INFRASTRUCTURING FOR OPEN FORMS OF USE AND CHANGING ROLES OF USERS – REFLECTING ON THE CASE OF A CO-SEWING CAFÉ.

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Abstract

This paper explores the concept of design for 'infrastructuring' to enable changing roles of users in an open peer production makerspace, a co-sewing café. For discussing user roles and participation we bring together theories from three different areas of research, forming a conceptual framework, which will be tested with the extensive empirical material gathered over 1.5 years of running the co-sewing café. Within this specific context 'infrastructuring' is argued as a design approach for addressing the issue of use and participation at different scales, spanning from traditional Participatory Design to alternative production platforms, such as Fab Labs and makerspaces. Tracing our evolving understandings of participation in literature and case analysis, the paper builds on illustrative figures to articulate different dimensions in relation to one another and in relation to the empirical analysis presented in the form of a table. This allows us an in-depth analysis of the users changing roles and answer the research questions: How can types of participation be understood and articulated in relation to the socio-material and spatial conditions of the open design production processes?

Keywords: Infrastructuring, makerspaces, peer production, user, use, participation

1 INTRODUCTION

In recent decades, there has been a growing number and variety of movements and platforms to open up design to more people and parts of society. People's ability to design for themselves has been "radically and rapidly" increasing as discussed in discourses of 'post-industrial design', 'open innovation' and 'open design' (Leadbeater et al. 2004; Mazé 2007; von Busch 2008, Fuad-Luke et al. 2015). This ability has been supported through the development of alternative platforms for design, including 'do-it-yourself' and peer production spaces such as Fab Labs, maker- and hackerspaces set-up for and/or by people using tools, equipment and facilities to design and produce their own artifacts (Kohtala 2016; Seravalli 2012). Using such platforms can potentially enable and empower a person to develop a "maker identity", as they become aware of and develop their own agency and skills and as they become part of a community making artifacts (Toombs, Bardzell & Bardzel 2014). These platforms are thus a highly relevant object of inquiry in design research, through which we can better understand such emerging types of production.

Within design research, such questions have long been at stake within discourses and practices of Participatory Design (PD). In PD, questions of production have always also been a question of power in design. Since the Scandinavian origins of PD in the 1970s, which involved workers directly in joint decision-making and in the design of their workplaces, "PD started from the standpoint that those affected by a design should have a say in the design process" (Björgvinsson, Ehn, Hillgren 2012, p.103). This motivates two agendas of PD: "the social and rational idea of democracy as a value" to enable and

empower people to participate in the process, and to involve the tacit knowledge of users of design as "expert of his/her experience" (ibid, 103). Besides resonating ideologically with related movements such as in peer production, the work of PD in opening design to stakeholders and users has produced new knowledge and theoretical foundations with relevance for design research and other fields concerned with emerging types of production.

A key theoretical as well as practical issue for PD extended and developed here is that of 'use'. First, by involving end-users in the design process, for example in making design decisions and even co-designing, PD puts into question the traditional distinction between roles of 'designer' and 'user'. Instead of separate and distinct categories, these can instead be understood as types along a spectrum of participation within design and production processes. In order to involve more types of participants in conceptualizing and developing future artifacts, PD has systematically developed methods for participants to bring their expertise into design processes (Sanders & Stappers 2014). Thus, not only are 'users' involved in design, as mentioned in the first point here, but also in experiencing and ideating the eventual 'use' of artifacts. In other words, PD involves participants in conceiving "use before use" (Redström 2008). Secondly, PD has expanded the object of design well beyond the traditional end-product of industrial design. The means for doing design, such as toolkits, as well as the socio-material aspects of participatory and learning processes are conceived of as designed and, indeed, as the primary object or product of PD (Björgvinsson et al., 2010). Contemporary PD, thus, is increasingly concerned with understanding the design of "infrastructuring" participatory processes.

In this paper, we inquire into types, issues and implications of 'use' in relation to a platform for more open design production. For the past 18 months, a "co-sewing café" has been initiated, developed and studied in rural Germany by the main author as an example of such production. The setup, running and ongoing development of the café can be understood as an extended process of infrastructuring, in which tools, materials and methods of participation have been considered as objects of design. In addition, techniques and technologies of clothes-making are shared, taught and learned amongst diverse participants, involving some participation of professional designers or dressmakers. As of January 2018, 42 workshops have been held totaling approximately 314 participants – thus, a wide variety of clothing users have become involved in making and designing clothing, applying their expertise, learning skills collaboratively, and developing their identities and roles. As the café is eventually intended to be self-managed by participants who would take over responsibility, recent attention of the main author has been on types of participation, including how this has developed, and the role of infrastructuring on participation.

The co-sewing café case has particular relevance for further developing foundational design research that builds on PD but also has more general relevance for understanding emerging types of peer production. The scale of participation in the café is extensive compared to many PD projects, including diverse types of participants, such as refugees and elderly villagers, with a wide variety of expertise over a relatively long period of time (Hirscher and Mazé 2017). Thus, the case holds potential for furthering understanding of the social concerns of PD in relation to larger and longer social practices, thereby elucidating nuanced and varied types of participation beyond dichotomies of 'designer' and 'user'. This prompts one question explored in this paper: What are some apparent types of participation, and how can these be articulated?

Furthermore, the co-sewing café presents an opportunity to attend to and give an account of the detailed composition and development of infrastructuring. As an object, both of design and of

research, the café is thus studied from multiple epistemological standpoints. On one hand, the café has been developed as part of the larger doctoral project of the main author following a 'research through design' methodology (Koskinen et al. 2012). Akin to other doctoral projects within the contemporary PD tradition (c.f. Seravalli 2014), the setup, running and development of the café has been carried out by the first author as a trained designer attending particularly to the practical material and "designerly" aspects of infrastructuring. The main author has also studied the effects of infrastructuring through qualitative research methods tracing design activities, ranging from planning to day-to-day facilitation activities, as well as the activities of participants including peer-collaboration and changing roles over the timeframe of 18 months. In addition, short, semi-structured interviews were conducted with 29 participants aiming to gain insight on their experience after participating in their first workshop.
This material enables us to further specify and explore the research question from above: How can types of participation be understood and articulated in relation to the socio-material and spatial conditions of the open design production processes?

This research question is addressed by drawing together concepts from relevant literature in relation to the empirical data. Concepts concerning 'use', particularly within literature discussing contemporary PD, enable us to explore and articulate types of participation in terms of roles, acts and practices. By exploring and developing a conceptual framework in relation to an empirical case, the aim of this paper is to contribute to better understanding of the issue of use and participation in open peer production platforms. Focusing on types of participation, we aim to shed light on relations between participation and infrastructuring, thus articulating not only a social but a material and spatial understanding of particular relevance for those designing as well as researching such platforms. Ultimately, and the subject of future research, findings from this paper will be developed further to examine participants 'attachments' (Marres 2007 & Dantec & DiSalvo 2013) and potential self-management in peer production contexts, including ways in which design for infrastructuring enables or disables such possibilities for participation.

