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ORIGINAL ARTICLE

Co-creating an idea lab: lessons learned from a longitudinal case study

Katja Thoring,[1,2*] Roland M. Mueller,[3] Carmen Luippold,[4] Pieter Desmet,[1] and Petra Badke-Schaub[1]

[1] TU Delft, The Netherlands; [2] Anhalt University of Applied Sciences, Germany;
[3] Berlin School of Economics and Law, Germany;
[4] Bauhaus University, Weimar, Germany
*Corresponding author: katja@thoring.com

ABSTRACT

This article presents a longitudinal case study of the development process of an idea lab—from initial planning to final implementation and usage. The research approach comprised various methods, including a user study with cultural probes and a visual canvas, a focus group co-creation workshop, and a follow-up evaluation, two years after the space's implementation. We identified 15 relevant themes and 39 spatial characteristics that constitute the individual users' preferences, as well as several insights from a corporate point of view. Our gained insights on the role of the physical workspace extend the current research on idea labs. Furthermore, our findings corroborate the suggestions from related literature in terms of an idea lab's capability to facilitate external input, experimentation, and employees' autonomy. The presented co-creation approach and the developed spatial recommendations can be adapted for other contexts and act as guidelines for others who want to develop creative spaces.

Keywords: Creative space; idea lab; longitudinal case study; co-creation; cultural probes; focus group workshop; requirements analysis; visual canvas.

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INTRODUCTION

When the German city of Kassel and the local university were planning a complex of innovation spaces, two of this article's authors were involved in the design process as external consultants, assessing the requirements for particular sections. The building complex—comprising over 6,000 square metres of creative space—was devised as a meeting place and innovation centre for students, start-ups, regional companies, and university spin-offs. It includes several co-working spaces, ateliers and laboratories, traditional offices, meeting rooms, incubators, a canteen, and an idea lab. The idea lab is the focus of this study. Its aim was to provide a large, flexible space for up to 50 people, to be used as an ideation or co-creation lab or to house special events such as talks or meet-ups. Fig. 1 shows a floor plan of the entire building and the location of the idea lab within this complex.

Consistently with the concept of 'open innovation' (Chesbrough, 2003; Von Hippel, 2010) idea labs are being established in many institutions, either affiliated with universities or as private enterprises, to promote the involvement of external actors and sources into the innovation process and thus benefit from diversified inputs. However, the research about the actual spatial requirements of such spaces is still in its beginnings. Moreover, there is limited research on the spatial planning processes of idea labs. Consequently, in this study, we address the following research questions:

1. What are the spatial requirements for an idea lab?
2. How can we facilitate the planning and design process for an idea lab?

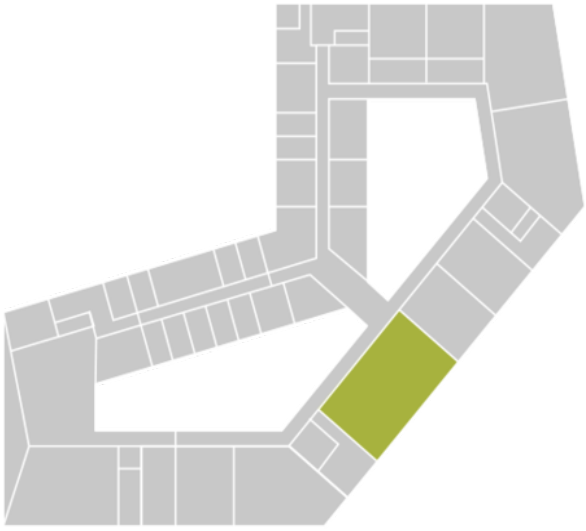

Fig. 1. Floor plan of the building, indicating the location of the idea lab within the innovation centre (image used with permission from Science Park Kassel).

THEORETICAL BACKGROUND

Lahr (2013) introduced the term 'creative lab' for a space that would provide a meeting environment for internal and external actors. According to his literature search, the term 'idea lab' was used less often but described the same concept.

