DOMESTICATION AS DESIGN INTERVENTION

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This paper describes a study in which design prototypes were domesticated in different households in order to collect responses provoked by them. These responses were then compared to the intentions that had been expressed by the designers in a previous study through the design of a series of design prototypes. The results indicate that some of the intentions correlate to actual responses whereas others do not. For example, the scenarios for use presented by the designers were not realized in actual use. Nevertheless, the more abstract intentions articulated for these prototypes could be said to have been realized. On the one hand, the results suggest that design prototypes act as domestication probes that provoke users and help them reflect upon their values, experiences and attitudes in a way not easily accessed by other means. On the other hand, the study illuminates the practices and procedures that people use in order to tame, i.e. make understandable, a material newcomer to a material environment. The results underline and illustrate some of these 'folk' methods. For example, 1) people understand a newcomer through creating links to historical and existing artefacts; 2) a newcomer may succeed because it makes sense socially, and 3) it may succeed because it finds a slot in the (eco)system of the household. On a more general level the paper discusses the ways in which domestication may be used as a design intervention.

INTRODUCTION

What we think of a product at first sight and how we respond to it in use may be two different stories. In design process, there is a need to understand and predict how a first experience of a product may succeed in upcoming use; *i.e.* whether a product that seems amiable at first encounter will succeed in later use, or whether a product that makes an indifferent first appearance may redeem itself in actual use. These facts give rise to design inquiries through domestication. The paper reports a study in which two design prototypes where domesticated in different households in order to collect responses to them. More specifically, the prototypes were designed with particular intentions that were embedded in the artifacts through form giving. The paper will ask whether and how these intentions were found in the use, and what these kinds of field experiments might enrich inquiries into design.

BACKGROUND

This is a study of the domestication of two experimental design prototypes. The prototypes stem from a project called Static! led by the Interactive Institute in Sweden (cf. Backlund *et al.* 2006). The basic ambition of Static! was to investigate the potential of interaction and product design as a way to increase people's awareness of everyday energy consumption, thus exploring a complement to existing strategies that concentrate on either more energy-efficient technologies or consumer information campaigns to influence people's energy behaviours. The prototypes used here stem from the early stages of this investigation. In the development of the first series of prototypes, the project aimed at creating a palette of design examples illustrating different design opportunities and tactics (*Ibid.*). A key design issue in this task was how to make energy more present in design, e.g., how it can be expressed as one of the materials literally building an object. Thus, the aesthetics of energy in design was a central issue, as were questions of how something typically hidden and invisible like electricity could be made more vivid and present. After such an understanding and knowledge had been gained, the intention was to move on to explore how such designs could be used to influence people's energy behaviours.

In terms of design approach, the Static! project relates to notions such as conceptual design (cf. Blauvelt 2003), but also to the idea that designs might have a persuasive character that in various ways influences how we act and relate to the world, ourselves and each other (cf. e.g., Buchanan 1989, Redström 2006). Though more or less 'fully functional', the prototypes have a conceptual character. Somewhat like how art depends on its context – its frame – these kinds of designs are often contextualized and framed in certain ways, as they are for instance often made for exhibitions rather than everyday use. There are examples where the framing is indeed built on notions such as 'adoption' (cf. Dunne & Raby 2001), but this was not the case here.

The prototypes that came to be domesticated were originally designed without the prospect of a domestication study to come. Rather, the idea of conducting this particular study came out of discussions on the potential of studying domestication processes using experimental prototypes stemming from conference presentations (Ernevi et al. 2005a, Routarinne 2005). As a result, two of the Static! prototypes temporarily emigrated to Finland. This paper reports on this process. The following questions guided the investigation:

- How will the users receive the prototypes?
- Do they interpret them in accordance with the design intentions embedded in them, i.e. do they increase energy awareness?
- Will the prototypes find a slot in the material and social system of a home?

From a domestication study point of view, working with experimental prototypes can be a complement to the study of artefacts, e.g. to see whether there are any crucial differences between how a finished commercial product and an experimental prototype is domesticated. With respect to choosing to do a study of this kind, rather than, for instance, a more controlled experiment of user reactions to prototypes as a way to 'evaluate' prototypes, it is important to keep in mind that especially the early prototypes from Static! were just as much about exploring energy in, and through, design as they were about potentially changing people's behaviour.

