

# Proto Design Practice: translating design thinking practices to organizational settings

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**Abstract.** The nature of services is becoming complex, indeterminate and often transformational and hence designed solutions need to allow for continuous and ongoing evolution by building up organizational capacity for sustained innovation. Design thinking practices are known to be effective at generating innovative outcomes in cross-functional, multi-stakeholder and indeterminate scenarios. However, they are also met with resistance to change due to deep rooted and established work practices and culture within organizations. Building on theoretical guidelines from practice theory, organizational studies and HCI literature related to practices, learning and innovation, this paper introduces ‘proto design practice’. Proto design practice is a practice-based approach for organizational settings that allows for the translation of design thinking practices in the context of communities’ work practice and consequently allows proto-practices to emerge. The proposed approach is showcased in a case study where design thinking was introduced in the context of an academic library.

**Keywords:** Design Thinking; Transformational Design; Design Methods; Practice Theory; Proto-practices; Sustained Innovation.

## 1 Introduction

Organizations increasingly need to function within a constantly changing multi-stakeholder environment and deal with indeterminate problems [1]. Consequently, design outcomes cannot take the shape of fully determinate designed solutions but rather needs to allow for continuous and ongoing evolution by building up organizational capacity and skills for reflexive action and sustained innovation [2]. The framing of design problems in such scenarios closely resembles Rittel and Webber’s [3] articulation of wicked problems which are problems that have multiple stakeholders and decision makers with complex and unclear information and incomplete formulation. Subsequently other researchers (see [4–6]) have also proposed design thinking as a viable approach for working within cross-functional scenarios and have deemed its practices as being especially effective for working with wicked problems [7].

‘Design Thinking’ has been approached from many perspectives and defined in many different ways throughout literature, with different levels of grounding in

theory, practice and research. A popular description of the process has been given by Tim Brown [6]

*a human centered and collaborative approach to problem solving that is creative, iterative and practical*

In an organizational context, this process works by developing a common shared language [8] across areas of cross-functional expertise for human and solution centric thinking [9, 10]. Dunne and Martin [4], highlight the difference between typical problem solving processes in organizations with design thinking by taking the case of managers who typically avoid working with wicked problems because of multiple, conflicting and often unclear decision making sources and contrasting them with designers who typically treat such situations as a part of the problem formulation or constraints. Design considerations in this process, as outlined by Brown [6], pay equal attention to service/product desirability, technical feasibility and business viability and hence help in the creation of products and services that align with business goals and human needs while remaining realistic in their scope. Design thinking practices have found relevance and have had demonstrable impact in a wide variety of fields like library systems design [11, 12], healthcare services [13], organizational strategy [4], organizational studies [9] and social innovation [5].

### **1.1 Design Thinking as an alternative to existing practice**

The incorporation of design thinking practices could be a viable strategy for enabling cross-functional and sustained innovation with a human centric perspective within an organizational context. However, the introduction of new and possibly 'transformational' [1] work practices as a preferable alternative within organizational contexts is usually met with a resistance to change due to deep rooted and established work practices and culture [14, 15]. Innovation processes, in such cases, need to use methods that foster core competencies of an organization along with aiding the implementation of new ideas [16]. Multiple toolkits have been designed to introduce design thinking in different organizational and institutional contexts [17–19]. However, we argue that these toolkits are too abstract and removed from actual organizational work practices to be adoptable for sustained organizational innovation and to cause significant change in non-design practice. Research has also highlighted the issues of adoption faced by design driven change processes in organizations [2, 14]. While these toolkits share important insights into design thinking practices, they need to be curated based on relevance and introduced in a setting informed by work practices. Further, we propose that design thinking practices need to be introduced in the context of existing work practice, i.e., translated and framed in terms of the existing practices and problems of an organization.

## 1.2 Design Thinking as a proto-practice

Instead of looking at resistance to change in purely detrimental terms (with regards to innovation), it should be taken as an indicator of existing design processes within an organization and incorporated into the change processes. Viewed from a practice perspective, resistance to change can also be decoded in terms of ‘*legacies of practices*’ [14] and specifically as legacies of work practices related to the design of services within organizations. Brown and Duguid [20] argue that while legacies of practices are considered as resistant to change and obstructive to learning and innovation, they are in-fact potentially complementary. Further, they suggest that learning, if framed in terms of practice, can offer a bridge between working and innovating. Lately, the concept of practice as a unit of design, as opposed to a unit of analysis, has also been given special attention in HCI literature [21, 22], specifically in the context of situations that require sustained and systemic change and offer important methodological insights with regards to framing design thinking in terms of legacies of practice for non-designers. Kuijer et al. [21] argue that while practices have been widely studied analytically and used empirically for the design of new artifacts they could also be used as a unit of design where the intent of the design process shifts from the design of new products to the design of artifacts and settings that lead to the emergence of ‘proto-practices’ [21, 23, 24]. Shove et al. [23] describe proto-practice as

*the active integration of elements [of practice], some new, some already well established, that together constitute what we might think of as innovations-in-waiting*

Further, they highlight the future oriented nature of proto-practices by describing them as practices that are not yet realized [23] but rather are proposals for future practice that are ‘in the making’ and yet grounded in existing practices [25]. Shove et al. [24] differentiate between proto-practices, practices and ex-practices by discussing them in terms of the configuration of the elements of practice (described in detail in section 2). They argue that changes in the configuration of the elements of practice lead to changes in the nature of practices with new configurations taking the shape of proto-practices. This is in contrast with routine practice where links between the elements of practice are continuously being formed and hence the configuration of elements being sustained and ex-practices or disintegrating practices where the links between the elements of practice are no longer being created. Additionally, owing to them being a combination of the new and the emergent or the familiar and the well established these practices are also known to be transformational and change drivers by nature. We argue that design thinking practices need to be translated into proto-practices with the involvement of organizational communities and by situating them in the existing problems and practices of organizations. These emergent design thinking proto-practices would offer a way for the reflexive and collaborative transformation of work practices. Additionally, it would also allow for the possibility of using past experience, constraints and failures as frameworks for understanding implications and viability of design concepts rather than merely as consequences of failed processes.

This paper makes contributions to design thinking theory and practice by presenting a theoretical examination of the discussions on practice, learning and innovation from a practice theory, organizational studies and HCI research standpoint and drawing from the outlined theoretical considerations to introduce a methodological approach called 'proto design practice'. Proto design practice is a practice-based approach for organizational settings that allows for the translation of design thinking practices in the context of communities' work practice and consequently allows proto-practices to emerge. Next, we present two cases where we investigate the proposed approach in use and discuss our findings in the light of the theoretical considerations and methodological approach presented. While the cases present results from the context of an academic library, we suggest and elaborate that the approach is equally applicable for organizations in general. Lastly, our study highlights important design and research considerations with regards to using practices as a unit of design within organizational settings. Therefore, while the study does not describe specific interactive systems in a traditional sense, it contributes to HCI literature by adding to the emerging but significant body of research relating to the design of practices.