2 'INFRASTRUCTURING' AND TYPES OF USE

Infrastructuring has become a key concept through which contemporary PD researchers and practitioners reconsider early PD preoccupation with use and users. Indeed, the concept is useful for us in exploring how the roles of the user and designer are blurred and continually renegotiated. With roots in Science and Technology Studies (Star & Ruhleder 1996), 'infrastructuring' has rapidly expanded as way to conceptualize the structures of PD processes (Karasti 2014; Karasti et al. 2018), and, further, to shift focus from designing for fixed environments, products or product-like systems towards a dynamic infrastructure that relates to different social and technical contexts (Star & Ruhleder 1996). Karasti and others (Karasti & Baker 2004; Karasti & Syrjänen 2004) have emphasized infrastructuring as an ongoing activity, describing a fluid and dynamic structure enabling and intertwining activities in a process of ongoing development through design and use phases including adaption, re-design and appropriation (Björgvinsson et al. 2010).

The concept is particularly useful for characterizing the necessary flexibility, openness and adaptability when designing for uncertain outcomes and future use (Hillgren, Seravalli & Emilson 2011). This dimension, which can be called "design for future use" (Redström 2008), is interesting to explore infrastructuring as the social, material and spatial structures sustaining a

community of participants (Dantec & DiSalvo 2013). Indeed, infrastructuring involves a constant renegotiation of roles and relations, "a continuous process of building relations with diverse actors and by a flexible allotment of time and resources" (Hillgren, Seravalli & Emilson 2011, p.180).

Beyond PD tradition "in the workplace", Karasti (2014) argues for its relevance within "communities", "publics" and "the commons". Infrastructuring includes the processes of community formation, of forming a public of committed participants (Dantec & DiSalvo 2013) able to take responsibility for the space and its forms of use. Infrastructuring can be understood as fluid and dynamic structure of participation, in which people and their actions cannot be reduced to terms such as "use" and "user", prompting calls for research on 'relational qualities' (Jegou and Manzini, 2008, 33 & Hillgren, Seravalli and Emilson 2011,180). Thus, it becomes a useful bridging concept between PD projects and peer production platforms such as Fab Labs (fabrication laboratories), maker- and hackerspaces set-up by and for participants (Kohtala 2016).

Conceptions of infrastructuring for contemporary forms of PD, such living labs, Fab Labs and makerspaces identified by Karasti (2014) are as yet under-developed. In this context, Seravalli (2012) has been exploring infrastructuring and design-for-design as a process within a makerspace called Fabriken, to discuss the co-designing, establishment and running of the setting. She analyzed their tactics for participant involvement in the space as well as the "participatory making of the space" as a form of infrastructuring. With this view, she sees a shift in understanding a makerspace as a fixed infrastructure for a defined use and community, towards spaces for infrastructuring, which offer a dynamically adaptable structure, to be redefined at "use time for supporting emerging activities" (2012, 2). Seravalli and others have pointed out a particular challenge: "While most of the online platforms have found some form of long-term sustainability, makerspaces are often striving with problems of participation and, consequently, sustainability" (2012, 2). Framed within this expanding arena of PD discourse and practice, this paper builds on notions of infastructuring, reflecting through the case on issues and challenges of 'use' and 'users', for example in a substantial process of (re)distribution of responsibilities among participants.

Activities relevant to infrastructuring can range from activities at project time, such as "design, development, deployment, and enactment" (Telier 2011) as well as activities at use time, facilitated e.g. by a designer - mediation, interpretation, and articulation in addition to the so called "design-in-use" activities run by the user such as "adaptation, appropriation, tailoring, redesign, and maintenance" (Telier 2011, 172). "In infrastructuring strategy must not only pay attention to how existing infrastructures condition use, but, in doing so, at the same time also deliberately design indeterminacy and incompleteness into the infrastructure with unoccupied slots and space left free for unanticipated events and performances yet to be" (Allen, Agrest, and Ostrow, 2000 in Telier 2011, 173). The challenge for the designer(s) while at project time is to design the future concept or space as open as possible, as if the future user was unknown, to enable infrastructuring as design in use.

2.1 Designing for participation

In cases of infrastructuring, such as seen in Fab Labs, hacker- and makerspace, spaces which leave use open to be determined by the individual user, the individual's roles are also thus open. They may visit once, they may create artifacts and appropriate the space, they may commit to responsible action sustaining the space. Complicating the dichotomy of 'designer' and 'user', this illustrates the

problem of reducing participation to participant roles. Another way to conceptualize use is in terms of acts of participation, following Redström's "RE:Definitions of use" (2006, 2008) from an act-based perspective, that is "what we do, not who we are". Through his argumentation, acts of using, designing or appropriating need not be understood as mutually exclusive, more nuanced and active relations between design and use can be formulated, as further elaborated and illustrated in Figure 1.

First, the concept „design-before-use", strongly driven by a designer's perspective to determine use before actual use e.g. referring to the traditional idea of PD in relation to the design of workspaces (Redström 2006). Secondly, the term "design-for-design" which in this paper we also refer to as the design of a makerspace, where designers aim to enable users to design objects for themselves (Seravalli 2012). This concept aims to result in "design-after-design" where the user becomes the designer while we are still at project time, where facilitating designers are involved. "Design-after-design" leaves to the involved stakeholders the possibility to initiate their own activities by performing design actions after the design of the platform is concluded (Telier 2011; Redström 2008). And in the following notion forming "design-in-use" which highlights the incompleteness of the designed object or space (Ehn 2008). Design-in-use also referred to as "at use time" or "during use" means activities of users over time, that the process is not under control and thereby "emphasizes the creativity that lies in the embedding and use over time …". (Dittrich et al. 2002). The user completes the design, while at use. In regards to infrastructuring, this requires the designer to open up the object of design to leave spaces to be determined by the user while at use.

