

The Social Consumption of ICTs: Insights from research on the appropriation and consumption of new ICTs in the domestic environment

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Abstract

This paper provides a review of sociological research on the use and consumption of technology in the domestic space, and some results of a study of the adoption and rejection of new ICTs. Technologies studies, media studies and consumer research have all focused on the home as a location for the consumption of new ICTs, and highlight the social nature of technology use, and the special nature of the home. However social changes and new technologies are challenging the traditional boundaries of the home, offering challenges to social researchers and product designers. Of particular importance is the way expertise and products are crossing these boundaries, and the role of the social network and informal economy in the adoption and continued use of new and often problematic technologies. A framework is suggested for developing new classes of products for the home, based on themes including family and community, as well as more common ideas of information and productivity.

Keywords: Domestic Technology, ICTs, Consumption, Social Networks, Consumer Research, Technology Studies.

Introduction

This paper reviews some of the research on the use and consumption of technology in the domestic space that may not be familiar to members of the usability and design community, especially who have traditionally focused on design for the workplace. I also introduce original research findings and conclusions from a qualitative study of the adoption and use of new ICTs conducted in a number of households and workplaces in the late 1990s. This was a time when many new ICT products and services were becoming available, and more traditional media and communication products becoming more intensively in homes (Stewart, 2002)ⁱ. The paper does not make recommendations about the type of products and services to be developed, or those that may be successful, although it is quite possible to draw this type of conclusion from it. Instead I point out some rather broader trends in the way that we engage with technologies, rejecting and adopting them, and the importance of our domestic space and social networks to the way we will engage with future technologies.

Many research fields study the place of information and communications technology in the home, in everyday life and in relation to the individual. These include Sociology of Consumption, Design, Gender Studies, Telework, Technology Studies, Media and Cultural Studies, and Consumer Research in various forms. With the exception of consumer studies and design, the object of most of the studies is not to find a way of developing new products, but the methodologies and findings of research in these fields could be very valuable if applied to these ends.

I would like to raise and discuss a number of issues related to the investigation of household and personal technologies.

1. The changing home space, and the links between home and other spaces such as work and community.
2. The difficulties of investigation in the home and everyday life.
3. Models of appropriation and domestication of new ICTs .
4. Some tools to investigate the place of technologies in everyday life.
5. The strategies through which people engage with new technologies: resistance, appropriation and living with technology.
6. Some thoughts on visions of the home shaping the development and adoption of new ICTs.

My approach is based on in-depth qualitative research inspired by work done on the domestication of media technologies and the consumption of goods in general (Morley, 1986; Lull, 1990; Ang 1991; Livingstone 1992; Morley, 1992; Silverstone et al., 1992; Campbell, 1995; Miller, 1995; Aune, 1996; Gay et al., 1997; Lie et al., 1997; Silverstone et al.,1998; Livingstone et al., 1999), and in recent research in the field of consumer studies (Hirschman, 1980; McCracken, 1988; Belk, 1995; Mick et al., 1995; Carey 1996a; Carey et al., 1996b; Dholakia et al., 1996; Venkatesh et al.,1992; Venkatesh, 1996; Mick et al., 1998).

This research focused on the types of household, activities and relationships of household members, the way they make a place for ICTs in the home, and the competing interpretations and uses they are put to. It relates closely to constructivist approaches to understanding technology innovation and use (MacKenzie et al., 1985; Bijker et al., 1987; Bijker et al.,1992; Williams et al., 1996). The research also highlights the strategies that people use to manage technologies, and the use of technologies by others in the household such as division of labour, restricting use, and

subversion. These strategies can be related to the many difficulties that ICTs present, and to the way that technologies are interpreted according to basic values.

The Home and the Life-space

Until recently many domestic technological artefacts were designed for the home only, and only existed outside the home in very different forms. Particular artefacts were shared between household members for doing things within the home and were thus interpreted within the context of these activities and domestic relationships. However many new ICTs are challenging the boundary of the home and the outside world, both practically and methodologically, as individual ownership of devices increases, and crossovers between home work and other activities appear to be increasing.

One reason for this is the rise of personal technologies. A clear example of this is the mobile phone, a tool that releases people from fixed telecommunication either in the home or at work. However, traditional home technologies are also much more available, with the trend towards more independence and personalisation including multiple TV sets, VCRs, telephone handsets and even computers (Livingstone et al., 1999). Other technologies, such as personal organisers, personal media player etc are emphasising this trend. However, while this personalisation gives flexibility to the individual, effectively removing the physical and moral borders of the home, it also removes a large element of the shared use of devices, media, information and communication that we are accustomed to. How might this change the way we design technologies, and does this apparent individualisation mask other social aspects of the social consumption of ICTs?ⁱⁱ

A second reason for the blurring of boundaries of the home and outside world is the change in the relationship between home, work, community, and household activities carried out outside the home. The computer and the telephone make it much easier for work to intrude into the home space, either as a welcome means of managing work, or as a result of a greedy workplace (Nippert-Eng 1995; Gournay et al., 1998; Gant and Kielser, 2002)ⁱⁱⁱ. There is also a rise in peripatetic work that takes place outside the workplace or the home, and in the 'third spaces' where personal and work times converge in new locations (Stewart, 2000). Today, there is a very common idea current that people will spend more time in the home, and do more things there, that the boundaries between home and work, and between the private and public are changing. Although this is an important trend, and one that could inspire a range of innovations, it is not the whole story. We must be careful with this assumption, and try to understand how people try to make, and keep, the home a special place. Many people, like to keep the home free of work and intrusive technologies, and prefer to do certain activities outside the home. People are looking for technologies that enable them to juggle the demands of home, household support work (shopping, banking etc), employment work, leisure and social life on their own terms. This does not only mean being in constant communication, although certain people crave this, but also being able to restrict communication and use of information, to preserve certain domains free from their demands. How can we develop technologies to help with this? This remains an open question.