## **2 Theoretical Considerations**

### **2.1 Learning and Work Practice**

Brown and Duguid [20], in their seminal work on organizational learning, suggest that although innovation, work and learning are often considered to be conflicting activities in an organizational context, *'working, learning and innovating are interrelated and compatible and thus potentially complementary'*. Their paper places special importance on understanding work as a constantly evolving and socially constructed practice with constraints, rules and workarounds and sustained innovation as community centric outcome rather than being driven by individual practices. Further, they offer a conception of learning as a bridge between work practice and innovation and frame it as separate from explicit 'transfer models' like training where transmission of abstract and explicit knowledge is the focus and the setting for learning is not considered to be important. Learning, they argue, is not just the acquisition of abstractions and facts about practice but more importantly is about acquiring the ability to perform like a practitioner [20, 26]. It closely resembles the situated, social and improvisational nature of actual work practice and happens within and between communities of practice in settings situated in (rather than removed from) practice [16, 26]. They refer to this as 'learning in working' and claim that the knowledge in such cases is performative in nature and different from abstract knowledge that is largely declarative.

Due to the tacit and performative nature of the knowledge embedded in work practice, the social context and involvement in practice play a crucial role in the nature of translation, interpretation and understanding of that which is being learnt

[26, 27]. Hence, processes working within organizational settings need to account for these shared practices and design legacies specially in the context of systemic change and cross collaborative innovation [28, 29]. Learning removed from context and practice leads to participants gaining a 'know-that' about knowledge rather than a 'know-how' and hence has little to no impact on the social practices of the community [26, 30].

## **2.2 Practices as a unit of design**

Kuijer et al. [21] build on Reckwitz's [31] definition of practice which describes it as routinized behavior that consists of several inter-related elements out of which three are especially significant from a design standpoint - images, skills and stuff [23]. Images are socially shared meanings of practice and shared ideas of the significance of participation in it. Skills are learnt bodily routines, accumulated know-how and ways of acting and feeling based on the situation at hand. Stuff refers to the hybrid material elements involved in practice involving both human and non-human actors. Treating images, skills and stuff as fundamental constitutional elements for configuring practices, they argue that practice oriented design needs to consider existing and future configurations of all three elements and equally importantly, how they relate to each other and come together to facilitate the creation of proto-practices.

While their discussion and subsequent framework is largely centered on developing routinized behaviors and habits for creating systemic change for sustainability, the foundational concepts highlighted share a lot of commonalities with discussions on learning and work practice in organizational studies. Building on the differences between the nature of collective practices highlighted by Shove et al. [23], Kuijer et al. [21] define specific and enduring configurations of images, skills and stuff as practices-as-entity and suggest that they are retained over space and time if performances are regularly maintained and reproduced. However, this know-how is appropriated with a reconfiguration of elements when being enacted in specific situations and is referred to as practices-as-performance. The performative aspect of practice is especially significant in this discussion as performance is highlighted as the means through which practice becomes embodied as tacit knowledge and consequently innovation in practice is a result of conscious changes in performance. Brown and Duguid also refer to embedded practices (also see [14]) as representative of socially constructed and shared knowledge or know-how within communities of practice. Further, they differentiate between canonical or explicit and non-canonical or tacit forms of knowledge [20] in organizations and argue that actual practices of communities take a tacit form and are largely performative in nature [26] relating closely to the earlier discussion on practices-as-entity. These embedded practices also need to be modified routinely through collaborative and ad hoc decision making [20] based on the particular difficulties at hand, similar to Kuijer et al.'s [21] discussion on practices-as-performance. They highlight how communities narrate and share these instances of specific reconfiguration as informal stories and use them as a way to learn and change practices and frame it as a form of continuous innovation.

Therefore, we argue that the design guidelines and implications outlined by Kuijer et al. [21] would be very relevant for framing a practice-based methodological

approach for introducing design thinking in organizations. They propose the following considerations for treating practices as a unit of design - bodily performances, creating crisis of routines and generating a variety of performances. Involving all of these considerations allows for the creation of evolving configurations of the elements of practice - images, skills and stuff [23].

### *Bodily Performances*

Bodily performances are described as ways in which routines are learnt and evolved [21] and how tacit knowledge is embodied through peripheral participation [26]. When considering practices as a unit of design, situations need to be created that allow for active bodily performances in which new and familiar elements are integrated leading to the construction of proto-practices that can then lead to altered practice-as-entities.

### *Crisis of Routine*

Crisis of routine refers to situations where a change in the elements of practice leads to adaptation, improvisation and experimentation by participants [32]. This leads to new kinds of "crisis" performances involving elements that are completely new to practice-as-entity and consequently, potential opportunities for creating a change in practices. Kuijer et al. [21] suggest that crisis of routines should be designed and staged for generating proto-practices in performance (i.e., allowing proto-practices to emerge in practice).

### *Variety of Performances*

Crisis performances, unless repeatedly performed by a community of practice, are always perceived as exceptional and as a unique case. To reconfigure practice-as-entity, the crisis needs to be repeated for different members of the community leading to different kinds of adaptations and improvisations and allowing for multiple sets of similar narratives to be developed by the community around the reconfigurations in practice.

In summary, considering the theoretical implications highlighted in section 2.1 and 2.2, settings intended to introduce new practices should, ideally, be situated in a real social contexts and deal with issues of actual practice. Additionally, these settings should communicate a combination of tacit and explicit forms of knowledge rather than explicating abstractions and facts about ideal notions of practice. Lastly, they should create reconfigurations of images, skills and stuff by creating bodily performances, crisis of routines and a variety of performances leading to emergent proto-practices that provoke reflective change in organizational communities' work practices.

### 3 Proto Design Practice

We have argued that for catalyzing sustained reflexive and collaborative transformation of work practices, design thinking practices need to be transformed into proto-practices, i.e., design methods novel to an organization need to be integrated with familiar elements from the context and the practice of the organizational communities involved. In this section, we refer to the outlined theoretical considerations to introduce a practice-based methodological approach called ‘proto design practice’ that is intended to catalyze the translation of design thinking practices in the context of an organizational communities’ work practice and consequently allow proto-practices to emerge. Due to the largely tacit nature of proto-practices [21], we suggest structuring settings designed for their emergence should take the form of hands-on and collaborative workshops involving cross-functional communities for introducing design thinking practices.

Physical environments have an important role to play in enabling bodily performances [21, 33, 34]. From a design thinking practice standpoint, design studios offer a spatial setup for the enactment of its performances and routines [35, 36]. Wilkie and Michael [37] extend the conception of studios beyond its spatial characteristics and frame them as ‘centers of synthesis’ where heterogeneous perspectives (images), expertise (skill) and availability, use and reuse of materials (stuff) culminate into ‘creative’ or ‘innovative’ outcomes both in pedagogic and work settings. Blevins et al. [38] also highlight the creative, collaborative and ‘highly material’ nature of design studios and emphasize the importance of tangible representation using sketches, paper prototypes etc. in the design process. They build on Cross’ [8] argumentation that designers use highly representational methods to drive discussions as a process of building a ‘collective memory’ within the entire team. Based on these discussions, we argue that design studios outline important characteristics for framing design guidelines for workshops intended to translate design thinking practices to organizational work practice.

