

Challenges in Understanding Roles and Responsibility for Use of Home Networking Technologies

Jennifer A. Rode

Department of Informatics,
University of California, Irvine
444 Computer Science Building
Irvine, CA 92697-3425 USA
jen@ics.uci.edu

Louise Barkhuus

Department of Computing Science,
University of Glasgow
17 Lilybank Gardens
Glasgow G12 8QQ, UK
barkhuus@dcs.gla.ac.uk

ABSTRACT

New technologies change the distributions of labor, distributions of roles & responsibilities, within families, and between family and the outside world. Networked technologies are particularly problematic in that they often require extensive configuration. These devices are placed in domestic settings devoid of network administrators. This paper discusses four issues relevant to framing the problem and provides an example illustrating some of the resulting complications home networking technologies.

INTRODUCTION

Technology does not enter homes merely as a result of cold economics, but rather as the result of social processes. Technology can be integrated into households through purchase, handed down through family networks by members who upgrade, or added due to professional obligations. Whatever the means of introduction into the home, the social dynamics surrounding its introduction are fundamental to its use. Once present these technologies have to be set within the context of roles and responsibilities for care in the home.

A range of new technologies are in the process of being incorporated into our homes. So we must shape boundaries and attitudes for their use. These include home networks, nanny cams, and tracking technologies like GPS and RFID attached to cell phones and backpacks, some of them allowing us to track the locations of our family's members. However, many of these technologies aspire to achieve a social ideal. For instance, social and cultural ideals of appropriate parenting have encouraged the adoption of technologies to transform care into *surveillance*, such as nanny cams and kids trackers. New technologies require being set within the context of roles and responsibilities for care in the home. The roles of caretakers and users need to be defined before technology can work in unison with the social sphere of the home. For example, as technologies lose their novelty and become routine parts of daily life they begin to follow the gendered division of labor in the home [11]; Grinter et al.'s study highlights that the party with the most network administration experience was given the job of maintain the home network [5]. Networked

technologies are particularly problematic in that they often require extensive configuration. These devices are placed in domestic settings devoid of network administrators. It is therefore important to consider how these new technologies entering our homes change distribution of labor, distributions of roles and responsibilities within families.

In order to understand how domestic technologies are used and integrated into daily social life, there is a need for work that is theoretically sophisticated, technologically engaged, and grounded both historically and ethnographically. In order to achieve this, and to understand how the often networked devices of a "digital lifestyle are managed" one needs to consider each of the following:

- The workplace value of efficiency and Taylorism
- How technology is acquired by households
- Gender roles in using domestic technologies
- Roles in housework and parenting in family settings

This set of issues is not intended to be comprehensive, but rather represents a set of key issues we feel to be especially relevant for a better understanding of domestic networked technologies. In this position paper, we elaborate on the relevance of these issues, and then use one of our own studies to illustrate how these issues can be used to help understand the complications emerging from networked technologies in the home. While our example centers on conference calling, these issues can just as easily be applied to other home networking technologies.

4 ISSUES FOR DOMESTIC NETWORKED TECH

Efficiency and Taylorism

Although the home is conceptualized as a site of everyday life, employment of technology in the home, both early appliances and later ubiquitous computing technologies have, focused on increasing efficiency [1]. Whether it is to make homes more efficient for care of the elderly, better communication within the family, keeping the power bill low, or programming your new home control system, these applications are all trying to reduce quantifiable metrics. The problem stems from bringing the workplace value of efficiency into the home.

The history of workplace efficiency being applied to the home is especially relevant and worthy of further comment. In the early 1900's we see the advent of scientific management, commonly known as Taylorism. Taylor timed and studied the actions of workers at the Midvale steel company in the hopes of streamlining production. These timings were used to determine if production could be sped up, a practice called Taylorism. Taylor's theories were applied to domestic life, which in turn encouraged the development of the value of domestic efficiency. Christine Frederick applied these techniques to the domestic domain timing and photographing women doing domestic tasks to advice on how housekeeping tasks could be more efficiently done. Similarly Lillian Gilbreth used Taylor's methods to adjust counter top heights, space plans, and create structured timelines for women to follow for maximum domestic efficiency. At the same time domestic economists like Catherine and Harriet Beecher all created new model houses to permit a single housewife to maintain her home without the assistance of domestic help [1]. These new house plans of homes represented a major re-conception of structure and use of space in the American home. This notion of an efficient home run like a factory is particularly prominent in the design of new domestic technologies and is a challenge to overcome as we should value experience over efficiency [1].