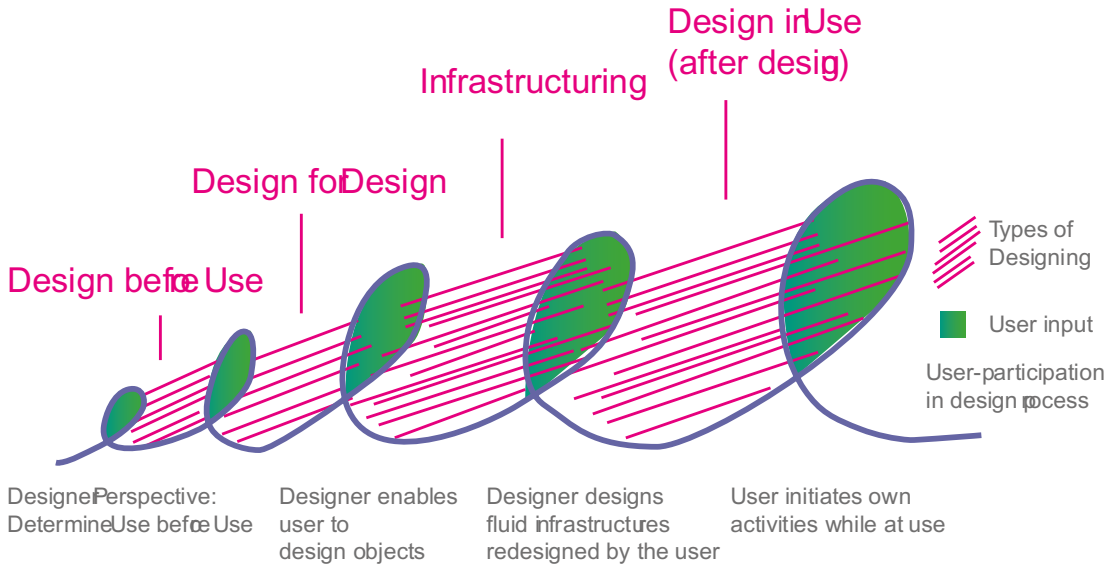

Figure 1: Correlation of participants' relation to types of 'designing'.

Since makerspaces are often part of a larger context, and are built within a community, external factors influence participant's acceptance and the sustaining of the space. Therefore, it is necessary to address these external factors and unknown future uses, needs and desires. Infrastructuring, or, in other words, "design-for-design" and "design-in-use" are approaches that enable flexibility and adaptability. This can potentially support participation and extended use over a longer period of

time, as it offers appropriation beyond only using and accepting the existing pre-designed structure. The design of a makerspace, what Seravalli (2012) refers to as “design-for-design”, participatory making or design for infrastructuring, can equally be referred to as an “unfinished” or open design, as it allows use and appropriation of an infrastructure (makerspace) after its establishment. In particular, the “design-in-use”, appropriation or “design-after-design” phase can be enhanced by seeing makerspaces as “spaces for infrastructuring” which can enable design and making activities during use-time as they offer in itself flexible appropriation over time (Seravalli 2012, 2). Taking this step further, these spaces in itself allow for “design-after-design”. They offer potential for addressing a variety of participants, as the space can be remade according to individual’s needs, use and activities, because, ”the ‘use’ that we simulate, create and invite as part of a design process, be it iterative or participatory, cannot deal with what it means for something to become someone’s, what it means for an object to become part of someone’s life” (Redström 2006, 130).

2.2 Types of Use becoming Design

As mentioned above, in the “traditional” idea of PD, the design process is about envisioning “use before use” (Reström, 2008), however, use is interpreted differently by the user vs. the designer, especially when considering use and appropriation over time (Redström, 2008). This is particularly evident in alternative spaces of production, where every participant acts as a user but also as a designer. The person is using a space while participating in workshops, but potentially is extending the act of use to appropriation, workshop facilitation in the future. This informs the hypothesis to consider infrastructuring through design, similar to an unfinished object, and forms of designing, where the final use is “undetermined” (Redström, 2008). Makerspaces as infrastructuring would represent objects which engage design as a process by designers or users alike, independent of who they are, but more on how they use the object or in this case the (maker)space beyond its original defined design: “design-after-design”.

This assumption informs the extension of the word “users” as through infrastructuring we do not only design a space for design-for-design and design-after-design but potentially for enabling extended forms of use, beyond designing and making objects. We are enabling engaged, longer-term participation which refers to “use” as taking responsibility, ownership and appropriation. These “use” activities can range from keeping the space clean, to organizing workshops run by locals. The act of use described in this paper goes beyond using or defining an object’s “use”, it refers to supporting people to become active participants and users who care for a common space, whose activities, environment and values they support. For this reason, we define in the following section several terms, which are in the literature associated to be types of use, but relate to what we refer to as “extended forms of use”. While at use the user is changing his/her role towards becoming an active “designer” or “maker”, as these types of use often refer to the skill-level and self-confidence.

Design, and in particularly design for infrastructuring can be seen as an ongoing, changing process, always interwoven with use-practice and the user. Dittrich et al. (2002, 124) pointed out that this is an important issue for PD, as it highlights design for change and “…brings into focus issues of coordination between use, design in use and adaptation and development.” The user starts to change his/her role from passively enacting a pre-designed use-practice towards changing object and use to better fit the current need. In this process users develop their skills by actively using the objects and start creating “…meanings that are so original that they become similar to designing” (Bredies et al. 2010, 159). These patterns of use and appropriation of an environment (Telier 2011,

177) can be also interpreted as social practices, as they refer to the act of change. Through use, change is enacted and meaning is created by the user, through active involvement (activities) of the users. The degree to which the user is involved may vary, starting from adaptation to appropriation, however it is challenging to make a clear distinction from where starts adaptation, becomes redesigning, reconfiguring to accomplish unanticipated forms of use and ends in appropriation over time. Nevertheless, in the analysis we identify with the help of distinguishing certain types of social practices the users changing role, depending on his/her way of using objects, applying skills and enacting meaning.

In the co-sewing café, first time participants can "execute" the *non-specific* everyday tools such as iron or vacuum cleaner without further instructions, and then start with the type of use which could be referred to as "learning" how to operate a *specific* tool, such as a sewing machine. In the next step, one can already be "informed" operating this tool, possibly such as threading the machine, even though some participants refuse to, as the machines are of different models, requiring new „learning". This is following the use-level of "maintenance" where one keeps an existing object/service/infrastructure in good condition which can be observed with the general infrastructure, however not with the sewing machines, they are maintained by the main facilitator (the author) and the local repair expert (Mr. Kraft). This follows use-practices referred to as "adaptation", "modification", "tailoring" and "redesign", all aiming to close the gap between the intentions of the designer and the actual use (Carroll 2004, 3). The user is altering, adapting or redesigning the appearance or function of an original design to better fit their needs. This can be seen in relation to the infrastructure of the co-sewing space, as well as to the prepared design objects and patterns. In a next step, the participants start to practice "appropriation" the way that users "take possession" of e.g. a technology innovation over time. Appropriation describes the act of taking possession of a thing, by making it to one's own (Carroll 2004), referring to situated use and appropriation of an object according to a context and the way it is "used". "Appropriation involves mutual adaptation" (Carroll 2004, 3) users reshape, adapt and redesign to appropriate and make the object their personalised own. Table 1 summarizes the types of use in reference to tools and examples given from the co-sewing café.