Therefore, traditional usability tests would not have been very useful. A more open process of making sense of these prototypes in an everyday setting over a longer period of time, however, seemed a much more interesting option.

Another important reason for exploring and developing this kind of study of prototypes in design is that they more profoundly address the issue of how new things do not exist in a void, but rather are brought into established systems of objects already appropriated. This perspective is too easily lost in more traditional usability evaluations where it is the (intended use of the) prototype as such that is in focus.

DOMESTICATION PROTOTYPES DESCRIPTION

The two prototypes to be domesticated were the 'Energy Curtain' and the 'Erratic Radio'. The Energy Curtain looks like a Roman blind that has been augmented with solar panels, LED lights and optical fibres interwoven in it. The Energy Curtain is able to save sunlight for later use (Ernevi et al 2005b).
The Erratic Radio can be used as a normal radio, but in addition, the radio itself 'listens' to its surroundings by means of a second hidden transceiver receiving frequencies around the 50Hz emitted by active electronic appliances. When it detects an increase in the amount of electricity being used in its vicinity, it begins to detune and to make disturbing noises (Ernevi et al. 2005a).

DOMESTICATION APPROACH

This inquiry is rooted in the domestication approach established by Roger Silverstone and colleagues during the 1980s. The domestication approach (Silverstone & Hirsch 1992) addresses questions such as how households with similar socio-economic backgrounds do, buy and enjoy different things (Silverstone 1994, 44). This framework of research emerged in the current of growing interest directed towards consumption and everyday lives (Haddon 2004, 3). Researchers of consumption began to make their way through the closed doors of private homes in order to understand the processes involved in people taming artifacts (cf. Miller 2001, 1-5; Haddon 2004, 4). In other words, the domestication/taming metaphor refers to an active construction of meaning in which the end users are engaged both mentally and in real time actions when they make sense and use of their material environment. Newcomer artifacts represent a challenge to the context in this framework. During the domestication process, a new product finds an "ecological" slot in the material and social system of a household (*cf.* Nieminen-Sundell & Pantzar 2003). All in all, domestication is a qualitative approach to understanding consumption and the forms it may take in individual households, in its time, age- and gender-bound activities (Silverstone, Hirsch & Morley 1992; Berker *et al.* 2006, 3-4; Haddon 2004, 4). The framework is most sensitive to moral issues such as what is conceived as appropriate or inappropriate for a given household: how the practices and choices manifest values.

PROVOCATION THROUGH DOMESTICATION

In the field of design inquiry, the domestication approach has been utilized as a means for design interventions. The Interliving project, for one, developed a set of semi-functional prototypes that were called technology probes. The project basically aimed to collect information on three levels by domesticating these probes in households (Hutchinson *et al.* 2003). For one, the sociological objective was to collect material on the ways in which technologies are used in real world domestic settings. Secondly, the probes enabled the developers to test novel technologies in a natural context. At the third level the idea was to inspire both designers and users to think of design opportunities and to think differently about everyday routines and the ways in which they could be conducted. These three types of information guaranteed rich data, which were then interpreted and utilized in scenarios based on everyday practices and participants' experiences.
Both the scenarios and the experiences were further iterated in user-centred design workshops. According to the philosophy of the Interliving project, the technology probes were functional in some respects to feed the imagination, but they were not yet new solutions. Rather, they were design proposals for probing new opportunities by combining several existing technologies and trusting the users' imagination. It was crucial that they encouraged households' playful interactions, recordings and communications. For example, one of the probes was a webcam for taking pictures voluntarily and sending them to another family member.

Urban probes by Paulos and Jenkins (2005) is another instantiation of domestication probes, although in this project, the domain of domestication is not the household but urban in-between spaces: that is, spaces in which people emerge when they want to get from the office or school to home and hobbies.[1] The urban probes aimed at collecting descriptions of Urban Atmospheres through four sub-themes: place, community, infrastructure and traversal (paths and routes). From these angles, Paulos and Jenkins wanted to address some of the ambivalences of in-between spaces – crowded but lonely, comforting and frightening, public and private, shared but exclusive. Beyond the cases they describe, the importance of Paulos and Jenkins' (*ibid.*) article is in the specification of a domestication probe. A technological domestication probe is a semi-functional artifact that is introduced to an environment in which it provokes or disrupts the usual

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[1] In a sense this view of the urban city does not resonate with ideas of urban space as a public living room.

way of life. This specification means that the probes are not paper prototypes but employ some functionality. However, they are not produced to solve a particular problem or improve a task. In this end they are loose or open-ended. In fact, the researchers conclude that even impractical artifacts may function well as domestication probes. If the artifact is able to draw attention to the environment and human conduct in that environment, it can be regarded as advantageous.