We start by identifying the communities involved in these workshops and the current configuration of the elements of practice for these communities by trying to discover the context of work, modes of participation and collaboration, common problem areas and mapping their experience and insights about the organization. Identifying these factors is also essential to understand the existing configuration of the elements of practice [23] for the participating organizational communities. This is done by repeated engagement with participating communities and facilitating their engagement with both problem discovery and solution discovery. The understanding gained through repeat engagements is also used to physically situate the workshop in the context of the participants’ practice and allowing them to work with their own problem areas in a familiar context. The re-configuration of elements happens in specially constructed settings along with new methods and materials that complement and sometimes replace existing ways of collaboration and are intended to create crisis of routines that allow for improvisation, appropriation and new bodily performances. Therefore, rather than a hands on training experience constructed around prefabricated design problems using prescribed and often abstract recipes commonly used in design training seminars and toolkits [17, 18], the participants are involved in

an improvisational and hands-on process built around design thinking methods introduced in the context of existing practices and problems of the community and offering a way of introspection, reflection and collaboration. Additionally, even though the workshop structure outlined in this approach shares characteristics with co-design settings [39] the focus on social and collaborative learning and the emergence of proto-practices rather than on design outcomes [40] serves as the primary and an important differentiator between the two. Other points of difference are the participants driving the problem definition and often working on multiple problem areas in independent design teams without any creative input from the designers who primarily play the role of process facilitators. The setup of the workshops is described in terms of the ‘space, the ‘materials’ and the ‘actions’ – characteristics evolved from conceptual descriptions of design studios in a research context [35–38] and explicated in terms of practice using the theoretical framework described in section 2 (see Table 1).

**Table 1.** Co-relation between the guidelines for Practices as a unit of design and the design guidelines for the workshop environment.

	Involving bodily performance	Creating crisis of routine	Generate variety of performances
Space	Creating an open space for free movement with access to personal and shared surfaces	Re-configured spatial arrangement situated within a familiar context	Undirected use of space, providing affordance and access to different surfaces
Materials	Providing access to a variety of materials for use as catalysts during exploration	Introduction of new materials while working with the problem area	Open-ended templates and a variety of materials
Actions	Provoking active collaboration and participation within and across groups	Introducing novel methods for performing familiar tasks	Semi structured outcomes

### *Space*

Kuijter et al. [21] suggest that participants find it difficult to let go of existing practices in familiar contexts but we argue that in the case of work practice, familiarity with the context and routines of the workplace offers greater opportunities of improvisation and appropriation. Therefore, rather than opting for a lab like environment that is completely removed from everyday practice, we instead propose a hybrid environment for the workshops that borrows elements from both the lab and the field<sup>1</sup>. Even though these workplace environments are situated in the context of

<sup>1</sup> Lab and Field here refer to methodological approaches described as a part of a larger framework, Lab, Field, Showroom, proposed by Koskinen et al. [41]. In this framework, lab refers to research conducted in controlled settings specifically created to observe and evaluate experimental prototypes that are radically different from real world settings. On the



the participant's practice, the physical setting of these environments is altered to resemble the setting and characteristics of a design studio. Vyas et al. [35] highlight the importance of re-configurability, agility and adaptability in design studios and refer to this flexibility in studios as 'workplace making'. They build on Horgen et al.'s [42] work by suggesting that workplace making is a reflection of the continuously evolving nature of the design thinking practice where changing understanding of the design practice leads to altered work practice and physical settings. Movement through shared and personal spaces is also attributed as an important characteristic of such studios [36, 38]. Therefore, workshop environments need to have accessible and usable vertical surfaces like walls and windows that form important shared spaces and movable furniture for personal and group work. The primary changes should be directed towards changing the workshop space from a traditional classroom or seminar like environment to creating open spaces with spread out furniture placed close to vertical surfaces (if possible) allowing for movement, re-configurability and access to shared and personal spaces.

### *Materials*

Materials, in the context of the design studio are used to represent and build a continuously evolving and externalized collective memory [35, 38] of the tacit understanding and work practices that individual team members possess. Materials in conjunction with specific spaces also highlight the evolution of shared physical spaces and helps build a common understanding between the team as a whole [43]. They are also significant from the perspective of collaboration and communication within and between communities. From this perspective, materials are conceptualized as boundary objects that help mediate cross-functional exchanges along with helping negotiate difficulties of effective communication and collaboration. Boundary objects, described as objects that embody shared meanings and are of interest to each community involved [44], help clarify the assumptions and attitudes of each community to others involved and to themselves as well [45]. Additionally, they are also known to enable reflection and second degree learning within communities engaged by them [44]. From a practice perspective, materials have a direct co-relation with 'stuff' and hence a change in the materials involved in the participant's routine practice would lead to an altered practice-as-performance due to a reconfiguration of the elements of practice. Hence, workshop environments should be equipped with access to a wide variety of physical materials like multi-colored paper, post-it notes, markers, scissors and glue. In addition to such constructive physical material, we also propose introducing semi-structured tools and templates that could act as a point of departure for various parts of the design process like storyboarding and mind mapping. These tools and templates act as catalyzing props for improvised performances. However, we argue for the use of minimal and reconfigurable templates that come without material or stylistic constraints and specific instructions for use. This is to allow for greater appropriation and experimentation during use.

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contrary, field is an approach where prototypes are situated in pre-existing real world social settings and their effects and interactions are studied 'in the wild'.

### Actions

Design thinking practices have been outlined as co-related design methods framed in the form of a process, both in academic literature [46, 47] and in commercial design practice [17–19]. Most discussions [8, 18, 19, 47] broadly frame the design process as a highly iterative process and moves between the following phases - problem identification, problem and context discovery, synthesis, ideation, prototyping and testing. In the context of workshop environments, we refer to actions as descriptions of design methods outlined through contextually relevant examples from work practice and leading to semi-structured outcomes. The major actions used to introduce specific design methods at different points in the workshop are described in Table 2.

**Table 2.** Actions used to introduce design methods related to design phases.

Actions	Design phases	Description
Problem Definition	Problem identification	Identification of the problem area to be addressed in a design project along with common goals and project vision amongst all the stakeholders involved.
Ecosystem Mapping	Problem and context discovery	An exploratory process that helps map and visualize the current understanding of a system [48]
Design Ethnography	Problem and context discovery	A set of methods (inspired from ethnographic research) used to understand specific user habits, perspectives and problem domain and context for informing design decisions [49]
Affinity Mapping	Synthesis	A process of identifying common co-relations and groupings between unstructured data and visually mapping them [50]
Sketching	All phases, general skill	A highly visual method intended to create rough and quick visual representations
Brainstorming	Ideation	An activity that is targeted at generating a lot of ideas rather than one 'perfect' idea
Storyboarding	Prototyping	A visual representation of the different elements of a concept that captures when, where and how products and services are used.
Rapid Prototyping	Prototyping	A method of creating low-fidelity prototypes of (physical and digital) interface concepts using rapid methods such as sketches [51]

While most of these actions are incorporated as methods in most commercial design toolkits [17–19] in one form or another, we argue against their introduction through detailed exposition and structured step by step process outlines supported by abstract examples removed from organizational work practice. Instead, we propose that these actions are intentionally introduced as loosely defined methods explicated primarily through examples from participants' work practice and supported by semi-structured templates to create an open-ended space for participants to perform and improvise using their skills and expertise. Actions should enable exploration and experimentation and allow the participants to learn through discovery and making

mistakes. From a practice standpoint, this allows for multiple reconfigurations of skills, stuff and images, allowing the participants to create variations in performance and define new and unique configurations of the elements of practice. The participants in such a workshop environment are free to develop their own visual language and format for the outcomes using the materials at hand, including the templates that provide a starting point for these actions rather than directing them towards fixed outcomes.