Type of Use Acts	**Types of Stuff**	**Example**
Operation	Non-specific everyday tool	Iron, Vacuum Cleaner
Maintenance	Specific sewing tool	Sewing Machine
Adaptation (Modification, Tailoring and Redesign)	Specific sewing tool	Sewing Materials (Fabrics etc.)
Appropriation	Infrastructuring Stuff	Patterns
Management	Infrastructure / Space	Key

Table 1: Types of use in reference to tools.

2.3 Practices of Use

In order to account for more extended and evolving type of use, our understanding is also informed by interpretations of 'social practice theory', which has entered into design research in various ways including studies of PD and 'living labs' (Kuijer 2014). Social practice theory has evolved within the overlap between fields of consumption studies and material culture and focusing on everyday

practices of consuming and using artifacts. While considered as a kind of 'micro' sociology within the larger field, social practice theory nonetheless considers larger and longer practices of consumption than typical in the field of design research (for example, practices in the middle and right in Figure 1 above, cf. de Jong & Mazé, 2017). Leading contemporary scholars in the field, Shove, Watson, Hand and Ingram, conduct research on DIY as an unexplored domain relevant to social practices of consumption, in which "the application of skill, knowledge judgement and passion and results in the production of something made and designed by the same person" (Shove et al., 2007,42 referring to Campbell, 2005:23). While primarily focused on social practices of consumption, their particular interest in DIY reveals consumption as a blurry category that may also include production and use at scales relevant to design research in general and to the study presented here.

Further, practice theory pays particular attention to materiality as an intrinsic component of social practices. Following Kuijer's (2014) interpretation and development of practice theory in design research, we view the composition of social practices as the interrelation of different components. The following terminology adopted by Shove and colleagues (e.g. Shove and Pantzar 2005, Shove et al. 2012) will thus be used as categories in our preliminary data analysis: "stuff" (materials), "skills" (competences) and "images" (meanings) (Figure 2). These terms have also been used by several design related papers such as (Scott et al. 2011, Kuijer and De Jong 2012) and shall therefore provide a basis for our analysis of participants use-practices regarding the co-sewing café. Here, practice theory is useful in expanding the unit of analysis in design research to include larger and longer practices of participation, including multiple, varied and changing practices of using the space (co-sewing café) its specific infrastructure, the tools (sewing machines and equipment), the interaction with the materials (fabrics, threads etc.) and participants' skill-development.

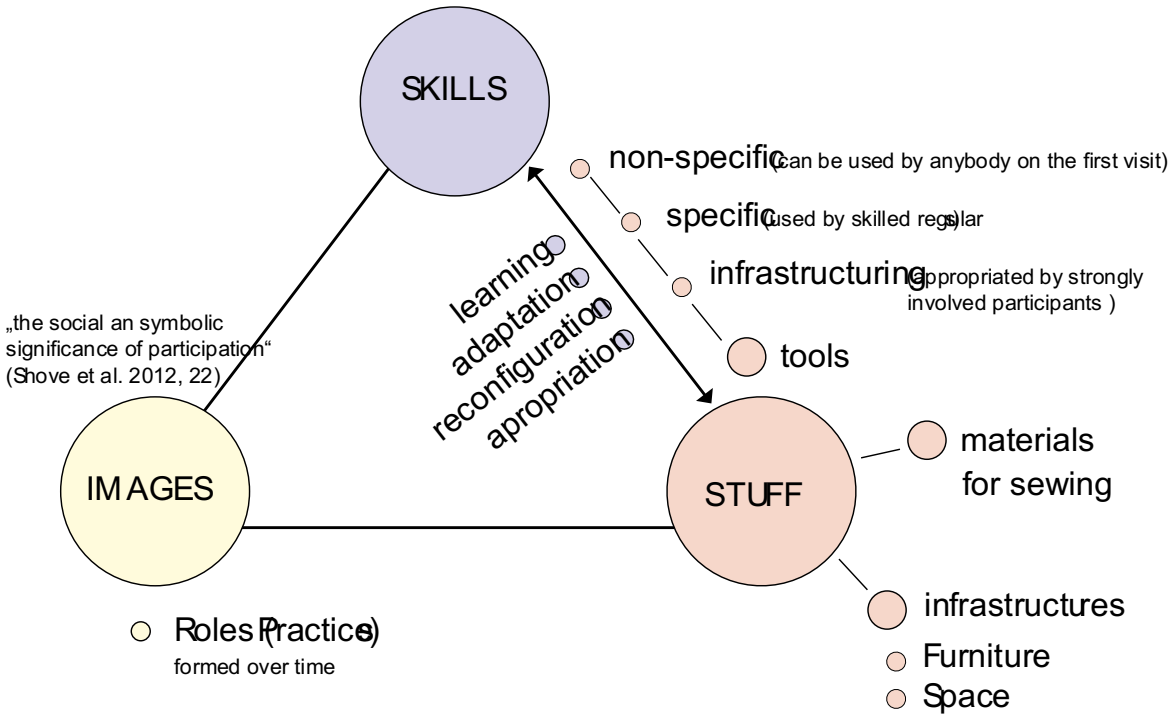

Figure 2: Our research context illustrated in a figure adapted from Shove and Pantzar (2005)

3 THE CASE AND ANALYSIS OF THE CO-SEWING CAFÉ

The 'co-sewing café' has been initiated and run by the main author as part of her doctoral research, including multiple roles such as designing the space and facilitating workshops, to acting as a participating observer and documenter/photographer of the activities. A mixed methods approach is common in this area of research such as living lab studies, as these methods are especially sensitive regarding the embodied experiences of researchers and participants and have a history of use in normative qualitative research.

Here, qualitative research has been a primary methodology for collecting and analyzing the case. In order to document and analyze her own extensive experiences, auto-ethnography informed methods such as a 'working diary' (Mäkelä 2007:162) by the design researcher and a semi-standardized dairy (Pedgley 2007) in which are recorded details of dates, number of participants, and other descriptions noted throughout the setup and after facilitation of each workshop. 29 short, semi-structured interviews were conducted with first-time participants. Extensive photographic documentation comprises approximately 1200 photographs taken by the main author and other participants as well as two video recordings of two full workshops. Photos thus constitute an additional source of data, since photos allow for capturing processes and interaction with artefacts, and are less selective than observations (Flick, 2014, 335). After an open-coding based content analysis of the authors own autoethnographic notes, protocols and excerpts from semi-structured interviews with participants the results were put in reference to the photographs. The combination of textual and visual material analysis resulted in several visual content maps based on representative photographs of specific workshops, highlighting situations and interactions with tools, supported by quotations or codes taken from the textual analysis. This method can be identified as visual concept mapping (Butler-Kisber & Poldma 2010).