The History Tablecloth as reported by Gaver, Bowers, Boucher et al. (2006) is an example of an artifact that is *not designed for a purpose*. Instead, it is designed for a homo ludens, the playful human being, to explore, reflect on and share in a temporal reality. The point of the History Tablecloth was to make history visible. This was afforded by an embedded technology: if an object was placed on the surface of the cloth it caused a halo effect to form under and around the object. Moreover, when the object was later removed, the halo effect would remain and only gradually fade. This function made the history of objects perceptually salient and thereby communicated how objects moved in the household.
Because the History Tablecloth was not understandable in terms of purpose, it instigated the household members towards domestication through interpretation. However, the prototype was not a product of a completed design project but more like a draft to be tested. Therefore, it did not always function as intended. These unexpected functional, or dysfunctional, traits (sometimes the halo effect did not fade, sometimes it did not occur) especially put the respondents' minds to work when they tried to make sense of its functions. The explanations inspired a new sensitivity to the material context. In addition, the tablecloth brought meaningfulness to everyday domestic activities like setting the table for dinner. Socially, it promoted discussions and new guessing games.

Previous inquiries clearly indicate that introducing semi-functional, unfamiliar objects into a familiar everyday context, and leaving them there for a while, is an effective way to provoke (cf. also Kurvinen et al 2006). An unidentified object helps people to reflect upon their experiences, desires and values. For designers such information is a source of inspiration.

METHODS

Based on the domestication approach in general and the

design interventions described above, the objective in this study was to domesticate two prototypes. The prototypes were given form with a bearing on energy. The investigation was conducted as a set of field experiments. In each experiment, a Static! prototype was left in a household for up to six weeks. This was called the domestication period, and it was both the basis and a trigger for information gathering. Information was gathered through interviews, e-mail communication, user diaries, photographs and video recording.

Energy Curtain
Family 1: 2 parents, 3 children (from 5-16 years)
Family 2: 2 parents, 2 children (from 8-13 years)
Family 3: 1 parent, 3 children (from 8-15 years), dog
Family 4: 2 parents; 3 children (from 4-17 years)

Erratic Radio
Family 5: 2 parents, 3 children (from 5-16 years)
Family 6: 2 adults, 2 dogs
Family 7: 2 young adults
Family 8: 2 parents, 3 children (from 5-16 years)

Table 1. List of households involved in the study.

The households are characterized in Table 1. All who agreed to domesticate the energy curtain were double or single parent families with 2-3 children between 5-16 years old. In truth no family refused to domesticate the curtain, whereas it was more challenging to find a home for the erratic radio. Two of the households who agreed to try and tame the erratic radio consisted of a couple. The other two radio households were families with three children. Both the radio and the curtain had in one household a domesticator who had a design education.

Two interviews were conducted in each household: one at the beginning of the test period when the prototype was brought into the domestic setting, another at the end of the domestication period when the prototype was collected. The opening interviews were semi-structured with the help of an interview sheet to encourage the household members to describe themselves loosely in terms of household composition, education and interests (see Figure).
Since the prototypes were designed to increase energy awareness and address issues of sustainability, it seemed necessary to discover the family members' attitudes towards this issue. However, energy awareness is a rather abstract notion, and therefore it was translated into issues of energy consumption and, what seemed the most down-to-earth sustainability issue, recycling. In addition, energy awareness is not a matter of an either/or opposition but a gradable one. A person's energy awareness may rise or fall during a time period; different