## 4 Case Study

The case study described here was a part of a research project on user experience in academic libraries and introducing design methods to aid the development of services with a user centric perspective. This research project provided a specific site to study the methodological guidelines (described in section 3) used in the 'proto design practice' approach within organizational settings.

### 4.1 Background: Introducing Design Thinking in Academic Libraries

Academic and research libraries are expected to fulfill new and more specialized roles relating to effective distributed information and infrastructure access, production and consumption [52] and subsequently librarians' roles have evolved beyond collection management and reference desk duties into that of subject specialists who provide cross-disciplinary research assistance along with discipline-specific help to academic units in an institution [53]. The nature of the librarians' expanded roles and responsibilities require the development of cross-functional expertise and continuously evolving services necessitated by constant technological evolution. Further, it requires the cultivation of a mindset and competence for cross-disciplinary and sustained innovation that builds on the existing expertise and competence inherent within libraries. However, due to the involvement of multiple stakeholders and the indeterminate and rapid nature of technology development, the development of an innovation strategy for libraries becomes a 'wicked problem' [3, 53]. Therefore, it presents itself as a dilemma between the motivation towards change [53] in the face of an increasing need for change and innovation. As discussed in section 1, design thinking practices, with their effectiveness in working with 'wicked problems' [7] and the demonstrable ability to catalyze cross-functional innovation (see [4, 9, 11, 12]), could offer important strategic directions for resolving the said dilemma. Hence, for the purposes of our study, the academic library is a quintessential organizational setting where design thinking practices need to be introduced and is consequently a good case to study the methodological guidelines described as a part of the 'proto design practice' approach.

## 4.2 Method

In this study we present our findings using a case study methodology to analytically describe participant interactions and design outcomes from workshops conducted at academic libraries using the proto design practice approach. Two cases, situated in the Law and the Humanities department libraries of an academic institution's library, are described. We present two cases to highlight the dynamic and evolving nature of the design of the actions and materials used even though the approach remained fundamentally the same. Two workshops are described within each case along with a short description of the changes made to the approach in the second case, due to the feedback and observations from the previous case. The workshop description in the second case is comparative in nature and highlights the changes to space, materials and actions and their effects as compared to the previous case. The study built on earlier research work highlighting the positive effects of design thinking in academic libraries [12, 54] as a driver for cross-functional innovation. The author along with two members of the central library from the academic institution the workshops were being held for, conducted both workshops. Both of the workshop co-facilitators were collaborators in the research project on user experience in academic libraries as well and were present to help the author conduct the workshop and assist the participants. The participants in both cases consisted of the staff and management from the library itself and were not recruited or monetarily compensated but were invited through an open sign up process for the workshops. However, the same set of participants was requested to attend both the workshops within each case since the outcomes and discussions from the initial workshop were supposed to inform the discussions and explorations in the subsequent workshop. The workshops were conducted in the context of the participants' practice with the participants divided into groups of 3-5 members each. The spatial configuration in all the workshops was oriented to create separate working spaces for all the groups as well as to allow for easy movement both for the participants and the workshop facilitators. The materials selected for the workshop were inspired from those used in design practice like multi-colored post-its, tape, foam boards, large and normal blank paper sheets, multi-colored marker pens etc. In addition, tools and templates were also made available for tasks like problem definition, brainstorming and storyboarding. These tools were kept extremely minimal and semi-structured by design (see Fig. 1 right for an example) to allow the participants to appropriate them in conjunction with other materials in use. Finally, the actions introduced in each case were selected based on the time available and the participants' familiarity with design practice.

Photo-documentation and direct observations were used as the primary analytical tool supplemented by verbal and written qualitative feedback provided by the participants during and at the end of the workshops respectively. We present our findings in the light of the impact of the methodological guidelines discussed in section 3 that define the nature of the space, materials and actions used to configure proto design practices in organizational settings represented in both cases by academic libraries.

### 4.3 Case 1: Law Library

The first case describes two workshops that were conducted with members of the staff of an academic institution's Law library including members from the reference desk, leader group and digital services group. Conceptually, the workshops outlined were thematically structured around 'problem definition' and 'solution discovery'.

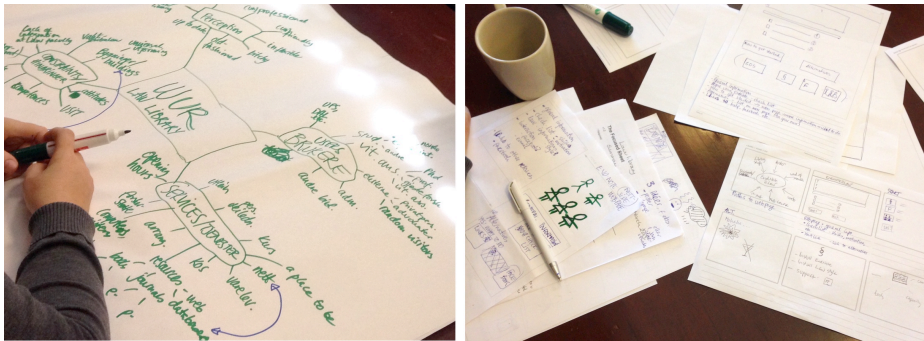
#### *Workshop 1: Problem Definition*

After an initial round of meetings with the library management to understand the roles of the participating communities in the workshop and to introduce the workshop structure to them, the first workshop was set up where ten staff members participated. The duration of the workshop was two hours and it took place at a conference room in the Law library where the furniture in the space was reconfigured to allow for group discussions and easy mobility. The goal was to have a collective brainstorming exercise for identifying potential problem areas from the participants' practice and experience. The participants were asked to form two groups of five each and were given a tool called 'the focused sheet' as a part of this action. This tool was an exploratory questionnaire that was divided into four parts that helped participants discuss potential users, their problems, context and organizational constraints respectively, as a way of formulating probable problem areas. Since the participants were used to working collaboratively with their group members, the structure of the group discussion was familiar to them. The tool however, created a reconfiguration of routine by being an additional physical material that the participants had to work with during their discussions and by adding a semi structured format to the discussion by posing questions around users and their context that would usually not be addressed in similar discussions. The groups addressed the tool differently, with one of the groups working through the sheet sequentially and discussing and completing each statement before moving on to the next and the other group choosing to have an open discussion after reading all the questions in the sheet. Finally, a collective discussion was conducted where both teams presented their responses and collectively deliberated over them with the author and library leaders helping assimilate their responses into a final collective focused sheet that outlined the problem area that would be addressed in the following workshop.

#### *Workshop 2: Solution Discovery*

The second workshop was conducted as a full day workshop in the same meeting room as the previous workshop at the Law library with fourteen members of the staff participating. Like in the previous workshop, the room was reconfigured and the participants were asked to form four groups, two of four and two of three members each. Each team was provided with an assortment of material like post-its, large and normal blank paper sheets and marker pens along with templates to aid the participants with different phases of the design process. The altered configuration of the space and the material available was designed to mirror the configuration and material used during the initial phases of the design process in design studios. The goal of the workshop was to introduce design thinking practices in the form of a process built around design methods using the problem area identified in the previous

workshop as the point of departure. The workshop was broken down into three phases: discovery, ideation and prototyping, with each phase lasting for about one hour and thirty minutes. The discovery phase consisted of a mind mapping exercise called ecosystem mapping where the participants tried to discuss and map the problem space visually by exploring four key areas as starting points - sub-classifications in the user category identified along with possible co-related users, current services offered related to the problem space, user's perceptions about the services offered and organizational constraints. The goal behind this action was to introduce a visual and collaborative method for group discussions and to establish a common agreed upon understanding of the problem space (Fig. 1 left).



