

# A generative design of collaborative innovation space

Marie Klooker<sup>1,\*</sup>  and Katharina Hölzle<sup>2,3</sup> 

<sup>1</sup>Faculty of Economics and Social Sciences, University of Potsdam, Potsdam, Germany.  
klooker@uni-potsdam.de

<sup>2</sup>Institute for Human Factors and Technology Management IAT, University of Stuttgart, Stuttgart, Germany.

<sup>3</sup>Fraunhofer Institute for Industrial Engineering IAO, Stuttgart, Germany.  
katharina.hoelzle@iat.uni-stuttgart.de

**A workplace for collaboration can be a powerful tool for fostering collaborative innovation in an organization. However, many organizations have failed in realizing the benefits of collaborative innovation workplaces. Applying a sociomaterial lens to an empirical investigation of the creation and genesis of workplaces for collaborative innovation in six organizations, we expand the focus beyond identifying workplace's material and social elements to the emergence of a collaborative innovation space as an effective workplace for collaboration. We develop a dynamic generative design model for collaborative innovation spaces. This model draws the attention to practices involved in the creation of such space instead of spatial characteristics only. It presents three dimensions for creating collaborative innovation spaces: the collaborative workplace consisting of collaborative spatial layout, work practices, and organizational structures. All are created and manifested by means of a collaborative-participatory design approach and the practice of generative reflection instead of conventional evaluation measures. Ultimately, a mindset shift is set in motion, generating a sustainable emergence of a collaborative innovation space. We conclude that a collaborative innovation space as an in-between space cannot be deliberately designed but rather evolves over time. Using our generative design model, organizations and stakeholder can actively become part of this emergence process.**

## 1. Introduction

Not only but especially for innovation and solving complex problems, a combination of different backgrounds, expertise, and skills is needed. Hence, organizations aim at fostering collaboration for innovation, that is, collaborative innovation. This approach to innovation requires not only a supportive organizational structure and culture but also organizational and management practices such as agile development, SCRUM, or Design Thinking, just to name a few. Furthermore, for people to meet, communicate,

and collaborate, they require workplaces with active, alternative, and innovative elements (Boutellier et al., 2008; McElroy and Morrow, 2010). These so-called innovation spaces materialize as fab labs (Tremblay and Scaillerez, 2021), innovation laboratories (Lewis and Moultrie, 2005) or creative spaces (Thoring et al., 2019). Despite different foci, they all aim to improve communication and knowledge sharing and thereby foster collaboration across different functions and departments (Boutellier et al., 2008; Manca et al., 2018). Yet, despite continuous interest in creating such spaces in organizations, doing so

successfully seems to remain a challenge for managers. In practice, we find innovation spaces that ‘work’ and many, that ‘do not work’, that is, they do or do not fulfil the expectations of enabling and enhancing innovation at work. This article therefore aims at further exploring the phenomenon of developing effective workplaces for collaborative innovation in organizations.

In research, there also has been continuous interest in the topic. It has long been prevalent in disciplines such as architecture, facility management, design, and more recently, also social sciences (Ciaramella et al., 2018). Reviewing existing literature about innovation spaces in the fields of management and organizational research, we find two major themes that have been explored: (1) the nature of organizational space, including spatial characteristics and ingredients and (2) the effects of organizational space on various dimensions of innovation at work. Overall, research has demonstrated the potential power of space for organizational innovation. Scholars have investigated the effect of the physical workplace on individual creativity (Kristensen, 2004; Magadley and Birdi, 2009; Meinel et al., 2017), creative attitude (Cirella and Yström, 2018), or innovation (Moultrie et al., 2007; Osorio et al., 2019). With a stronger focus on the social space, organizational scholars have explored how space affects organizational life (Clegg and Kornberger, 2006; Elsbach and Pratt, 2007) or organizational culture (Schein, 1990; Hatch, 1993; Gibbert et al., 2014; Mašlikowska and Gibbert, 2019).

Reviewing existing literature on the nature of organizational space, we find opposing views in the current academic debate that can be summarized as two streams of research. Scholars of the first stream regard space as static and assume a one-directional impact, originating either from social or material (spatial) elements. Scholars of the second stream, on the other hand, apply a relational ontology to space, highlighting the interactive relationship of a designed workplace and its users. Hence, social and material elements are equally important for its impact. It needs to be highlighted that both understandings of space also hold different implications for approaching the development of innovation space. We conclude that a workplace for collaborative innovation comprises neither only material nor social elements. Instead, it consists of both at the same time, and both are equally relevant with regard to its effect (Caccamo, 2020). However, much literature on this phenomenon belongs to the first, static stream and therefore most findings on spatial ingredients do not sufficiently explain the phenomenon of innovation space development in organizations, especially

regarding collaborative innovation. Highlighting the socio-material nature of workplaces for collaborative innovation necessarily broadens the perspective on innovation space development beyond identifying general spatial ingredients or deriving a generally applicable template. Creating collaborative innovation space based on such cookie cutter approach bears the risk of the created workplace to fail, that is, not being accepted by the organization and its members. In contrast, applying a relational view on collaborative innovation spaces and their development shifts the attention towards all spatial dimensions that enable effective use of the designed workplace, that is, collaboration among users. Furthermore, it acknowledges the importance to consider users’ specific needs. Petrulaitiene et al. (2018) summarize this by pointing out that an effective workplace for collaborative innovation must be created as an experience, which implies to consider the users’ needs when designing space. Consequently, we conclude that the phenomenon of creating collaborative innovation space can only be fully grasped applying a relational ontology that acknowledges the socio-material nature of such workplaces. Therefore, we position our research in the second stream.

In the relevant literature, we find different frameworks that focus on workplace development, including its social and material aspects. Chan et al. (2007) first developed a model describing multiple dimensions of workplace design beyond the spatial layout, and the tensions between them. Manca et al. (2018) elaborate on this model. Besides the physical layout and facilities, they mention organizational culture and structure, human resources and work practices, and information and communication technologies as relevant dimension for designing workplaces. Additionally, they identify enablers and barriers for leveraging the power of collaborative workplaces. As such, these frameworks display the constitution of collaborative workplaces beyond spatial ingredients. Furthermore, they display the multifaceted nature of workplaces for collaborative innovation and overall provide promising insights into the phenomenon of collaborative innovation space development. However, they are limited to displaying the various dimensions of the collaborative workplace and do not address how effective collaborative innovation evolves from the designed workplace. We will explain in more detail why this bears some shortcomings. Drawing on De Certeau (1984), we define space as enacted place. As such, the created workplace may only be effective if brought to life or using De Certeau’s (1984) words: ‘a *space* is like the word when it is spoken’ (De Certeau, 1984, p. 117). Accordingly, we define collaborative innovation

*space* as an effectively enacted *workplace* for collaborative innovation. To further explain the missing dots, we draw on Ollila and Yström's (2020) concept of in-between space. According to the authors, collaborative innovation takes place in a space of such specific nature. Besides describing other inherent characteristics in detail, the authors highlight that in-between space cannot be deliberately designed at once but only evolves over time. Regarding the challenge of creating collaborative innovation space in organizations, this adds another layer of complexity. It implies that a description of various spatial dimensions and elements as well as their relations does not sufficiently explain the phenomenon of developing collaborative innovation space, that is, effective workplaces for collaborative innovation in organizations. Thus, while previous scholars of the relational stream have focused their research on the dimensions that constitute the sociomaterial workplace for collaborative innovation, we close this gap by focusing on the evolution of collaborative innovation space instead. Therefore, the research question this paper aims to answer is: *How can a workplace for collaborative innovation purposefully evolve into collaborative innovation space?*

To answer this question, this article explores the phenomenon of creating collaborative innovation spaces from a sociomaterial perspective (Orlikowski and Scott, 2008). Thereby, we acknowledge the added complexity of creating collaborative innovation space that is described by the concept of in-between space (Ollila and Yström, 2020). Furthermore, we contribute to the current academic conversation by adding yet another perspective on the phenomenon of developing collaborative innovation space. More specifically, the sociomaterial view takes a network perspective on the evolving collaborative innovation space, where all elements, including those of social, material, and human nature, become actants (Latour, 2005) of similar importance. Agency is created in the entanglement of all actants, instead of in either one of them, or their interaction. This takes us beyond prior approaches of directing research towards the recursive nature of a socio-material workplace. It moves us from spatial elements to the practices needed for their enactment leading to the evolution of collaborative innovation space as effective workplace for collaborative innovation.

This article thus explores the phenomenon of developing collaborative innovation space, based on a relational ontology and is informed by theory at the intersection of organizing for collaborative innovation and organizational space. Furthermore, it takes an interpretivist approach to elicit theory as emerged from empirical data collected in a multiple case

study with six organizations that created workplaces for collaborative innovation. Led by the results and guided by a sociomaterial perspective (Orlikowski and Scott, 2008), we conceptualize the creation of collaborative innovation space and develop a dynamic generative design model of the evolution of such space. The model sheds light on the entire process of innovation space development and especially draws attention to the practices involved instead of spatial characteristics only. It presents three dimensions for creating collaborative innovation spaces that have emerged from the empirical data: First, a workplace for collaborative innovation combines three dimensions including (physical) spatial layout, work practices, and organizational structures, all aligned to collaborative innovation. Second, a collaborative-participatory design approach (Scariot et al., 2012) empowers users and provides the foundation for co-creation between users and experts guided by strategy. Third, establishing the practice of generative reflection in contrast to conventional evaluation measures ensures an ongoing development of the designed workplace. Ultimately, a mindset shift is set in motion, generating a sustainable emergence of a collaborative innovation space.

We start the article with briefly explaining the theoretical foundation and lens for our research including the relational ontology of space and the sociomaterial perspective on collaborative innovation space as in-between space. Subsequently, we describe our methodological approach in detail and provide an overview of the cases. We present our findings along with the developed data structure, followed by a thorough discussion integrating them back into literature to derive our theoretical contribution. We conclude by deriving managerial implications that assist the development of collaborative innovation spaces in organizations and point out limitations and opportunities for further research.

## **2. Theoretical background**

### *2.1. Towards a relational ontology of collaborative innovation space*

Exploring the nature of organizational (innovation) space, we find two opposing streams of research, based on different ontologies. Scholars of the first stream apply a static view on space. They come from either management or organizational research. Management scholars focus mainly on material elements of the space such as furniture, architecture, tools, and equipment and how these affect the people within the space or the whole

organization (Lewis and Moultrie, 2005; Moultrie et al., 2007; Thoring et al., 2018). Here, innovation space is defined as a physical environment offering the necessary resources to stimulate the creativity of employees working in innovation projects (Lewis and Moultrie, 2005). Oksanen and Stähle (2013) even refer to innovation space as a service for users. Scholars of this stream have identified general spatial factors for creativity (Deb and Sinha, 2011; Dul et al., 2011), more specifically for team creativity (Weinberg et al., 2014), collaboration (Oksanen and Stähle, 2013; Waber et al., 2014; Thoring et al., 2018; Delgado et al., 2020), or innovation (Lewis and Moultrie, 2005; Wagner and Watch, 2017). Organizational researchers focus more on the social dimension of (innovation) space. Much of this research builds on Lefebvre's thoughts of production of space as a social product. The social space is created and formed, that is, produced (Lefebvre, 1991) through the acting of participants. Research on the social space concerns the people acting in the space, their relationships, and culture (e.g., Taylor and Spicer, 2007; Bucher and Langley, 2016). Despite the different foci on either the physical or social space, both groups of scholars follow in their research a one-directional impact. Either people and their (inter-)actions create the space or the space affects people and their (inter-)actions. Therefore, we summarize them as one stream of research.

