community as their main cognitive motive focused on a common vision associated to the formation of a radical innovation to be experimentally tested in a symbolic collaborative space. Once the collaborative space was implemented, the group of commoners turned to initiating some form of community of practice focusing on exchanges of best practices and sharing of knowledge. As Coriat (2015; 14) underlined, "the 'commons' is an eminently social construct. It mixes formal and informal rules, market and non-market relations, norms and conventions, and behind "a common" there is a community."

With regard to the commons, the results suggest that the dynamics of innovation within such innovative spaces is inherently related to the articulation of different *commons* orchestrated by the commoners in order to establish interdisciplinary boundary crossing collaboration. Based on our observations, the dynamics of innovation in the collaborative spaces results from the following sequence of *commons*: 1) *social relationship commons*, 2) *symbolic commons*, and 3) *innovation commons*. Each of these commons corresponds to a collective action governance mechanism over a specific common pool resource which is a key determinant of the innovative project. First, as we have seen, at the origin, the professional communities reflecting a strong local culture pay great attention to nurturing, managing and preserving a *social commons* (Helfrich and Haas, 2009) focused on the formation of dense relationships and mutual help between the diverse members of the community**.** This type of social commons offers a resource-pool in the form of a critical mass of shared professional expertise and know-who (who shares the same interest, who has the skills, who knows, who can help, etc.) that are key ingredients at each stages of the innovative process. Second, the development of a *symbolic commons*, which expresses the main challenges, the purpose, the shared values of the community, the intention to put those values into action in order to create an environment conducive to innovation, played a key role in the creation of a local buzz and the generation of global pipelines that attracted external players to invest and participate in the collaborative space. Third, the development of diverse *knowledge commons* that pools distributed information about knowledge, uses, costs, problems and market opportunities, progressively paved the way to the success of these innovative endeavors. The important point is that all the shared resources associated with each of these commons are made accessible by the commoners to the participants of the collaborative spaces. The articulation of the diverse innovation commons is the critical base of the innovative movements that led to the foundation of successful ecosystems of innovation.

Such results on the importance of innovation commons echo Amin and Howell (2016:1) when they advanced: "how should we understand these contemporary conjugations of the commons, if by this term we understand a process, a contest of force, a reconstitution, a site of convening practices? ... Without ignoring the facts

of the systematic encroachment on life, resources, and spaces once held in common, at the same time we envisage the opening up of new spaces of cooperation and collective action, such as the digital commons, new practices simply of 'being in common', community economies and solidarity networks. We see the contemporary commons as both being lost in old shapes and recovered in new forms, as, in brief, a contested and dynamic domain of collective existence, with the balance delicately poised between the rapacious demands of political economy and the promise of social innovation ... We aim, rather, at a collective, cooperative audit of transformations, driving forces, and commoning experiments, pressing towards outlining the new possibilities for the commons. These options are not mutually exclusive, for the commons (to revisit its etymology) are notably *commodious*, in the sense of being both spacious and timely".

With regard to communities, the contribution comes to an original conclusion while the literature dealing with communities generally analyzes the development and the role of a given community characterized by a given cognitive motive (a community of practice, an epistemic community, a community of interest, etc.), the examination of the three cases suggests that the orchestration of the dynamics of collaborative innovation results from a community of passionate individuals (the commoners) whose main cognitive focus changes through time (first professional, then epistemic, and finally practice-driven) as they articulate a series of commons (firstly social commons, secondly symbolic commons, and then knowledge commons) in order to conduct the innovative process through the collaborative space. According to Maguire et al. (2004: 657), commoners can thus be considered as institutional entrepreneurs, given that they "... have a stake in particular institutional arrangements and [can] leverage resources to create new institutions or transform existing ones."

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