

SELF-DIRECTION IN A CO-DESIGN PROJECT FOR A HOSPITAL INFORMATION SYSTEM: TOWARD SOCIETY-SHAPING DESIGN

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1. Introduction

This paper looks at a co-design project being advanced by the authors, reflects on the way it has evolved, and makes observations about the principles that facilitate the self-directed collaboration between design experts and users fostered therein. Self-directedness means that plays a role of operating design both by designer's and user's independent point of view respectively. Discussion includes an outline of the project, a framework of principles for understanding the evolution of the project, a distillation of a model for self-direction, and the factors that make such evolution possible.



Figure 1. Sketches by nurses: Looking closely at their own jobs

2. Research Outline

2.1 The Challenge of Co-design

Co-design is a process in the research and development of products or services wherein design experts draw users into the design process, building collaborations that generate solutions to design problems. Emerging to shape people's potential activity as a new objective of service design requires a new formation for the design development team. Sanders and Stappers describe the distinctive feature of co-design as being in the process of coming up with what issues to address by changing the roles of the designer, the researcher, and the user [Sanders and Stappers 2008].

It is no easy task, however, for designers and users to cross the boundary between the worlds of makers and users and come up with what issues to address through design. The reason is that because both are conscious of the bilateral relationship between them it takes time before a merging of roles can be achieved. Nurturing a project in which self-directed co-design takes place – that is, the designing of the project itself – is a new issue in design research.

The value that self-directedness brings is appreciated on increasing usability of the design results derived from adequate shape for potential activity drawn by users, also growing capability of improvement on outcomes of the design by users in their practice.

For the current research, we have put together a collaborative team of experts from the fields of medical services, design, engineering, and psychology and are engaged in a co-design product. The topic addressed is the development of a handheld terminal for nurses to use in a hospital information system [Fujimitsu et al. 2033], [Watanabe et al. 2013], [Nishimura et al. 2013]. In this collaboration, the medical services members (the nursing group) were largely responsible for knowledge about and execution of nursing duties. Meanwhile, members from the fields of design, engineering, and psychology (the research group) were responsible for tool design and for the organization and operation of the design project. Within this team, the project evolved in a self-directed way.

The project, named MED (Medical Services, Engineering, and Design), is composed of three phases: a start-up phase, a development phase, and a conclusive phase. This paper reflects on activities in the start-up phase, which has already been carried out. We also offer observations on the strategy of using “expression” as a means of facilitating passage between the worlds of makers and users, and examples of ideas for “issues to address through design” that were grounded in the collaboration between users and designers that emerged from such boundary-crossing. In addition, we offer observations on the principles that led to self-directed co-design.

2.2 A Framework for Understanding Project Evolution

The way the project evolved displayed the following characteristics as a result of being grounded in the social practice of medical services. 1) The positions and perspectives of project members constantly changed as they encountered habitual on-site activities, with members of the nursing group reflecting on them and members of the research group learning about them. Through this, 2) each member determined his or her own affiliation with the team, and the project team as a whole transformed from a gathering of professionals to a single community. Also, 3) in order to move the project forward it was essential that all members engage in learning in order to understand the knowledge that those from different fields brought to the collaboration.

In order to make observations about the collaborations that have occurred during the project and the principles underlying them, it is useful to think of the co-design team’s activities as those of a “learning community.” Situated learning theory understands learning to be the activity of communities and the compositional elements of learning to be both relational and generative in character. In particular, we note the concept of Legitimate Peripheral Participation (LPP), which suggests that the essence of learning lies in the way communities change through exposure to the different, that is, through participation at their peripheries [Lave and and Wenger 1991].

The next section analyzes the evolution of the project using the fundamental LPP concept of change in the form of membership among project members. In addition, we seek to capture the nature of this change using the LPP concepts of meaning creation through the negotiation of actors, and the development of these actors’ identity as a result.

2.3 Expression as a Strategy



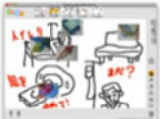



In developing the start-up phase of the project, the research group centered the project on expressive activity by the nurses. Expression in this context means having the nurses sketch the stethoscopes or other tools they use every day, or write essays about their own experiences (Figure 1). It was important that these be expressed in the first person as narratives. The authors call these programs for experiencing expression “expression workshops” [Sunaga 2011]. Participants in expression workshops gain the following three benefits: 1) recognition of self-expression as an enjoyable experience; 2) the first-person narrations allow the research group to learn about the nurses while giving the nurses an

opportunity to reflect on their duties; and 3) a mutual appreciation for what was expressed (that is, for the works produced). From this, the nurses became interested in each other's duties (particularly in those from other departments not experienced on a daily basis) and cultivated among them a shared sympathy for the "nurse's mind".