Scholars of the second stream base their research on a relational ontology. For them, the active role of the users in constructing (i.e., building) and modifying organizational space (Dale and Burrell, 2008; Kornberger and Clegg, 2004; Hernes et al., 2006; Caccamo, 2020) is key. They focus their research on the interactive relationship between the designed place and its users. More specifically, in contrast to researchers of the first stream focusing either on the material or social space, scholars of the second stream believe in a socio-material space where 'social processes and structures, and material processes and structures are seen as mutually enacting' (Dale, 2005, p. 641). Organizational space is regarded as 'product of the negotiations between the normative aspects of building design and layout and the potentially creative appropriations and reconstructions of the societally embedded users' (Peltonen, 2011, p. 807). Users socially construct meanings, norms, and values that are associated with the built environment (Kornberger and Clegg, 2004; Dale and Burrell, 2008). Organizational space is thus defined as recursive space where spatial design shapes work practices and interaction, which are reshaped

by interactions of employees in return (Hernes et al., 2006). Furthermore, the relationship between space and work practices has been emphasized (van Marrewijk and Van den Ende, 2018). In recursive space, all work practices become spatial practices and *vice versa* (van Marrewijk and Van den Ende, 2018). In this stream, the focus is not on either social or material space, but on the socio-material nature of it. Caccamo (2020) further describes the socio-material innovation space as 'both a physical environment and a group of people sharing a culture' (p. 3). Exploring the phenomenon of collaborative innovation space and how it develops can only be done based on a relational ontology. Ollila and Yström (2016) point out that collaborative innovation is about developing relationships among all actors and leveraging their respective knowledge for developing business and organizational learning. This interaction leads to the production of social space (Lefebvre, 1991) which also enables and defines the use of the physical place. Focusing on workplaces for collaborative innovation, we therefore position our research in the second stream and base our investigation on a relational ontology, acknowledging also the socio-material nature of such space.

## 2.2. *The collaborative innovation space as in-between space*

Following Yström and Agogué (2020), we define collaborative innovation (CI) as 'innovation activities or innovation processes involving multiple actors, organizations or individuals transcending boundaries (within or across organizations) to create and develop new products, services, policies, processes or business solutions' (p. 1). Creating a collaborative innovation space frames CI practices and provides context. From a design perspective (Ollila and Yström, 2016), a collaborative innovation space is never complete. Instead, it is recreated continually and given meaning through permanent interaction. This moves the focus from existing organizational systems to the creation of new organizational artefacts. And it is the incompleteness of organizational artefacts that becomes the trigger for action. Ollila and Yström (2016) identify five design principles that generally account as guidance for organizing CI: (1) presence of participants equals influence, (2) diversity is the source of creativity, (3) multiple identities create an extended action net, (4) a higher purpose unites the participants, and (5) the participants are creators of the collaboration. In 2020, Ollila and Yström developed their concept further to an in-between space



and argued that this is the space where collaborative innovation happens. In-between space exists between actants (Latour, 2005), and has its own character and value, being referred to as ‘both-and as well as neither-nor. It is a space of transformation, embracing disorder and ambiguity with the potential of destruction as well as becoming’ (Ollila and Yström, 2020, p. 205). Being between spatial elements, it connects the immaterial and cognitive with the material space. Lefebvre’s (1991) concept of production of space as a social product informs the concept of in-between space. It follows the same mechanisms of production and reproduction, yet it is extended to the physical, cognitive, or virtual level (Ollila and Yström, 2020). The authors outline the core characteristics of in-between space to be multiplex, in becoming, recursive, and translative (Ollila and Yström, 2020). It is multiplex, as it allows individuals to act as hybrids between diverse cultural backgrounds. It enables and embraces plurality and diversity, allowing individuals to keep multiple identities based on, for example, different roles, departments, and functions. As such, it bridges different cultures, backgrounds, and agendas of the participants (Ollila and Yström, 2016). The in-between space is in becoming as it is emergent and cannot be deliberately designed or implemented immediately. In contrast, it remains constantly evolving through interaction and learning. As recursive space, it involves the designers of the materialized place and actors within the space to continuously reconfigure the space. In the translative space, differences among cultures are integrated into a new culture of collaborative innovation. Thereby, shared meaning and practices can be developed. Simultaneously, the actors maintain and preserve their different cultures or disciplinary backgrounds. In-between space as social space is characterized by inherent uncertainty and ambiguity.

### 2.3. Applying a sociomaterial lens to creating collaborative innovation spaces

Orlikowski and Scott (2008) coined the concept of sociomateriality. According to the authors, taking a *sociomaterial* perspective can help advance research on technology, work, and organization, directing attention to the entanglements among all three instead of how one affects the other. Sociomateriality contrasts an ontology of separateness where separate things, for example, social and material elements in the workplace, need to be joined together and agency is ‘located either

in the human or the artefact’ (Introna, 2007, p. 134 in Orlikowski, 2010). The authors draw on Actor-Network Theory (ANT) (Callon, 1986; Latour, 1987) as well-known example of theories applying a sociomaterial lens: ‘From an ANT perspective, no distinct and separate social or technological elements interact with each other; rather, technological artefacts are considered equivalent participants in a network of human and non-human agencies that (temporarily) align to achieve particular effects’ (Orlikowski and Scott, 2008, p. 456). The different agencies are referred to as actants (Latour, 2005). In this article, we will make use of this term when referring to any social and material elements, including humans as parts of the created workspace. Thereby, we intend to underline the symmetrical impact of all elements indifferent to their figuration and effect. By comparing the sociomaterial to the recursive space, two crucial aspects need to be highlighted. First, both concepts overlap about acknowledging that users of a workplace take a crucial role in the creation of collaborative innovation spaces. However, the sociomaterial view expands the recursive view by the symmetry of all actants, highlighting that social, material, and human are all equally important. In sociomaterial space, agency is created in the entanglement of all actants. Second, the sociomaterial view adds the idea of performativity to the recursive space. A performative view (Barad, 2003) on innovation spaces draws attention to how relationships between all elements are enacted in practice (Orlikowski and Scott, 2008). Looking through a sociomaterial lens on creating collaborative innovation spaces directs our interest beyond defining spatial ingredients or social and material elements that interact in recursive space. As a source of agency, the performative act of the entanglement of all actants (Latour, 1987) becomes the focus of our research. Hence, we will empirically investigate the emergence of collaborative innovation spaces focusing on the practices that transform collaborative workplaces into collaborative innovation spaces, that is, enact the entanglement of all actants into a sociomaterial assemblage.

## 3. Research design

The overall aim of the study was to understand the phenomenon of developing collaborative innovation space in organizations based on the informants’ experiences and their interpretations of them. More specifically, we focused on identifying practices that enact the evolvement of collaborative innovation

space. Therefore and due to a lack of empirical evidence, we chose a grounded theory approach (Glaser and Strauss, 1967; Charmaz, 2014). Multiple case studies were conducted at organizations that had recently established innovation workplaces. Overall, the empirical study was two-fold. In three cases, a longitudinal study was conducted (Cases D-F). We attended the entire cycle of innovation space development, including the planning phase, the creation of the workplaces and their use after initial completion and collected *in situ* data. In the other three cases, data on the entire process were collected retrospectively (Cases A-C).

### 3.1. Sampling

Employing purposeful sampling (Glaser and Strauss, 1967), all selected cases and informants provided rich information on the phenomenon under study. In total, we selected and studied six cases in depth. Aiming at a holistic understanding of innovation space development called for a diverse sample that provides sufficient variance. We therefore chose to investigate multiple and diverse cases. All selected cases and informants together offer multifaceted insights into various experiences of the same phenomenon. In all cases, new workplaces were created or planned based on multi-space or open-plan concepts (Boutellier et al., 2008) with the aims to foster (collaborative) innovation and to provide enabling contexts for employees. The function of all newly created collaborative workplaces is product development.

The cases differ regarding the organizational nature, status in organizational development, and industry sector. Furthermore, the intended role of the future innovation workplaces in the overall organizations varies. We investigated innovation spaces that take the form of an innovation laboratory (Lewis and Moultrie, 2005), creative space (Thoring et al., 2019), or an entire office turned into a collaborative workplace (Manca et al., 2018). Another difference among the cases concerns the levels of experience with innovative collaborative methods, perceptions of what innovation space entails, and consequently, approaches to its development. While in some cases architects and interior designers developed the spatial concept, in other cases, a co-creation approach was chosen, with later users of the workplace being actively involved in the process from the beginning. And last, despite common patterns of the spatial set-up being obvious, spatial characteristics such as size, style, and furniture differed among the cases. However, the spatial design itself was not the focus of this study. Table 1 provides an overview of all cases. Taking a longitudinal approach to data

**Table 1.** Overview of cases

	Case A	Case B	Case C	Case D	Case E	Case F
Industry sector	Electric tools	Finance	IT services	Fashion	Healthcare	Social entrepreneurship
Founded	1886	1999	2006	2008	1863	2014
Focus	Product development	IT/software development	IT applications and digital solutions	IT/product development	Product development	Social entrepreneurship
No. of employees (organization/department)	20,000	1,600	4,300	15,000	41	19
Revenues ca. (in EUR)	4,6 billion	234 million	836 million	3 billion (in 2015)	23 billion	2 million
No. of employees (new space)	100	120	12–60	15–100	10–20	60
Opening of new work space	2016	2017	2016	2015	2015	2015

collection (in cases D-F), geographical proximity was a prerequisite to be able to frequently visit the case organizations.

Our approach to selecting the cases changed slightly over the course of the study.

After the initial data collection, we experienced that two of the created work places did not succeed as intended. The innovation spaces were not used as expected, or were re-transformed into conventional office space only shortly after its opening and despite their apparently promising concepts. However, our aim was to learn more about successful innovation space development, that is, cases with the newly created innovation workplaces still being up and running beyond the hype of their initial opening, at least for one year, and based on the perceived positive impact as reported by managers and users. We therefore chose to extend the data sample and switched to a retrospective approach. This also promised further insights into and focus on different phases of workplace development. Overall, we expected more thorough reflections of informants on their experiences. In total, we selected additional three cases (Cases A-C). In the selected cases, the workplaces' initial creation was completed one to two years before the data collection. Memories were therefore still fresh and relevant drivers of the change initiatives were accessible, while enough time had passed to report on learnings and further developments. Drawing on the guidelines for theoretical sampling (Glaser and Strauss, 1967), we also searched for more specific criteria for selecting further cases to evolve when the study progressed. After the primary data analyses, we learnt that the approach to designing the new workplace itself, as well as the scope of the initiative, mattered for its effect and chance to sustain. Wagner and Watch (2017) state that effective spaces have aligned organizational ambition, culture, and people to produce a supportive, enabling design. Consequently, we identified scope of (re-)design and design approach as focus codes (Charmaz and Thornberg, 2021) of innovation space development and aligned our case selection to these aspects. Accordingly, we acquired further cases where aspects beyond the spatial design had been addressed and users had been actively involved in the creation process. Besides already mentioned differences, these additional three cases also intentionally varied regarding the scope and trajectory of the change initiative. Variance of the data sample was further enhanced through including diverse sources of data within each case.