In contrast to incubators, creative labs are not permanently rented to start-ups, but rather used as encounter spaces to conduct workshops and idea generation sessions for a short period of time. Schmidt and Brinks (2017) discussed the emergence of new spatial settings for innovation that they summarized under the term 'open creative labs'. They distinguished between four lab types: (1) experimentation labs (grassroots initiatives run by interest groups or non-profit associations), (2) working labs (organized as private enterprises that primarily attract freelancers, micro-entrepreneurs, and start-ups), (3) open innovation labs (initiated by firms, academic institutions, or research and development organisations with the aim to enrich internal processes with external knowledge), and (4) investor-driven labs (e.g. incubators). According to Narayanan (2017, p. 27) "idea labs are deliberately established locations, where individuals and teams with new product ideas can work together for concentrated bursts of time, sharpening and focusing their product concept, embedding the voice of the customer in product design and charting alternative progression paths for their ideas to be developed into potentially profitable offerings by units of the business that will nurture them. […] In addition, they offer technology tools, bring together people with diverse perspectives and provide links to information networks that facilitate the migration of product ideas".

The idea lab that is subject of our study fits well to these provided definitions. It was initially meant as an encounter space for students, university's staff, and external companies to work together in workshop settings. Following the categorization suggested by Schmidt and Brinks (2017), it can be defined as an 'open innovation lab'.

In order to better understand the concept of idea labs, we conducted a systematic literature review within the Scopus database, using both the search terms 'idea lab' and 'innovation lab'. We filtered the resulting 137 sources according to abstract-based relevance, and we expanded them using co-citation analysis. The resulting 13 sources identified as relevant for the topic are discussed in the next section.

Eight papers focused on different aspects of creative labs. Berger and Brem (2016) discussed 'innovation hubs' in the Silicon Valley, such as Xerox PARC, and stressed the importance of installing such labs at a remote location—away from the headquarters and day-to-day work life—in order for the employees to freely develop their ideas without interference from the company's management. Schmidt, Brinks and Brinkhoff (2015) studied innovation labs in Berlin, Germany. They distinguished between different objectives of a creative lab (purposes, target group, operators, and innovation practices), and identified location patterns (accessibility, industry focus). They identified 53 creative and innovation labs in Berlin and mapped their locations according to those criteria. Schmidt and Brinks (2017) focused on the impact of 'open creative labs' on the community and the respective organisation. In a workshop study, they identified three main criteria for such labs: (1) openness (spaces that are open to a diverse user group), (2) flexibility (labs provide access for various temporalities and can be used for a short time), and (3) collaboration (labs offer instruments that foster serendipitous encounters, such as workshops or hackathons). However, they did not provide any insights on spatial configurations of such labs. Tõnurist, Kattel and Lember (2017) presented a study of 11 innovation labs (i-labs) in the public sector. Based on their interviews within the selected institutions, they derived possible explanations for creating such new organisational structures and map these to existing theoretical concepts. One of their main findings suggested that those i-labs were created to enable cross-disciplinary and citizen-driven approaches. Similar to Berger and Brem (2016), they stressed the need for autonomy of the units in the sense that i-labs should allow the users to pursue their innovations without interference from traditional organisational structures. McGann, Blomkamp and Lewis (2018) studied public-sector innovation labs and presented several classifications according to different criteria, such as the type of funding or the methods employed in the studied labs. Based on a literature review, Timeus and Gascó (2018) suggested that public innovation labs would allow to overcome traditional administration's bureaucracy, encourage experimentation, facilitate idea generation and knowledge exchange, introduce new technologies, and hence increase an institution's innovation capacity. Lewis and Moultrie (2005) conducted three case studies within innovation laboratories. They outline possible benefits for an organisation and discuss potential drawbacks. Among the benefits are the dislocation from day-to-day activities and the possible elimination of hierarchies. Furthermore, they identified innovation labs as a reinforcement factor for employees' commitment to innovation. Narayanan (2017) discussed four characteristics of idea labs: (1) positioning in the firm's innovation value chain, (2) tasks (generate, develop, and migrate product ideas), (3) processes (bonding, bridging, experimentation, protection, and learning), and (4) structure (system, facility, and technology enabler).

Three papers analysed the role of the physical environment in general, but without a specific focus on creative labs. Dul, Ceylan, and Jaspers (2011) used questionnaires to examine the effect of the physical work environment on the creativity of knowledge workers in Dutch small and medium-sized enterprises (SMEs).