**Fig. 1.** (left) The ecosystem map created by one of the groups. (right) The concept storyboard designed by one of the groups.

The ideation phase was split into two parts. The first part was an individual exercise where the participants were asked to work with the ecosystem map and identify as many concepts as possible for redesigning existing services or for new service ideas in the problem space. This was followed by a group exercise where the participants were asked to present concepts to each other and deliberate over them to identify the best concepts and/or create new concepts that built on individual ideas. This was done to allow participants to create concepts that built on their own individual experience and expertise in the framework of the identified ecosystem before discussing and deliberating over them as a group, allowing for more meaningful exchanges incorporating a multiplicity of perspectives. Participants were asked to put their ideas down on blank sheets of paper and initially, it was seen that most of them were verbally explaining their concepts on the sheets of paper provided and using a lot of time struggling with finalizing a proper framing for their concepts. Since this was becoming nearly identical to the participants' everyday practice, the ideation phase was paused and a small sketching exercise, led by the author, was conducted for about fifteen minutes. During this exercise, the participants were asked to create rapid sketches of common artifacts and spaces like smartphones, academic buildings, reception areas and stick figures and later asked to construct a narrative out of them. After the sketching exercise the ideation phase was resumed and the participants used a combination of sketches and snippets of text to illustrate their

concepts in a much more rapid fashion. Finally, in the prototyping phase, due to the constraints of time, the groups were asked to identify one of the final concepts and develop it into a storyboard (Fig. 1 right). The participants were asked to break down the concept into a series of direct and indirect interactions where the indirect interactions would lead up to the moment of direct interaction and subsequently lead out from this moment. Besides using the storyboarding templates provided, the technique of using individual visual elements to outline a narrative discussed in the sketching exercise was also used by the groups in this action. Finally, all the storyboards created were presented followed by a common discussion around overlaps between presented solutions and possible implementation strategies and risks for each solution. An open feedback session was conducted along with the circulation of a feedback form and the workshop was concluded with a note of thanks to the participants.

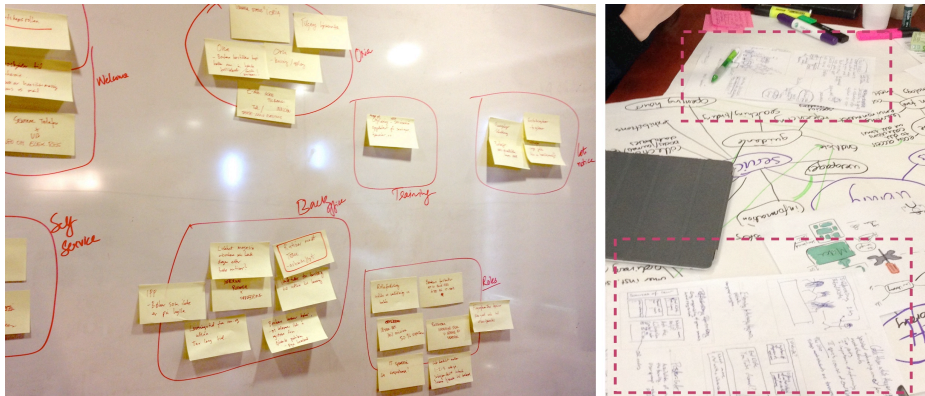
#### **4.4 Case 2: Humanities Library**

The second case describes two workshops that were conducted with members of the staff of an academic institution's Humanities library including members from the reference desk, leader group, backend services, support services and digital services group. Being a larger section of the library, the number of participants in the workshop was almost twice compared to the previous case. While the nature of the workshops followed a similar 'problem identification' and 'solution discovery' format, the actions incorporated were changed based on our observations and feedback received in the previous case. The problem identification method and template were altered and made less rigid while in the second workshop design ethnography, affinity mapping and rapid prototyping were incorporated as new actions. Further, multiple problem areas were identified, allowing each group to work with a problem area that was closely related to their practice.

##### *Workshop 1: Problem Identification*

Due to the diverse nature of the work practice of the participating communities and the larger number of participants in this case a different strategy for problem identification was adopted. The first workshop was setup as a part of one of the regularly scheduled meetings in the library where the structure of the upcoming workshop was introduced to the attending library staff and the author got a direct and face-to-face introduction to the roles and participating communities that the staff members were a part of. Twenty-two members of the library staff attended the workshop that was scheduled as a two-hour workshop. Rather than converging the problem space through discussion and deliberation around the focused sheet, an open brainstorm strategy was adopted. The participants in this meeting were asked to identify specific service, space or information related issues and every suggestion was noted on a post it and added to a wall without any filtration. The library management was not included in this part of the discussion to make the environment more anonymized and to encourage more open suggestions. Next, all the suggestions were collaboratively grouped by service, space or information type and larger clusters of problems were broken into sub-clusters by problem type (Fig. 2 left) leading to the

creation of seven problem areas. Using a sign up process, five groups were created, four of four members and one of six members. All the groups signed up for different problem areas. At the end of the workshop, all the participants were given the focused sheet and were asked to meet in their groups and discuss possible problems within their chosen problem areas that they could address in the next workshop.



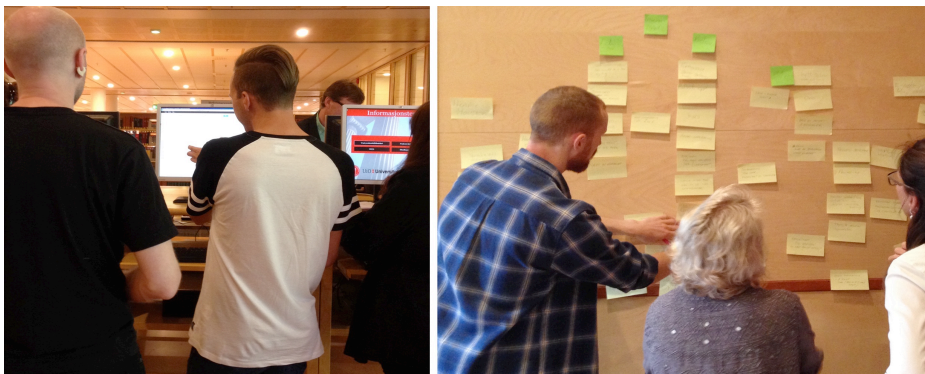
**Fig. 2.** (left) The final sub-clusters identified highlighting the problem areas. (right) The ideation sheet being used by participants in Case 1 (highlighted with red dotted lines).