Only the insights gained from all six cases together led us to relevant concepts and themes that helped us to understand the dynamics between them and thereby grasp the phenomenon of collaborative innovation space development.

### 3.2. Data collection

The approach, scope, and depth of data collection varied among cases based on the longitudinal versus retrospective approach. The longitudinal approach offered the opportunity for more intense and detailed data from observations of the workplaces in use and interviews on the informants' intentions and struggles, as well as their perceptions on the development and changes throughout the entire creation process. On the other hand, the retrospective approach, despite bearing some natural blind spots throughout the process, ensured more condensed information based on more thorough reflections on past events, adding different perspectives. Furthermore, it allowed us to gain deeper insights into the bigger picture of innovation space development beyond its initial creation, from its initiation to the evolvement of the created spaces, including adaptations and changes, as well as its outcome. Both parts of the study and the collected data have been valuable with regard to our results. Together they form a more holistic picture of the phenomenon under study that we could not have gained taking either a longitudinal or retrospective approach alone. Furthermore, case-specific differences also led us to different approaches to and results of data collection. More specifically, depending on the amount of people involved in the initiatives or the different uses of the workplaces, the amount of data collected by means of interviews or observation differs.

We gathered qualitative data from primary and secondary sources until we reached theoretical saturation (Glaser and Strauss, 1967). The primary sources include own observations during on-site visits, informal conversations and formal interviews with lead users and managers of the space. Secondary sources entail archival documents like floorplans, annual reports, project plans, event calendars, templates, and pictures of the new work environments. They were provided and selected by informants and included background information about the creation process, numbers, figures, and changes made over time. Data collection occurred between 2015 and 2019. The variety of all data sources (primary and secondary) allowed us to triangulate the collected data and assist us in better understanding the phenomenon of innovation space development. Table 2 provides an overview of all collected data in each case organization, including primary and secondary sources and, where applicable, ordered according to the different phases of workplace development (in Cases D-F).

In line with our expressed aim to understand the phenomenon of innovation space development based on the informants' experiences and their perceptions of them, we relied on formal interviews

**Table 2.** Overview data collection

Case A	Case B	Case C	Case D	Case E	Case F
Longitudinal (April 2015 – August 2016)					
Retrospective (July – Dec 2018)					
<p><b>Primary Data:</b></p> <p><b>2 interviews:</b></p> <ul style="list-style-type: none"> <li>project lead re-design/130 min (A1)</li> <li>lead-user/90 min (A2)</li> <li>informal inter-views on site</li> </ul> <p><b>Observation:</b></p> <ul style="list-style-type: none"> <li>on-site visit &amp; workplace tour (1 day)</li> </ul> <p><b>Secondary Data:</b></p> <ul style="list-style-type: none"> <li>underlying concept</li> <li>pictures</li> </ul>	<p><b>Primary Data:</b></p> <p><b>2 interviews:</b></p> <ul style="list-style-type: none"> <li>project lead redesign/120 min (B1)</li> <li>lead user/60 min (B2)</li> <li>informal inter-views on site</li> </ul> <p><b>Observation:</b></p> <ul style="list-style-type: none"> <li>on-site visit &amp; workplace tour (1 day)</li> </ul> <p><b>Secondary Data:</b></p> <ul style="list-style-type: none"> <li>pictures</li> </ul>	<p><b>Primary Data:</b></p> <p><b>2 interviews:</b></p> <ul style="list-style-type: none"> <li>head of department/40 min (C1)</li> <li>lead user/90 min (C2)</li> <li>informal inter-views on site</li> </ul> <p><b>Observation:</b></p> <ul style="list-style-type: none"> <li>on-site visit &amp; workplace tour (1 day)</li> </ul> <p><b>Secondary Data:</b></p> <ul style="list-style-type: none"> <li>pictures</li> <li>additional documents (event calendar, previous projects, templates for project work)</li> </ul>	<p><b>Planning Phase (Expectation &amp; Intentions)</b></p> <p><b>5 interviews:</b></p> <ul style="list-style-type: none"> <li>head of project (D1)</li> <li>team members 'space team' (D 2 – D5)</li> <li>40-60 min. each</li> </ul> <p><b>1 group interview</b> with 'space team' (5 interviewees), 40 min (DG)</p> <ul style="list-style-type: none"> <li>on-site visit</li> <li>floor plans</li> <li>visualizations by architects</li> <li>pictures</li> </ul> <p><b>Observation:</b></p> <ul style="list-style-type: none"> <li>5 days – Hackathon Week</li> <li>1 day event – feedback marketplace</li> <li>2 x 5 days in 2 months</li> <li>full innovation programme (2 projects)</li> </ul> <p><b>3 interviews</b> with users of space/25-35 min each (D6 – D8)</p>	<p><b>3 interviews:</b></p> <ul style="list-style-type: none"> <li>head of project (E1)</li> <li>expected lead users (E2/E3)</li> <li>40-60 min. each</li> </ul> <p><b>1 interview</b> with head of project, 20 min (E1)</p> <ul style="list-style-type: none"> <li>on-site visit</li> <li>floor plans</li> </ul> <p><b>Observation:</b></p> <ul style="list-style-type: none"> <li>1 day design thinking workshop, – 2 teams</li> </ul> <p><b>2 interviews</b> with users of space/25 min. each (E4/E5)</p>	<p><b>3 interviews:</b></p> <ul style="list-style-type: none"> <li>CEOs/Founders (F1 – F3)</li> <li>40–60 min. each</li> </ul> <p><b>1 group interview</b> with CEOs/founders (3 interviewees), 45 min (FG)</p> <ul style="list-style-type: none"> <li>on-site visit</li> <li>floor plans</li> <li>visualizations by architects</li> <li>pictures</li> </ul> <p><b>Observation:</b></p> <ul style="list-style-type: none"> <li>regular visits over 2 years</li> <li>informal interviews with users &amp; CEO's</li> </ul> <p><b>1 interview</b> with user of space/30 min (FU)</p> <p>annual report on journey</p>



as the main source of data. The other collected data served for triangulation and as supplementary sources and therefore were important for supporting a better understanding of the information provided through interviews and for gaining additional perspectives. (Miles and Huberman, 1994). Across all six cases, we conducted 26 formal semi-structured interviews with lead users. These consist of 18 individual interviews with project leads and managers of the different cases. Each lasted between 25 and 130 minutes. In two cases, we additionally conducted formal group interviews with lead users. The interviewees were similar to the individual interviewees. However, the focus was on different aspects of innovation space development. We identified the chosen interviewees as lead users due to their active roles in the planning and conceptualization of the initiatives while also being frequent users of the designed place at the same time. A list of topics, including strategic intention, the process of creation, the designed workplace (beyond physical place), its use and how it developed or changed, guided the interviews. In cases D–F, we also conducted six interviews with regular users of the designed workplaces. These interviews circled around the users' perception and experiences of using the newly designed workplaces. Despite the topic lists, the conversations developed freely 'following wherever the informants lead us' (Gioia et al., 2013, p. 20). All interviews were conducted in the native language of the interviewees (German or English) and on-site at the workplaces, partly during touring the space. Including the physical environment in the interview triggered additional topics and narratives. The otherwise hidden knowledge emerged by unleashing the power of show and tell (Crawford et al., 2021). All interviews were recorded and transcribed. Back and forth translations were checked by both authors independently. Additionally, non-participatory observation of the innovation spaces in use assisted us in interpreting the informants' reported experiences. The intention was to complement the information gathered during interviews to help us in contextualizing the innovation space development at different cases. The times and duration of observation varied between cases from one day to an entire week. Reasons lie in differences between cases regarding the length of an innovation project cycle and the time of data collection (*in situ* vs. retrospective). The observations were captured by means of *in situ* protocols.

To gain a deeper understanding of innovation space development, the authors additionally visited numerous other organizations with newly designed innovation spaces in Europe and USA. These experiences and conversations held with architects

specialized in innovation space added to our knowledge regarding the topic of innovation spaces and their creation in organizations. Consequently, such data influenced our ability to make sense of the core data set and affected our understanding of the phenomenon under study.

### 3.3. Data analysis

In line with Glaser and Strauss (1967), we simultaneously collected and analysed our data in an iterative process to be able to adjust and redefine the data collection as described above. The transcriptions of formal interviews and observation protocols provide the empirical core for the data analysis. We combined data of all cases for the analysis while staying attentive to contextual differences. Our analysis overall follows the method for a systematic inductive approach to concept development as described by Gioia et al. (2013). Our approach was not purely inductive, but can rather be referred to as an act of abduction (Alvesson and Kärreman, 2007). In the first step of the data analysis, we coded the data in the form of interview transcriptions and observation protocols based on text passages that showed recurring concepts (phrases, terms, and descriptions). Wherever possible, we retained the terms and expressions used by informants (Gioia and Chittipeddi, 1991). In all other cases, we used a short descriptive phrase. Subsequently, we summarized the codes across data transcripts into a workable amount of first-order categories that display the information provided by informants. In the next step, we looked for links among first-order categories and raised the level of theoretical abstraction into second-order themes. We searched for themes and concepts that describe and explain the phenomenon under study as experienced by the informants. The analysis overall was not linear, but followed a recursive process. We stopped when we felt that we had fully grasped the theoretical relationships among categories and themes and no new data relations could be revealed. When we reached such theoretical saturation (Glaser and Strauss, 1967), we collapsed the second-order themes into even higher nodes of aggregate dimensions. To demonstrate the process of analysis, we provide an overview of each aggregated dimension in Tables A1–A3 that are included in the appendix. Transitioning from informant-centric codes and categories to researcher-centric themes and dimensions, we switched from inductive coding to an abductive approach. We constantly cycled between inductively emerging themes and theoretical concepts we had identified in the relevant literature (Alvesson and Kärreman, 2007). We thereby aimed at offering

plausible explanations being led by hunches based on our knowledge, literature and empirical data (Sætre and Van de Ven, 2021). The set of first-order categories, second-order themes, and second-order aggregated dimensions provided the basis for developing the data structure as is shown in Figure 1. Throughout the data analysis, many more themes and codes than displayed in the final data structure had emerged. However, we focused on the data that were relevant to this study and answering our research questions. The data structure summarizes our data analysis by displaying the progress from raw data to themes and concepts. In addition to conducting these steps, we employed a triangulation of category-building to ensure the trustworthiness of our data. Among the authors, we discussed coding and categorization until we agreed. In cases of disagreement, the categories

and themes were modified. The qualitative research software MAXQDA was employed to assist in data analysis.