2.4 Project Members and Flow

Project members include the nursing group, composed of 26 nurses (including 4 head nurses and 2 deputy head nurses) from the nursing department at a university medical school-affiliated hospital, and the research group, which includes the authors and is composed of 2 people from the field of information design, 2 from service engineering, and 1 from psychology. The psychologist researcher is resident at the same hospital.

Table 1. List of Expressive Activities (E#) Conducted Jointly by the Research and Nursing Groups

	E1	E2	E3	E4	E5	E6
Day	May 28, 2012	Jul. 28, 2012	Oct. 14, 2012	Dec. 17, 2012	Feb. 03, 2013	Mar 21, 2013
Time	90 min	120 min	180 min	180 min	180 min	90min
Title	Sketch Workshop	Zuzie Workshop	Zuzie Workshop	Essay Workshop	Experience-mapping Workshop	Presentation
Program	Freely choose one tool used in nursing duties, observe it carefully, sketch it with pastels, and compose a short statement, for presentation, about thoughts while sketching.	Sketch a tool used in nursing duties and compose a short statement. Combine multiple sketches using the Zuzie group workshop support tool to create a composite work.	Sketch a tool used in nursing duties and compose a short statement. Combine multiple sketches using the Zuzie group workshop support tool to create a composite work.	Compose an essay about a memorable recent experience on the job. After noting keywords (elements) from essays read by others on slips of paper, sort them while diagramming an "experience map."	Using an experience-mapping creation tool prepared by the research group as a template, diagram the previous session's essays as a group to create experience maps.	Make a presentation about the project and report its results at a meeting in the hospital. Part of the presentation involves acting out a story, written in advance, that imagines nursing in the future.
Outcomes						
example fig.	Sketch of a neck strap	One-sheet composed	One-sheet composed	Part of an experience map sorting elements from all essays	Experience map diagramming a particular essay	Essay imagining the future
participants	nurses: 6 doctors: 3 research group: 5	nurses: 16 research group: 7	nursing group: 26 research group: 5	nursing group: 31 research group: 6	nursing group: 31 research group: 7	nursing group: 5 research group: 5

The start-up phase of this project was driven from Stage 1 through Stage 5 by a number of expressive activities (E). Those that were conducted jointly by the research group and the medical services members are listed in Table 1.

3. Project Evolution

Looking back on the evolution of the MED project, we note that it was not always the research group that served as operator of the expressive activities. Shifting the role of operator between the research group and the nursing group caused changes in the form of membership [Lave and Wenger 1991]. In this regard, we consider three evolutions that have characterized the project, as outlined below.

3.1 Evolution 1: Medical Staff Encounter Expression

April 2012. When one head nurse said, "Should we really be drawing pictures in a hospital?" it encapsulated the way the project builds collaboration through an encounter with a different culture and the formation of a shared consensual domain. The medical staff candidly wondered why, given how busy they were, they should spend their time drawing pictures.

That May, the research group conducted expressive activity E1 (Table 1) in a hospital lab with head nurses and doctors. The assignment was for each to draw something they had with them or were wearing. The research group demonstrated the sketching process and then the nurses and doctors did their own sketching. In addition, each prepared a short statement about what they noticed as they sketched, which was then read aloud while sharing their sketch (Figure 2).

For example, one nurse who drew her own stethoscope said, “Taking a close look I realized how dirty and nicked it is. It has been working hard just like me. I decided that I’d like to clean it.” Another said, “I was given this last year when still in nursing school so I hope to take good care of it.” In this way, each presented their sketch while talking about what they noticed while making it. Many of these works earned a sympathetic response from other participants. In July, at the request of a head doctor and nurse, we conducted expressive activity E2 with the participation of off-duty floor nurses.

The nurses experience pleasure on the expressing something related their belongings and satisfaction from appreciation and sharing the works. The experience allows them deeper understanding of feeling or thoughts on their everyday job each other. Then they have a novel mindset on enabling expressing, making and designing something related to their job. This cultivates their mind on self-directedness for the project.