3.1 The co-sewing café as a makerspace

The subject of data collection and analysis is the co-sewing café - a makerspace dedicated to offer tools, materials to experiment and experience sewing, handcrafting, upcycling and garment repair in a collaborative setting. Through participatory clothing design workshops participants are enabled to grow their capacities and design the future use of their garments. In this paper, we refer to the co-sewing café as a makerspace, as it offers a more general term, than for example Fab Lab or hackerspace, referring to any kind of collaborative workshop space (Kohtala, 2016), not necessarily emphasizing technology and innovation.

The co-sewing café is located in a small town in south Germany, with about 6600 inhabitants. It was established in July 2016 by the main author as part of a bigger research project, a "Reallabor" (real life laboratory) exploring practices of sustainable transformation in a rural context. The town has a history in textile manufacturing, however today much of the former factory spaces are unused and several revitalization projects have been initiated. The co-sewing cafe is occupying a former 60m2 shop, hosting 10 -12 workstations with refurbished home sewing machines and donated materials for sewing. During the research-period, 3 hour-long workshops were offered 3 times a month over 1.5 years. Each workshop provided sewing suggestions including patterns and examples to try on, for

different skill-levels and assistance with technicalities or design. Until January 2018, 42 workshops have been held with approximately 314 participants in total. The majority of participants are female, age ranging from 16 to 80 years, though most participants are between 30 – 60 years. Each workshop hosted, had a varying number of participants ranging from 4 up to 25. However, the average number are 6-8 people which fit comfortably into the space. The participant group is mostly built by 3-4 regular visitors, and the others are first-timers or occasional participants.

A kick-off session as co-design workshop hosting more than 30 participants (locals and refugees) generated the framing of activities, which concluded in the concept of a co-sewing café, offering shared ownership. With the opening, various people contributed by providing materials, machines and tools, but also offering advice in sewing or the repair of the sewing machines by a 90-year old immigrant from Russia. The furnishing of the co-sewing café offers a flexible arrangement to be re-designed dynamically. The diversity of participants and skills also required the designer to adapt to changing needs and requirements with design for infrastructuring. This became evident, when a blurring of roles between user vs. designer occurred first time with one very skilled refugee from Afghanistan. He used to work as a dressmaker and found in the co-sewing café a new space to apply his knowledge by preparing upcycling designs and helping others with his capabilities. He was the first person who asked for an extra key to access the space, to offer additional opening hours for garment repair. As his German was very limited at the beginning, we prepared posters with translation of sewing terminology into 3 different languages (Figure 3). In addition, we designed labels for the different materials, instructions to use specific sewing machines and guidelines for pattern-use if none of the main-facilitators were co-hosting. These activities, and tools being designed while already running the co-sewing café, are identified based on aforementioned definition as infrastructuring.

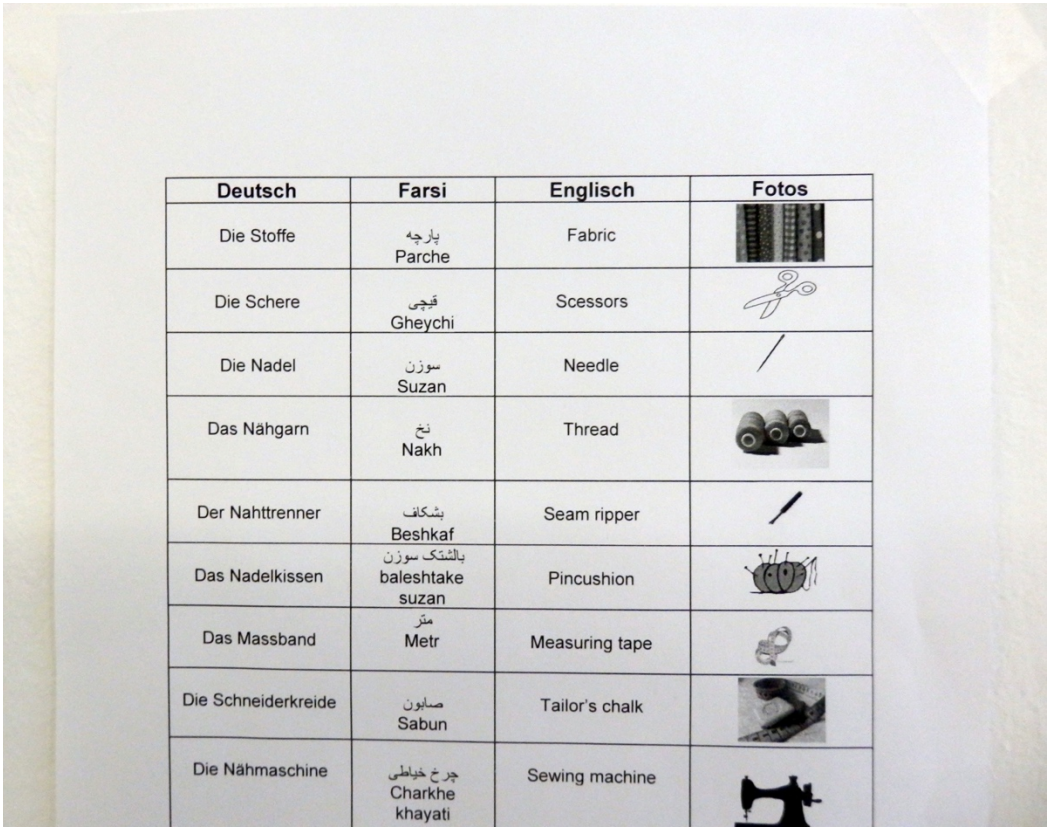

Figure 3: Infrastructuring tools – multilingual poster for sewing terminology

What differentiates the co-sewing café however from a traditional PD workshop setting is the long-term planning, including the ambition to sustain the space beyond the research period. This includes external challenges such as rent, regulations by law affecting in particular our refugees and shared ownership. Therefore, user-transformation enhanced through infrastructuring and different types of use are a prerequisite for sustaining the space. This objective will be investigated through the types of participation identified in relation to socio-material and spatial conditions such as objects, tools and design for infrastructuring.

3.2 The participants use of the co-sewing café

After some time, participants are encouraged by the facilitators to take action in planning and facilitating workshops for others. Thereby a former participant becomes an active user/designer, appropriating the space by taking ownership and responsibility in supporting others. These iterative changes in the participant roles, require a flexible approach such as infrastructuring, allowing an ongoing development through design and use phases.