#### 4. Findings

The collected data overall offered rich information on informants' various experiences. We learned most from successful cases and much from those that did not succeed as intended. Together, they merge into a more holistic understanding of the phenomenon of collaborative innovation space development. Due to restrictions regarding the scope of this article, we will combine the findings from all cases and present them as a single narrative that is aligned to the data structure. To support our findings, we will draw on representative quotes.

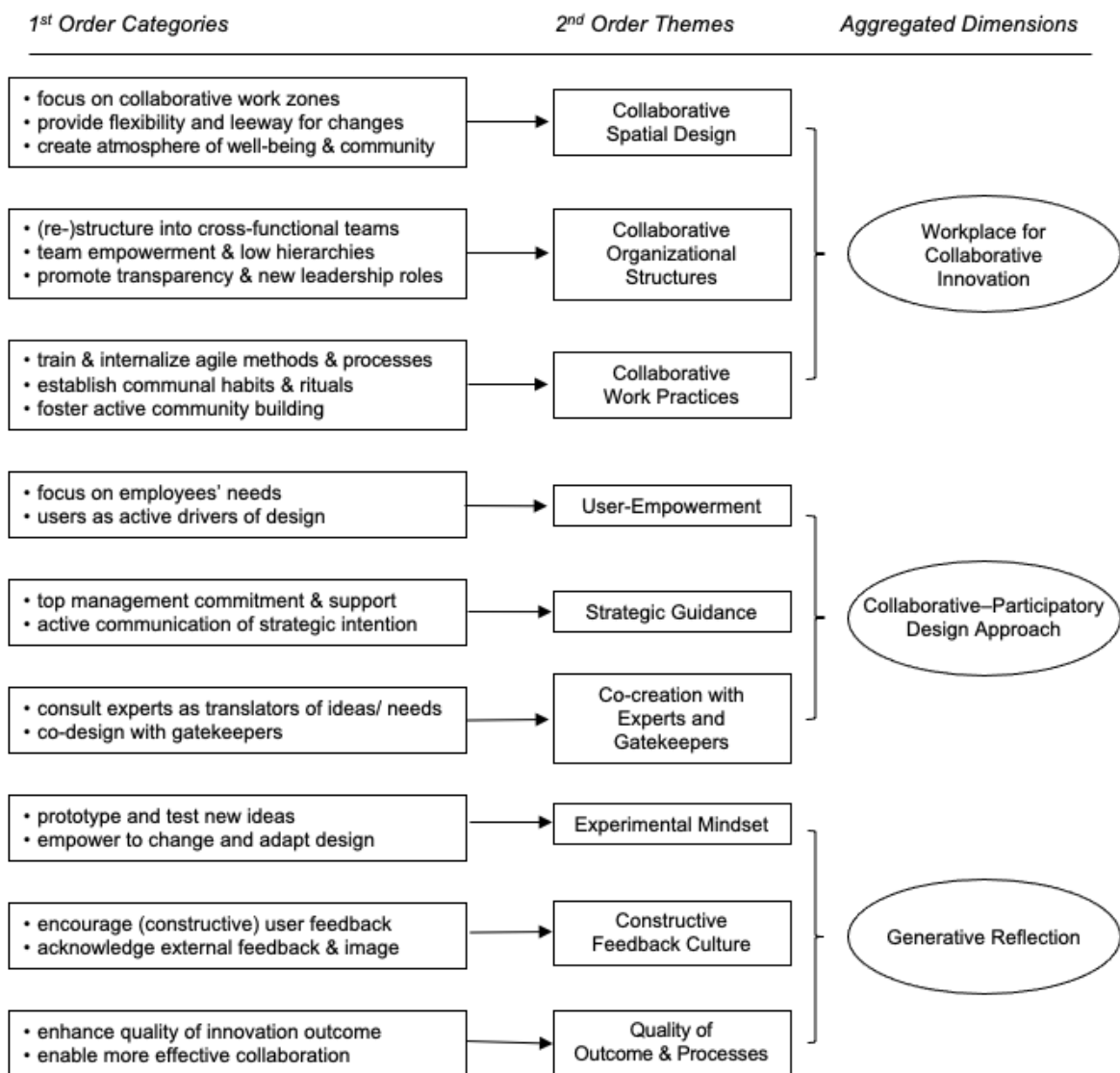


Figure 1. Data structure – Three dimensions of creating CIS.

Despite many differences concerning our informants' experiences and outcome of the different redesign initiatives, three major themes were addressed among all cases throughout the journey of innovation space development. First, the characteristics and design of the workplace itself was perceived as an important issue. However, the addressed dimensions of space (material, the social, and socio-material) and how they were prioritized differed among cases. Some focused on the physical layout only, while others appeared to be more aware of the need to address other dimensions as well. Based on our theoretical understanding, we conclude that underlying assumptions about the nature of space differed between informants (i.e., static vs. relational view). Accordingly, the chosen approach to and the process of creating the workplace – the second overarching theme in the dataset – differed as well. While some workplaces were fully designed by architects, we also found approaches that more actively involved employees and leadership and included bottom-up and/or top-down processes. Third, almost in all cases, informants deliberately shared their concerns about evaluating the effect and impact of the newly built workplace. In the remaining cases, we explicitly asked informants about their approach to evaluation and their experiences with it. The form of evaluation differed between cases. In some cases, our informants mentioned the obligation to report to higher management and the related need to measure the impact by numbers. In other cases, a rather indirect form of evaluation took place that was based on collecting feedback from users with the intention to improve their experience. We learned that despite the fact that some informants did not perceive it as formal evaluation of the new workplace and its effect, it still was an issue and took more indirect forms. Accordingly, and throughout our data analysis, we defined three overarching dimensions of developing collaborative innovation space. Each dimension entails various themes that emerged from the data and explain the lived experiences of our informants and their interpretations, leading to a more comprehensive understanding of developing collaborative innovation space. First, a workplace for collaborative innovation constitutes out of three dimensions itself: the (physical) spatial layout, organizational practices, and organizational structure, all being aligned to collaboration. Second, the workplace is created by means of a collaborative–participatory design approach with user empowerment, co-creation among all stakeholders, and strategic guidance from top management at its core. As such, it reinforces and

establishes collaboration as core practice, already in the creation process. Third, establishing the practice of generative reflection replaces the need for conventional approaches to evaluation and ensures an ongoing iteration of the workplace. It entails an experimental mindset, a constructive feedback culture and the focus on quality of the work process and outcome instead of quantity of, for example, ideas and solutions or people using the workplace. All three overarching dimensions together are relevant for the evolution of collaborative innovation space. In the following, we will describe the findings related to each dimension in more detail and zoom in on the practices of collaborative–participatory design and generative reflection as key to developing collaborative innovation space.

#### 4.1. Creating a workplace for collaborative innovation

All cases created new workplaces with putting much thought into the physical design of the space. The physical workplace is perceived to play a crucial role in the work life:

It is a decisive factor in acceleration. It is also crucial concerning motivation and affects how we work and what we do. So, yes, it has a huge influence. (B\_Int2)

It initiates change, fosters collaborative innovation, and has a strong impact on employees:

We go through a different kind of dialog with other departments. It's a different conversation culture [...] from sitting in a conventional meeting space. It affects people as soon as they enter through this door. [...] Their eyes are actually glowing when they leave. Yes, it's enthusiasm, this openness, the free space to think and look around here. (C\_Int1-2)

Such an initiative involves investments. Therefore, it is also understood as a strong, visible statement of an organization's willingness to change. As such, it becomes a source of motivation for employees. An interviewee even called it '*the most courageous in the entire [change] process*' (B\_Int2). And another interviewee of the same case remembered thinking:

'Wow! The company is really serious about it. It's a real commitment [...] And not just: *we label it "squads" and "chapters" but continue working as before at our desks. But here, they really want to change something*'. (B\_Int1)

Despite some cases initially only paying attention to the physical workplace design itself, all informants had discovered throughout their journey that other

aspects are also relevant, and previous gaps needed to be filled. What is interesting, however, is that the cases took different routes departing from various starting points.

In Cases D and E, the workplaces were designed first. Only afterwards, Case D developed an entire innovation programme, putting much effort into it. However, as users reported and our observations confirmed, the momentum of the initial opening had been lost already. In the meantime, the workplace had been used by employees for other purposes (e.g., regular meetings) and the hype of newness had already faded when the innovation programme kicked off. Furthermore, the overall organizational structures remained in place, and hindered adequate use of the space according to the innovation programme. Members of the multidisciplinary innovation teams were recruited from different departments or regular project teams. They were granted a percentage of their work time for this programme. However, over the course of the project, some team members could not fully participate due to their regular obligations. As a result, not all participants contributed as expected and the collaborative innovation process stagnated. The 'old' organizational structures hindered collaborative innovation. One of the interviewees pointed out:

It doesn't make sense to build a new workplace without changing the organizational structure. Then, you just have a pretty workplace, people sit at other places, but that's it. You just continue working the same way as before. (B\_Int2)

In Case E, we witnessed that the space remained unused. Employees appeared to be overwhelmed by its differentness and unsure how and for what reasons to use it. New work practices had not been established to enable employees to use the workplace accordingly. In Case B, on the other hand, employees had first been trained in applying the agile work method SCRUM. However, only when they found the space, the initiative gained momentum and the learned method and its underlying principles were reinforced as new work practice.

We tried it [working differently] with a pilot team and that worked. [...] we thought this could also work with more teams, but over there [at the headquarter offices] it wouldn't work. The premises are too restrictive to actually play around. Yes, we needed a new space and we found it. (B\_Int1)

In case A, informants pointed out that because the 'old world' (i.e., the former workplace) was fully erased, employees were forced to adjust to and

adopt new ways of working. Hence, in all cases, the themes organizational structures and work practices surfaced eventually and led the redesign initiative to be extended beyond the spatial design. Yet, it appeared to cost much more effort to design these aspects after the spatial layout had been set. Only in case A, we found that the scope of redesigning the entire department, besides the spatial layout, also entailed developing new organizational structures and establishing practices all at once. This allowed to make all fit together and leveraged the power of the momentum created by the first hype. Thus, it seems efficient to synchronically define all of them:

Before you design the space, you should think about how you want to work together, how is the flow of information? How does your collaboration work? [...] The architect always wanted to get started. But we said: 'No!' We first had to define how we needed to design the place, not in terms of where to position the furniture but how the furniture should work. (A\_Int1)

We further found that all three dimensions of workplaces for collaborative innovation need to embrace and be designed to mainstream collaboration. This was done in Case A. As such, the developed design goes beyond activity-based flexible offices (Zamani and Gum, 2019), agile work methods like Design Thinking or SCRUM, and more general new ways of working (Kingma, 2019). Here, the focus is on collaboration and teams instead of structures designed for individuals. And team empowerment, referred to as 'the whole team is involved in every decision to take and has the power to make decisions' (A\_Int1), becomes crucial.

'A focus on team empowerment is crucial to not fall back into old roles. Sometimes it just seems easier to make decisions alone but that's not how it's intended to be'. (A\_Int1)

The newly designed organizational structures therefore focus on enabling cross-functional collaboration.