Third, the house is actually a very leaky vessel. The household members rarely make a homogeneous group, and the social networks and activities that each household member takes part in cross over the social and physical boundaries of the home. This depends very much on the household: in particular the family is characterised by this

lack of cohesion, particularly across generations. This creates tensions between members of the household, who have to balance living together, with activities and relationships outside the home.

What this implies is that the home is no long a particularly good unit of analysis, and the walls of a house should certainly not provide the boundaries to research and development of new consumer technologies. We have to investigate how relationships and activities are linked across the entire *life-space* (Dholakia et al., 1996) and how technology can be used to support the discretionary and negotiated boundary making or breaking that is an increasingly common feature of everyday life.

ICTs are also crossing boundaries, not always physically, but in terms of values, ideas, experiences and expectations. The main boundary is between two areas where technologies are most used, home and work. By focusing on boundaries a number of points become clear:

- Experience in one domain of life with ICTs is carried over to other areas of life in practical and symbolic ways. In my study of adoption and resistance to new ICTs (Stewart, 2002) there was frequent crossing of boundaries, including similar technologies being used at home and work, and ideas, advice, and learning being developed and used in both areas. People with computer experience at home were better able to cope with enforced adoption at work, and those with professional use of computers were able to bring computers in the home, and help others in their friends and family network to do the same^{iv}.
- People use ICTs to make and maintain barriers, especially given that many technologies are linked symbolically to work. Because of this close association with work, particularly the telephone and the computer, some people who refuse to bring work home also actively resist using these technologies at home too (e.g. Gournay et al., 1998). Of course this does not imply that other technologies of leisure and private life are not used, but should have considerably different characteristics.

There are other common crossovers where ICTs were relevant, such as between households, within households, and between networks of friends and colleagues. The community is alive and well, and inter-household boundaries were crossed by ICT use. One of the ways we see this is through the *informal economy*, the sharing, exchange, gift, and sale of equipment and knowledge within personal networks (Stewart, 2002).

The difficulties of investigation in the home and everyday life.

The home, household and everyday life are difficult to investigate. In the workplace does it is generally possible to undertake structured surveys, ethnographic research, and participant observation and engage with people as regards their work activities and relationships. The home presents particular problems: it is the site of more complex relationships and 'private' activities: family relationships, children, love, sex, and a complex social history (Morley, 1992; Silverstone et al., 1992; Moores, 1995). If we wish to understand the routines, activities, needs and relationships in the household, is it possible to move in and observe? Except in a few circumstances the answer is no. To do this is to join the household, and to thus considerably influence it, which is of course a particular research method that is gaining acceptance (Stern 1998), but intensely difficult. Therefore we have to resort to other methods, such as in depth interviews, especially as part of longitudinal surveys, diary methods, group and personal creative exercises, and remote technologies. The rise of 'real-life' television has pointed to the possibilities of using cameras in households, and the speed at which they may be accepted, and this may be an interesting, although expensive and unproven tool. To 'open the black box' of the home and everyday life we have to utilise less invasive techniques and try to get to sufficient descriptions by using

triangulation, or more targeted interviewing. There is a difficult balance between attempting a rather strict ethnographic study, and a rather lazy set of structured interviews (Morley 1992). The question remains as to how effectively we can capture relationships, meanings and activities in a way that can inform our understanding of the place of technology within everyday life.

As was highlighted earlier, the home should no longer be the exclusive focus of research when trying to understand existing and future uses of 'home' technologies. It is important to engage not only with every household member, within the home, but also to investigate their lives outside the home, to put the home activities and meaning in perspective. Only then can we start to understand the place of the home within their lives, the way they 'construct' the home, any the problems they may need to solve, and the routines and strategies that are used to satisfy and service domestic life. We also tend to think of the household as been a rather homogeneous group, but this is often not the case: the home space is often filled with people who want privacy from each other, and for whom conflict is as common as agreement and consensus. The household is not static either, and evolves in important ways over the life cycle of its members, changing relationships, activities and consumption (Cohen, 1987; Wilkes, 1995). In particular, as families evolve the needs and pressures for independence can grow, and individual families may take different attitudes to living together and independence within the home (Livingstone et al., 1999). We must also recognise that there are many different types of household, and not focus on the nuclear family as representing the household. In many western cities up to 50% of the population live alone, and it is common to share homes with non-family members. Many households are also linked to other households in many intimate ways though kin and friendship bonds that as just as important as household relationships.

