Domesticating Spaces: Sociotechnical Studies and the Built Environment

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Abstract

The main aim of this article is to rephrase good and bad performance of built environments as good or bad interplay of spaces, building technologies, and users. To support this perspective, two conceptual tools broadly used within the social study of technology are introduced. These concepts, the semiotic pair "script/antiprogram" and the study of "domestication of media and technology in everyday life," were originally developed in the search for a better understanding of the mutual shaping of culture/society and technology. In this contribution, these concepts are applied in an empirical study of two nonresidential buildings. Through an extension of these concepts, consequences for the creation and maintenance of better built environments are proposed.

Introduction

Buildings enclose human behavior; humans create and adapt buildings to fit their needs. Although these are statements are not particularly controversial, the relation between what a building does to its occupants and what occupants do to their buildings is a constant source of professional debate. We know that buildings can regulate social behavior by ordering space (see Shah & Kesan, 2007, for an overview). At the same time, built environments are obviously created and then adapted by humans who are influenced by their respective cultural and societal contexts. The question remains of how to conceive this mutuality (Bechtel, 1997).

This article contributes to this debate by introducing two concepts that are broadly used in the study of science and technology—domestication and

script/antiprogram—to the study of built environments. Both concepts are part of a strand of research that struggles to understand the mutual shaping of technology and society (Bijker, Pinch, & Hughes, 1987; Smith & Marx, 1994). Arguing avidly for a balanced approach that focuses evenly on both technologies and society (Janda, 2002; Shove, 1998), these so-called sociotechnical approaches have inspired a broad set of research both on technology design and use and on the links between them. Although the idea that built environments and culture shape each other mutually is not entirely new (Barker, 1968; Bechtel, 1977), the introduction of the concepts of domestication and scripts can refine the interaction between buildings and the people who occupy them.

The next section describes how the relationship between society and technology has been dealt with within the social studies of technology. Then, concepts from this line of thought are applied in the study of two college buildings in Norway. In this application, the concepts themselves are adapted to the realm of built environments. Finally, consequences for design, use, and operation of buildings are proposed.

Built Environments in Everyday Life

The concepts script and antiprogram are part of a semiotic approach that treats technologies as text within the general field of social studies of technology (Akrich & Latour, 1992; Woolgar, 1991). While objects are designed, their expected use is inscribed in their physical form, in their functions, and in accompanying information (e.g., manuals, advertisements). These scripts are based on user representations, which are created through formal methods, such as market surveys and user trials, and a variety of informal activities, such as the "I-method" identified by Akrich (1995), in which design decisions are based on the designers' own use experiences and expectations. When the object is taken into use, the technologies are "read" by their users. In the simplest case the designers' in-scription and the users' de-scription coincides. More often, however, negotiation with the original script will take place. In extreme cases, users may even revolt. Through negotiation or revolt, users develop their own antiprograms, which lead to uses unexpected in the design phase.

Applied to the built environment this semiotic approach resonates with the well-known fact that every design is political in the sense that it contains representations of its users and that it therefore is subject to negotiations or opposition. Mismatches between building designer scripts and the users' problems are common. Although such mismatches do not always result in bad building performance, they are most problematic if there are conflicting user representations (e.g., Akrich, 1995). Mismatches can even have a positive effect: Good technologies and improved building performance can be the result of negotiation and opposition spurred on by inadequate scripts.

In domestication studies, these negotiations have been shown to be an important part of processes that create a sense of ownership among the users. Like the semiotic approach, the domestication perspective focuses on interactions between technology design and use. It was developed by researchers from media and technology studies during the 1990s, studying how media technologies were incorporated into domestic everyday life (Silverstone & Hirsch, 1992). These studies found that the everyday use of technologies required that the users' daily routines and technologies have to be adapted to each other. A large number of empirical studies have explored this mutual adaptation for a broad variety of technologies (Berker, Hartmann, Punie, & Ward, 2006; Lie & Sørensen, 1996).

Domestication takes place in four dimensions: acquisition, objectification, incorporation, and conversion. All four dimensions comprise cognitive, practical, and symbolic changes occurring both on the side of the domesticated and the domesticator (Sørensen, Aune, & Hatling, 2000).