persons can be compared as being more or less aware of energy consumption. Therefore, the interviewees were asked to place themselves on a continuum between an eco warrior and a serious shopper (the horizontal axis in Figure 1).
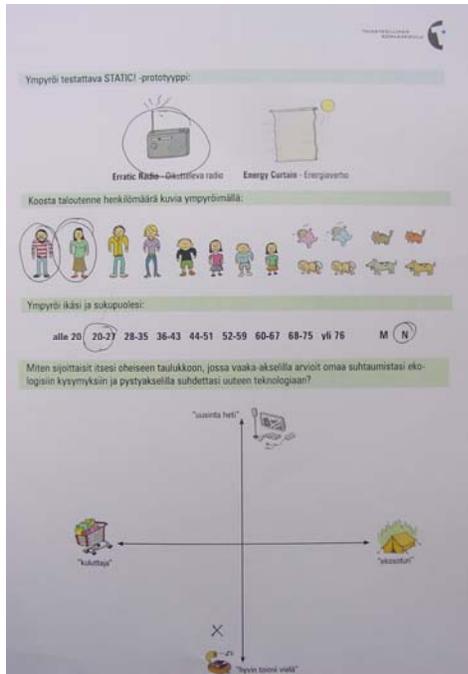

Figure 1. Background information was elicited with the help of a visualized information sheet.

In addition, as the prototypes were also novel technological devices with which the users could not be familiar, they were asked to position themselves on an attitudinal continuum between the poles of trusting old technologies or being eager to buy the latest ones (the vertical axis in Figure 1). The interview sheet was drawn up by BA-level design student Tatu Piispanen, who also conducted approximately half of the interviews, the rest of the interviews being conducted by the first author.

During the first interview, the prototype to be domesticated was introduced. The families were told that they were designed by a Swedish design studio in a project that focused on energy. It was told that the energy curtain was supposed to collect daylight and glow in the evening. The researcher(s) volunteered to help with the installation, and the domesticator was recommended to keep daylight and sun direction in mind. The final decision on what window the curtain should be placed in was naturally left up to the domesticator. The erratic radio was introduced more mysteriously. The families were told that it was a radio but not a usual one because from time to time it was

erratic. The test persons were then encouraged to discover if its twists could be explainable.

For the domestication period, the households were also provided with a diary for taking notes on their experiences with the devices. The diaries were sent to the researcher approximately a week before the prototype was collected and the final interview was conducted. In the final interview the test families were asked how different family members had understood the prototype, how it might have come up in social occasions when somebody was visiting the home, whether the users had come to think about how that device might be used in another context or developed to meet user needs and desires more accurately. The domestication interventions were conducted during winter 2005 –2006 from November to April.

RESULTS

The interviews indicate that the test participants were more likely to place themselves closer to the eco warrior than the serious shopper end of the vertical axis in the trigger sheet. Yet, when asked to justify their placement through examples of their ecological behaviour, there was wide variance. In this sense, the absolute value of self-assessment did not correlate with the reports on behaviour in which the users manifest their ecological attitude. The answers thus indicate that being an ecological person is a disposition to which people wish to conform. This attitudinal climate can be interpreted as an opportunity for ecological design.

With reference to the question regarding technology acquisition, the placements on the given continuum were more heterogeneous. In this sense, there seemed to be more freedom for individual choice in the acquisition of technologies, although none of the test persons located themselves at the poles of the given continuum. In this sense, these answers also add to a picture of a moderate and reasonable consumer.

EXPERIENCES WITH THE ENERGY CURTAIN
The first contact with the energy curtain involved installation. In two families the curtain was later reinstalled on different windows during the test period in order to find a better location. In these reinstallations the family acted for the benefit of the curtain, eager to see it lit. However, these households had to admit that the curtain did not live up to expectations. The following example illustrates how one of the domesticators, a woman in her late thirties, describes the first encounter with the curtain in an e-mail:

"I was left alone with the curtain after dark. I went to the bedroom and pulled the curtain down. Well, I did not succeed immediately: I had to put the electric lights on and pull the strings before the curtain came down.

Then I turned off the light, I even closed the door and sat on the bed expecting that the curtain would glow. I watched and watched and was imagining seeing something but it was probably only an illusion. The curtain was dark and I was pretty disappointed."

Figure 2. One family decided to cheat in order to make the curtain glow. They used a bright light appliance to charge it.

In three out of four households the curtain did not function as intended. In the fourth family it finally began to lighten as expected. This depended on two contextual factors: the domestication period took place in late March and the beginning of April, which means in our latitudes that there was daylight available. In addition, the curtain was installed on a huge window facing south.