Evolutionary Factors

After E2, a participating doctor said, “This experience may change the way the floor nurses relate,” suggesting perhaps a premonition about the developing identity of the participating nurses. Nurses perform planned hospital tasks but can also develop into creators who are capable of expressing their own jobs.

Later Developments

Once the medical staff discovered the significance of the expressive activity that had been held, in September we launched a joint research effort – Handheld Terminal Design for Nurses (MED Project) – together with the nursing department’s information systems committee. In October, expressive activity E3 was held as part of the official program of this joint research. As with E1 and E2, participants used familiar everyday tools as a topic for presentation (Figure 3). Twenty-six nurses took part.



Figure 2. A doctor presenting his own sketch (May 28)

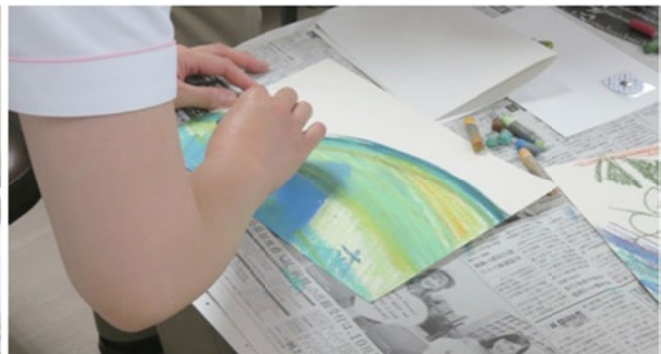


Figure 3. A nurse drawing her badge (October 14)

Changes in the Form of Membership

The relationship between medical staff and the research group established in May and July, and further developed through the launch of the project in September, changed at the E3 in October to a community form of membership in which the nursing group and the research group were partners, forming a community of design. This process is diagrammed in Figure 4.

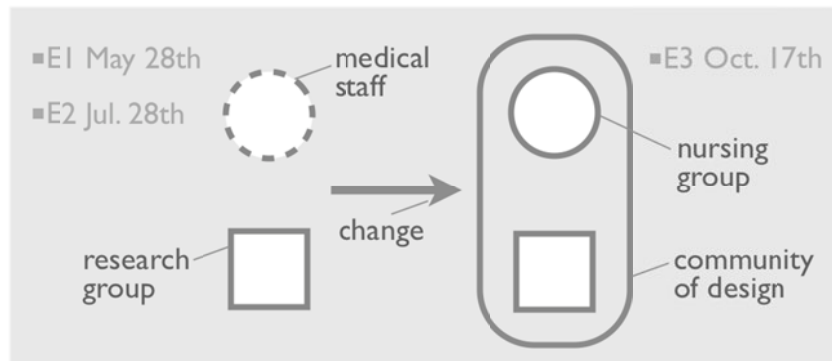


Figure 4. Changes in the form of membership: Formation of a community of design

3.2 Evolution 2: Formation of a Community of Design

The topic for expressive activity E4, held in December 2012, was an essay about a recent memorable experience on the job (Figure 5). In addition, in order to get a bird's-eye view of nursing experience from a first-person perspective, keywords were extracted from the essays and rearranged in an expressive activity.

In one of the essays, "An Incident With a Patient," a nurse carefully described taking action out of a sense of concern for a patient that ended up leading to a subtle misunderstanding with a doctor, an inability to convey her feelings to the patient, and a scolding. She also described how she went home that day feeling shocked and saddened. In this way, the essays read by the nursing group expressed the subtleties of the relationships among medical staff, or between nurses and patients, or concerning birth and death, from the perspective of those actually involved. The group of keywords distilled from these essays reflected the realities of the job of nursing.



Figure 5. Nurse composing an essay (December 17)



Figure 6. Participants arranging essays and keywords (December 17)

On the receiving end, the research group realized that the rearrangement of keywords was a task in which we were unable to take part. Sensing this, Head Nurse H from the nursing group said, "This nursing stuff is so intense, why don't we do the categorization ourselves?" The nurses all then began categorizing the essays and keywords by themselves and arranging them on the wall (Figure 6). This rearranging led to a memorable dialogue expressed in the form of a variety of nursing experiences.