In summary, effective workplaces for collaborative innovation are constituted by a triad of three dimensions: collaborative spatial design, including work zones, adaptability and atmosphere, collaborative organizational structures, referring to team structures, power relations and roles, and collaborative work practices, that is, establishing methods and processes, promoting a specific attitude and creating relationships. Designed as such, it takes the new workplace design beyond either the material or



the social space and leads to the creation of a socio-material workplace (Caccamo, 2020).

#### *4.2. Taking a collaborative-participatory design approach to workplace creation*

Among the cases, we found different design approaches for developing and creating the workplace. The degree of strategic guidance and user involvement varied from having architects developing the spatial concepts without involving the users, to identifying core users and making them responsible for the initiative or at least for evaluating the architects' proposals. Regarding the design approaches, the roles and levels of involvement of different stakeholders in the change process, like users, management, and design experts are interesting. Each of them shows strong expertise in different aspects that all are relevant for creating effective collaborative workplaces. The management defines the overall strategic direction, while users are true experts concerning their own needs and requirements. In Case A, both were regarded as being equally relevant:

Starting bottom-up doesn't work. It must come from top-down. [...] But the concept of the new space was developed from bottom-up. A Mr. [CEO] cannot say how the space must look, this must be done by employees and shouldn't be done from above. But defining the big topics [...] must come from the top. (A\_Int2)

Furthermore, giving employees the full responsibility for designing the new workplace was perceived as demonstrating trust in their expertise and commitment from management. In Case A, the strong support from top management was even highlighted as major success factor:

Most importantly was the support from top management. [...] I think the company never experienced a change of such extent [...] And you must say, it wouldn't have worked without management support. (A\_Int1)

We found that transparency about design decisions and their communication to the employees enables users to actively participate in the design process. This also creates a feeling of ownership which later also increases employees' confidence in using the place with all its facilities.

The space was built with our community [the users of the space]. Therefore, they don't need any

instructions or facilitation, but move around freely and naturally. (F\_Int2)

Making the strategic intentions and motivation for change explicit provides the necessary strategic guidance for a user-driven and participatory design. In cases where employees were not informed about the reasons behind the changes, they were more likely to complain about the delivered design and they did not feel heard, instead of taking initiative to change it.

In some cases, we found that different stakeholders were actively involved in the design process. This enabled them to understand reasons behind design proposals and thereby smoothed the process. Again, this helped to keep the momentum of the change initiative alive.

We had relatively little discussion about costs because the executive board was part of the user-team who developed the design. That was crucial as we could make decisions quickly. (A\_Int1)

In some cases, external design experts were involved as co-creators instead of providers of finished design solutions. We found that this helped to develop more effective solutions as they could build on or translate the employees' own ideas into feasible solutions. After all, this raised the quality of, for example, the spatial design or effectivity of the innovation programme. An often-reported difficulty in redesigning the workplace was that facility management was bound to strict requirements such as internal design rules and general lists with available furniture that limited employees' choices while they did not support or fit new ways of working. Such restrictions often seemed to hinder or slow down the creation process. In another case, work council requirements that clashed with new workplace concepts were mentioned as making the creation process more difficult as well. In Case A, an interesting solution was found together: Usually employees must agree to a changed workplace set-up by providing their signature on the new floor plan where their workplace would be positioned. In open offices, without fixed workplaces, this rule becomes obsolete. Because members of the work council were involved early in the process, they also were able to grasp and appreciate the reasons behind abolishing individual fixed workplaces. Consequently, they proposed to collect all signatures together on the overall floorplan since the new collaborative space also entailed all individual workplaces. This shows that including gatekeepers such as board members, representatives from the work council or facility management already early

in the design process as co-creators, makes innovative solutions possible and ultimately may even accelerate the process.

We summarize the emerging themes as *collaborative-participatory design approach* (Scariot et al., 2012). All parties become partners and participants in the development process with the users being the drivers of the creation process. Together, all parties co-create the space, each contributing to the design according to their expertise and skills. Involving gatekeepers is key. Providing strategic guidance is crucial and goes beyond defining strategic intention (Moultrie et al., 2007) and making it explicit, but especially calls for commitment and support from top management. Furthermore, in addition to Scariot et al. (2012), we found the advantage of tackling the design challenge from two directions: In a bottom-up process, users are empowered and in charge of the actual design. Simultaneously, in a top-down approach, top management must provide strategic guidance as guard rail for any design decisions. All of these aspects together enable collaboration and plant the seed for developing a collaborative mindset already in the creation process.

#### 4.3. A mindset shift from evaluation to generative reflection

We found that evaluation of the newly designed workplaces took place in all cases. However, approaches to and assigned value and need or intention of evaluation differed. Overall, the approach chosen for evaluation appeared to be connected to the approach chosen for initially creating the workplace. One interviewee explicitly connected their ongoing involvement of the spatial concept to the initial creation:

Co-creation is not a process carried out to end up with a cool space, but rather the starting point of a process that continues and is ongoing. [...] It doesn't stop when the doors open. (F\_Int1)

In some cases, evaluation and reporting back to higher management was requested as solid proof that the effort and investment were worth it. Or employees desired confirmation that changing their work practice, team constellation, etc., pushing many out of their comfort zone, actually made sense. Evaluation here was based on quantity of ideas and innovations generated (Case D) or based on numbers of visitors (Case C). However, our informants reported difficulties in defining meaningful measurements and overall, they felt, these measures did not help them to improve the workplace.

'We thought about what could be KPI's? But it's not so easy, because the impact is not so easy to measure. We defined the goals of the project [...] But they're difficult to measure'. (A\_Int1)

Or employees felt unrelated to the workplace and rather complained about its uncomfortable set-up instead of taking the initiative for changing it (Case E). Evaluation was commonly associated with quantitative measurements like fulfilling certain KPI's or with obligatory reporting of such measures to higher management. Instead, interestingly, in some cases, informants did not perceive the established measures as actual evaluation. However, evaluation often took more indirect forms as one interviewee described it:

I think you cannot measure the workplace in any way. So, you cannot say: *ok, these are KPI's for having a cool space. I think it's all somehow intertwined. But I feel we perform well. Because we have this new space, communication becomes much easier. We now have the right resources to communicate. We can make it more transparent. And that, I believe, as a synthesis of the arts [Gesamtkunstwerk], is also extremely helpful for improving our usual KPI's like conversion rates and the like.* (B\_Int1)

In those cases where users experienced trust and ownership of the workplace, employees reported on their intrinsic motivation for evaluating the workplace's effect and employee performance. The motivation was rooted in the need to continuously improve the space instead of proving its effect and value. We found that employees in these cases also seemed more likely to be encouraged and able to take initiative for changing and adapting the workplace according to their needs. Furthermore, not having to report numbers shifted the focus from delivering what was expected to trying out new solutions and ideas. Thus, an experimental mindset is fostered.

In several cases, structured feedback sessions were regularly organized. Here, new proposals and ideas were shared, and feedback on experiences or additional ideas were collected from users. In such sessions, users were actively encouraged and therefore more comfortable to express their feedback and constructively help the further development. Besides, external feedback and the perceived image of the company confirmed the 'success' of the change initiative:

Many people from outside approached us. I wouldn't have expected that names are given around and you are contacted to give advice. But it feels good. (A\_Int2)

In Case B, the fact that members of the executive board frequently showed the new space to external

visitors was perceived as proof of their appreciation and acknowledgement:

I'm also somehow proud, when people come here to see how we work. It apparently seems cool and that means it's good as well. (B\_Int2)

We conclude that the trust and support experienced from higher management also provided the basis for a constructive feedback culture among employees. In contrast to Case C, where the numbers of users were reported as indicator whether the workplace reached the intended effect, here, the 'quality' of the visitor (as board member) was decisive. The applied evaluation criteria overall were based on how the workplace was used and fulfilled users' needs. Thus, evaluation activities in these cases showed a strong focus on the quality of work processes and outcome while employees did not pay much attention to the quantity of ideas or solutions produced. On the contrary, they trusted in the process and the added value of the new workplace for their work life in general. Previously defined design principles and strategic intentions made explicit, provided the basis to derive qualitative criteria. In Case A, these included, for example, 'development of user-centred products', 'easier work processes', and 'better communication among employees and across functions'. Besides these general criteria, the teams defined all other performance measures themselves. Due to the established end-to-end responsibility of the teams for any products and their revenues, their validity was ensured. Furthermore, this is where the real change happened. As one informant put it:

This is a real mindset change, where we entered new worlds. It changes everything. (...) Each team defines their own KPI's and therefore feels responsible for achieving them. (A\_Int2)

These practices represent acts of reflecting on the created workplace, concerning its design and effect. Furthermore, they generate participation on the employees' and management sides, and develop an experimental mindset, thereby enabling a continuous process of creation and actual use of the designed workplace. Due to the integration of these practices in the inherent design, an evaluation in the form of an assessment becomes obsolete.

We define such approach to evaluating the workplace and its effect as practice of generative reflection. Overall, we conclude that establishing the practice of generative reflection in place of evaluation based on conventional, rather quantitative measures, appears to be key in an ongoing process of iteration. We saw that trusting employees' expertise for their own needs, and therefore granting them

a high degree of responsibility for their own work environment, not only enabled but also obliged them to care for and fulfil their needs themselves. Distributing responsibilities and generating active participation during the creation process and evaluation enable the employees (i.e., users) to enact the designed workplace for collaborative innovation. Taking a collaborative-participatory design approach and establishing a practice of generative reflection in the workplace thus empower employees to become active drivers of change. This requires leaders to trust in the competence and willingness of their employees, consequently changing the assigned role of leadership. Both may be challenging and takes time as one interviewee told us:

'You have to learn this. [...] And it has been a long process, an opening process, for us'. (A\_Int1)

As another interviewee highlighted, it first requires a mindset shift towards 'agility' compared to conventional approaches.