When studying the home and the extended life-space, it is also difficult to know what one is looking for, what criteria and objectives are we assessing technology and technology use against. In the workplace one is usually looking ways to improve productivity, in a variety of ways, such as understanding how people use information and communicate, or looking for conflicts and problems in management. In the home, efficiency and information are not central issues, or at least they are expressed in very different ways compared to the workplace. Utilitarian activities are only one concern of the household: expressive and affective relationships and activities are at least as important, and we use technology in various ways to sustain or manage these.

Frameworks for understanding appropriation and consumption of domestic ICTs

There are many practical and theoretical tools to analyse the place of technologies in everyday life, and look for opportunities and limits to use and adoption of new products and services. These include the domestication model (Silverstone et al., 1992; Lie et al., 1997; Silverstone et al., 1998), models of consumption (Cowan 1987; Belk 1995; Holt 1995; Mick et al., 1995; Douglas 1996; Gay et al., 1997), and models of resistance to technologies (Lawrence 1954; Sheth 1981; Stevens et al., 1989; Bauer 1995; Dunphy et al., 1995; Miles et al., 1996; Fournier 1998; Szmigin et al., 1998).

The recognition of both utilitarian and expressive dimensions to human activities underpins an initial simple model for understanding how we use and experience ICT products and services that we can apply to understand the potential future adoption and diffusion of new products. It supposes that there are two main factors that attract us to products and keep us using them which relate to the expressive and instrumental uses notes above: *Engagement* and *Utility*. Utility is what we find useful in a product. Taking media products as an example, we use them to relax, to inform ourselves, to

search for information, to learn, to spend time with colleagues and friends, or to be seen by other people. We can make calculations about the effort taken to use a product and the benefit we gain. Designers and service providers create, maintain and promote products that satisfy these calculations, providing relevant information, user friendly interfaces, quality production values, and acceptable prices.

However, this may not be enough to attract us to a product, and make us come back to it in the context of the often voluntary setting of home and private life. A product has to be *engaging*^v. If our interest and imagination are not captured, then however useful a product may be, we will be reluctant to invest more effort in it than is necessary, and we may be easily seduced by an alternative. Engagement is what keeps us glued to the TV, to a book or video game way past the time we should have gone to bed, or leads us to spend a fortune on recordings of our favourite artists. Engagement leads us to surf the Net for hours, become obsessive about a mobile phone, enthuse about a product or activity to our friends and family, or set up a new business. Artistic talent, promotion, visions, novelty, celebrity and wonder are the stuff of an engagement-satisfying industry. We can see that the engagement or utility of a particular media product depends entirely on the user. Personal taste, resources, peer pressure, occupation, commitments and social network will all effect our exposure to, and subsequent use of products. It is this minefield of individual circumstances that the developers must find their way through to produce new successful, generic products.

Dimensions of Consumption

Going deeper into the processes of consumption and use, three main dimensions to consumption of products and services are recognised by consumer research: *Functional*, they do something practical; *Experiential*, they provide sensual pleasure, entertainment etc; and a third factor, *Identity*, which recognises that products provide

expression of self identity of individuals and groups, and help provide links to an individual's past or a group's social history^{vi} (Csikszentmihayli et al., 1981; Belk, 1988; Wallendorf et al.,1988; Fournier, 1991). Holt (1995) has extended this in an interesting interpretation, bringing together the various personal, social and cultural dimensions of consumption. Drawing on a study of supporters of a baseball team he suggests that there are four dimensions to consumption, based on the structure of the action, and its purpose. Autotelic activities are those that 'justify the end in themselves', or are purely undertaken for their own sake. Instrumental activities are to produce other outcomes. Some consumption activities are focused on an object, in this case baseball, or in our case some aspect of an ICT, others focus on activities that are primarily social or interpersonal.

	Autotelic	Instrumental	STRUCTURE of ACTION
Object Action	EXPERIENCE	INTEGRATION	
Interpersonal	PLAY	CLASSIFICATION	
	PURPOSE OF ACTION		

Table 1 Four dimensions of consumption (Holt 1995)

Here I apply these categories to the consumption of ICTs.

Subjective reaction/experience: *The direct, (phenomenological) experience of the object*: exciting, fascinating, brilliant, wonderful, troublesome, frustrating, feelings of helplessness, bafflement.

Integration: *Actions directed at the object*. These include: Assimilating: becoming a computer person, owning, learning about device and uses; Producing: the technology is useful, indispensable, it gets the job done, it makes a particular lifestyle possible, or

makes work possible; Personalising (appropriation): both *physical and meaningful* including owning, (e.g. a collection of software, games, e-mail addresses photos, IT hardware), developing one's own knowledge, production outputs, and demonstrations of successful personal use.

Classification: *social classification of individual*. Based on Object: ownership, knowledge, expertise, (Mac person, technology person, graphics person, nerd, or alternatively, a non-technology person, resistor, left behind, excluded); or Based on Action with Knowledge/object: professional user or amateur enthusiast, innovator, entrepreneur, games expert, programming expert; activities such as reading about, spending time using; or classification through actions towards others: active proselytism, teaching, talking about, boring...

Playing: *autotelic (having no other reason but itself) interpersonal relationships*. As a common experience: playing together, working together, designing together, communicating; Socialising: as a conversation point, a focus for relationship building: shared interests, talking about, swapping, helping and teaching.