They developed a theory about the possible influences of the work environment on creativity. They distinguished between the social-organisational work environment and the physical work environment and presented a list of 12 spatial aspects (furniture, plants, calming colours, inspiring colours, privacy, window view to nature, any window view, quantity of light, natural light, indoor climate, sound, and smell) that would influence creativity positively. Waber, Magnolfi, and Lindsay (2014) presented examples of new spatial approaches used by companies like Facebook, Yahoo, and Samsung and their focus to enhance social interaction. They suggested that particular changes in the work environment, such as reducing the amount of coffee stations provided, forced more people from different departments into casual meetings. This spatial change correlated with an increase of the company's sales by 20%. Kristensen (2004) analysed a space's impact on the organisation across different phases in the creative process. He suggested that the preparation and elaboration stages require a combination of communal and private space, while the incubation and insights stages require more private space.

Only two papers addressed the intersections of both aspects—the possible creative impact of the physical space in the context of creative labs. Moultrie et al. (2007) proposed a framework to better understand the design, role, and goals of innovation labs in a practitioner's context. They distinguished between strategic intent, process of creation, process of use, and physical embodiment of intent. The authors presented 10 categories within the physical embodiment category: geographic location, scale, real/virtual, flexibility, design values and imagery, IT resources, data and information, modelling and visualization resources, constraints, and evolution. However, these categories are not further detailed or illustrated through examples. Haner (2005) looked at two cases of innovation laboratories and analysed both cases' support of the divergent and convergent thinking of teams and individuals. He suggested three categories of spatial characteristics: location (which also includes virtuality), style (which includes soft factors such as colour and materials), and building and layout (which includes e.g. visibility, proximity, and privacy).

None of the discussed sources presented an in-depth, longitudinal case study of an idea lab—from the first planning phase to the evaluation of the implemented space and its use. Also, most of the sources did not analyse the design requirements of a creative lab's physical environment, which both is presented in this paper. Understanding such aspects is important because an analysis of the complete use cycle of idea labs provides insights about the impact and limits of co-creation processes and about actual user needs in this emerging field.

METHOD AND DATA

Our research approach can be differentiated in two phases. Phase 1—the co-creation process for defining the spatial criteria—includes a pre-study using a combination of cultural probes and a visual canvas and a focus group workshop. Phase 2—the evaluation of the finished space after it has been in use for two years—includes a follow-up interview with the idea lab manager, a questionnaire with a regular user, and on-site observations to evaluate the space's implementation.

Phase 1: Co-creation and development process

Cultural probes are a self-documentation method in which selected participants are equipped with a predesigned set of questions and tasks meant to be independently completed (see, e.g., Gaver, Dunne, & Pacenti 1999; Mattelmäki 2006; Thoring, Luippold, & Mueller 2013). We chose this particular approach, because it allowed us to collect qualitative, rich data from the target users, without having to visit them in person. This reduced the time and effort for the researchers, and also allowed the participants to reveal private and possibly sensitive information.

We provided nine selected participants with a canvas-based cultural probes set (see Figs. 2 and 3). We chose the participants to address a wide range of backgrounds and employment positions. We invited four practitioners (one start-up founder, one self-employed designer, and two employees of global companies), one student, and four research associates from different departments. Unfortunately, the future architects of the space were not able to participate in the study. Two of the nine participants had prior experience with working in idea labs but had not been previously involved in any deliberate spatial planning processes.

Fig. 2. Overview of cultural probes set. Contents: canvas poster, pictures of exemplary creative spaces, coloured pens, snack with questionnaire inside, USB stick for digital files, and return envelope.

The canvas and the resulting data were structured as follows: The lower part of the canvas (placed inside an abstracted speech bubble) was dedicated to the

documentation of the *status quo*—the existing workspaces the participants were working in. The upper part of the poster (placed into an abstracted thought bubble) was dedicated to the participants' *vision*. Here they provided ideas and thoughts about their desired idea lab, along with a sketch of a floor plan for the envisioned space (Fig. 3).

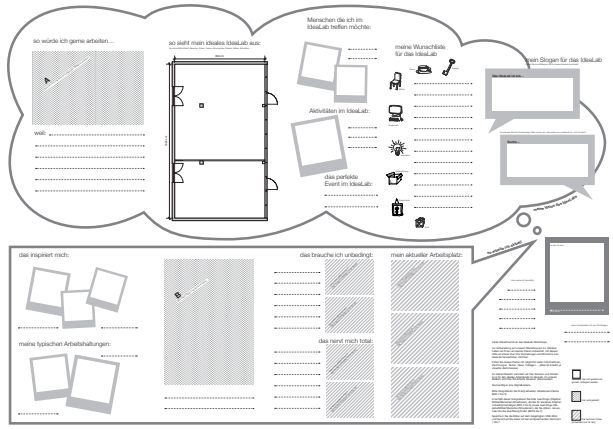

Fig. 3. Visual canvas used (1) for individual self-documentation and reflection prior to the workshop and (2) for co-creating ideas during the workshop.