If you say, ok, we're now agile, I think this is only one piece of the puzzle. It's important that you also live it. [...] It's much more a mindset for me than just following through all methods and processes, like SCRUM etc. It's all about a mindset shift. You must stay open and this is what we really need for the future. Because work has changed, and especially for me as an executive, it has completely changed. (A\_Int2)

## **5. Discussion**

The aim of this article was to understand the phenomenon of creating collaborative innovation space in organizations. As a theoretical foundation, we conceptualize such space as relational and position our research in the respective stream accordingly. We conclude that collaborative innovation space as in-between space (Ollila and Yström, 2016) cannot be deliberately designed but rather evolves over time. Accordingly, and based on De Certeau's (1984) definition of space as enacted place, we differentiate between a purposefully designed workplace where collaborative innovation can or cannot happen (a workplace for collaborative innovation) and an emerging space that provides an enabling context and generates collaborative innovation. Applying a sociomaterial lens (Orlikowski and Scott, 2008), we expanded the focus beyond identifying the characteristics and elements (social and material) of a created workplace itself to the emergence of a collaborative innovation space. Hence, we searched for practices

that generate collaborative innovation space and its continuous evolvment, that is, enact the entanglement of all social, material, and human actants. From a sociomaterial perspective, this is where agency is created, instead of in either one of them. Based on the applied theoretical foundation of this article, we conclude that a sociomaterial perspective is essential to fully grasp the phenomenon of developing collaborative innovation space as an effective workplace for collaborative innovation. We empirically investigated the creation and genesis of workplaces for collaborative innovation in six organizations. As our findings show, besides the designed workplace itself, the process of its creation and the approach to its evaluation are decisive factors for generating a collaborative innovation space. We summarized the themes emerging from the data related to the creation process as collaborative-participatory design approach (Scariot et al., 2012). Those themes related to evaluating the workplace and its effect are defined as the practice of generative reflection. Both practices provide the foundation for the collaborative innovation space to emerge and its continuous adaptation. Most interestingly, we learned that mindfully designing the creation process according to a collaborative-participatory approach feeds into an intrinsic motivation of users to evaluate their workplace and its effect as means to improve and adjust it. Abolishing conventional evaluation measures based on quantitative criteria calls for and eventually leads to a mindset shift and implants core principles of collaborative innovation in the new workplace. Furthermore, applying the practice of generative reflection ensures that new ideas and a continuous development are generated. With team empowerment

being at its core, it also represents a practice of collaborative innovation itself. As a prerequisite, collaborative innovation space needs to entail the characteristics described by the concept of in-between space (Ollila and Yström, 2020). However, according to our findings, we argue that conventional measurements do not help in identifying successful cases among many that fail. More important is the fact that the created space is continuously evolving over time, or that it can be adjusted to users' needs and their changes.

Based on these findings, we propose a dynamic model for the generative design of a collaborative innovation space (see Figure 2). It resembles a continuous loop of creation and generative reflection. The model provides a theoretical contribution to the existing literature and sheds light on crucial aspects of the phenomenon of developing collaborative innovation space, that is, an effective workplace for collaborative innovation.

In contrast to existing frameworks and models for workplace design (e.g., Chan et al., 2007; Manca et al., 2018), which focus on the workplace itself and what it entails, our framework expands the focus to the emergence of collaborative innovation space and its ongoing evolvment. Yet, as part of the model, the dimensions of a collaborative workplace itself have been identified as well. They show parallels to Chan et al. (2007) and the elaborated Manca et al.'s (2018) model. However, in contrast to these, we did not find that technology played such crucial role. Rather, it was perceived as integrated feature of all three dimensions. Secondly, we chose more general dimensions to include the various forms the actual spatial characteristics can take according to specific intentions.

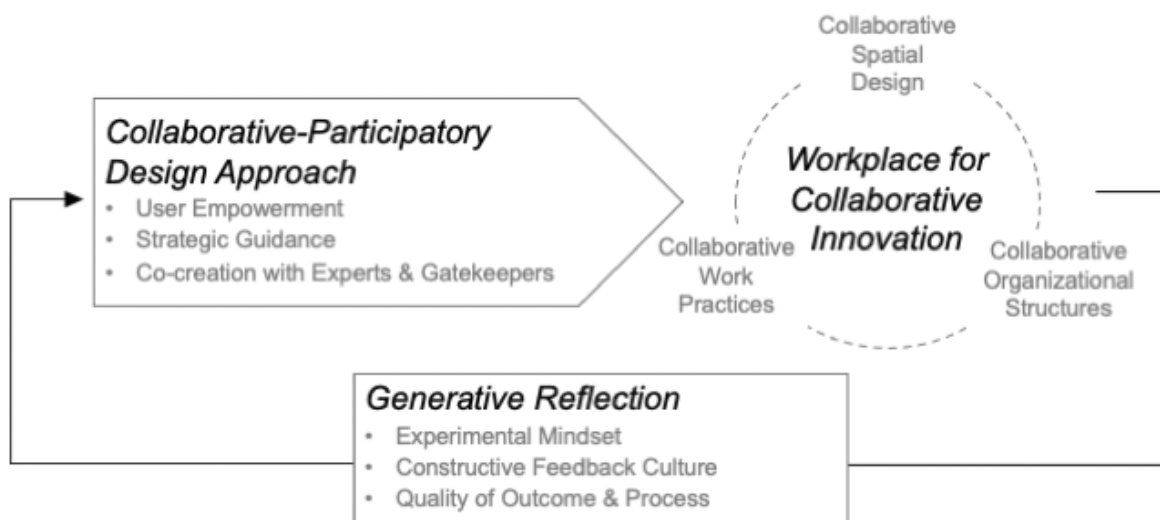


Figure 2. Model of the generative design of collaborative innovation space.



As is represented by the proposed model, the generative design of a collaborative innovation space entails three dimensions: designing a workplace for collaborative innovation, taking a collaborative–participatory design approach, and establishing a practice of generative reflection. The developed model displays the relationship between them. A prerequisite for the emergence of a collaborative innovation space is a workplace for collaborative innovation consisting out of three dimensions itself: spatial design, organizational structures, and work practice. Each of these must be designed with a clear focus on collaboration. Together, all three are in a dynamic relationship with one another. Hence, changing one affects the others and calls for alignment. Creating collaborative organizational structures defines a focus on collaboration. Together with establishing collaborative work practices, it furthermore enables employees to use and enact a designed workplace as space (De Certeau, 1984). As such, social and material space is created, resulting in a sociomaterial workplace for collaborative innovation. According to Caccamo, this is a crucial prerequisite for collaborative innovation.

Taking a collaborative–participatory design approach (Scariot et al., 2012) empowers users to become designers, guided by strategy and with experts and gatekeepers acting as co-creators. Generally, the creation of workplaces is an act of placemaking which includes someone defining its meaning (i.e., intention) (Berti et al., 2018). In traditional approaches, these are architects and interior designers. In the generative design of a collaborative innovation space, users (i.e., employees) take a hybrid role as place- and space-makers. Or, in line with De Certeau's (1984) metaphor of defining space as a spoken word, users act as authors and readers. They first create the place and then enact it. Strong strategic guidance serves as guard rail ensuring that the design of the workplace is aligned not only to employees' needs but also to management's strategic intentions. Both, the workplace for collaborative innovation and the design approach, can be deliberately designed. Yet, as sociomaterial (Caccamo, 2020) and recursive space (Hernes et al., 2006), the ongoing development needs to be considered. The practice of generative reflection on the designed workplace and its effects ensures an iterative process of evolvement. Such practice is established by fostering an experimental mindset and embracing a constructive feedback culture. Furthermore, any evaluation of the designed workplace refers to the quality of outcomes and processes. This contrasts with conventional approaches to evaluating spatial impact, which are often based on quantitative KPIs. In line with the design perspective

on organizing for collaborative innovation (Ollila and Yström, 2016), it sets the constant generation of organizational artefacts (i.e., the workplace and its facilities) in motion. We argue that the practice of generative reflection is key to creating a collaborative innovation space and therefore represents a critical function in enacting its emergence as sociomaterial assemblage (Orlikowski and Scott, 2008).

In sum, our model displays how the initial approach leads to designing a collaborative workplace. Applying the practice of generative reflection of the created workplace instead of conventional evaluation based on mostly quantitative measures feeds into continuously recreating and redesigning the workplace. Ultimately, this leads to the emergence of collaborative innovation space. Such a collaborative–participatory design approach provides the basis and facilitates as well as reinforces establishing a practice of generative reflection which itself represents a practice of collaborative innovation. Thus, a generative design of creating a collaborative innovation space already represents an act of collaborative innovation and integrates the key principles of collaborative innovation in the DNA of the emerging collaborative innovation space. Overall, it supports embracing collaborative innovation at all levels and thereby creates and sustains a supportive context for CI. Establishing the practice of generative reflection reinforces a mindset shift towards agility with collaborative innovation at its core.

This article contributes to theory, as it provides a unique view on the phenomenon of collaborative innovation space and its emergence that links and builds on existing theory about collaborative innovation and space in organizations. We conceptualize collaborative innovation space as sociomaterial assemblage (Orlikowski and Scott, 2008) and thereby draw attention to the equally important roles of users of a designed workplace, the material and social elements, and the practices involved in developing collaborative innovation space. In line with the design perspective on organizing for collaborative innovation (Ollila and Yström, 2020), we investigated the emergence of a collaborative innovation space. And, applying a performative view (Barad, 2003) on its development, we aimed at identifying the practices that trigger and sustain it. In sum, our contribution to the existing theory is threefold:

First, we draw attention to the crucial role of users within a collaborative innovation space development, that is, establishing the necessary practices for its emergence. In line with De Certeau's (1984) understanding, we demonstrate how users need to take an active role, from being place-makers to becoming space-makers. Thereby, they repeatedly

(re-)produce and enact the collaborative innovation space (Lefebvre, 1991). Simultaneously, the equally important role of social and material elements is also highlighted and demonstrated by conceptualizing the collaborative innovation space as sociomaterial assemblage (Orlikowski and Scott, 2008).

Second, adding a sociomaterial perspective on organizational space to the existing academic debate enhances our understanding of innovation space development. This makes the difference between a workplace designed for collaborative innovation and a collaborative innovation space explicit. In contrast to existing frameworks, our model goes beyond defining characteristics and spatial dimensions. Its focus is rather on the emergence and evolution over time, including the initial creation, evaluation, and continuous development as prerequisite for collaborative innovation space to emerge and sustain. Furthermore, the performative nature (Barad, 2003) of a collaborative innovation space is highlighted, bringing clarity to the misunderstanding that setting up a collaborative workplace or introducing collaborative practices is sufficient for creating a fruitful context for collaborative innovation. It shifts the focus to the enactment of the emergence of a collaborative innovation space and away from defining only the workplace itself.

Third, expanding the view on the development of collaborative innovation space to designing an approach for a collaborative creation and the necessary mindset shift regarding the evaluation (incl. its continuous recreation) advances our understanding of organizing for collaborative innovation. Our model of a generative design of collaborative innovation space complies with the five design principles of organizing for collaborative innovation based on a design perspective (Ollila and Yström, 2016). Furthermore, it expands the concept of in-between space (Ollila and Yström, 2020) as a fruitful context where collaborative innovation happens by detailing the practices involved in its creation and identifying necessary ingredients that enable its emergence. Furthermore, it links the theoretical concept to the creation of a socio-material space in practice. Our empirical study shows how the generative creation of a collaborative innovation space can be set in motion. The emerging space fulfils all postulated characteristics by Ollila and Yström (2020), as it allows all users to actively form it (multiplex). It is in-becoming as it is constantly emerging through its active use and its multidimensional set-up. It is continuously reconfigured (recursive) and translative as it fosters and reinforces a common mindset of agility with collaborative innovation at its core.

Based on the conceptual understanding and empirical study, we conclude that collaborative innovation

space cannot be deliberately designed. However, knowing the mechanisms for transforming the designed workplace into a generative space paves the road towards managerial action. Hence, adequately designing the spatial ingredients (the workplace for collaborative innovation), the process of creation (collaborative-participatory design approach), and establishing a new evaluation practice (generative reflection) provide a fruitful context for collaborative innovation space to emerge.