Had the test period focused on usability, the conclusion would have been that the curtain failed. As it is, the curtain was intended to act as a technology probe that provoked households during a period of domestication. Gaver et al. (2006) report with reference to the History Tablecloth intervention how, paradoxically, the insecurity of a domestication probe encouraged the users in active interpretation and reflective work. The same phenomenon occurred with the curtain.

The designers had proposed that energy awareness will increase when the users have to decide whether to a) enjoy the sunlight during the day or b) save it for the night (Backlund et al. 2006). In addition to that scenario, one of the families articulated a more serious one: the curtain must be pulled down in front of the window at all times, otherwise it will not glow at all. But if the curtain is pulled down, the family must use electricity for lighting. This observation made them realize the difficulty of reducing energy consumption. In addition, all the rest of the families reported how the curtain helped them realize how dark it is during winter in Northern Europe. These reflections reveal that indeed the curtain did increase the users' energy awareness.

In their great desire to see the Energy Curtain light up, one family came up with the idea of 'cheating' by charging it using a light therapy device (see Figure 2). From the designers' point of view, this was a previously unconsidered scenario. In terms of an ambition to reduce energy consumption, this use of the curtain is quite the opposite, but in relation to the notion of raising people's energy awareness, it is not necessarily so. Situations such as this illustrate the complexity with which designers have to deal – and from which design can also benefit – if designs are to be used to persuade people to think or behave in certain ways: it is one thing to propose something by means of a design, but it must be remembered that something quite different often then happens as people use it.

The energy curtain proved to offer a platform for social encounters. The families report that visitors were fascinated by the idea of it. They also received suggestions about companies that should be contacted in developing the idea and the technologies. This links to the inspirational aspects of the energy curtain. All the families came to think of alternative solutions with LED lights and solar cells. Would it be nicer to have the functions in Venetian blinds? Should the solar cells and the illumination be separated locally? What if the light appeared in an installation on the wall? Could we recharge our mobile phones with solar power if we could have solar cells in our backpacks, hats or bicycles?

EXPERIENCES WITH THE ERRATIC RADIO
According to the test persons, the erratic radio was easy to understand in the first place: it was recognized that there were only three knobs. The users did not experience a need for a technical manual, although the mother in one family inquired whether a manual was enclosed.
Because the Erratic Radio was relatively small and not heavy, the families did not situate it in one place and leave it there but moved it about, in every household. In one family the radio was first taken into the kitchen because it was the place in which the family normally listened to the radio while reading the morning paper and having breakfast. Soon the family members discovered that it ruined their mornings, and they began to relocate it. Similarly, in another family, the radio began on the coffee table in the living room but soon travelled to other

rooms, one after another. In these two families the radio was soon abandoned.

The other two households both consisting of a couple took a different approach. They began an investigation in order to understand the appliance and its twists. One of the couples concluded that wherever they took the radio, it became erratic after ten minutes. In other words, they tried to make sense of it on the basis of duration. The other of the couples adopted a detective approach. They took photos and video-recorded its use in different places, even on the washing machine in the bathroom. The overall result was that the families did not find enough consistency in their interactions with the radio.

At some point during the domestication period the households were informed by the researchers that the radio was designed to be erratic when many electronic devices nearby were in use. The designer scenario had been to force the user to make choices between different appliances (Ernevi et al. 2005a). One of the couples happened to reflect upon this idea in detail:

Figure 3. The radio travelled to the bathroom.

It did not function as intended… sometimes we had nothing on but we only got the buzz… I mean, should we go and call the neighbours and tell them to shut

down their appliances?... I don't know, but how many people just listen to the radio? Should I sit in the dark and listen to the radio?…usually I listen to the radio when I'm on the computer, like who only listens to the radio, the function could better be embedded in a TV set.

Socially the erratic radio was not as fruitful as the curtain. One of the reasons may be that since it was smallish, it was not as easily noticed by visitors as was the energy curtain. Nor did the erratic radio inspire as many suggestions for further development. Among those articulated was a suggestion to create a mobile appliance that was easily moved from place to place. In one family it was suggested that instead of sound a visual indicator of electricity use might be less disturbing. A proposal was made that a separate appliance could be developed: who would want to buy a radio that did not serve as a radio? Instead, someone might be willing to buy a gadget that would interact with an existing radio or a television set. All in all, nobody claimed interest in owning the erratic radio, even if they felt a bit sad when it was collected from the household.