Acquisition describes the process leading to control over the object (e.g., buying or renting in the building sector). Juridical and economic factors play an important role, but expectations about future uses and the meanings of the act of acquisition are critical as well. Economics, psychology, and cultural studies of consumption focus exclusively on these objective and subjective aspects. Domestication, however, treats acquisition only as first step in a series of overlapping stages.

Acquired objects are (re)defined, both in relation to the new owner and to other objects owned by him or her. Some functions may be ignored, some misunderstood. According to the new context, the new object is changing—it is objectified. One example of this process from domestication studies is the importance of the physical placement of a TV set in the home. Whether it is placed in the bedroom or in the living room will make it a different object with different uses, and thus indicates different routes of domestication.

The incorporation of objects into daily routines of their users is the third dimension of domestication. When new objects are acquired, they have the potential to transform or even disrupt existing routines. A mutual adaptation between the routines enabled by the new object (and its "scripts") and existing routines is a sign for successful domestication. If the object is not embedded—for instance, when the object makes existing routines impossible or when the object has no impact at all— nonuse or bad performance is likely. As the object is incorporated, its use is carefully deliberated, which is in sharp contrast to the unconscious character of daily routines.

The fourth and final dimension of domestication is called conversion. The object has transformed from something new and strange to a part of the owner's identity.

Complementing the semiotic approach, domestication describes in depth how negotiations between scripts and antiprograms take place practically, symbolically, and cognitively. Moreover, based on empirical observation and an evaluation

of technology use in everyday life, domestication adds a normative dimension: Successful domestication is defined as mutual adaptation including practical, symbolic, and cognitive activities. If one of these dimensions is absent, then domestication is not complete.

Based on these concepts from the social studies of technology, we can say that built environments are constantly subjected to domestication, which takes place between scripts inscribed by designers and antiprograms employed by users.

Description of Cases and Method

This empirical study explores the design, building process, and daily use of two college buildings to reveal how buildings support or interrupt everyday life functions. This kind of research, done thoroughly, demands a longitudinal approach—spanning several years and including a broad range of participants. Longitudinal studies are scarce, mainly because of their high demands on research resources. The toolbox of qualitative research methodologies, however, provides shortcuts. The approach that was chosen here treats designers, builders, and users as experts for what has happened in the past and what is happening now within the building.

In semi-structured interviews, informants were asked about what, according to their recollections and opinions, goes/went well and what goes/went wrong. The disadvantages of such an approach are obvious: the respondents' accounts may very well have changed over time and we can only know about these changes insofar as the respondent is aware of them (see De Wilde, Augenbroe, & van der Voorden, 2002, for a struggle with a similar problem). Therefore, this study is not labeled as a postoccupancy evaluation, even though it could be part of one, providing feedback based on postproject discussions (Bordass & Leaman, 2005). Instead, the following is meant to enable more inclusive conversations about buildings (in the same spirit as Gann, Salter, & Whyte, 2003), starting with an actual conversation with users.

The buildings studied here (henceforth called B1 and B2) are located at the same site and host a college. These buildings have a rather special building history. B1 (11,160 m2 gross area), when finally commissioned for use in August 1999, had gone through long planning period reaching back to the 1980s. Although an architect had won the design competition in 1994, public funding was delayed and building could not commence until March 1998. The building was completed shortly afterward within an extremely tight schedule. By the time the building was completed, it was clear that another building (B2, with 10,140 m2 gross area) would be needed because of the rapidly increasing number of students in the region. Thus, many of the same users and experts planned and built these two buildings at the same site in two separate processes with only a few years in between. This particular history made it possible to interview a relatively

small group of people who were able to reflect on differences between B1 and B2. B2 was generally held to be a success, regarding the design, construction, and the final outcome, especially when compared with B1.

Data were gathered through three focus group interviews with 11 occupants working in either B1 or B2 and eight expert interviews, which took place in 2004. These interviews excluded students, who are obviously important end-users within these buildings. However, those working within the buildings for a longer period of time were considered to be more interesting in terms of transferability of results to other nonresidential buildings. In every group discussion, occupants from both buildings were present and were encouraged to speak about and compare their everyday experiences. Because of the nature of focus groups as discussions between interviewees (Morgan, 1997), the interviews focused on those topics deemed important at the time of the study. The downside of this approach was comparably little control over the data that were actually produced. Therefore, the data were complemented with eight in-depth expert interviews (consultants, building owner representatives, and facilities managers) involved in the building process of one or both buildings. In line with the approach outlined above, the analysis of the material (interview transcripts, observations within the buildings, and additional material including informal conversations with occupants and web pages and brochures produced by the building owner) focused on reports about everyday episodes of good or bad performance; their social, material, and technical background; and their relation to the design phase of the buildings.