All these reactions and activities are readily visible when we look at how people deal with technologies, adopt them, reject them or put up with them. In designing new technologies we can never be sure now they will be adopted, but we can be sure that there will be as many different interpretations and uses as there are users. The difficulty is producing products that are either flexible enough or strong enough to find acceptance with many people. To do this it is worth doing some research into the ways that the product may be consumed in a way that recognises the consumption is much more than just making practical, functional use of it.

Interpreting Technologies

Another approach focuses on evidence for specific values we place on technologies and the way we interpret them. We are able to understand better why people let some products into their lives and keep others out if we can see how they are interpreted. For example, Livingstone (1992) examines the meaning of domestic technologies using an approach which focuses on the way people actively construct their world. This highlights some of the ways that technologies are incorporated into the household and become points of conflict, especially since men and women give very different meanings to everyday technologies. She identifies four main ways that people may feel about a technology: Technologies are *Necessary*, and cannot be done without; they allow *Control* over things, time, one's own life and other people; they are *Functional* – they do things, both practical and impractical; and they facilitate *Sociality* and *Privacy*^{vii}. The different meanings associated with technologies reveal some of the tensions in the family, and their different values, such as decisions on what money should be spent on, how much time tasks take. There is evidence for conflict over newer technologies such as the CD, VCR, Satellite TV, a multimedia computer - often seen as men's and children's toys, or contrasts between adult and teenager use of mobile phones. Many examples from research can be used to illustrate the social process around consumption of technologies and media, and the results can be seen around us today. This returns us to the dimensions of utility and engagements or the toy versus tool interpretation of technology (Table 1).

Functional tool	Toy/World to be explored
Efficiency Simplifying Utility Time saving	Curiosity Attachment Engagement Time filling/time well spent

Table 2 Tool or Toy

Appropriation and Domestication

A growing strand of research in technology studies, drawing on a cultural and consumption studies has examined the active processes through which people adopt and use technologies. This is often termed appropriation, and links the concepts of adoption and consumption, including processes of resistance and rejection. How easy is it for people to appropriate and find their own uses for new technology and shape them to fit their own homes, activities, values etc? This is especially important in the home situation, where we mix together many generations of technologies, and integrate them into activities and routines establish over many years. Seldom do people start with their home as a clean slate^{viii}.

One approach to understanding how products are introduced into the home setting and how their use and meaning evolves over time is called ‘domestication’. It is a tool to allow the researcher to follow the process of cultural integration of artefacts as they move from the outside world into the ‘moral economy’ of the home (Silverstone et al., 1992) without losing sight of the physical artefacts (Berg, 1996). One widely adopted framework (Silverstone et al., 1992) for distinguishing elements of the dynamics of a household comprises four elements of symbolic and cultural work: *appropriation* (the technology is brought into the home), *objectification* (the way the object is fitted into the space and time structure of the home), *incorporation* (the everyday usage) and *conversion* (fitting the object to the wider social and cultural surroundings)^{ix}. These are not discrete, but inter-linked facets of the biography of a domestic technology and the home. Although these processes are primarily related to the initial adoption of a

product, they are on-going, as usage, the household and technology change. Domestication includes many social features important in the adoption and consumption of new ICTs including exchange and gift giving. Rituals of possession and grooming can be seen in the continual process of domestication, as products are constantly reassessed, and given new value. (McCracken, 1988) points out that as new products are introduced into the home they are not only integrated into it, but change it. He describes the concept of the Diderot Effect whereby every new introduction into the home sets off a re-evaluation of the existing material environment in a never-ending spiral.

Other researchers have taken up the ideas of domestication as a general approach to analysing the appropriation of a generic technology to a specific setting, whether it be the home, an organisation or even a country. Lie and Sørensen (Lie et al., 1997) use domestication to emphasise the practical and symbolic work that is done in appropriating technologies in many situations. As appropriation occurs, local routines are constructed, and scripts (Akrich, 1992) or ways of doing things are transformed as the technology creates new opportunities, but also imposes itself on the existing organisation or household. There is a two-way process of enabling and disabling, done on the one hand by the strategies of designers and marketers trying to shape and promote certain uses and meanings (Woolgar 1991), and the counter-strategies of users appropriating and redefining the technology both in relationship to the technology, and between each other. Domestication brings connotations of taming, but not as a single act, but rather as “stable truces that can be broken” (Lie and Sorensen 1997): re-domestication can and often does occur (e.g. telephone, screen activities).

Another approach to this two-way process suggested by Fournier and Deighton (1999) focuses on *assimilation*, where people accommodate themselves to the artefact, making up for inconveniences or shortcomings, and the *incorporation* of new product and person meanings. They point out that any new assimilation also involves the successful *dis-adoption* of existing way of doing things, routines, relationship patterns etc. This is often the end story for many products, a process of divestment (McCracken, 1988) as artefacts become worn out, are disposed of, or owners loose interest, but often involves active rituals of dispossession, such as mourning or pleasure at seeing the back of the old.