### *Workshop 2: Solution Discovery*

The second workshop was conducted over two full days with twenty-two participants in a large conference room at the humanities library. The conference room was selected because of its large area, reconfigurable furniture and the accessibility of vertical surfaces like walls and windows in it. Five separate workspaces were created for the groups formed in the last workshop and each group was provided with materials like multicolored post-its, index cards, blank paper sheets in different sizes, multicolored marker pens, scissors, rulers and tape. While the goal of this workshop was the same as in the last case, i.e., introducing design thinking practices through the proto design practice approach using the problem areas identified in the previous workshop as a point of departure, a few important changes were made with respect to the materials, space and actions. While most of the materials were similar to the last case, index cards (A5 size and format) were specifically added to aid rapid ideation. Index cards, being smaller in size than sheets of paper (A4 size and format), allowed the participants to sketch a single concept per card and use as many cards as needed. This was due to the observation from the last case, where participants found the size of the sheets of paper too big (and the size of post-it notes too small) for single concepts (Fig. 2 right). Tools like scissors, rulers and tape were also introduced to allow the participants to reconfigure the materials. Vertical spaces were also made more accessible and the nature of the actions was also altered slightly from the last case to make greater use of these spaces. This was done to create improved shared spaces and encourage more active bodily engagement from



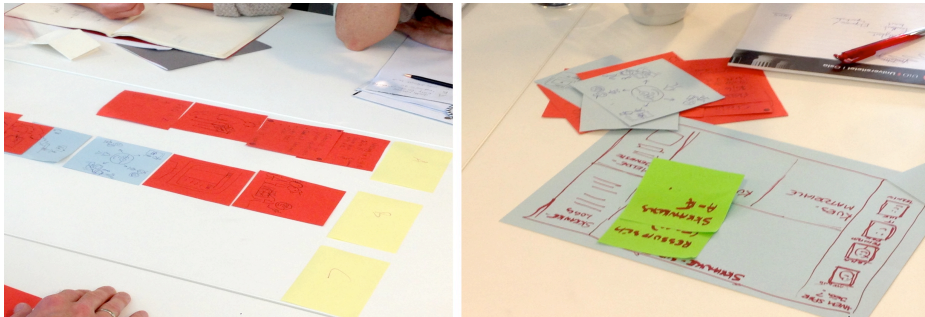
the participants. The change in actions used during the workshop was driven by two important observations. First, it was observed in the previous case that the discussions amongst the participants were largely framed around organizational and technological considerations with limited attention being paid to the user's perspective. Second, the storyboards discussed by the participants were still at an abstract level with regards to considerations like the content, format and channel. Hence, in this workshop, design ethnography and affinity mapping were introduced as an action to explicitly engage participants in user-centric perspectives in the workshop along with rapid prototyping to allow the participants to express their concepts in a much more tangible and concrete manner. Therefore, in this case, the workshop was broken down into four phases: discovery, synthesis, ideation and prototyping. As a part of the design ethnography action, the participants were introduced to different methods, including open interviews, guided tours, interface walkthroughs, cognitive mapping and directed storytelling. After the introductory session, each group was given thirty minutes to prepare for engaging with their informants where possible lines of enquiry and methods were decided. In the interest of time, informants had been pre-arranged for each group and an hour was allocated for this action.



**Fig. 3.** (left) Participants using the guided tour method with an informant. (right) Ecosystem maps being created on vertical surfaces.

Each group chose to work with more than one method, opting to complement open interviews with guided tours (Fig. 3 left) and cognitive maps for physical spaces and with directed storytelling and interface walkthroughs for digital services. This action was followed by a debrief coupled with the affinity mapping [50] and ecosystem mapping action. The intent behind this action was to identify common relationships and sub-groupings within the semi structured data in the map from the last action. The goal of this action was both reflective and analytical, juxtaposing user and organizational perspectives to clarify and create a common understanding of the problem space along with identifying possible areas of opportunity and intervention. As discussed earlier, in contrast to the previous case, the groups were asked to work with the vertical spaces in the room to create the ecosystem map (Fig. 3 right). Each participant used post-it notes to add their observations and thoughts to the map using

a similar template as the last case, starting with outlining user perspectives and followed by services offered and organizational strengths and constraints.



**Fig. 4.** (left) Segregating concepts into categories based on the complexity of implementation. (right) Paper prototype of a support website designed by one of the groups.

The session on day two consisted of the ideation and prototyping phases. The strategy for the ideation phase was similar to that of case 1, starting with a short exercise in rapid sketching followed by individual brainstorming and group discussions. As discussed earlier, the participants used index cards to represent their ideas and were subsequently also asked to collectively segregate ideas into three categories based on their complexity and the time frame needed to implement them: A- short term, B- intermediate term, C- long term (Fig. 3 left). Next, each group was asked to identify a concept for prototyping. Based on the concept selected, different strategies for prototyping were individually introduced to the groups (Fig. 3 right). Keeping the paper prototype as a central artifact, the groups then created a storyboard presenting the selected concept in use. Finally, each prototype and the accompanying storyboard was presented and discussed by all participants highlighting opportunities around impact on user experience, implementability and possible risks. Each group also tried to discuss their struggles and processes of concept selection during the final presentation. Finally, a feedback form was circulated and the workshop was concluded with a note of thanks to the participants.

## 5 Findings

In this section, the theoretical considerations related to learning and practices as a unit of design are used as an analytical lens to discuss findings related to the participants' interactions and feedback in the workshops. In addition, the proposed methodological guidelines introduced in section 3, related to the configuration of the space, materials present and actions introduced are also evaluated.

## 5.1 Improvised Bodily Performances

The spatial settings were reconfigured in both cases to allow for free movement and discussion within and between groups and the use of surfaces like walls, windows and tables to trigger improvised bodily performances. Additionally, each group was provided with a variety of materials like multicolored post-its, paper, multicolored markers, tape and scissors. We observed that altered spatial characteristics and access to materials played an important role in supporting active and collaborative bodily performances that were triggered due to the introduction of new actions during the workshop. For example, during the ecosystem mapping action in the first case, most participants chose a standing posture and gathered closely around the sheet of paper on which the map was being created (Fig. 5 right). This was also seen during the affinity mapping action in the second case, when most groups chose to stand and gathered around sections of the walls implicitly understood to be reserved for the group to start the debrief by putting post-its on the walls. The re-configurability and affordance of the materials also played a role in directing the performance when the groups chose to spread away from each other as the discussion moved forward, working approximately in each corner of the room. One of the groups started the debrief on paper sheets on their table but due to restricted possibilities of movement, chose to shift their map to the wall. This was different from the routinized bodily performances that formed the participants' work practice as described by the following snippet from a participant's feedback:

*The method of working (at the library) is usually based on a string of meetings, followed by summary sheets or discussion groups. (Participant, Case 1)*



**Fig. 5.** Differences in bodily performance due to the materials and space used. (left) Using a vertical surface (wall) for ecosystem mapping in case 2. (right) Creating the ecosystem map on a large paper sheet on a flat surface (table) in case 1.

Working with materials like post-it notes and index cards in the second case instead of writing directly on sheets as in the first case also had a positive effect on the range of movement and collaboration amongst the participants (Fig. 5). In the first

case, we observed that participants would often switch back to verbal discussions and delegate the job of writing and note taking to one or two of the participants, possibly due to the size and orientation constraints presented by the paper sheet. In contrast, in the second case, all the participants collaborated fully by writing on their own post-it notes and moving freely to add their notes to appropriate sections of the map. The vertical placement of the map (on walls, see Fig. 5 left) allowed for greater physical engagement on each participant's part and was aided by the use of post-its which allowed for re-configurability of data during the debrief. We also noted that locating the workshop in a familiar physical space had a positive effect on the participants' bodily performance. An example of this was observed after the introduction of the design ethnography action, when rather than electing to restrict themselves to open interviews, which would have closely resembled their routine practice, almost all the groups chose to complement the interviews with more performative modes of enquiry. Groups dealing with physical spaces and training decided to actively engage in the relevant spaces in the library by following the informants in guided tours and taking pictures of the points of interest and creating cognitive maps outlining the most frequently visited spaces in the library (see Fig. 3 left). Other groups dealing with digital services like search and retrieval also engaged the informants in walkthroughs through the services being evaluated. Thus, the active, collaborative and highly material nature of the design thinking practice [36, 55] was adopted in the participants' improvised bodily performance organically due to introduced actions, materials and spatial arrangements that aided the reconfiguration of the elements of practice in the workshops.