How technology is acquired by households

It is relevant to look at how individuals choose new technologies to put into their homes. Men and women, for example look for different things when purchasing technology. Livingstone argues that women look to domestic technologies as a means of controlling situations and minimizing domestic chaos, whereas, for men, technology is about control and a means to express expertise. Men "tended to emphasize that technologies are 'purely functional,'" and discussed them in terms of features. Livingstone elaborates:

Women are also concerned with the utility of objects...how the object allows them to function in their everyday lives... They tend to refer outwards to domestic practices when justifying object use rather than pointing out its inherent properties, its modern features or its price tag. [6, p120.]

Logan's ethnographic work following home purchasers of new high-end TVs found men in the study were more interested than women in acquiring larger television screens, and in "owning and operating the latest, greatest technologies" [7, p42]. Further, men and women have a tendency to play a more active role in the acquisition of domestic goods that relate to their household roles [14]. They tend to be responsible for decision making regarding items in their gendered sphere of influence [9], and there is similar variability in who has the money to spend and how much access an individual has to market goods. Men and women's disparate gender values influence their technology purchases.

Gender roles in using domestic technologies

Individual differences affecting technology include social roles and gendered attitudes. Where individuals may take on various roles of a passive consumer, a person who interacts, or a 'technology czar' [11], gender roles still affect the use of technologies to a great extent. Cockburn has argued that appliances are predominantly designed by men, and that "contemporary western femininity has involved the construction of identities organized around technological incompetence" [4]. Rode and colleagues proposed specialization of domestic programming skills along gender lines [11]. In their study women tended to specialize in temporal appliances (VCRs and oven timers) that facilitated household management, whereas men tended to specialize in programming of appliances they were more oriented toward configuration. Usage patterns of domestic technologies are dependent on gender roles, technological competence and are not consistent across household participants.

Historically, technological advances like indoor plumbing, advances in heating, and store bought grain removed the tasks of fetching water, chopping firewood and milling grain. As these tasks were typically facilitated by men, these technologies decreased the need for male participation in domestic work, contributing to their leisure time. At the same time it has been argued the amount of time American women spent each day on domestic work has been constant since before the industrial revolution despite these technological advances [12]. This suggests that domestic technology results in increased standards and a decrease in the domestic work required of men and children, and this has implications for how roles are assigned with respect to new technologies.

Roles in housework and parenting in family settings

Household compensation is highly variable and worthy of considerably study in its own right. However, in traditionally structured families married women are doing a significant portion of domestic labor. Berk cites other work which shows women with the longest work week (paid and unpaid labor combined) tended to be married to men with the shortest workweeks; while this suggests and interdependency, it also suggests that the time spent by the husband remains constant regardless of the wives paid work [2]. Maushart claims married women perform two-thirds to three-quarters of housework and acting as the primary party responsible for child care [8]. Sullivan's study from 2002 showed this trend was changing in the UK. Comparing survey data between 1975 and 1997, his work shows that men of lower-socio economic homes are closing this gap, and that there is a "clear reduction in gender inequality in the performance of some normatively feminine-associated tasks." [13, p 453]. A closer examination of his statistics show a rise of male participation in "cooking and cleaning tasks" and a corresponding drop in female participation, however, minutes spent with "child care" during the same period increased with a slight narrowing of the gender gap.

The fragility of the domestic space is apparent when children are born. While gender, age, occupational level, and education are all factors in determining how much and domestic work there is to be done and who does it Berk's work suggests that it is that age of the household's children that is the primary factor. Motherhood dramatically increases the amount of housework that needs to be done, however while it nearly doubles the workload for women, the workload for men remains unchanged [Maushart, 2001]. Maushart recounts the results of a study which showed that in dual-income families with children, husbands were likely to sleep later, watch more TV, spend 28% longer eating breakfast, 34% less time cooking, and 67% less time tending to the children's needs; women arrived home first 75% of the time to tend for their children and their husbands spent 25% more time in the evenings on leisure activities [2001]. It is especially relevant to understand current practice in gendered patterns of housework and parenting when integrating new technologies into the home.