In this case, it is quite clear that the change of context for the Erratic Radio plays a certain role. Whereas the Energy Curtain makes it clear in a rather obvious visual way that it is not a 'normal' curtain, it is less obvious what makes the radio different from a normal radio. In combination with being a prototype (that does not necessarily work entirely as intended at all times), this likely made the radio harder to understand. Another issue worth further study would be what role the character of the introduction of the prototypes (e.g. by the researchers in the study) has played (e.g., that the radio was introduced more "mysteriously").

INTERPRETATIONS

On a more general level, both the curtain and the radio were interpreted through anchoring. These anchoring practices represent folk methods of understanding on the basis of previous experiences. One family understood the energy curtain by comparing it to a traditional Finnish wall hanging, 'raanu'. Through this link to the tradition and history of handicraft, the aesthetics of the prototype were connected to something with which the family was already familiar. As to the radio, it was also anchored in the history of radio transmitters. One family enjoyed the radio because it was 'nostalgic'. It reminded them of the good old days in the countryside with the grandparents when they used to listen to a tube radio. For another couple the aesthetics of the radio represented a retro

style, and they were taken back to the times when they had been kids.

In creating historical links the domesticators were likely to mention people and places that were attached to certain historical periods of their lives. These personal connections seemed to add value to the users. Even if the users were not always very active in interacting with the prototypes, all the households except one reported that they felt a loss when the prototype was collected. Creating personal links had been one of the ways to attach oneself with the artifact. With reference to social links, the curtain was more successful in affording social interactions. Visitors to the test households noticed it and were willing to discuss it. In this sense the erratic radio did not offer as much initiative capital as an artifact. However, some of its domesticators had discussed it with their friends and relatives.

In one of the households that domesticated the energy curtain, the curtain enabled them to find an ecological slot in the practices of the household. In that home, the family had their shared computer in the living room next to a huge window. They had been suffering from light reflections on the computer screen. Being installed next to the computer the energy curtain helped block the reflections.

Figure 4. The users anchored the energy appliances to familiar artifacts through seeing them in a historical sequence.

CONCLUSION

Domestication as design intervention is a powerful tool for user evaluation that is able to go beyond first impressions. The ideal tool for this kind of intervention is a semi-functional interactive appliance. Semi-functional means here that the appliance is not yet a completed product ready for launch. Instead, it lends

itself to be interwoven into practices in ways that cannot be anticipated by its design. Some sort of functionality is advantageous for provoking responses. The case presented in this reported investigation consisted of a domestication intervention where two Static! project prototypes, the energy curtain and the erratic radio, were each domesticated in four different households for a period of up to six weeks.

The findings here as well as those by Gaver et al. (2006) implicate that the uncertainty and instability of functions in a domestication probe are especially likely to trigger interpretations and enable people to reflect upon their experiences and aspirations. In domestication the users make reference to the context of their everyday lives. The context consists of the material and social environment but also the history of artefacts, and the history of people's lives are present in interpretations. On the one hand, the results suggest that design prototypes act as domestication probes that provoke users and help them reflect upon their values, experiences and attitudes in a way not easily accessed by other means. On the other hand, the study illuminates the practices and procedures that people use in order to tame, i.e. make understandable, a material newcomer in a material environment. The results illustrate some of these folk methods. For example, 1) people understand a newcomer through creating links to historical and existing artifacts, 2) a newcomer may succeed because it makes sense socially, and 3) it may succeed because it finds a slot in the (eco)system of the household.

The paper reports on an investigation that builds on the project Static! As compared to the designers' intentions in Static! (see Ernevi et al. 2005a; Backlund et al. 2006), the responses indicate that some of the intentions were actualized whereas others were not. For example, the anticipated scenarios for the energy curtain and the erratic radio were not realized in actual use. Nevertheless, the more abstract intentions on the level of energy awareness that were articulated for these prototypes were realized. Domestication as design intervention addresses the issue of how the first experience of a product or an artifact changes over time and what the critical features are in its domestication. Domestication probes intrude into practices; while doing so they provoke alternative practices or at least alternative interpretations of them. This is the perspective they have to offer for design inquiry.

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