## 5.2 Crisis of Routine

While improvised 'crisis performances' were being triggered through the introduction of novel, highly representational and visual actions using material elements and spatial re-configuration, having familiarity with the problem space and context helped the participants in building on their own experience with the problem areas and physical space. For example, while materials like post-its and markers were not new to the participants, physically engaging with them for the purposes of collaboration and 'visually mapping' common perspectives and understandings as an ecosystem was highlighted as novel by participants in both cases who were used to more textual or verbal approaches like discussions in agenda driven meetings. However, we observed that this 'novel' action was still effectively used by participants to discuss personal experiences and map service issues, opportunities and organizational constraints (see Fig. 5 left). Further, even though a reconfigured spatial arrangement helped enable improvised crisis performances, familiarity with the physical space also aided reflection on context related assumptions like how users preferred to move around in specific spaces and which spaces and services they use the most. While this was largely absent during the first case, it was repeatedly observed in the second case during the affinity mapping action when participants highlighted new insights and gaps in their understanding that emerged after their interaction with the informants during design ethnography. One of the groups in this case, working with the employee training in the library, decided to revisit their problem space after realizing that most

of the issues in the space were due to lack of good informational and support services and not due to ineffective training methods as presumed earlier. One of the participants from this group noted during the workshop:

*The structure [so far] seemed chaotic and uncertain but the [affinity] mapping has brought us on the same page. The keyword is 'lack of information'. (Participant, Case 2)*

We also observed that the affordance of different materials in conjunction with the nature of the introduced action also led to varied crisis performances. For example, we observed that after the exercise in rapid sketching in case 1, most participants started using a combination of sketches and text to represent their concepts. However, most participants used only a single sheet of paper to represent all of their concepts and tended to stop (rather than taking a second sheet, see Fig. 2 right) once the sheet was fully filled up. In the second case, the sketching exercise was conducted before ideation and similar results were observed during the ideation phase with one important difference. In this case, index cards were provided to the participants for representing concepts. Due to the format and affordance of the index cards, the participants could take a stack of cards in their hands and sketch a single concept on a card, remove it from the stack and move to the next. We also observed that they also allowed participants to reflect on existing concepts to evolve them further in separate cards and in the subsequent group ideation action, co-relate and categorize concepts physically and collaboratively. These examples highlight the nature of crises that led to emerging proto design practices that were used during subsequent actions.

### **5.3 Variety of Performances**

Due to the semi-structured form of the outcomes from the introduced actions, the participants were free to come up with the means of expression and deliberation that worked best for their groups. For example, during the sketching exercise in both cases, participants were encouraged to develop their own styles of visual representation and therefore outcomes took different formats with some participants using stick figures and abstract figures for representation while others took a more detail oriented approach. The participants took this visual style forward into their storyboards and paper prototypes, highlighting common patterns in individual performances even though performances differed from person to person (see Fig. 1 right). This was also aided by the availability of a wide variety of materials and templates along with the availability of group specific spaces allowing the participants to move around and change postures during different parts of the workshop. For example, rather than outlining a particular process and introducing a strict template for developing storyboards, the informational and narrative aspects of the storyboard were explained to the participants along with multiple templates. This allowed the participants to develop their own narrative techniques using different materials and means of representation. While some groups sketched multiple iterations of the storyboard using the template provided, others used post-it notes and elected to add or remove frames as the narrative developed. Some groups also improvised their ways of

working by learning from other groups and discarding strategies that were time taking or hindered collaboration.

#### 5.4 Emergent Proto-Practices

##### *Emergent proto-practices through reconfigured elements of practice*

We observed that the individual and group actions in both cases were highly collaborative and discussion driven with participants presenting outcomes like problem definition, sketches, concepts and storyboards within their groups and to the entire workshop. As highlighted earlier, each group developed their own ways of collaborating and visual representation using the materials provided. In addition, we found that the role of the designer was essential as a facilitator and a catalyst to help introduce the participants to the actions, materials and in configuring the space (the considerations of proto design practice). This is in line with the observation by Brown and Duguid [20] that ‘learning in working’ happens through fostering access to the practices of the target community along with opportunities to bring in existing experience and expertise and the intricacies of the context into the process. However, we deliberately decided against the explicit and active involvement of the designer in creative processes and instead allowed the groups to engage in free exploration and independent decision making. As discussed earlier, hands-on engagement with the introduced actions and materials in the altered spatial configuration helped trigger a variety of improvised crisis performances. These performances also highlight a reconfiguration in the elements of practice – stuff, skills and images. Skills and stuff were re-configured through active engagement with actions and materials in the workshop. The reconfiguration of images happened through the reflective co-relation of actions to work practice by the workshop participants. Consequently, this allowed for the emergence of proto-practices through the creation an alternative configuration of the elements of practice. For example, active engagement with visual mapping actions like ecosystem and affinity mapping (Fig. 5) to collaboratively synthesise insights from large unstructured data sets allowed the participants to work constructively and develop a shared understanding of the problem space. Additionally, the outcomes from these actions were used to identify design opportunities further on in the process. The combination of active improvised performances and the application of these outcomes to familiar problem spaces (from participants’ practice) helped the participants in a reflective appropriation of design thinking methods to their own practice; thus triggering the emergence of proto-practices. This was also indicated by comments from the participants like:

*The mapping based ‘analysing method’ has interesting potential both for small and big challenges/scenarios.  
(Participant, Case 1)*

*It [design thinking practices] is a good way of learning to cooperate, discuss, listen and create. I will try and make visualizing a part of group/project work. (Participant, Case 2)*

### *Impact of proto design practice on routine work practices*

Collectively, our findings indicated that substantial engagement and interest was created towards design thinking practices in both cases. Beyond general reflection on work practice, participants also shared specific instances of where they thought design thinking practices could be integrated into their own work practice, specifically with regards to actions introduced in the workshops related to information mapping and cross-functional collaboration like ecosystem mapping, sketching and individual and group brainstorming. This seems to follow naturally from the information centric and cross-functional nature of the participants' work practice which routinely requires them to work across communities like researchers, students, engineers and professors. Some specific examples were highlighted by the participants in their comments like:

*I like the visual way of working and believe I will use it in shaping courses for students in the fall term. I find it a useful way of abstracting complex information to bare necessities.*

(Participant, Case 2)

*I will use sketching to make ideas for teaching my students and in working with information about what the library can offer to help students with reference work. We can be more aware of how new students can be introduced to End note when they start to write their thesis. (Participant, Case 1)*

The repeated mention of students as the focus of potential design outcomes like re-worked course structures and reference material in these comments highlights the incorporation of a user centric focus in the participants' responses. Participants also commented on the need for repeated engagement with design practices both in workshop and real world project settings to be able to fully integrate introduced actions into practice. While this is not the immediate focus of this study, we agree with the need for repeat interaction and engagement with design practices to reinforce and strengthen the links between the reconfigured elements of practice. The transition of proto-practices to routine practice through repeated engagement and support would be a valuable extension of this study and an important topic for future research.