The participants had three weeks to complete and return the cultural probes set. Fig. 4 shows an exemplary poster created by one participant.

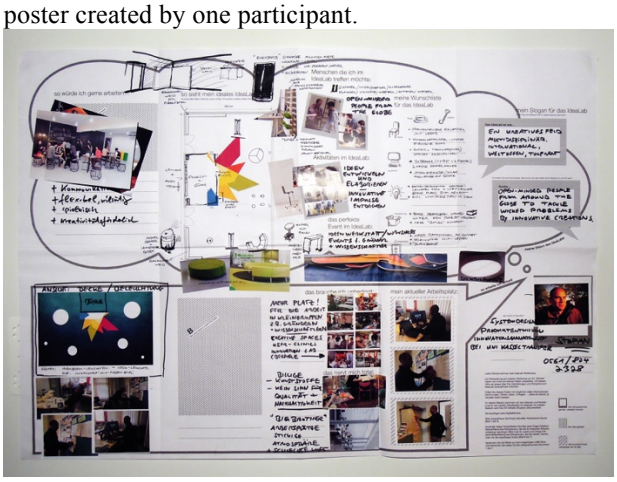

Fig. 4. Exemplary canvas of one participant.

In preparation for the workshop, two researchers evaluated the returned data from each poster by extracting and writing down the main insights. The notes were clustered to the point of theoretical saturation (Corbin & Strauss, 2014) until 15 themes emerged.

After completing the cultural probes tasks, all nine participants were invited to a focus group workshop to discuss their insights and to co-create ideas for the future idea lab. During the one-day workshop, the participants jointly analysed and discussed their posters, clustered the notes and ideas, and then prioritised the most relevant aspects. In summary, the individually prepared posters yielded 15 themes of relevance which were then detailed into 39 spatial characteristics during the workshop. A full description of the phase 1-study can be found in Thoring, Luippold, Mueller, & Badke-Schaub (2015) and Thoring, Desmet, & Badke-Schaub (2018, Section 4).

Phase 2: Follow-up evaluation

After the idea lab had been created and in use for two years, we conducted a follow-up evaluation study. On-site observers checked the actual implementation of the suggested designs, by using a checklist containing the 39 spatial recommendations. Non-visible aspects (e.g. offered events, booking processes) were enquired of the idea lab's secretary, by using the same checklist. A follow-up interview with the idea lab manager and a questionnaire with a current idea lab user (who had also participated in the phase 1-study) were conducted to gain insights about the success of the initial concept.

The interview with the idea lab manager was conducted via telephone. It lasted 45 minutes and was audio-recorded and transcribed. We consulted the user via email with a set of ten open-ended questions, which were grouped under three categories: (1) usage of the idea lab, (2) satisfaction with the idea lab, and (3) comparison with the initial workshop requirements. We coded the interview and the questionnaire answers to extract relevant quotes related to positive and negative aspects of the space and to detect coherences and inconsistencies. Although the limited number of data sources from the phase 2-study (one interview, one questionnaire, and on-site observation) does not allow for generalistic inferences, the triangulation of the three perspectives (manager, user, and researcher) yielded several rich insights that are summarized in the next section.

PRELIMINARY RESULTS

Phase 1: Co-creation and development process

Based on the evaluation of the cultural probes canvases we derived 15 themes of importance for most of the participants. These identified themes (ordered according to the number of mentions) include: (1) working zones, (2) physical activities, (3) lighting, (4) style and atmosphere, (5) flexibility, (6) open space, (7) break areas, (8) electronic infrastructure, (9) knowledge storage, (10) access to materials, (11) outdoor access, (12) storage, (13) privacy, (14) layers and platforms, and (15) serviced facilitation.

In the focus group workshop, the developed themes were discussed with the participants and detailed with concrete spatial characteristics and additional services. After the voting and selection process, a list of 39 recommendations for the future idea lab was defined. We

kept these recommendations abstract and conceptual for later adjustment by the external architects. We consolidated the findings in a documentation that was handed to the organisation's management. Table 1 outlines the 39 recommendations, along with an indication of whether they were implemented in the final idea lab, which will be elaborated in the subsequent section.