Domesticating the Alarm

When occupants were encouraged to reflect about the buildings they work in, they commonly offered reports about systematic disruptions of everyday life. B1 end-users talked about insufficient ventilation in auditoriums and offices and occasionally mentioned insufficient heating. As we might expect from its good reputation, B2 did much better in these respects with only one report about a draft (see also Mathisen, 2004).

The failure mentioned most often was B2's alarm system, which went off every other hour when someone used the building outside standard working hours. Even though the false alarm was a failure with no severe immediate consequences for users, it was still considered harmful as it disturbed concentration and thus the ability to work within the building. Typically, the end-users reacted first to the disruptions by asking coworkers and experts—mainly janitors—about the reasons for the malfunction. Here, the end-users learned that this failure was actually a feature. The system prevented people from switching off the alarm completely during times when the building was supposed to be unoccupied. Those who decided to work outside regular working hours had the possibility to "buy" themselves time by using their key card at a terminal located outside the

offices, which would silence the alarm for a limited time.

Although the end-users were well informed about this "functionality," they found it disruptive because the alarm's hours did not coincide with the users' hours:

> So, if you are not programmed in your head according to the building, then you risk activating the alarm. And then I sometimes thought that I actually should get a shotgun and shoot this thing [laughter]. (End-user, B2, group discussion)1

The logic inscribed into the alarm system contained rules about when to be present within the building, yet this end-user disagreed with these rules. Antiprograms employed by the users may include the use of a metaphorical shotgun.

The same end-user also reported why he was so irritated:

> This was sometimes so irritating that I wanted to have my teaching at another place. You cannot invite people who pay for the teaching—some pay actually quite a lot of money for courses—and so they come into this building and the alarm goes off like mad. That's just . . . we have students from [large Norwegian companies]. And we are helpless. (End-user, B2, group discussion)

If there was no solution to the problem ("and we are helpless"), end-users—like this one— were ready to leave the building altogether. Whether they actually could choose the "exit option" or not depended on whether there were other venues available to them. Several employees mentioned the home as an alternative venue for work in discussions of the alarm.

In terms of theory, this introduces a first lesson gained in the study of the domestication of built environments. Early domestication studies excluded technologies that may not easily be domesticated by those affected by them, such as nuclear power plants (Feenberg, 2002). In these cases, however, powerless end-users may react by moving in space (e.g., away from the power plant), thus evading the technology. As we have seen in the example discussed here, this option is often available in the domestication of built environments, which may allow easy movement between rooms, floor levels, or houses.

Most often, however, the end-users of B2 remained within the building, seeking to understand the system and to find solutions or at least workarounds. Based on this kind of "reengineering," which was done by trial and error, they developed theories about the system and adapted their behavior, resulting in a "tacit manual." "Tacit manuals" are of an informal character, which excludes them from more formal methods of inquiry. Compared with the official manuals (if they exist), "tacit manuals" have a compensatory function. One building user described this compensation work in detail:

If you do not follow the normal procedures then there are frictions—and we do not follow normal procedures. It is stupid that we in fact had to learn how this

works. I worked too much last fall. . . . Then, I knew when it started to beep then I had to go to the outside and to use my key card. And you had to do that every one and a half hour at a Saturday afternoon and Sunday [laughter]. So, you learned what you had to do to satisfy the system, so that you were allowed to work in peace. (End-user, B2, group discussion)

This end-user had to figure out how the alarm worked by trial and error, but after doing so, accepted the "normal procedure" that was inscribed into the technology. He accepted that because he did not follow the "normal procedure," he could continue only under certain circumstances. A "tacit manual" told him how to control the alarm.

Ultimately, the programming of the alarm system is a question of software presupposing certain patterns of presence and absence at a certain space. The story of the alarm is typical for those building technologies that aim at automatic control of environmental parameters, because they all contain assumptions about presence and absence within the building. In the case observed here, there is not much mutuality in the shaping of spaces and their users: Users' activities were restricted to learning how to adapt to the system or to leave the building altogether.