Resistance and Ambivalence

The general reaction to technology is ambivalence: contradictory emotions that have to be coped with (Mick et al., 1998)^x. Domestication includes the development of coping strategies that will contain the technology, reconciling these emotions. However these strategies do not imply a stable situation, since ambivalence continues. Someone with a negative attitude towards technology may distance themselves from the product, or create strict rules about how it can be used, but still have to use it. An enthusiast may choose continual replacement or tinkering, hoping technical fixes will solve the problems and eliminate ambivalence. This of course creates its own problems. These strategies can be individual, but in many cases have to be negotiated, especially when there is conflict over whether there is a problem, or over the ways to manage it.

Studies of households, gender and generations show that these tensions are often caused by different members of a household interpreting the technology differently, causing conflict. Where there is considerable cross-over of home and work, the tension comes from the obligations of home and work. In these cases the cause of the

tension is largely social, or interpersonal. However, the technology is not neutral, and can be the cause of the tension too. For example, the lack of confidence and the problems of ownership and maintenance can contradict the benefits derived from the use of the technology, or its ownership. In other cases there is a tension between what the technology represents to an individual: an undesirable reliance on technology, being tied into a mistrusted techno-industrial system, or seen as an anti-nature programme that goes against basic values.

As well as looking at how people adopt and consume, it is also important to look at why and how some people will resist or reject new technologies (Lawrence, 1954; Sheth, 1981; Stevens et al., 1989; Bauer, 1995; Dunphy et al., 1995; Miles et al., 1996; Fournier 1998; Szmigin et al., 1998). There are various forms of resistance, from an active rejection through to a passive ignorance of innovations. The principal reasons for rejection are value-based disapproval, or a fear or anxiety related to the technology (Brosnan 1998). Today ICTs do not provoke much active resistance on a public scale such as nuclear power or the motor car^{xi}, but it occurs often in more private ways. Active resistance implies that there is a pressure to adopt or accept a technology that an individual is unwilling to accept. There are many sources of pressure, including workplace, peer pressure and family. Often non-adoption by an individual is a delay in some eventual adoption, when it is unavoidable, more affordable, there is further innovation or there are events that make a particular technology or service more relevant and accessible.

Summarising the lessons from cultural studies of consumption and domestication, the user is taken as active in appropriating the technology, there is conflict over practical and symbolic aspects of technologies and media and communications technologies

have meanings both as physical objects and through the content and messages conveyed through them. Domestication puts into question the boundaries and relationship between where the technology comes from, where it is used, and the various domains of the life-space where it is used.

Empirical Research

Based on these theoretical approaches I conducted a study into the way that people make sense of innovations in mass market ICTs included looking at how they adopt them and integrate them into their activities and relationships, and how and why many people fail to engage with these products, or find ways to not adopt them (Stewart, 2002). I looked at four social networks of family, friends and work colleagues, and tried to understand how they encountered new ICTs. This was undertaken during the 1990s, a time when the computer and mobile phone in various guises were becoming mass market products, reaching more than 20% of the population at home and work, and becoming part of our culture, but before the dot-com and the mobile phone ‘revolutions’. I tried to develop and use frameworks that would cross over the boundaries of the ‘home’ to capture how new ICTs were adopted and used across the life-space of the individual, and the way that people linked and divided different parts of their life, especially with regard to new ICTs.

To do this I used the concepts of consumption and domestication, encompassing economic and symbolic analysis of people’s engagement with technology based on a constructivist approach to understanding consumption, which sees it as an social process. Consuming takes practical and symbolic work, which is only partly influenced by the characteristics of the object (Holt, 1995). Any object, be it a media or physical product is consumed in different ways by different groups and different

individuals. We need to study the way consumption varies across groups and situations, and the consumption practices that people develop and the meanings they give to products. Within groups we can also see differences in the way people engage with technologies, and these differences reflect and enforce local relationships.

I suggest a framework that can be used not only to guide investigation in the field, but also to start analysing it to use in the design process. We have to deal with four important dimensions to data on the adoption and use of ICTs: Background or personal history, Events, Activities and the (social) Network (BEAN). The BEAN approach enables the management of large amounts of data, and structured investigation of the domestication and consumption process. Within each dimension of BEAN, material, social and symbolic aspects of everyday life are brought together. It is important to look more broadly than what people do, or how they use information – this is only one part of the picture. This framework can help guide the research and the initial analysis of gathered data in order to paint a more complete picture.

Background focuses on an individual or community's life history, previous life stages, values, experiences of technology and socio-technical change. It shows how past experiences can be brought to bear on engagement with innovations, including the development of knowledge, technical and social capital.

Activities covers current life projects, such as family, employment, current goals and motivations, and specific routine activities of everyday life. It looks at resources currently available, such as money, space, time and skills (Dholakia et al., 1996). New technologies have to be relevant to existing activities, transforming or supporting them, although sometimes they are used to develop new activities.

Events are specific activities that produce changes in routines or life projects. These are often times when new roles are taken on, activities change and new technologies are adopted. Major life events include changing job, having a family, unemployment etc. Some cyclical events such as holidays and Christmas are important times for the adoption and use of new ICTs. The focus on events is not common in research on the adoption and domestication of technologies, but provides a rich vein of interesting material.

The Social Network is all the relationships with other people, across the whole life sphere. The social network is the site of the social consumption of technologies and their meanings. It looks at how the network is used for information seeking, providing resources, problem solving, and support, but also how it is the source of conflict and compromise over the adoption and use of new ICTs.