While reflecting on over 42 workshops facilitated, selected, illustrative case-examples are given to show the diverse requirements the space has to attune to. For example, one group of participants represented by the handcrafting club of local elderlies, organized three workshops on crochet activities for upcycling t-shirts, where they removed the sewing machines and formed a circle of chairs (Figure 4). Two other women who participated in workshops regularly became friends and started together to represent the sewing café at two local fares and run shared workshops in the co-sewing café. They share a key, but are also taking ownership by bringing tools and materials such as rulers and pin cushions, which they realized were missing when facilitating workshops. One of them also mentioned that: “I would have never thought to make clothes for myself, I only did quilting for many years.” In general, we can conclude that the more often people participate, the more likely they are to start appropriating and designing the facilities according to their needs. Regular visitors already have identified preferred workstation and tools, as well as started offering to facilitate workshops once a month.

Figure 4: Crochet Workshop

One questioned was being asked repetitively by the participants “what happens with the co-sewing café, when the research project ends?”. Through interviews and discussions, the participants indicated their strong desire to sustain the space, as they appreciated the social setting, the flexibility of arrangement, the advice and shared activity, independent of age, nationality or skill-level. This illustrates that the concept of infrastructuring enables the participants to grow their capacity in designing and making garments (Seravalli 2012). This development requires a fine interplay in design for infrastructuring and the designer’s facilitation and handing over of responsibilities to encourage extended forms of use. To date, the co-sewing café has been run 18 months as a research project, but is to be implemented during the next 6 months as a self-sustaining concept. The aim is to encourage locals to act as the main owners and facilitators, offering further information for this research.

4 ANALYSIS - An account of materials, tools, infrastructuring and use

In section 2 we discussed the different approaches of design for, with and by the user and how this refers to design for infrastructuring. This was followed by an analysis of use as a practice and defining different types of use occurring in the sewing café. As a result, Figure 1 illustrates the correlation of the users input and participation in the different types designing.

In this section, we will elaborate how the different types of participation and use are linked to the way the co-sewing café has been designed with the aim of enabling "design-in-use" and forms of user appropriation of space and objects. The aim is to clarify how in the context of a co-sewing café specific socio-material and spatial conditions inform the users participation and development in regards to use practices such as learning new skills or appropriating tools for personalized use. By "stuff", we refer to material objects which build together the co-sewing café infrastructure. These tools and materials fulfill a certain task, such as sewing equipment, cleaning tools or the key to open the space. This is categorized in table 1, referring to the three basic categories elaborated in practice theory, however adding additional sub-categories. Under the category "stuff" we find "tools", "materials" and "infrastructures" with different sub-categories which are informed through specific observations in the co-sewing cafe. Tools are here a sub-category of stuff, as the analysis extends to objects, materials and infrastructures as suggested in practice theory to broaden the design context (tool, material) to a wider area, such as accessibility through a key.

The analysis illustrated that for the specific co-sewing café setting, a combination of theoretically-derived categories (from the literature surveyed above) were required to demonstrate the different types of use and the resulting change in user-role. As an example, the majority of the 314 participants knew from the beginning how to use everyday objects such as an iron, scissors and cleaning tools (starters). However, already when needing to pin patterns to a fabric, only about 30 people dared to start this on their own, the majority asked for assistance. Likewise, sewing machines are only used independently by 35-40 regular participants (regulars). This means that for the maintenance, such as oiling, chaining needles etc., only about 5-8 people are left, these are our local repair expert and additionally 4-5 facilitating experts (former seamstress and dressmaker) as well as the first author and facilitator. This illustrates that the engagement and usage of objects depends on the skills and frequency of participation. In general, one can observe that the more often participants join the workshops, the braver they act in choosing and cutting fabric and knowing where and how to use which tool. Based on the analysis, a categorization of the different types of users, their skills, rate of participation and stuff-use has been summarized in table 2.

Types of Use Competence	**Number of participants**	**Description**
Beginners	314	Refers to people who come for the first time and those who can operate the basic tools and space. They may continue at this level or learn and improve their skills.
Regulars	</σπαν> 40	Advanced users, for example those participating more than 3 times or on a regular basis who know how to use the space, independently operate machines, choose materials and use/adapt/create patterns.
Visiting Experts	5	Skilled locals, such as a former seamstress who assists occasionally or Mr. Kraft who repairs the sewing machines.

Active Facilitators	7	Active regular or very skilled participants who start offering to facilitate workshops, such as the dressmaker Naser (see 4.3).

Table 2. Types of users in relation to "stuff".

Based on these materials and data analysis, table 3 was created, which relates the "stuff" categories from practice theory to the types of use outlined in table 1 and the design concepts elaborated in section 2.1 in correlation with categories derived from the empirics, the type of user. The table is particularly looking at the specific stuff which was brought and made by participants and the stuff differentiating the co-sewing café from other makerspaces - the stuff "designed for infrastructuring". Table 3 aims to identify what stuff type of stuff (materials, tools or infrastructuring stuff) in reference to the types of designing account for the specific setting of the co-sewing café, and through this lens shed light on the type of use and its impact on the blurring roles of designer, user, facilitator in regards to taking ownership of a space.

Stuff	**Skills**	**Skills**	**Source**
Types of Tools	**Use/User Competence**	**Use Acts**	**Who brought/made**
Non-specific			
Scissors Needles Pins Pin cushions	**Beginners**	Operation	Donations by former seamstress and Mr. Kraft (*visiting experts*) E.g. 5 pin cushions were made by *regulars* (see section 4.3)
Iron and ironing board	**Beginners**	Operation	Donations by different participants (*regulars*)
Trash bins, broom and vacuum cleaner	**Beginners**	Operation	Purchased Donation
Multiple plug socket	**Facilitators**	Operation	Purchased
Ruler	**Beginners**	Adaptation and Operation	Brought by *regulars*, measurement was made together (see section 4.3)
Specific			

12 sewing machines	**Regulars**	Maintenance Operation Appropriation	4 sewing machines purchased, thereafter donations from locals and Mr. Kraft (*visiting experts*), currently 12 machines
Crochet hooks	**Regulars**	Operation	Purchased for the workshop hosted by the knitting circle (see section 4.3)
Oil can	**Facilitators** **Experts**	Maintenance	Mr. Kraft made a special tool (see section 4.4).
Chalk and measuring tape	**Regular**s	Adaptation	Donated, sponsored by local firm
Patterns and paper	**Regulars**	Adaptation Appropriation	Self-designed, donated or open source patterns, provided by the facilitators or brought by participants (*active facilitators*)
2 dress forms/mannequins	**Regulars**	Adaptation Appropriation	Donated
Materials			
Fabric of different colors and materials	**Beginners and Regulars**	Adaptation	Donated
Thread of different colors	**Beginners and Regulars**	Adaptation	Donated
Buttons, zippers, ribbons, rubber, clipsÉ	**Beginners and Regulars**	Adaptation	Donated
Spatial arrangement			
Furniture	**Beginners and Regulars**	Adaptation Appropriation	Donated Purchased

