Technology and the Home: Supporting Cooperative Analysis of the Design Space

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ABSTRACT

The home is a complex and (as yet) poorly understood environment. Placing emphasis on production and efficiency, approaches and methods developed to analyze the workplace seem inappropriate to the study of domestic life. A variety of new approaches and methods that are sensitive to the lived realities of domestic life and which support cooperative analysis of the home from multiple viewpoints are required to analyze the domestic design space. An adapted patterns framework for scoping domestic environments, complimented by targeted ethnographic inquiry, is offered as a means of explicating a social viewpoint that provides concrete empirical insights and resources for parties to design to draw upon and use in analyzing the design space.

Keywords

Domestic environments, ethnography, patterns of action and technology use, design space, cooperative analysis.

INTRODUCTION

The domestic environment is currently receiving a great deal of attention from commercial and academic computing sectors as a place of design and IT development. A key research problem in designing for this environment is to understand the everyday character of the home, how people live in the home, what they do when they are at home, and the potential role of technologies within the milieu of domestic activities. Developing a concrete understanding of these factors or issues is central to the analysis of the design space and the formulation of potential design solutions. We take it that the home is a shared environment to some large extent and that these issues are, therefore, predominantly *social* in character.

Understanding the sociality of the design space has been a prominent feature of contemporary workplace design. We believe that the insights developed in designing for the workplace are not easily or readily transferable to the home, however. Underpinning this stance is the recognition that for members of the ordinary society the home is not characterized by a practical day-to-day concern with the organization of action to meet the demands of production and efficiency, *as those notions are understood in the workplace*. New approaches and methods may be required then, which are sensitive to the lived realities of life in the home.

We place emphasis on approach*es* for we take it that just as with the workplace, no single approach will furnish a 'silver bullet' to the problems that design will inevitably be obliged to address in a domestic context. Simply put, the domestic is a huge domain – every bit as diverse and complex as the workplace – and one that may be best understood through the use and development of a variety of analytic perspectives and methods. It is in this respect that we speak of the need for 'cooperative analysis' of the design space, where *multiple viewpoints*, including those of end-users, are brought to bear in various ways on exploration, elaboration and resolution of design problems.

Insofar as our own contribution to this collective effort is concerned, then we propose that the sociality of the domestic might be explored, and analysis of the design space be usefully informed, through the application of an adapted patterns framework, and in more familiar ways, through ethnographic inquiry. We offer an adapted patterns framework as a means of *scoping* an already complex and divergent domain of practical action and technology usage and, thereby, of identifying potential target areas for (re)design. We offer ethnography as a complimentary means of *specifying in organizational detail* the real world, real time sociality of the discrete areas of practical action and technology usage identified as potential candidates for (re)design.

We say '(re)design' to point out that the domestic environment is already a complex technical domain, not necessarily in terms of sophisticated computing systems but technical nonetheless (simply look around the modern home; contrast it with those in primitive cultures to see the immense technical and, simultaneously, social differences). Consequently, we take it that the development of

sophisticated computing for the home will be required to build upon *existing social-and-technical-infrastructures*, which are as yet poorly understood. We offer an adapted patterns framework and ethnography as a means of explicating existing social-and-technical infrastructures in the home, thereby providing concrete resources which parties to design may draw upon and use to reason about the design space and the potential role of new technologies within the milieu of domestic activities.

The words 'social-and-technical-infrastructures' are joined together by hyphens to draw attention to the mutually elaborative and constitutive relationship that holds between practical action and technology – between the actions of 'sorting the mail', for example, and all the subtle technical arrangements that are implicated in that achievement (including technical arrangements of display, sharing, and storage). The joining together of the words draws attention to our focus on basic real world structures (infrastructures) of technology in use then, and so to phenomena that we all know as members but which often pass us by as analysts, taken for granted, seen but unnoticed. This mutually elaborative and constitutive focus *reminds* us, then, of important organizations of technology in the home that are often forgotten yet may be drawn on or even built upon when we assume the role of analysts in design.