## 6. Managerial implications

Especially in these times when organizations think and discuss how to provide a meaningful environment for their employees to 'go back to the office', collaborative physical workplaces are a powerful tool for fostering collaboration and meaning in an organization. However, workplaces for collaborative innovation need to go beyond the physical design of a place. Organizational structures and work practices have to be considered and adjusted accordingly. They need to be (re-)designed agilely with a focus on collaboration. The creation process is crucial and needs to be thoughtfully designed, involving experts, gatekeepers, and users alike. Employees are experts about their needs to do a good job. They have learnt over the last years what works for them and what not. They need to see the purpose and meaning in their organization's physical setting in order to be motivated to come to the office. As users of the workplace, they need to be empowered by the organization to become active drivers in the design process. Managers and leaders are experts concerning the strategy and the goals of the organization. They should define and communicate the strategic intentions behind the initiative. Experts like design professionals and architects or agile coaches and SCRUM masters who know how strategic goals can be reached through transformation processes and by applying innovative methods, need to provide their expertise on the generic design. Other crucial parties as, for example, work council and facility management, who are often regarded as gatekeepers, need to be included in the design process early on. Only if everyone understands the underlying needs and intentions, shared solutions can be found. Making strategic intentions explicit and transparent is therefore the prerequisite and first step for all parties to co-create a new workplace that may evolve into collaborative innovation space. Besides providing a direction for any design decisions, this also enables the evaluation of the effect such (re-)design initiative will have. Last but not least, a mindset shift concerning evaluating the effect of such workplaces is needed. Encouraging employees to take the initiative and

responsibility for modifying the workplace according to their needs and requirements fosters an experimental mindset. Actively collecting feedback and ideas from all employees regularly helps to establish a constructive feedback culture. Instead of measuring the success on conventional terms and KPIs, the evaluation should focus on the quality of outcomes and processes (e.g., user-centred product development, enhanced transparency, and easier communication). All together ensure the continuous improvement of the designed workplace and its outcome. Most importantly, it allows the adaptation to changes regarding employees' or strategic needs. The latter is crucial, especially in recent times. Overall, strong commitment, trust, and support by top management are necessary to facilitate and accelerate the creation of a collaborative innovation space.

## 7. Limitations and future research

There are some limitations to our research. First, the data sample is limited. Lead users were selected as interviewees and provided the voice of other users as well. However, opinions, perceptions, and experiences are diverse and extending the data sample to more general users may have brought additional insights. Second, data collection started before the global spread of COVID-19. Since the outbreak of the pandemic, the nature of and perception towards the workplace and its use have dramatically changed. It would be intriguing to return to the cases studied to discover how the ongoing process of re-creating collaborative innovation space continued (or not) given the pandemic circumstances with most employees working remotely and the prevalent restrictions especially affecting collaborative activities. With a future of hybrid working models, the design of collaborative innovation space will have to be adjusted to incorporate work-from-home aspects as well as integration of machine-supported processes and instruments. Future research may also focus on the question of whether there are specific types of workplaces for collaborative innovation with recurrent characteristics that can be categorized accordingly. Comparing the workplaces of a representative sample based on the underlying strategic intentions and derived design principles may shed light on inherent manifestations of collaborative innovation within the designed new worlds.

### Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

## Acknowledgement

Open Access funding enabled and organized by Projekt DEAL.

## REFERENCES

- Alvesson, M. and Kärreman, D. (2007) Constructing mystery: empirical matters in theory development. *Academy of Management Review*, **32**, 4, 1265–1281.
- Barad, K. (2003) Posthumanist performativity: toward an understanding of how matter comes to matter. *Signs: Journal of Women in Culture and Society*, **28**, 3, 801–831.
- Berti, M., Simpson, A.V., and Clegg, S.R. (2018) Making a place out of space: The social imaginaries and realities of a business school as a designed space. *Management Learning*, **49**, 2, 168–186.
- Boutellier, R., Ullman, F., Schreiber, J., and Naef, R. (2008) Impact of office layout on communication in a science-driven business. *R&D Management*, **38**, 4, 372–391.
- Bucher, S. and Langley, A. (2016) The interplay of reflective and experimental spaces in interrupting and reorienting routine dynamics. *Organization Science*, **27**, 3, 594–613.
- Caccamo, M. (2020) Leveraging innovation spaces to foster collaborative innovation. *Creativity and Innovation Management*, **29**, 1, 178–191.
- Callon, M. (1986) The sociology of an actor-network: the case of the electric vehicle. In Callon, M., Rip, A., and Law, J. (eds.), *Mapping the Dynamics of Science and Technology*. London: Palgrave Macmillan. pp. 19–34.
- Chan, J.K., Beckman, S.L., and Lawrence, P.G. (2007) Workplace design: a new managerial imperative. *California Management Review*, **49**, 2, 6–22.
- Charmaz, K. (2014) *Constructing Grounded Theory*. London: Sage.
- Charmaz, K. and Thornberg, R. (2021) The pursuit of quality in grounded theory. *Qualitative Research in Psychology*, **18**, 3, 305–327.
- Ciaramella, A., Rossi-Lamastra, C., Rovelli, P., and Tagliaro, C. (2018) Who talks about collaborative spaces, how, and why. *CERN IdeaSquare Journal of Experimental Innovation*, **2**, 1, 3–7.
- Cirella, S. and Yström, A. (2018) Creativity and science parks: more than just a physical platform? *CERN IdeaSquare Journal of Experimental Innovation*, **2**, 1, 8–13.
- Clegg, S. and Kornberger, M. (eds). (2006) *Space, organizations and management theory*. Oslo: Liber.
- Crawford, B., Chiles, T.H., and Elias, S.R. (2021) Long interviews in organizational research: unleashing the power of “show and tell”. *Journal of Management Inquiry*, **30**, 3, 331–346.
- Dale, K. (2005) Building a social materiality: spatial and embodied politics in organizational control. *Asian Journal of Management Research*, **12**, 5, 649–678.
- Dale, K. and Burrell, G. (2008) Disturbing structures: oscillations in time and place. In: *EIASM Workshop*

- on Architecture and Social Architecture: Disturbing Notions of Structure in Organisations (Brussels).
- De Certeau, M.D. (1984) *The Practice of Everyday Life*. Berkeley, CA: The University of California Press.
- Deb, S. and Sinha, S. (2011) Spatial influence on organizational creativity: through syntactic analysis of space. *Asian Journal of Management Research*, **1**, 114–129.
- Delgado, L., Galvez, D., Hassan, A., Palominos, P., and Morel, L. (2020) Innovation spaces in universities: support for collaborative learning. *Journal of Innovation Economics & Management*, **3**, 1, 123–153.
- Dul, J., Ceylan, C., and Jaspers, F. (2011) Knowledge workers' creativity and the role of the physical work environment. *Human Resource Management*, **50**, 6, 715–734.
- Elsbach, K.D. and Pratt, M.G. (2007) 4 the physical environment in organizations. *Academy of Management Annals*, **1**, 1, 181–224.
- Gibbert, M., Hoegl, M., and Valikangas, L. (2014) Introduction to the special issue: financial resource constraints and innovation. *Journal of Product Innovation Management*, **31**, 2, 197–201.
- Gioia, D.A. and Chittipeddi, K. (1991) Sensemaking and sensegiving in strategic change initiation. *Strategic Management Journal*, **12**, 6, 433–448.
- Gioia, D.A., Corley, K.G., and Hamilton, A.L. (2013) Seeking qualitative rigor in inductive research: notes on the Gioia methodology. *Organizational Research Methods*, **16**, 1, 15–31.
- Glaser, B.G. and Strauss, A.L. (1967) *The Discovery of Grounded Theory: Strategies for Qualitative Research*. New York: Aldine de Gruyter.
- Hatch, M.J. (1993) The dynamics of organizational culture. *Academy of Management Review*, **18**, 4, 657–693.
- Hernes, T., Bakken, T., and Olsen, P.I. (2006) Spaces as process: Developing a recursive perspective on organisational space. *Advances in Organization Studies*, **17**, 44.
- Introna, L.D. (2007) Towards a post-human intra-actional account of sociomaterial agency (and morality). *Paper prepared for the moral agency and technical artefacts workshop*. The Hague: Netherlands Institute for Advanced Study.
- Kingma, S. (2019) New ways of working (NWW): work space and cultural change in virtualizing organizations. *Culture and Organization*, **25**, 5, 383–406.
- Kornberger, M. and Clegg, S.R. (2004) Bringing space back in: organizing the generative building. *Organization Studies*, **25**, 7, 1095–1114.
- Kristensen, T. (2004) The physical context of creativity. *Creativity and Innovation Management*, **13**, 89–96.
- Latour, B. (1987) *Science in Action*. Boston, MA: Harvard University Press.
- Latour, B. (2005) *Reassembling the Social: An Introduction to Actor-Network-Theory*. Oxford: Oxford University Press.
- Lefebvre, H. (1991) *The Production of Space* (D. Nicholson-Smith, Trans.). Cambridge, MA: Blackwell.
- Lewis, M. and Moultrie, J. (2005) The organizational innovation laboratory. *Creativity and Innovation Management*, **14**, 1, 73–83.
- Magadley, W. and Birdi, K. (2009) Innovation labs: an examination into the use of physical spaces to enhance organizational creativity. *Creativity and Innovation Management*, **18**, 4, 315–325.
- Manca, C., Grijalvo, M., Palacios, M., and Kaulio, M. (2018) Collaborative workplaces for innovation in service companies: barriers and enablers for supporting new ways of working. *Service Business*, **12**, 3, 525–550.
- van Marrewijk, A.H. and Van den Ende, L. (2018) Changing academic work places: the introduction of open-plan offices in universities. *Journal of Organizational Change Management*, **31**, 1119–1137.
- Mašlikowska, M. and Gibbert, M. (2019) The relationship between working spaces and organizational cultures. *Facilities*, **37**, 1153–1165.
- McElroy, J.C. and Morrow, P.C. (2010) Employee reactions to office redesign: a naturally occurring quasi-field experiment in a multi-generational setting. *Human Relations*, **63**, 5, 609–636.
- Meinel, M., Maier, L., Wagner, T., and Voigt, K.I. (2017) Designing creativity-enhancing workspaces: a critical look at empirical evidence. *Journal of Technology and Innovation Management*, **1**, 1. <https://ssrn.com/abstract=3051058>
- Miles, M.B. and Huberman, A.M. (1994) *Qualitative Data Analysis: An Expanded Sourcebook*. Sage.
- Moultrie, J., Nilsson, M., Dissel, M., Haner, U., Janssen, S., and Van der Lugt, R. (2007) Innovation spaces: towards a framework for understanding the role of the physical environment in innovation. *Creativity and Innovation Management*, **16**, 1, 53–65.
- Oksanen, K. and Stähle, P. (2013) Physical environment as a source for innovation: investigating the attributes of innovative space. *Journal of Knowledge Management*, **17**, 815–827.
- Ollila, S. and Yström, A. (2016) Exploring design principles of organizing for collaborative innovation: the case of an open innovation initiative. *Creativity and Innovation Management*, **25**, 3, 363–377.
- Ollila, S. and Yström, A. (2020) 18 open laboratories as “in-between spaces”. *Innovating in the Open Lab: The New Potential for Interactive Value Creation Across Organizational Boundaries*, **1**, 203.
- Orlikowski, W.J. (2010) The sociomateriality of organisational life: considering technology in management research. *Cambridge Journal of Economics*, **34**, 1, 125–141.
- Orlikowski, W.J. and Scott, S.V. (2008) Sociomateriality: challenging the separation of technology, work and organization. *Academy of Management Annals*, **2**, 1, 433–474.
- Osorio, F., Dupont, L., Camargo, M., Palominos, P., Peña, J.I., and Alfaro, M. (2019) Design and management of innovation laboratories: toward a performance assessment tool. *Creativity and Innovation Management*, **28**, 1, 82–100.
- Peltonen, T. (2011) Multiple architectures and the production of organizational space in a Finnish university. *Journal of Organizational Change Management*, **24**, 806–821.