All dimensions of life identified in the BEAN framework bring us into contact with new ICTs, and influence the adoption process and domestication processes. It was used in this study in a flexible way, to guide the codification and organisation of the data and its analysis. To the extent that the designer or research wishes to address the ways in which ICTs are becoming integrated within the fabric of social life, the BEAN approach provides tools for examining the different dimensions and their inter-relationship – the warp and weft of the techno-social space.

The Trouble with Technology

Living with technology is seldom a one-sided affair – most people recognise the double-edged nature of machines that introduce as many new problems as they solve, and the ambivalence they engender. The respondents interviewed in my research identified a number of important problems that afflict the owners and users of most products:

- Technical faults;
- Limitations in knowledge, skills in use and purchase, and the weaknesses in the user interface;
- Problems with learning;
- Problems with commercial service providers, such as network companies or retailers;
- Social relationships issues – particular disputes over use and purchase;
- Everyday usage problems and frustration with limits of the technology as expectations and demands overtake the facilities and affordances available.
- Continual uncertainty over innovation and upgrading as technologies evolve (Stewart 2002).

Some of these problems are one-off events, others are chronic, associated with everyday usage of the technology. Technologies are not completely ‘tamed’ (e.g. (Lie et al., 1997) from the formal economy when we acquire them (Silverstone et al. 1992, p. 127). I observed that many people failed to really domesticate technologies. They instead had to find ways of controlling them, never really trusting them. They arrive at an unhappy compromise, and would be very happy to get rid of them.

There are many people who do not adoption new products, or are slow to adopt products that are gaining general acceptance. I identify four main types of non-adoption: active and passive resistance, and active and passive delay. There are several examples of active resistance, some based on expectations of these problems, others on negative symbolic interpretation of new technologies in relation to themselves and the institutions and lifestyles they represented. Several women refused to learn to use computers, instead relying on their husbands or other family members to operate them, and do the typing. One retired man liked to watch sport on the television and was upset that some had moved to satellite TV, but he was not willing to subscribe on principle. In a case such as this the rejecter is suffering privation from refusing to adopt (all be it a minor one in this case). Another type of active resistance in these cases was parents resisting the demands and desires of their children. One woman controlled her daughter’s use of the TV, and refused to buy her a video games

console, while others controlled their children's television viewing but allowed them to use computer games.

There were two main strategies for being controlling use of technology that active resisters and delayer used, which did not entirely mean being a non-user, but rather a restrictive user.

Limiting use through mastery: this strategy was to keep the technology in its place, both practically and symbolically. It normally involved the imposition of boundaries for use, such as only for work, or only for certain tasks. There is also the refusal to spend more money on it, or to learn new skills.

Using the local economy: One strategy is very important : to rely on other people, and make use of technologies by proxy. This strategy passes responsibility, problems and costs onto other people, or at least allows users to share difficulties and costs. In many situations this was as part of an exchange in the informal economy, or part of mutually supportive close relationships. The use of this strategy is very important, since it means that the benefits of technologies are reaching many more people than it might be apparent from the statistics. Of course formal, commercial provision and service is still important. In the case of some technologies there is a whole range of commercial provision of service, and in the workplace a division of labour shares responsibility formally. However with many new mass market technologies this formalisation of public services is happening only slowly, and often satisfies the providers more than their customers. In the case of private technologies like the mobile phone, the borrowing or reliance on others is always a private relationship. When developing new products we have to take account of the importance of using the local economy for sharing, borrowing, learning etc.

The individual adoption process is a slow process, as consumers go through a process of finding out about a technology, often taking no notice of it until it comes into their lives through other people, which may strengthen resistance to it, as much as allowing them to see how and when it is used. Even without adopting, people are able to use and experience innovations second-hand, and often prefer, or are obliged to, keep it that way. One important factor is that this resistance is seldom permanent, and many people recognise that sooner or later they are going to have to face up to the technology, but are often waiting until they have no choice, or a specific product emerges that grabs their interest.

Symbolic convergence

Studying the appearance, adoption and use of new ICTs makes it clear that there is not only a convergence in the technology, but in the way we think about and use them – there are symbolic convergences. This is certainly the case for computers, mobile phones the Internet and other ‘gadgets’. For all the respondents in my study these technologies had some sort of strong meaning, either to do with engagement, control and freedom, or alternatively to do with loss of control, intrusions, submission and anti-nature, anti-human values. Basic values are reflected in the meanings given to technologies and the way they were appropriated. People make strong links between a range products such as mobile phone, the Internet, and a Global Positioning System (GPS). This link affects our attitudes towards ICTs and the way we appropriate them, such as using strategies of limiting use, delay in adoption, and tight control over the domains of life and relationships they could intrude into. Technologies are linked in respect to a global negative image of the place of technologies in society, and their propensity to bring problems with them. All these products create similar problems as identified earlier.

In contrast to the majority of people who have an limiting and controlling approach to technologies, there are a few enthusiasts who seek to experiment with every new technology, expecting to find some sort of benefit and new freedom. The link between the personalities and activities of enthusiasts and new technology is an important symbolic factor for many non-users or reluctant users. When we develop new technologies we have to question the importance of designing for enthusiasts, when they are a very small market, and often seen as outsiders (Dunphy et al., 1995; Mallein et al.1994).