Changes in the Form of Membership

Figure 7 diagrams how the operator of the expressive activity shifted from the research group to the nursing group at this point, changing the form of membership in the project.

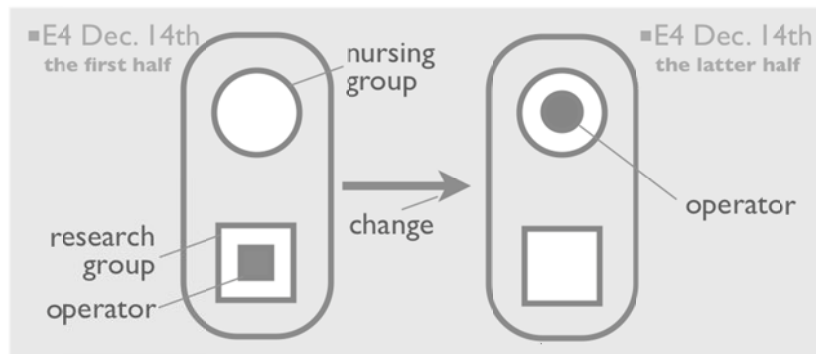


Figure 7. Changes in the form of membership: Shift of operator

Evolutionary Factors

At this point, the identity of the research and nursing groups is developing. Each now recognizes its role in the organization of expression and the organization of content. This can be seen as an opportunity for a “community thinking about to design” to become a “designing community”.

The next expressive activity, E5, involved diagramming the content of the essays to create an experience map, and was held in February 2013. The goal of this activity was to reflect on the nature and meaning of each experience through the process of rearranging the essays in a diagrammatic expression. In E5, the research group created a storyboard representing the state of the nurses’ mental image externalizations, thereby reclaiming the role of operator of the expressive activity. This paper omits further explanation of E5.

3.3 Discovery of Mental Image Layers

Through the process of expressive activities conducted as a community of design (E3–E5), the co-design team discovered the following: 1) The expressive approach enabled nurses to externalize their mental images; 2) It was possible to share externalized mental images; and 3) The sharing of mental images is a kind of knowledge that engenders mutual empathy and understanding. Finally, there was a sense that this had the potential to influence the quality of nursing duties. Figure 8 describes a model of nursing duties as composed of two mutually linked layers: a mental image layer and a task layer. The mental image layer consists of expressed sketches and essays that represent the nurses’ thoughts and feelings concerning with their job. Contents of the task layer consists of records their duties those are entering to the existing hospital information system.

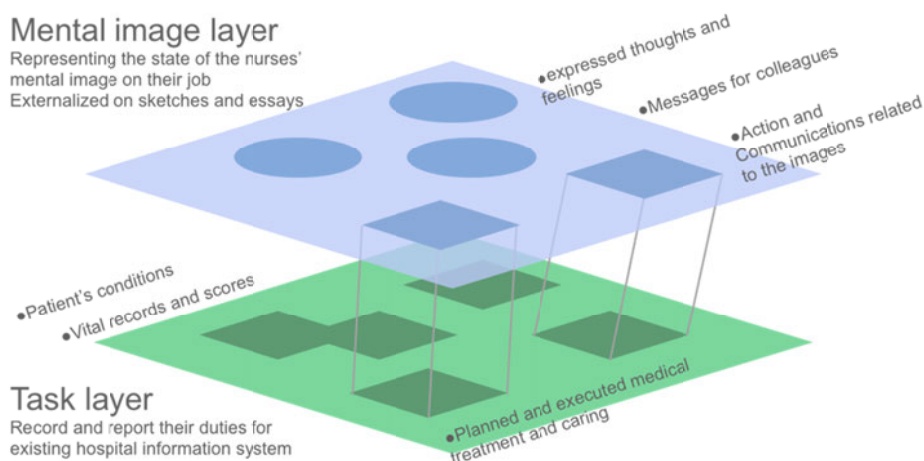


Figure 8. A model of nursing activities made up of mental image and task layers

3.4 Evolution 3: The Day the Nursing Group Became Self-expressive

Taking this two-layer model as a fundamental design concept, we then sketched out “nursing activities using a future handheld terminal” as a way to wrap-up the start-up phase of the project. For expressive activities at this stage, we created opportunities for dialogue using videoconferences linking the research group’s base at an art university with the nursing group’s base at the hospital.