Of the four issues in relation to domestic networked technologies, emphasized here, we find that the most important issue is the integration of social roles and technologies. Where many technologies are divided in the homes between these roles, this often result in disturbing factors such as break downs when the 'administrator' is not home or 'misuse' by family members such as children (who might think that the VCR looks a great deal like a toaster and attempt to make their own toast). To gain empirical insight into actual use of technology in relation to social roles within a family, we therefore now present a case study conducted by one of the authors.

NETWORKING FROM HOME

While working with Tracee Vetting Wolf and Wendy Kellogg at IBM, the first author conducted nine interviews of conference call users. Eight of participants all reported working at home, seven of which reported at least two locations in a typical week. The aim of the study was to investigate how conference calls are used by IBM consultants outside of the office. She spoke to a mixture of telecommuters, and teleworkers (including individuals using satellite work centers or a combination of locations). These participants reported working 9-13 hours and taking 2-10 conference calls on their most recent workday. The majority of our participants had children, three of our participants had children under six, four had children between six and twelve, one had a child over the age of thirteen and one man had no children. Unsurprisingly, with so many children in the mix work-life balance was important. Conference calls provide an example of a networked technology that changes the roles and responsibility of the home.

Home networks and conference calling gave workers the ability to work at home, a drawback of this was the lack of casual social interaction with co-workers which came up repeatedly in our interviews. Two examples of this were a

working mom who reported that by Thursday she had to get out, even if it meant something "silly" like going grocery shopping or getting ice cream with her daughters, and a man who remarked that his dog's visit to his office was "the day's entertainment." In a very real sense this dog and grocery shopping are the closest things these employees have to collegial interaction. Conference calling is an example of a networking technology that changes home dynamics, as household members come to stand in for virtual co-workers.

At the same time taking calls from home extends the workday, our subjects reported working 9.5-13hours on their previous workday. The significant factor here is the pressure to accommodate conference calls from other time zones which in an office environment would be considered well outside the duration of the typical workday while at the same time working long days (our subject's average workday was 11.5 hours). Many of our subjects commented that balancing work and family pressures was something that required constant management.

A recent study by Noelle Chelsey on cell phones also reports similar bleed through of work and home realms into their opposite sphere. Interestingly, gender appears to be a factor. Reimer, a journalist reporting on this study, reports "Women were more likely to be negatively affected than men by this spillover. Children would call their mothers at work more often than their fathers to report accidents or bad news at home. Men also reported negative reaction to spillover, although it was more likely to be in the reverse direction, with work calls interrupting home life. Women were not immune to reverse spillover, however, and wound up with stress going in both directions. Both genders reported a decrease in satisfaction with family and work life due to these interruptions." This is indicative of a natural social tension between prioritization of work and family life, where gender roles play a significant part.

In our study we saw several examples. Children wanted attention from dad on the rare occasion he worked from home, or in one case would play a game called "mom is working" that make it evident attention would be preferred. Boundaries have to be placed on when and where to take calls. While many of our callers were more than happy to take calls in the car, one working mother refused to do so when her children were present due to safety concerns. This meant not taking calls when picking the kids up from school everyday. There are varying level of respect for this sort of prioritization. For instance, a single man bitterly complained of crying babies and talking cockatiels, and expressed his firm believe that 9-5 is company time disapproving of working parent's use of flex time. Both our study and this cell phone study indicate how existing gender roles play significant factors in how new networked technologies are integrated into existing roles and responsibilities.

It became apparent that these blurred boundaries affected the home. This meant active management of ambient noise and use of domestic space was required. Crying babies, barking dogs and talking cockatiels are all readily apparent background noise for callers not on mute, as many of our callers remarked. One caller's story illustrates how the mundane events of everyday life present problems on a conference call. The working mom typically avoided scheduling calls between 3pm and 3:30pm when her children returned from school. She recently had an important 2-3pm call which on which she had to present, but when presenting one can not use "mute" to obscure background noise. She was unable to reschedule the call, but knew when the children returned from school the dog would bark causing significant distraction on her call. Her solution was to explain the situation to her children, and told them "no noise in the house" when they return from school. She brought the dog, and three small dog biscuits into the room with her during the call. Her strategy was that if the dog was busy chewing he could not make noise on the call. This strategy of managing background noise through active negotiation with the household was common. As one of our callers mentioned their "kids know to be quiet" when they are working. All of this suggests that home work is not done by the employee, but rather it is facilitated by the household as a collective adjusting domestic flow to account for the home worker and help ensure their productivity. Home conference calling is fit into the larger domestic flows.