Domesticating the Canteen Besides stories about technical disruptions, we also encountered avid discussions of environmental qualities. In the next quote an end-user reflected about this:

> And they [technical malfunctions] are obviously annoying. But the more immediate experience, which I think of when talking about [B2], is its experience of openness, its free space. There is a lot of light and you can see right out [of the windows]. There is something about the technology which sometimes creates problems. . . . But when it works then it is [great], then nobody gets angry. (End-user, B2, group discussion)

Here, the building was described as more than just the technical. Instead and even "more immediately," this end-user experienced qualities of the building's envelope ("the openness"), the windows, and what you see when you look out of the window. In this quote, the positive material qualities of the building are contrasted with technical disruptions. More often, however, stories about environmental conditions involved disruptions as well.

Many of these discussions centered on the common canteen, which is located in B1 and which consists of an unbounded open space with a high ceiling. As our informants told us, it was the architects' explicit goal to create an open meeting space for students, teachers, and other employees. The end-users clearly recognized this social agenda:

The architects, I know that for sure, were very much motivated by the experiences they had when they were students themselves . . ., with little contact between the students and the teachers. And they were very interested in build-

ing obstacles into the building so that we cannot have our own places here, we the teachers. (End-user, B1, group interview)

The problem was that fewer and fewer employees visited the canteen on a regular basis.

According to the interviews, reasons for this were both social and material annoyances:

> I think the canteen does not work very well at all. It is too long and to narrow, it has too much noise and you are always in the way so that you get stressed of sitting there in order to eat. . . . And it has consequences: Fewer and fewer employees are using the canteen. . . . Because it does not have the feeling, a sort of coffee bar feeling, this nice feeling. You don't have that. . . . So, if we would be sitting in the canteen now, in no time there had been students standing before one of us or someone else, and they would just lean over to you wanting to talk to you. . . . Plus, that it is cold in there. (End-user, B2, group interview)

As a result of their discontent, some users converted spaces, such as corners in corridors or even small offices, to "coffee corners" and little spaces where they could meet. Users placed coffee machines and furniture inviting to socializing and relaxation in these spaces.

In the classical example from domestication studies described above, the placement of a technology was described as an important aspect of its objectification. In contrast to the standard analysis showing that whether the TV set was placed in the living room or in the bedroom defined its uses, meanings, and functions, we observe here that the domestication of the built environment happened through the placement of objects.

Participation and Domestication

Both B1 and B2 were not only the result of the architects' and other experts' wishes, visions, and actions but also featured user participation during their respective building processes. Committees that included representatives from different user groups (students, janitors, larger organizational units) voiced opinions about equipment and in a few instances even had influence on installations and the physical layout of the building. The following two examples of the management of social spaces show how participation affects domestication.

The first example is about a long corridor with a large number of individual offices on one side in B1. This space was built narrower than the architects' original design because of users' interventions. Users were afraid of people gathering in the corridor causing noise and other distractions. The users got what

they wanted: a long and uninviting corridor. Six years later, however, several end-users in our group discussions complained about this corridor, in one instance comparing it to a "prison corridor":

But you know, all the time we meet students who are walking down the corridor and are counting the doors. From this side, I work on the other side. And I think it's 50 doors, I think. It's crazy! It's almost like in a prison. So, this is not good at all. (End-user, B1, group discussion)

The spatial design of the "prison corridor" and the common canteen complement each other. According to the architects' script, students and employees should meet in the common canteen anyway, so they do not need inviting areas somewhere else. As a result, the scripts inscribed by the architects and the scripts inscribed by the participating users harmoniously supported each other, seemingly avoiding antiprograms. Still, only a few years later users sought to establish coffee corners all over the building.

The second example resulted in a high degree of user satisfaction. During the participation process for B2, the user-representatives for one office wing decided to demand smaller individual offices to make room for more inviting common areas located in the corridor. The users made these demands after thorough discussions about previous experiences with B1, considerations about new modes of collaboration, and the importance of informal meeting spaces for productivity and well-being. In our interviews, a direct connection was drawn between these "commons" and the story of the canteen. These new meeting spaces worked

too good, perhaps. Yes, because this has something to do with—they [the users] remain here in the building [B2] during lunch, for example. . . . It varies somewhat from person to person and group to group, but some people never leave this building [B2] in the course of a work day. (User Coordinator, B1 and B2, expert interview conducted by Helene Tronstad Moe and Robert Bye)

And indeed, the cozy niches of B2's commons were unanimously praised, even somewhat enviously by users from B1, for making B2 a nice place to work. The "commons" were not created to lure people away from the main canteen. Their creation was the result of considerations about how to work together more effectively, but they ended up changing the usage of the common canteen. These spaces hid the discontent with the canteen, while making the "wild" establishment of "coffee corners" explicit.