Space	**Beginners and Regulars**	Adaptation Appropriation	Rented
Emerging stuff			
Sample pieces, Example garments	**Beginners** **Regulars** **Experts**	Appropriation	*Facilitators* or *experts* create them before the workshops (usually 2-3 per workshop).
Produced garments, Garment showcase	**Beginners** **Regulars** **Experts**	Appropriation	*Facilitators* (see section 4.2)
Photo gallery, photographs of participants with their garments	**Beginners** **Regulars** **Experts**	Appropriation	*Facilitators* photograph each garment produced (see section 4.2)
Posters	**Beginners** **Regulars** **Experts**	Operation Adaptation	*Facilitators*, including poster with multi-language sewing terms (see section 4.2)
Instructions (for materials and machines)	**Beginners** **Regulars**	Adaptation Appropriation Maintenance	*Facilitators*, created for more independent use (see section 4.2)
Labels: Made in Dietenheim	**Beginners** **Regulars** **Experts**	Appropriation	*Facilitators* (see section 4.2)
Stamp: Made in Dietenheim	**Beginners** **Regulars** **Experts**	Appropriation	Created by one of the *facilitators* with a *participant*
3-4 Keys	**Beginners** **Regulars** **Experts**	Management	Landlord provides on demand of *facilitators*

Table 3. Summary of analysis: theoretically-derived categories related to empirical findings.

This categorization offers an insight on the development of the individual user and his/her interaction with the stuff, the formation of the space as well as the designers infrastructuring approach. The table illustrates that everyday tools, can be used from the beginning, thereby not

fostering any longer-term engagement or attachment to the space as it does not require a learning process over time. In comparison, the specific sewing tools require a deeper engagement as their functionality are not known, thus a certain degree of learning has to take place. The capacity participants gain by understanding the system and usage of the different types of machines enables them to work more independently, as they do not require steady assistance (Figure 5). The users redesign, adaptation and appropriation process is started by having the ability to pick preferred machines, create the best personal working environment and make use of that setting in creating own garments. The tools are appropriated by the regular participants, creating a stronger bonding to the co-sewing café environment, which in a next step can lead to active facilitators. The better they know the machines and space, they more they dare to give assistance to newcomers, thereby taking responsibility and ownership.

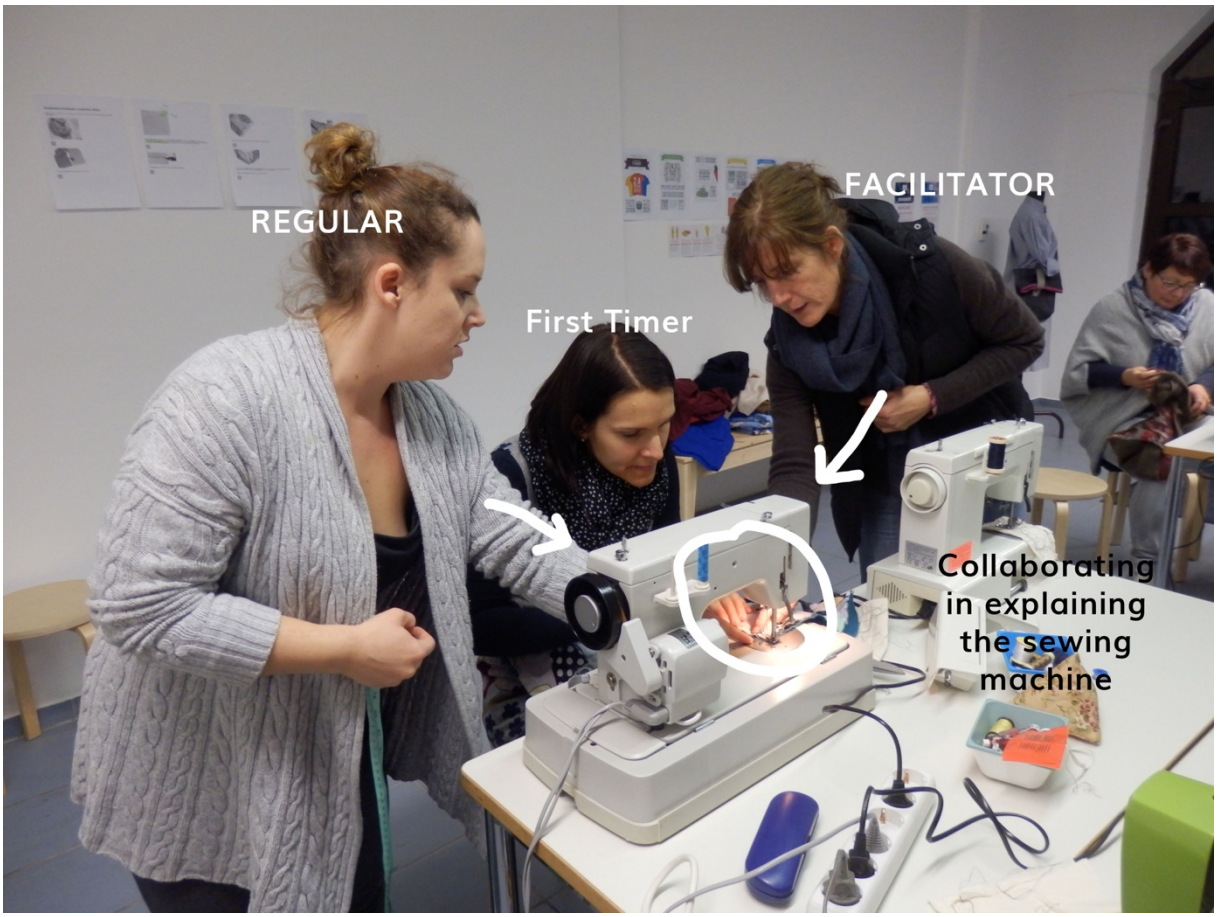

Figure 5: Collaboration while learning to use the sewing machine.

In the “specific tools” category, we identify “oil” and the respective tool to oil the machines, developed by our local expert Mr. Kraft. The oil is a representative tool that refers to local experts without whom the co-sewing café would not run as smoothly. These experts provide us with their expertise, donations and in the case of Mr. Kraft, the repair of the sewing machines at no charge. The machines should be oiled, only applying very small amount of oil. To enable also others to run this task, he made an oil-can with a small needle opening which only allows drops of oil to emerge. This shows his strong engagement with the space, but also his creative ability, knowing the space and tools so well, that he designs perfect fit tools.

The “materials” and “infrastructures” do generally address both beginners and regulars, but still offer use such as learning, redesign, adaptation and appropriation as they address the user’s individual

abilities and choice of engagement. On the one hand, they can follow our suggestions of fabric, thread and space arrangement, likewise a combination of their own can be created. This type of stuff refers also to the standard makerspace, which according to Seravalli (2012) enables “design for design” – tools and spaces that allow users to create own design objects such as garments.