Conference calling is not only susceptible to the effectiveness of the malleability into household flows, but the worker's values of appropriate work life balance. Conference calls provide an example of a networked technology that changes the roles and responsibility of the home. Value placed on efficiency, gender roles, housework assignment patterns, all influence how a technology is used and maintained.

FUTURE WORK AND CONCLUSION

As we have seen here, networked technologies are very challenging to include in domestic settings. Homes function as both leisure area and (domestic) working area making the workplace value of efficiency which often is associated with business technologies inappropriate. Social practices dictate which networking technologies have the opportunity to be integrated into the household. Social obligations and roles existing in a home put restraints on who can use it as well as who will benefit from the technology. We conclude by calling for more research within actual homes, focusing on these dynamics in order to trace uses and practices in this regard. We intend to perform more studies of this kind.

MINI-BIOGRAPHIES

Jennifer Rode is a PhD candidate at University of California, Irvine, working with Paul Dourish to conduct ethnographic studies of domestic technologies. She previously worked as a usability engineer at TiVo

evaluating its user interface and conducting ethnographic studies. Her research looks at gender differences in domestic appliances are programming, parenting practices surrounding VCRs, and cross cultural discussions of homes and appliance use.

Louise Barkhuus is currently a Research Fellow in the department of Computing Science at Glasgow University, researching ubiquitous computing, in particular games and other leisure technologies. She recently conducted a research project on visual home media, comparing the differences in usage patterns between regular TV/VCR use, PVRs, and watching TV via downloads to a computer [3]. She is part of the UK wide Equator project.

ACKNOWLEDGMENTS

We would like to thank all the participants from the studies. We also thank our colleagues with whom we conducted the studies on which this work is based. This includes Tracee Vetting Wolf, Wendy Kellogg, Barry Brown, Eleanor Toye, Mark Stringer, Alan Blackwell and Paul Dourish.

REFERENCES

1. Bell, G., and J. Kaye (2002). Designing technology for domestic spaces: A Kitchen Manifesto. *Gastronomica*. Spring 2002: 46-62.
2. Berk, S. F. (1985). *The Gender Factory: The Appointment of Work in American households*. New York, Plenum.
3. Brown, B. and Barkhuus, L. The television will be revolutionized: Effects of PVRs and Filesharing on television watching. In *Proc. of CHI 2006*. Forthcoming.
4. Cockburn, C. (1985). *Machinery of Dominance*. Boston, Northeastern UP.
5. Grinter, B., Keith Edwards, Mark W. Newman, and Nicolas Ducheneaut (2005). *The Work to Make a Home Network Work*. ECSCW.
6. Livingstone, S. (1992). The meaning of domestic technologies: a personal construct analysis of familial gender relations. *Information and Communication Technologies In The Home*. Routledge, New York.
7. Logan, R. L., S. Augaitis, R.H. Miller, and K. Wehmer. (1995). *Living Room Culture- An Anthropological Study of Television Usage Behaviors*. *Proc. Human Factors and Ergonomics Society 39th Annual Meeting*. p326-330.
8. Maushart, S. (2001). *Wifework; What Marriage Really Means for Women*. New York, NY, Bloomsbury.
9. Qualls, W. J. (1987). "Household Decision Making Behavior: the Impact of Husband and Wives Sex Role Orientation." *Journal of Consumer Research* 14: 264-279.
10. Reimer, Jeremy. "New study finds cell phones disrupt family life." <http://arstechnica.com/news.ars/post/2006105-5909.html>.
11. Rode, J. A., Eleanor F. Toye, and Alan F. Blackwell (2004). *The Domestic Economy: a Broader Unit of Analysis for End User Programming*. CHI, Portland, OR, ACM PRESS. 161-176.
12. Schwartz-Cowan, R. (1983). *More Work For Mother: The Ironies of Household Technology from the Open Hearth to the Microwave*. New York, New York, Basic Books.
13. Sullivan, O. (2002). "The Division of Domestic Labor: Twenty Years of Change?" *Sociology* 34(3): 437-56.
14. Webley, P., Burgoyne, C., Lea, S., and Young, B. (2001). *Economic Behavior in the Family. The Economic Psychology of Everyday Life*: 75-98.