Tab. 1. Overview of recommendations and implementation.

	Initial Recommendations	Implemented
1	Individual, mass-tailored furniture line	Yes
2	Movable, flexible furniture on wheels	Yes
3	Room layout without a designated front or direction	No
4	Flexible configuration of the space, (e.g., through mobile workstations)	Yes
5	Room-in-a-room concepts or zoning through mobile dividers	Partly (only dividers)
6	Writeable surfaces or pinboards	Yes
7	Storage facilities	No
8	Lockers and cabinets for materials and personal stuff	No
9	Various seating options (chairs, stools, stand-up furniture, comfortable seats, and sofas)	Partly (no sofas)
10	Mobile writeable walls and dividers	Yes
11	Tables with various sizes (optional: adjustable height)	Partly (not adjustable)
12	Lounge area (also outside the idea lab possible)	Canteen outside
13	Flexible, adjustable furniture that does not require lots of assembly	No
14	Optional: flexible stage or platforms with additional storage	No (fixed stage)
15	Outdoor areas for recreation and outdoor work	No (access to parking lot)
16	Meeting points or withdrawal areas in hallways and outdoor areas	Yes
17	Events, specific content-based services, and thematic activities, such as networking events	Yes
18	A regular newsletter for interested parties and tenants	Yes
19	Rules for using the space without over-regulation	No (only formal contract)
20	Designation of a responsible contact person and a facilitator for maintaining the idea lab	Yes (secretary)
21	24/7 access to the space	No
22	Booking facilities (e.g., through web portal)	No (only by phone)
23	Different pricing models and discounts for long-term tenants	Yes
24	Furniture configurations for different usage scenarios (e.g., small groups, large groups, lectures)	Upon request
25	Use of natural, sustainable, and local materials	Partly
26	A timeless, clean, and modest design	Yes
27	Robust and sturdy materials that do not wear off quickly	Yes
28	Blinds on windows	Yes
29	Audio, video conferencing, projection facilities, and good Internet connection	Partly
30	1 or 2 mobile presentation units	No
31	1 to 3 computer-based workstations with printer and scanner	No
32	Optional: Smartboard	No
33	Adjustable light system that allows different temperatures and styles of lighting	No
34	Basic work materials (e.g., paper, Post-It notes, pins, timer)	Partly
35	Flat screen display or iPad in each unit to share data	No
36	Installation of a small on-site library	No
37	Material supply for prototyping	No
38	Selection of sports and games facilities (e.g. table soccer and table tennis)	Partly (outside)
39	Plants and flowers (if care is assured)	No

Phase 2: Follow-up evaluation

After the first two years of implementation, the space is well-received and regularly rented. In the following section, we present our concluding evaluation.

On-site observation

Table 1 outlines our 39 recommendations and indicates which of them have been implemented. Our on-site evaluations revealed that more than half of the recommended specifications had been implemented fully or partially (21 out of 39). Additionally, several measures that have not been implemented directly in the lab are now available in other areas of the complex; for example, video conferencing systems are located in co-working spaces next door. Similarly, lounge areas and games can be found on each floor. Nevertheless, some requirements that the workshop participants emphasized in the planning phase have not been implemented at all. Examples include adjustable light systems, outdoor access (which is possible but leads to a parking lot), and specific equipment (e.g., desktop computers, printers, and prototyping material). Other requirements were implemented as recommended; for example, an individual furniture line was designed through a design contest. Figures 5–7 show impressions of the final idea lab space and the customized furniture concept.

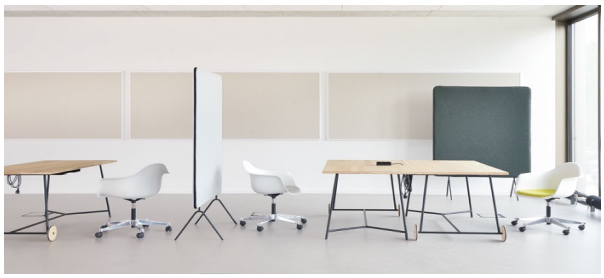

Fig. 5. Final furniture concept: tables and pinboards (photo ©Minu Lee, with permission from studio Aust Amelung).