One unifying factor that many people saw as linking ICTs were the difficulties the caused. My empirical research demonstrated that although those who use new ICTs find them extremely beneficial and useful, they also find many problems. The technologies mentioned in the study, such as the Internet and many Internet services, mobile phones, and digital television are still not stable and are often flawed. Even those with considerable expertise often experience difficulties setting up and keeping them operating. Those who are trying to adopt for the first time, or to upgrade have to deal with the considerable uncertainty, complexity and difficulties involved in making sense of the many different technologies available, the lack of any clear choices, and the huge amount of knowledge that is needed to even approach them, let alone use them. This knowledge is often not formal and explicit either, but comes in an important part from using the technologies. Without access to knowledge capital acquired from years of use there are a great many hurdles (Hirschman, 1980). To cope with this people turn to the media and formal resources, and, critically, to the informal economy and the local expert. However, as has been shown the social network and the institutions that frame everyday activities, such as work, shopping, and family life are

often the cause of problems too, and these can only be resolved through social innovation.

Visions of the home

The way we approach the idea of the future home, and designing new products and services for the home space depends very much on the ideas we have of 'the home', and the way it is related to other spaces and to the economy and society outside. It is clear that the home can be interpreted in many ways: a physical space, a social space, an information space etc, and there are many, many different sorts of homes constructed in different ways by those who live in them, and those who create the technologies and the social conditions that they are made from. I have outlined a number of research tools to understand how technologies are part of everyday life at home, and see how future technologies may be adopted and put to use: how they can be assimilated into existing social structures and patterns of activity, but also provide the opportunity for change.

There are a number of key themes that are shaping the way the future home is envisaged, and how technologies are being developed for it. I suggest the following analysis:

Theme	Key issues	Technologies
Environmental Factors	Reducing the environmental impact of the home, and the cost of running the home. This is perhaps one of the most developed perspectives on home technology	Energy technologies - control of heating, lighting, insulation, efficient building practices, materials, easy and cheap maintenance.
Communication and Information	The home as a communication and information hub: technology allows people to communicate as they wish.	Network technologies – broadband connections, end user terminals – interactive television, PC, telephone etc
Efficiency and Productivity	The home as a place for more work and education. More efficient performance of domestic tasks, such as shopping and cleaning. More choice and efficiency in access to information and entertainment.	On-line learning, broadband network connections, work stations, Internet shopping and banking, television on demand.
Privacy and Security	The home as a private space. Home activities are private. Also protected from information and communication intrusion.	Network technologies, alarm technologies
Family Development and Well-being	The home as a place to bring up a family. It provide space and tools to live together, learn, and grow.	???? Communication, and learning technologies, family entertainment, personal media production...
Community Inclusion	The home linked strongly to local communities and global personal communities, and linking home life to working life.	???? Communication, local information services, community media production...

Table 3 The future home and future technology.

This makes clear the normative dimensions of developing new technologies for the home, and the assumptions that we make about their relevance, how they should be used and by whom. The three first categories represent aspects of the home that are strongly related to exploiting the capabilities of new technology and to the priorities

of industry and science. Many technological products and services are being developed along these dimensions, and some are being very successful, but do we think about their implications in the long run? When we look at the three other dimensions, privacy, family and community, themes closely associated with the home, it is much less clear what technologies are being developed specifically with these in mind. Maybe by experimenting with products and service ideas in these dimensions there are new possibilities for imagining successful domestic products, and we can satisfy consumers for whom these issues are a priority. We should also assess technologies developed within one theme against the priorities of other themes, to see if there are conflicts, or the product or service may undermine the values or goals that potential users may aspire to. For example, many ICTs consume a great deal of energy in their production and use, making them incompatible with environmental concerns, or personal technologies without particular forms of connectivity could undermine community and family goals.

Conclusions

This paper has attempted to provide designers and researchers new to the field of the home and domestic technology with some rather abstract models from literature that many will be unfamiliar with, and some more concrete findings from recent empirical work. With new waves of ICTs stimulating industry to find domestic uses for them, and markets for existing products becoming saturated, this is an exciting time for experimentation. Hopefully these experiments will be more creative, and more successful through the influence of this type of knowledge, either applied directly in design methodologies, or taken on board by designers and new product developers as a way of enriching the implicit culture they draw on in their work.