### *Management support and strategic directions*

We realised that having the management of the library participate in both cases was helpful in identifying opportunities for continued engagement by developing promising outcomes from the workshop further and in planning strategic extension of these practices within the organizational context. Concepts from the workshop like the development of a facebook page for reference management support in the first case and creation of reference material like brochures for book search in the second case have been developed further. In the second case, the library management also highlighted possible actions like brainstorming and affinity mapping that could be incorporated into the weekly section meetings. Continued organizational interest in design thinking practices has also resulted in grant proposals from the university

library for further developing design thinking methods and support services in collaboration with the research group the author is a part of.

### *Organizational uptake and spread of design thinking practices*

While this study focuses on the initial impact of reconfiguring the elements of practices and the emergence of proto-practices, larger organizational interest in the participants' co-constructed narratives during the workshops could be seen in the willingness of the organization to engage with these practices in real world project contexts along with interest from other departments in similar workshops as well. The author was invited to co-ordinate and conduct a similar workshop at an inter-departmental planning and discussion session for the web editor group where the information on the library web pages were deliberated upon and areas requiring direct user evaluation were identified. Members of the web editor group from the library, which includes some participants from the workshops described in the cases, have subsequently tried to run guerrilla evaluation tests for various web based library services. We were also invited to conduct a workshop for a cross-disciplinary working group for an upcoming university building where participants from different research groups, the science library and an architecture firm participated. This workshop has become a recurring event for the working group and is led by researchers from the library itself. Such events have also had repeated participation from members of the library whose role cuts across departmental or domain specific boundaries (like digital services, web editors etc.) and have shown an interest in introducing design thinking practices to other communities that they are involved in, as well. Moreover, we have been (and continue to be) invited by many other departments for similar workshops including the Humanities library (described in case 2) due to word of mouth interactions between workshop participants and the larger library community. Brown and Duguid have stressed on the importance of socially constructed, practice linked narratives with regards to knowledge retention and transfer within and between organizational communities [26]. Therefore, we think that these word of mouth interactions within and between organizational communities were catalyzed by the emergence of the narratives linked to proto-practices during the workshops. These findings indicate the strategic importance of engaging organizational communities and highlight the longer-term impact of the proto design practice approach beyond the workshops themselves.

## **6 Discussion**

Present day organizations are situated within complex and continuously evolving multi-stakeholder ecosystems leading to complex and indeterminate product and service outcomes. Therefore, it is clear that organizations' work practices need to transform to allow for ongoing evolution at both the process and outcome levels. While design thinking has been proposed as a good fit for the kind of transformational work practices needed within organizational settings, organizational engagement with it has been limited at best. A key contribution of this study on design thinking literature is to theoretically and practically examine the considerations



and effects of a practice-based approach to introducing design thinking in organizational contexts by drawing from discussions in practice theory, organizational studies and HCI. Further, our study highlights important design considerations with regards to using practices as a unit of design within organizational settings and for designing for improvisation within these settings which contributes to the significant and emergent area in HCI literature relating to the design of practices. In the following sections, we present our reflections on the study and approach along with articulating design and research implications for HCI.

## **6.1 Designing for Improvisation**

A central goal of the study was to explore how design thinking practices could be reflectively appropriated and transformed into proto-practices by organizational communities. Building on theoretical considerations outlined by Kuijer et al. [21], the configuration of proto-practices was done through the reconfiguration of the elements of practice and triggering improvised performances. Additionally, situating the workshops in the physical context and in issues extracted from everyday practice but in reconfigured spatial arrangements, materials and actions resembling a design studio environment helped create crisis of routines [32]. This allowed the participants to appropriate and translate the described methods in the context of what they knew through experimentation, making mistakes, and discussion and consequently leading to a 'variety of performances' that all groups could learn from. Our findings indicate that as with the design process itself, it was essential that this process take a route of active exploration and discussion, with the designers playing a purely facilitative role rather than an overly instructive or creative one. However, while the participating groups finally managed to uncover multiple creative concepts through collaborative exploration, the process of improvisation with design methods may often seem unstructured and 'somewhat chaotic'. While designers are known to work with uncertainty as a part of their practice [8], participants often expect 'correct' answers to be pointed out, especially early on in the process. Workshop facilitators in such cases need to perform a difficult balancing act between keeping the participants engaged in the process while also provoking further exploration and improvisation.

## **6.2 Design of Practices**

Using design thinking practices to engage with problem-spaces situated in their own physical contexts provoked the participants to reflect on the role of design and design methods with regards to their own practice. This reflective integration and appropriation of the freshly introduced design practices with the existing routine work practice is a clear indicator of the emergence of proto-practices. Our findings highlight that the proto design practice approach was successful in engaging participants with user and solution centric design processes and enabling reflection on the longer term role of these processes with regards to their own practice. However, while it provokes creative and reflective engagement within organizational communities, we strongly suggest that this engagement should be supplemented with

strategic planning and partnerships to facilitate repeated interactions and further use in work practice. Additionally, while the focus of this study was on the introduction and translation of design thinking practices in organizational communities, the longer term individual impact of design thinking proto-practices focusing on the making and un-making of the links between the elements of practice suggested by Shove et al. [24] is an important next step deserving further exploration.

Finally, while the topic of the design of practices is being discussed from many perspectives in HCI research like design futures [56], domestic practices [57] and sustainability [21, 22], there is little work addressing the direct exploration of these concepts in the context of organizational learning. This study contributes to this potentially significant area of HCI research by highlighting findings related to the design of more meaningful engagement with design thinking practices within organizational settings from a practice-based standpoint. Further, it extends and applies the concepts of learning in working [20] and knowledge transfer through socially constructed narratives [26, 44] from organizational studies to design thinking discourse. In particular, the proto design practice approach positions the participants in an active design role and highlights the future possibilities of proto-practices in action by reconfiguring the elements of their work practice within the context of daily performance.

## **7 Conclusion**

Building on theoretical discussions on practice theory, learning and innovation in organizational studies and HCI literature, we have outlined theoretical guidelines and proposed a practice-based methodological approach for translating design thinking to organizational work practices. We refer to this approach as 'proto design practice' and suggest methodological considerations related to the configuration of the space, materials present and actions introduced that would allow design thinking practices to be transformed into emergent and generative proto-practices through hands on workshops. These interventions are intended to create reconfigurations in the elements of participants' work practice by triggering improvisations in bodily performance, creating crisis of routines and generating a variety of performances. Therefore, we contribute to design thinking theory and practice by discussing the relatively un-addressed area of the role of practices with respect to the strategic and transformational impact of design thinking in organizational settings. Further, we also contribute to the significant and emerging area of the design of practices in HCI literature by highlighting important design and research considerations with regards to using practices as a unit of design within organizational settings.

Using the findings from a case study on introducing design thinking in an academic library setting we have shown that workshops structured using the proto design practice approach are capable of overcoming initial resistance to change and subsequently translating design methods to proto-practices. Additionally, we have found that beyond generating initial interest in design methods, the workshops also generated insightful and reflective discussions around longer term impact on work practices and hence indicate the potential for larger transformations within

organizations. Lastly, while the focus of our research was the translation and introduction of design thinking practices in organizational communities, we feel that the longer term affects of emergent design thinking proto-practices on individual participants deserves further exploration.

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