The stories of the canteen and the "commons" reveal how end-users could remain in the building and adapt it to their own needs, implicitly (by creating informal "coffee corners") and explicitly (by altering the architectural plans to include "commons"). In both cases, the users reacted according to their own experiences with spatial scripts inscribed into the buildings. Without this experience, the practical, symbolic, and cognitive adaptations that are constitutive for domestication are not likely to occur.

Moving into a new building obviously interrupts daily routines. In processes of

domestication, the building becomes part of the users' daily lives. This implies that it is difficult to harness domestication within user involvement in building programming or design. In our case, it was possible only when users could base their demands on their own experiences within a similar building. When they participated without having this resource, their intervention only made the building worse.

Lessons for the Design of Good-Built Environments

In the interviews, users of B2 were proud of their building. In terms of domestication this means that the appropriation has gone full circle: the building was proudly presented to the outside world as "their" building. What lessons can be drawn from the success of B2 and the failure of B1?

Exit or Mediation

In the story of the alarm, very much in the same vein as in traditional domestication studies, a technology was the object of study. As we have seen, however, the alarm system is a special kind of technology: as part of a basic infrastructure it scripts the relation between space and users in particularly profound ways. This is true for all infrastructures, within, between, and outside buildings. In these cases, successful domestication would mean that both the technology and the service provided by this technology fade into the background—as long as they work as expected. But the alarm literally refused to disappear, making itself heard persistently. In this situation, users were left with only two choices: learning how to adapt to the system by creating tacit manuals or leaving the building. They did not have access and knowledge to actively adapt the technology to their uses—which would have been an option in traditional artifact-based domestication. In fact, given the nature of this infrastructure, enabling all users to reprogram the system is not really desirable.

A solution to this problem of the "domesticability" of critical infrastructures would be to involve mediating agents such as coworkers and janitors. In this specific case, the janitors acted mainly as information source, but they could have also become mediators in a stronger sense by adjusting the alarm system. In terms of semiotics, to perform this function they would have to be able to read both scripts and antiprograms in order to mediate between them. Codomesticating mediators have been described as facilitating the domestication of technologies before (e.g., Stewart, 2007). To take part in users' domestication would mean to work practically, symbolically, and cognitively with the mutual adaptation of building and users. This kind of codomesticating building operator would probably resemble much more the old-fashioned janitor than the

white-collar professional championed in current facilities management literature (Aune, Berker, & Bye, 2009).

Designing for Domestication

A more direct form of domestication of the built environment was observed in discussions of commons areas when occupants changed the meaning and uses of spaces according to their wishes.

From a semiotic perspective, the creative (mis)reading of the original scripts about the common canteen and hallways is not unexpected and may even be considered to be desirable. Successful domestication is defined as mutual adaptation. The original scripts have to change in unexpected ways—at least to a certain degree.

For the design of built environments, this means that the more a built environment tries to reinforce a narrow set of scripts the less it will become an organic part of its users' everyday life. In our example, the prison corridor that reinforced the script of the common canteen led to a further alienation between users and building, instead of stabilizing the original intentions.

Based on the approaches introduced here, the question of semiotics is therefore not whether postmodern readability or modernist functionalism is to be promoted or refused (as indicated by Preiser & Vischer, 1991). The question is neither whether users should be involved in building design or not. Based on the cases described here, built environments that support domestication fulfill two conditions: first, they abstain from enforcing their vision of use (script) after the occupants have moved in; and second, occupants have to receive support from local experts who are willing and able to help adapting the environment to its users' needs. Thus, the solution requires both open flexibility of designs and the assistance of willing and able experts when the design is rigidly excluding alternative uses. If both conditions are met, then built environments have a really good chance for becoming useful and meaningful for their users.

Notes

1. The interviews were conducted together with Robert Bye, Department of Interdisciplinary Studies of Culture, Norwegian University of Science and Technology. They were translated from Norwegian into English by the author.

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