Fig. 6. Final idea lab in use (photo ©Eibe Sönnecken, used with permission from Birk Heilmeyer und Frenzel Architects).

Fig. 7. Final furniture concept: storage-whiteboards (photo ©Robin Stummvoll, used with permission from Tim Mackerodt Studio).

Interview and questionnaire

The interview with the idea lab manager and the questionnaire with a regular user of the idea lab resulted in the following insights.

The idea lab was originally planned as a meeting and co-creation space mainly for educational purposes. However, it has transformed into a space mostly used by local SMEs, who seem to have a higher demand for 'unusual' spaces to get away from their normal day-to-day routines. The additional planned permanent co-working spaces have not proven as successful as the idea lab because the need for these kinds of spaces was not as great as expected. By contrast, the idea lab, devised as a temporary workshop space, is regularly rented. Although this success can certainly not be reduced to the spatial design alone, the space probably facilitates experimentation and creative work processes as some sort of 'third teacher' (Cannon Design, VS Furniture, & Bruce Mau Design 2010). This might be due to the relatively scarce and reduced, yet flexible interior, which invites people to adjust and transform it to create new situations. This is what makes it a 'pedagogical space'. The space's only problem is its size, in the sense that it could be larger and expanded towards an entire building.

The questionnaire with the user, however, revealed also some negative feedback concerning the light system that would not allow adjustable work modes, and the rather low quality of the idea lab's interior, specifically the standard plastic chairs, the ceiling-mounted electrical connection hubs, and the relatively scarce and lifeless design. Moreover, the limited access to external recreation facilities (especially outdoor access) was mentioned as unsatisfactory. According to the user, some of these issues could be explained by a differing conception of the idea lab between workshop participants and architects.

However, both the manager and the user had positive evaluations regarding the customized furniture concept, consisting of work tables on wheels and moveable whiteboard-storage boards (Figs. 5–7). Furthermore, the adaptable layout and the flexibility of the space due to the different working zones with moveable dividers were perceived positively. According to both informants, the playful design and flexible configurations allowed for any activity or event, ranging from only 12 to almost 300 participants.

DISCUSSION AND CONCLUSIONS

This paper presents a longitudinal case study of an idea lab, from the initial planning phase to the evaluation of the implemented space after two years. The contribution of this study is twofold.

Our research question 1 addressed the spatial requirements for an idea lab. The 15 themes and 39 spatial recommendations presented in this paper can act as a guideline for others who want to implement an idea lab. The evaluation of the final space revealed several positive insights that can act as best practice examples, as well as negative issues that should be considered when designing similar creative spaces. Further research directions should include experimental studies within engineering and user-driven environments, such as IdeaSquare@CERN, in order to provide further insights on these aspects.

Of particular interest is the fact that in the end the idea lab was mainly used by external SMEs, and rarely as the envisioned encounter space for students, staff, and external practitioners. The apparent need for SMEs to occasionally move away from their daily routines would support the hypothesis raised by several authors that innovation would flourish when creatives performed away from their headquarters and without interference

from superiors (Timeus & Gascó, 2018; Tõnurist et al., 2017; Berger & Brem, 2016).

Our research question 2 addressed the facilitation of the planning and design process for an idea lab. The multi-methods approach we used in this study had several advantages. The cultural probes task allowed the participants to prepare for the workshop in due time and to freely express their own experiences and wishes regarding a creative workspace without being influenced by the other participants. The same visual canvas could then be used for the co-creation workshop to discuss each other's insights. It served as a shared mental model (Bierhals, Schuster, Kohler, & Badke-Schaub 2007) as well as an extended knowledge repository and a platform to develop ideas. Hence, the workshop did prove to be effective in terms of the requirements assessment for the spatial planning process. One problem we identified was a discrepancy of expectations between the workshop participants and the architects who implemented the space. This reinforces our suggestion that all stakeholders should be involved in such a co-creation approach, to ensure that all requirements are met.

The presented study relies on insights from only one single case. Hence, it remains unclear whether the results can be transferred to other contexts and institutions. However, the triangulation of different data sources and perspectives, as well as the longitudinal study over several years generated qualitatively rich insights and provided a deep understanding of the spatial requirements of idea labs and the related planning process.

Given that new spatial concepts (such as idea labs, incubators, co-creation spaces, or makerspaces) are established in many organizations to facilitate their innovation capabilities, future research will have to continue to explore this emerging field.

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