Figure 9. Storyboard (partial)

The research group presented this proposal to the nursing group during the videoconference in early March. Concerning the content of the story, the nursing group made comments such as, “It is unrealistic to use text to write mental images with a future handheld terminal (too much time would be required to enter data for the electronic record)” and “The content of the mental image should not be written but spoken, expressed like a symbol that creates an opportunity for those involved to talk together.” As a result of this videoconference, the five head nurses in the nursing group produced, on their own initiative, essays of the sort the research group hoped for that described their visions of how they would like nursing duties to be in the future. Once again, the role of operator of expressive activity had switched back from the research group to the nursing group.

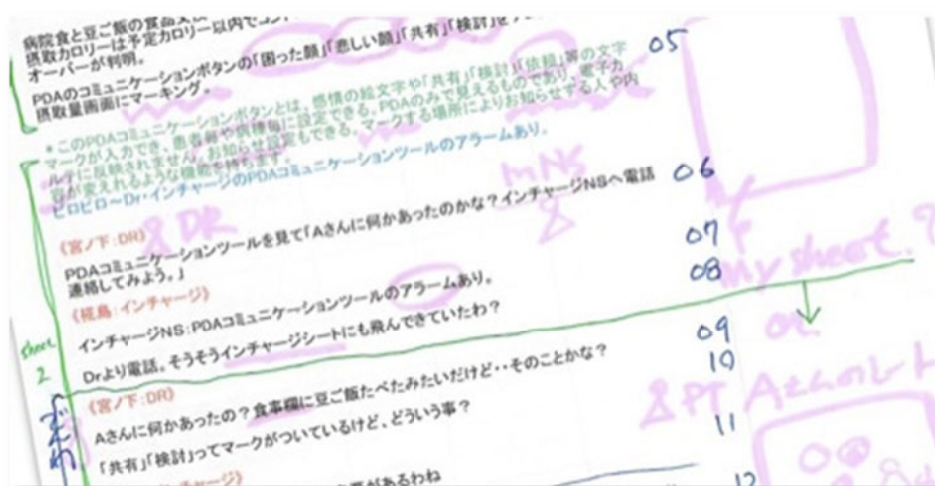


Figure 10. Essay about the future by head nurse Y, with analysis by the research group

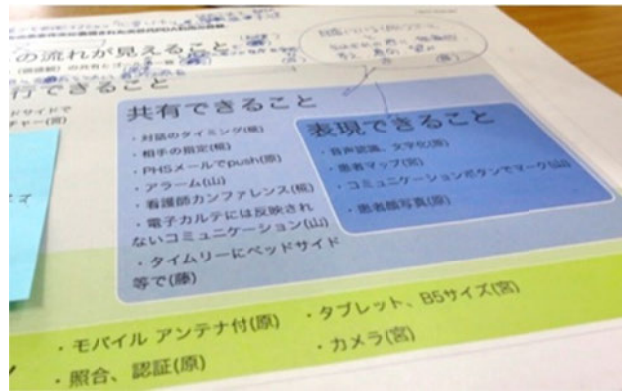


Figure 11. Concept for a tool for expressing mental images, developed by the research group

After the research group selected the essay written by Head Nurse Y, the nursing group transformed it into a script to be acted out. The head nurses and others performed this skit at the hospital-wide committee briefing session in late March. This was expressive activity E6.

Changes in the Form of Membership

This can be seen as another change in the form of membership (Figure 12). That is, for the community of design to disclose its expressive activities at an all-hospital meeting was an effort to spread the community's activities throughout the hospital as a whole.

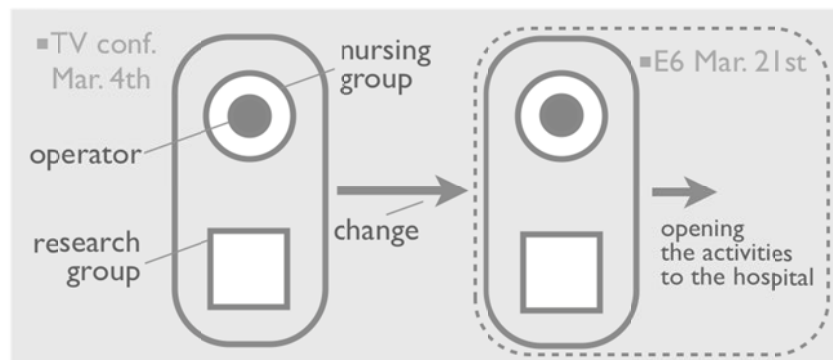


Figure 12. Change in the form of membership: Disclosing activities to the entire hospital