THE ADAPTED PATTERNS FRAMEWORK

Following success in software engineering [8], pattern language frameworks have been championed by members of the HCI community as a vehicle for sharing design solutions [2,3,5,6,7]. The main focus of existing patterns frameworks is essentially retrospective in character, where the general aim has been to mine existing experiences in order to build a set of patterns that convey design problems and solutions to the wider community. Prescriptive solution-based patterns approaches have been complemented by descriptive patterns frameworks, which are concerned to illuminate, again retrospectively, work arrangements that commonly occur across a variety of settings, rather than design problems and solutions [10,12]. These patterns frameworks form part of a broader pattern based-approach to design where patterns are made available as a resource for design teams [9].

Our own work seeks to extend the concern with descriptive frameworks by shifting from a retrospective outlook to consider a prospective role for patterns in the design of interactive systems for the home. We are particularly interested in the use of pattern-based approaches as a means of structuring the on-going analysis of ethnographic material as part of an on-going process of design. Our aim, then, is not to re-examine previous ethnographic studies in the search for aggregated phenomena but to provide those undertaking ethnographic studies of the domestic environment with a *device for structuring and presenting* ethnographic findings in a way that supports the broader needs of design, particularly analysis of the design space [4]. The adapted patterns framework does not articulate

problems and solutions, then, but is a vehicle for 'capturing and conveying expertise' [14], and more precisely, for reminding analysts of important social-and-technical-infrastructures that exist in the home when considering the question: what is to be built?

Although eschewing the conventional problem-solution focus, our turn to a patterns framework as a means of driving an on-going design process is informed by Alexander's original work where the commonsense notion of *place* assumes a central role in the structuring and presentation of patterns [1]. Simply put, Alexander instructs us that patterns are tied to places (bathing to bathrooms, eating to kitchens, sleeping bedrooms, etc.) We take this observation to be foundational and to provide a distinct study policy: important social-and-technical-infrastructures that exist in the home might be explicated by attending to the patterns of action and mutually elaborative technology uses that occur in the particular places that make up the home.

Our use of such a framework in design is motivated by the appeal to and use of commonsense knowledge of patterns of action (or "typifications") in everyday design practice [13]. Typification (shared knowledge of what persons usually do, what typically occurs in this place or that, how activities are normally conducted, etc.) is central to design and a descriptive patterns framework may provide a useful typification device, capturing and conveying knowledge of day-to-day activities, interactions, and technology uses in the home. Patterns support cooperative analysis of the design space by informing us as to what activities typically occur in particular places, how those activities are interactionally (socially) organized, and how technologies are implicated in the production and management of everyday activities constitutive of 'life at home'.

Furthermore, the collection of patterns that occur in a place display a *bricolage of patterns* that coalesce around particular technologies. This coalescence draws attention to potential sites for design. The set of empirical patterns of use surrounding the kitchen table, for example, illustrate the way in which a pattern approach serves to support analysis of the design space. Real world patterns of action and use inform us that the kitchen table assumes far more practical significance in domestic affairs than being an important place to eat meals and socialize [11]. In day-to-day praxis the kitchen table is an **activity center** around which a great many patterns of use revolve. These patterns inform us that the kitchen table has a number of important uses in the management of the everyday activities and interactions in the home.

- It is used as an *awareness center* where people place things they are required to take along with them when they leave the home. Thus, the table is used to coordinate domestic activities with the outside world.

- It is used as an internal *coordination center* where adults may monitor the doing of schoolwork by children and as a site where young children may be

occupied (doing drawing, crayoning, painting, etc.) and monitored while adults get on with domestic chores.

- It is used as an *internal communication center* where mail is sorted and displayed to household members, where letters and cards are written, and where notes are jotted down and displayed.

- It is used as a *shared information production and management center* where shopping lists are constructed, bills are processed, account books and ledgers updated, etc.