The infrastructuring stuff specifically designed for and with the participants illustrates that while running a makerspace with the basic tools “designed-for-design”, there still emerges design opportunities asking for the ability to adapt to the flexible needs of the users to promote their own engagement with the stuff and the space – design for infrastructuring. With this approach, the designer is able to offer open forms of use. For example, the labels or stamp indicating “Made in Dietenheim”, engage the user with the space of making, offering them to take ownership and pride in making garments for themselves. Likewise do the photographs taken from the proud maker, after completing a garment. This photo-gallery adds personality, inspiration and ownership to a space, but also to the persons represented. With an infrastructuring approach the roles of user and designer were renegotiated, as for example the labels or photography wall were collaboratively developed with participants and the facilitating designer. In the case of the co-sewing café, design for infrastructuring offered a suitable approach to support users in appropriating a space while growing their attachment, feeling of ownership and responsibility.

A very unique role plays the key, as it relates so strongly to use as taking responsibility and ownership by having independent access, taking the role of a co-owner, co-host or facilitator. Nevertheless, it can be considered as part of infrastructuring, because only based upon the request of the Afghan dressmaker we provided an additional key for new facilitators. Infrastructuring to address matters of flexibility, while for us this refers to “design for future use”, use beyond project time towards sustaining a community of participants. When former participants become users of the key to run workshops, the strongest level of attachment to the space has been enabled. Once this level is reached, the goal of enabling a sustaining of the co-sewing café beyond project time, fostering “design at use” or “design after design”, is potentially reinforced. These findings are also illustrated in Figure 6 below, bridging over our categories developed from theory and empirics to illustrate the correlation of strengthen user-participation, types of use and designing.

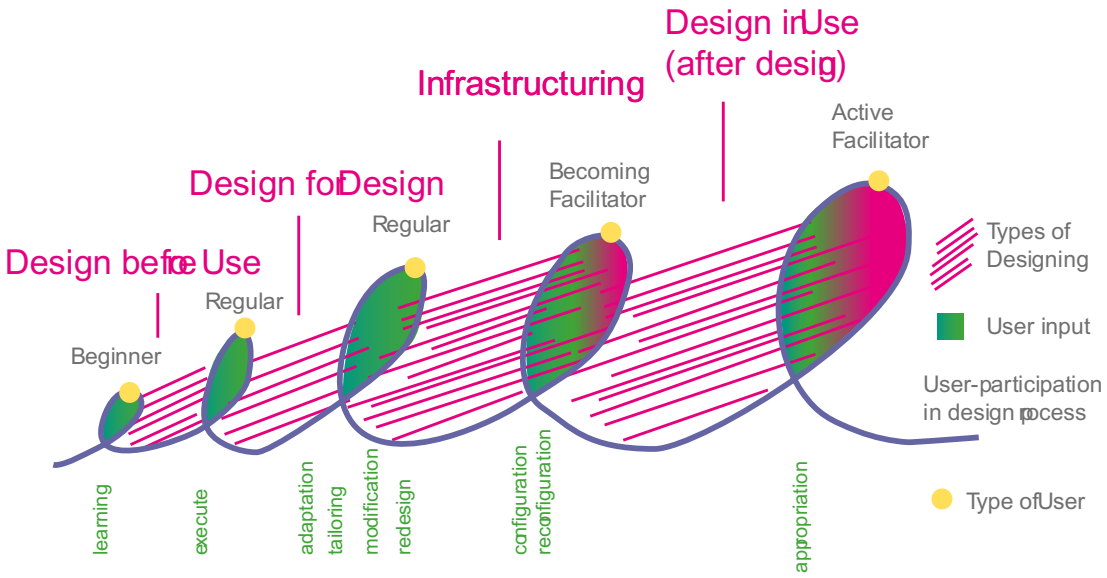

Figure 6: Illustrating the correlation between the times of participation, the stuff-use and the types of designing.

6 DISCUSSION AND CONCLUSIONS

This paper brought together theories from three different areas of research, forming a conceptual framework for discussing matters of use and participation in a co-sewing café. While research focusing on user roles tends to remain preoccupied with different types of people, framing participation in terms of acts of use facilitates articulation of more nuanced and varied expressions along a more fluid spectrum of activity spanning between design and use. Drawing in social practice theory allows us to explicitly account for the materiality through which 'infrastructuring' takes place. Thus, 'infrastructuring' is argued as a bridging concept to address the issue of "use" and participation at different scales, spanning from traditional PD to alternative production platforms, such as Fab Labs and makerspaces, characterized by larger and longer socio-material practices. Our elaborated categorization (table 3) offers a contribution to theory for research on such platforms, since research to date has only touched upon socio-material influences upon user transformation, for example, in the detailed analysis by Toombs, Bardzell and Bardzel (2014) of tools as indicators in the development of a "maker identity".

Practically, elaboration of these concepts derived from literature have enabled a framework through which the extensive empirical material can be analyzed and discussed in the section above. It becomes possible to articulate a broad and robust framework at a level of detail and at the human-scale of design/platform implementation, thus directly impacting forthcoming choices in the development of the café and potentially benefiting other practitioners operating within platforms for such emerging types of production.

In the tradition of 'research through design', practice and the empirical analysis have also sharpened, influenced and shaped our theorization of key concepts drawn from literature. Tracing our evolving understandings of participation in literature and case analysis, the illustrative figures throughout the paper articulate different dimensions in relation to one another and in relation to the empirical analysis presented in the form of table 3. Drawing together key dimensions derived from the literature and empirical analyses, table 3 directly addresses the research question in its form and content. The analysis of the table illustrated that within the co-sewing café as a makerspace, evident types of participation are identified, which are manifested through the types of use and the frequency of participation. The types of use in reference to the type of stuff gave insight on the level of skills and engagement of the participant and the roles they attune to or change over time. These types of participation can be understood and articulated in relation to the way they use or interact with the tools, materials and infrastructuring "stuff", offered in an open peer production setting. The role of the designer is seen in this context as enabling a fluid infrastructure that attunes to a spectrum of possible participation – design-for-infrastructuring. Anecdotes, such as that of the physical key to the café, bring to life the overarching aim of the café of enabling sustained use beyond project time, fostering "design at use" or "design after design".

We are aware that this research has also certain limitations. Within the scope of the paper, it has not been possible to provide depth accounts (including some theoretical inconsistencies and potential contradictions) of concepts within and across multiple fields and disciplines. Our framing of key concepts and the conceptual framework are thus open for further development, testing and iteration. Likewise, the extent of empirical material offers the possibility for deeper analysis regarding some quantitative and temporal aspects. These and other issues, including further analysis of the interviews, will be reported in future publications.

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