Evolutionary Factors

The storyboard developed by the research group inspired the nursing group to compose essays about their jobs in the future. The essay selected by the research group was then taken by the nursing group and transformed into a script and a skit. What occurred was a negotiation ([Lave and Wenger 1991]) on the theme of sketching out “nursing activities using a future handheld terminal.” This negotiation gave concrete form to the role of the tool, the relationship between people and the tool, and the conversations and expressions generated therein.

We can see that the negotiation in crossing the boundaries between the worlds of makers and users shapes the meaning of the experience and of future activities.

The Next Changes in Form of Membership

In the course of this evolution, the head nurses and others gained their own position and perspective for collaboration with the research group. In this they grasped a vision of the future of nursing duties. In addition, in looking forward to the development phase of the project, they have begun to construct a form of membership as a community of design encompassing the whole team.

In the coming development phase of the project, designing products embedded in the expected activity will be directed mainly by designers. The quality of the hand held terminal as a product should be guaranteed by them.

4. Conclusion

4.1 Self-direction in Co-design Project

The co-design project is evolving from the research group's encounter with the medical staff and then the formation of the research group and nursing group teams. In terms of changes in the form of membership in the project, we were able to see three self-directed evolutions: medical staff encounter expression, formation of a community of design and discovery of mental image layers.

These evolution has been derived from changes emerged in the following five stages [Kobayakawa et al. 2013]. Those are a model process for self-direction in co-design project.

Stage 1: Makers approach the practice of users, creating a shared consensual domain made up of users, makers, and artifacts to design [Winograd and Flores 1986].

Stage 2: Users express the activity to be designed in terms of their own experience, therein discovering the essence of the activity.

Stage 3: Carefully examine the discovered essence and describe the activity program.

Stage 4: Based on the described activity program, shape the actions of the people and the functions of the tools of which it is constituted.

Stage 5: Expand the consensual domain, moving the project deeper into the context of the practice being addressed.

The driving force encouraging self-direction in co-design can be seen as located in this change. We will return to this point at the end. Any design project entails two types of issues: how to organize the design activity (here, the expressive activities) and how to organize the content dealt with therein (the content expressed). The former can be said to be largely a problem for makers, and the latter largely a problem for users.

In design projects where these groups of problems are in harmony, makers and users are able to take the lead in seeking solutions as required by the specific issues encountered as activities unfold. In other words, it is important that makers not always serve as operators of a design project but rather that the role of operator shifts to users as conditions demand. Fostering the mind-set as makers for users might be innovative expertise of designers.

Principles for self-direction in co-design can be said to include clearly identifying user problems rather than maker problems as central to the project, as well as flexibility in shifting who takes the lead in seeking solutions.

However, what is difficult when pursuing a real-world project is for the makers (the design, engineering, and psychology experts—in this case the research group) to relinquish control for organizing and driving the project forward and hand it over to their collaborative partners the users, entrusting to them the evolution of the activities. What is needed for a co-design project to move forward through self-direction is for the research and development group to be broad-minded enough to permit this.

4.2 Fundamental Concept for Society-shaping Design

Issues of design, in giving shape to a variety of industrial products, also expand to give shape to society as part of the way people create messages, tools, and environments. Design plays a role both in posing the questions of what to make and what kind of society to aim for, and also in untangling the solutions to these questions [Sunaga et al. 2011]. When pursuing society shaping design, it is important to share these questions with the people who are actually engaged in social practice.

In the context of this expansion, experts in design are beginning to draw users into the design process and search for ways to build collaboration with them. Here, we have introduced one example of such an effort in the form of a co-design project being carried out by the authors and offered observations about a kind of change discovered therein that enables such projects to evolve in a self-directed way.

The important thing in co-design is for the people who are the main actors in a social practice to begin to design, and to create spaces for such design. It is also necessary to take a bird's-eye view of design today that recognizes that designing is nothing more than the expression of one characteristic of a preexisting social practice that will remain embedded beyond the project. We are convinced that

understanding the act of design to be an indispensable part of social practice will be a fundamental concept for design that shapes society.

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