- Petruaitiene, V., Korba, P., Nenonen, S., Jylhä, T., and Junnila, S. (2018) From walls to experience—servitization of workplaces. *Facilities*, **36**, 525–544.
- Sætre, A.S. and Van de Ven, A. (2021) Generating theory by abduction. *Academy of Management Review*, **46**, 4, 684–701.
- Scariot, C.A., Heemann, A., and Padovani, S. (2012) Understanding the collaborative-participatory design. *Work*, **41**, Supplement 1, 2701–2705.
- Schein, E.H. (1990) Organizational culture. *American Psychological Association*, **45**, 2, 105–125.
- Taylor, S. and Spicer, A. (2007) Time for space: a narrative review of research on organizational spaces. *International Journal of Management Reviews*, **9**, 4, 325–346.
- Thoring, K., Mueller, R.M., Badke-Schaub, P., and Desmet, P. (2019) An inventory of creative spaces: innovative organizations and their workspace. *Proceedings of the Design Society: International Conference on Engineering Design*, **1**, 1, 39–48.
- Thoring, K., Mueller, R.M., Luippold, C., Desmet, P., and Badke-Schaub, P. (2018) Co-creating an idea lab: lessons learned from a longitudinal case study. *CERN IdeaSquare Journal of Experimental Innovation*, **2**, 1, 30–37.
- Tremblay, D.G. and Scaillez, A. (2021) Fab labs: a place for innovation, collaboration, and creation? In: *Encyclopedia of Organizational Knowledge, Administration, and Technology*. IGI Global. pp. 317–326.
- Waber, B., Magnolfi, J., and Lindsay, G. (2014) Workspaces that move people. *Harvard Business Review*, **92**, 10, 68–77, 121. PMID: 25509577.
- Wagner, J. and Watch, D. (2017) Innovation spaces: the new Design of Work. In: Anne, T. and Robert, M. (eds), *Bass Initiative on Innovation and Placemaking*. iBrookings.
- Weinberg, U., Nicolai, C., Hüsam, D., Panayotova, D., and Klooker, M. (2014) The impact of space on innovation teams. In: *Design Management in an Era of Disruption*. London: DMI (Design Management Institute). pp. 902–923.
- Yström, A. and Agogué, M. (2020) Exploring practices in collaborative innovation: unpacking dynamics, relations, and enactment in in-between spaces. *Creativity and Innovation Management*, **29**, 1, 141–145.
- Zamani, Z., and Gum, D.. (2019) Activity-based flexible office: exploring the fit between physical environment qualities and user needs impacting satisfaction, communication, collaboration and productivity. *Journal of Corporate Real Estate*, **21**, 3, 234–253.

**Marie Klooker** is a PhD candidate at the faculty of economics and social sciences of Potsdam University. She studied Cultural Studies in Maastricht, Madrid and Berlin, and Design Thinking in Potsdam. Within her PhD, she explores the domain of strategic design of workspaces for collaborative innovation. She strongly believes in user-centred design and that the workspace may have a major impact if designed accordingly. Marie held a scholarship from the HPI-Stanford Design Thinking Research Program and was part of an interdisciplinary research team at HPI School of Design Thinking. Since 2014, she teaches Design Thinking to students and professionals and works as innovation consultant with a focus on new work and strategic design of innovation work spaces.

**Katharina Hölzle** is professor and director of the Institute of Human Factors and Technology Management IAT at the University of Stuttgart and director of the Fraunhofer Institute for Industrial Engineering IAO. She is former Editor-in-Chief of Creativity and Innovation Management (Wiley) and deputy chair of the expert commission for research and innovation policy advising the German government. Her research areas are disruptive technologies and innovation, (digital) transformation of the organization, human factors, and entrepreneurship. She has published in multiple leading technology and innovation management journals including *Journal of Product Innovation Management*, *Creativity and Innovation Management*, *R&D Management*.

APPENDIX A

**Table A1.** Aggregated dimension – Workplace for collaborative innovation

2nd order themes	1st order categories	Exemplary 1st order codes
Collaborative spatial design	Multi-space with a focus on collaborative work zones and less space for individual work	<ul style="list-style-type: none"> <li>• Multi-space – collaboration zones, communication areas, focus space, meeting space, individual spaces, quiet space, UX-Lab or prototyping area</li> <li>• UX Lab/Prototyping ensures that practical work &amp; staying closer to the products.</li> <li>• Spaces for <i>ad hoc</i> meetings reduce disturbances in the open office</li> <li>• Positive experience of increased collaborative space helped to accept change</li> <li>• Digital collaboration enabled by mobile equipment and clean-desk policy and advanced technology</li> <li>• Open layout and proximity of team members facilitate spontaneous collaboration</li> <li>• Be able to move everything where needed.</li> <li>• Adjusting space independent from facility management</li> <li>• Encouraging all employees to take responsibility for actively changing and improving the space where needed</li> </ul>
	High degree of flexibility and leeway incorporated within the spatial set up	<ul style="list-style-type: none"> <li>• Provide opportunities for leisure activities and recreation – such playful aspects</li> <li>• Include places for informal exchange such as kitchen and coffee areas</li> <li>• ‘If you feel comfortable and enjoy your workspace, then you also stay an extra hour’</li> </ul>
	Creation of atmosphere of well-being and community	<ul style="list-style-type: none"> <li>• Team members cover different skills and expertise – multidisciplinary perspective</li> <li>• Facilitators support – identify missing functions and connect suitable colleagues</li> <li>• Teams are defined by the main function or focus of products and services that are developed (vs. functional department)</li> </ul>
Collaborative organizational structures	(Re-) structuring in cross-functional teams	<ul style="list-style-type: none"> <li>• Strong focus on team empowerment</li> <li>• End-to-end responsibility of teams – all team members are responsible for the project/product success</li> <li>• Each team defines own mission and KPI’s + how to get there</li> <li>• No business owners based on functional excellence or expertise</li> <li>• Leadership role as facilitator or coach</li> </ul>
	Turn towards team-empowerment and low hierarchies	
	Promotion of increased transparency and new leadership role	
Collaborative work practices	Train and internalize agile methods and processes	<ul style="list-style-type: none"> <li>• Transparency is important to enable teams to take responsibility</li> <li>• Enable all employees to apply collaborative methods (e.g., SCRUM, DT)</li> <li>• New work practices – increased insecurity about daily work routines</li> <li>• Good process facilitation is key to establish changed work practices</li> </ul>
	Establish communal habits and rituals	<ul style="list-style-type: none"> <li>• Opportunities for spontaneous exchange with colleagues beyond one’s own team (e.g., collective meals, movement through space)</li> <li>• Enhanced transparency of projects and processes enables to contribute to a project and give feedback</li> <li>• ‘Being always approachable made it easy to connect to each other’</li> </ul>
	Foster active community building	<ul style="list-style-type: none"> <li>• Events as opportunities for knowledge exchange</li> <li>• Community platform</li> <li>• Regular events to present/test prototypes and collect feedback</li> </ul>

**Table A2.** Aggregated dimension – Collaborative-participatory design approach

2nd order themes	1st order categories	Exemplary 1st order codes
User empowerment	Focus on employees' needs	<ul style="list-style-type: none"> <li>• Employees participate as experts of their needs</li> <li>• Collect ideas and feedback from employees – 'making them feel heard'</li> <li>• Involve further employees/power of 'grey eminences' as multipliers</li> </ul>
	Users as active drivers of design	<ul style="list-style-type: none"> <li>• Users become lead designers – ownership of space &amp; confidence</li> <li>• Bottom-up development of spatial concept – user-driven design</li> <li>• User-team in charge of designing the process for creation</li> </ul>
Strategic guidance	Top management commitment & support	<ul style="list-style-type: none"> <li>• Top-down initiative necessary – 'starting bottom-up does not work'</li> <li>• Top management support as key to success of extensive changes</li> <li>• Trust in employees – motivates to participate</li> </ul>
	Active communication of strategic intention	<ul style="list-style-type: none"> <li>• Transparency of underlying concept enables user participation</li> <li>• Making strategic intention and motivation explicit provides guidance</li> <li>• Actively communicate underlying intentions/reasons why to all</li> </ul>
Co-creation with experts and gatekeepers	Consult experts as translators of ideas/needs	<ul style="list-style-type: none"> <li>• Experts advise on effective solutions for innovation programme</li> <li>• Architects translate ideas into feasible solutions</li> <li>• Agile coaches provide expertise on innovation methods</li> </ul>
	Co-design with gatekeepers	<ul style="list-style-type: none"> <li>• Involve powerful decision-makers – little discussion and acceleration</li> <li>• Enable facility management to understand underlying concept</li> <li>• Ideate with gatekeepers for new solutions to address users' needs</li> </ul>

**Table A3.** Aggregated dimension – Generative reflection

2nd order themes	1st order categories	Exemplary 1st order codes
Experimental mindset	Promote to prototype and test new ideas  Empower all employees to change and adapt design	<ul style="list-style-type: none"> <li>• Trying out what works well/trial &amp; error</li> <li>• Encouraging ongoing process of development/iterative process</li> <li>• 'If it does not work stop it' – not all good ideas work well</li> <li>• Co-creation with users leads to continuous and ongoing process</li> <li>• Trust in employees enhances motivation to take initiative for changes</li> <li>• Lower barrier for proposing changes</li> </ul>
Constructive feedback culture	Encourage (constructive) user feedback  Acknowledge external feedback and image	<ul style="list-style-type: none"> <li>• Organized feedback sessions and collect ideas from employees</li> <li>• Expose ideas and invite colleagues to give feedback</li> <li>• Change ideas according to feedback – demonstrates that users are taken seriously</li> <li>• Being approached from external people asking for advice</li> <li>• Invite visitors to space for a tour through the space</li> <li>• Being proud of high interest in the space and change process</li> </ul>
Quality of outcome and processes	Enhance quality of innovation outcome  Enable more effective collaboration	<ul style="list-style-type: none"> <li>• User-centred products &amp; services</li> <li>• More innovative solutions</li> <li>• Cross-functional team ensures feasibility of innovative solutions</li> <li>• Easier communication &amp; exchange</li> <li>• Accelerate product development – shorter cycles/increase iterations</li> <li>• Increase informal exchange with colleagues outside of own team</li> </ul>