Indeed, the kitchen table is used for a host of practical activities that are completely unsupported by current computer-based technologies in the home.

Other patterns in the kitchen inform us that the design space is larger than we might initially believe as the kitchen table, to continue with the example, is also *connected in action* to a range of other technologies: to noticeboards, calendars, diaries, etc., which raises the possibility of developing distributed systems, devices and displays in the kitchen and around the home. And if such systems and displays are developed, what of interacting with them via mobile devices from outside the home to further augment awareness, coordination, communication, and shared information production and management in the home?

Limitations of the Framework
Like any framework, ours has its limitations. These are essentially practical rather than ontological or epistemological in character. As noted above, the domestic is as complex and varied a domain as the workplace and so the framework is confronted by the problem of scale. Understanding the home, like work, will take time This does not negate the usefulness of the framework as a structuring and presentation device but draws our attention to the simple but brute fact that it will take many years of painstaking research to explicate a substantial corpus of knowledge of social-and-technical-infrastructures that exist across a wide variety of different kinds of domestic setting.

This, in turn, leads us to confront a second significant practical problem, namely, the constraints of design. Research everywhere is conducted within designated time frames. This means that design is compelled to be selective, concentrating on particular aspects of domestic life rather than the needs of the home as a whole. The implication of this is that in its early stages the framework offers piecemeal views on the home according to the various research initiatives which drive investigation. Nonetheless, over time it might be expected that a considerable corpus of findings extending across the home and various settings might emerge.

The third significant problem we have encountered is in the use of video. We began our research with a large corpus of video data (some 6000 hours in total). Apart from the resources required to analyze this material (some 27 years, which puts such a task outside the constraints of design),

the primary problem with such data is its partial character. The video was collected from cameras mounted in fixed locations, with the result that although a rich picture of life in the home is produced it is nonetheless incomplete as the fine, close-up details of peoples interactions are missed; as people move in and out of view; and as activities have a temporal order that extends beyond the recording cycle. In order to develop the kinds of in-depth understandings that design requires we have therefore been obliged to augment the findings produced through the application of the adapted patterns framework. This is not an inherent problem of the framework, however, but of the video data the framework is applied to.[1]

AUGMENTING PATTERNS: ETHNOGRAPHY
Targeted ethnographic studies have been undertaken to augment the adapted patterns framework and explicate the specific organizational details of particular areas identified in analysis as relevant to design. This involves the close inspection and scrutiny of the social organization of specific activities in the home; activities such as sorting mail, annotating calendars and diaries, using photographs, etc. The aim here is not to collect a large number of studies of targeted activities but to examine one or two instances of their *situated occurrence* in *observable and reportable details* of their occurrence. The emphasis on detail prevents the provision of a practical example in such a short paper. The rationale underpinning the approach is well known in design however, and in CSCW in particular, where it has enjoyed considerable success under the auspices of 'ethnomethodological studies of work' [15].

Ethnomethodological Studies of Work
It may appear strange to talk of 'studies of work' given the questionable value of workplace approaches and methods to the study of the home. Ethnomethodology employs the notion of 'work' in a very specific sense however, in that it construes of the domestic environment as a site characterized by ongoing practical activity: of getting up and ready for work in a morning, of taking the children to school, of receiving guests, making dinner, doing schoolwork, and all the other *mundane, ordinary, everyday and nonetheless crucially important practical activities and interactions* that go on in and make up life at home. We take it that it is the sense of ongoing practical activity and interaction, rather than of paid labor, that the home may be characterized as a site of 'work' that is amenable to study then. Furthermore, we take it that the work that takes place in the home elaborates existing social-and-technical-infrastructures in real world, real time organizational detail. Close inspection of the situated work implicated in the accomplishment of specific activities in the home thus provides concrete resources which may be used to elaborate patterns in fine detail and reason about the definite character of potential design solutions.

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[1] For more information about the adapted patterns framework see [4].

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