References

- Akrich, M. (1992). The De-Description of Technical Objects. Shaping Technology/Building Society. In W. E. Bijker et al.(Eds) Shaping Technology Building Society : Studies in Sociotechnical Change. Cambridge, Mass, MIT Press: pp. 205-224.
- Ang, I. (1991). Desperately Seeking the Audience. London, Routledge.
- Arendt, H. (1958). The Human Condition. Chicago, Chicago University Press.
- Aune, M. (1996). The Computer in Everyday Life: Patterns of Domestication of a New Technology. In M. Lie et al. (Eds) Making technology our own? : domesticating technology into everyday life. Oslo, Scandinavian University Press.
- Bauer, M., Ed. (1995). Resistance to New Technology : Nuclear power, Information technology and Bio-technology. Cambridge, Cambridge University Press.
- Belk, R. W. (1988). Possessions and the Extended Self. Journal of Consumer Research 15 (September): 129-168.
- Belk, R. W. (1995). Studies in the New Consumer Behaviour. In Miller, D. Acknowledging Consumption. London, Routledge.
- Berg, A.-J. (1996). Digital Feminism. Senter for teknologi og samfunn. Trondheim, Norges teknisk-naturvitenskapelige universitet.
- Bijker, W., T. P. Hughes, Pinch T (Eds) 1987). The Social Construction of Technological Systems. Cambridge, Mass., MIT Press.
- Bijker, W. E. and J. Law, (Eds) (1992). Shaping Technology Building Society : Studies in Sociotechnical Change. Inside Technology. Cambridge, Mass, MIT Press.
- Brosnan, M. (1998). Technophobia. London, Routledge.
- Brown, B., Green, N. and Harper R. (2002) Wireless World: Social and Interactional Aspects of the Mobile Age, London; Springer.
- Campbell, C. (1995). The Sociology of Consumption. Acknowledging consumption. D. Miller. London, Routledge.
- Carey, J. (1996a). An ethnographic study of interactive television. iTV 96, Edinburgh, Proceeding of Conference iTV'96, Research Centre for Social Sciences, University of Edinburgh.
- Carey, J. and M. Elton (1996b). Forecasting Demand for New Consumer Services: Challenges and Alternatives. In Dholakia, R. et al. (Eds) New Infotainment Technologies in the Home. Mahwah, New Jersey, Lawrence Erlbaum Associates: 35-57.
- Cohen, C., Ed. (1987). Social Change and the Life Course. London, Tavistock.
- Cowan, R. S. (1987). The consumption junction: a proposal for research strategies in the sociology of technology. In Bijker, E et al. (Eds) The Social Construction of Technological Systems. Cambridge, Mass., MIT Press.
- Csikszentmihayli, M. and E. Rochberg-Halton (1981). The Meaning of Things. Cambridge, Cambridge University Press.
- Dholakia, R. R., N. Mundorf, et al. (1996). Bringing Infotainment Home: Challenges and Choices. In Dholakia R. et al. (Eds) New Infotainment Technologies in the Home, Demand-side perspectives. New Jersey, Lawrence Erlbaum Ass.

- Dholakia, R. R., N. Mundorf, and Dholakia, N., Eds. (1996). *New Infotainment Technologies in the Home, Demand-side perspectives*. New Jersey, Lawrence Erlbaum Ass.
- Douglas, M. (1996). *Thought Styles: Critical Essays on Good Taste*. London, SAGE Publications.
- Douglas, M. and Isherwood, B. (1997). *The World of Goods: Towards an anthropology of consumption*. London, Routledge.
- Dunphy, S. and P. A. Herbig (1995). Acceptance of Innovations: The customer is the Key. *The Journal of High Technology Management* 6(2): 193-209.
- Fournier, S. (1991). Meaning-Based Framework For The Study Of Consumer-Object Relations. *Advances in Consumer Research* 18: 736-742.
- Fournier, S. (1998). Consumer resistance: societal motivations, consumer manifestations, and implications in the marketing domain, ACR special session summary. *Advances in Consumer Research* 25: 88-90.
- Fournier, S. and J. Deighton (1999). *Assimilating Innovations*. Association of Consumer Researchers, Columbus,.
- Gant, D. and Kiesler, S. (2002). *Blurring the Boundaries: Cell Phones, Mobility and the Line between Work and Personal Life, in Wireless World: Social and Interactional Aspects of the Mobile Age*, London; Springer.
- Gay, P. d., S. Hall, et al. (1997). *Doing Cultural Studies: The Story of the Sony Walkman*. London, Sage.
- Gournay, C. d. and P. A. Mercier (1998). *Entre la vie privée et le travail: décloisonnement et nouveaux partages*. In *Proceedings of Conference Penser des Usages*, Bordeaux, IREST/ADERA/France Telecom.
- Hickman, L. (1988). The Phenomenology of the Quotidian Artifact. In Durbin, P. (Ed) *Technology and Contemporary Life*, vol 4.. Dordrecht, D. Reidel. pp.161-176.
- Hirschman, E. (1980). Innovativeness, Novelty Seeking and Consumer Creativity. *Journal of Consumer Research* 7(December):283-295.
- Holt, D. B. (1995). "How Consumers Consumer: a Typology of Consumption Practices." *Journal of Consumer research* 22(June):1-16.
- Law, J.(Ed) (1991) *A Sociology of Monsters* . London, Routledge.
- Lawrence, P. R. (1954). "How to overcome resistance to change." *Harvard Business Review* 32(3): 49-57.
- Lie, M. and K. H. Sorensen, Eds. (1997). *Making technology our own? : domesticating technology into everyday life*. Oslo, Scandinavian University Press.
- Lie, M. and K. H. Sorensen (1997). *Making technology our own? : domesticating technology into everyday life*. In M. Lie et al. *Making technology our own? : domesticating technology into everyday life*. Oslo, Scandinavian University Press.
- Livingstone, S. (1992). The Meaning of domestic Technologies. In Silverstone, R. et al. *Consuming Technologies: Media and Information in Domestic spaces*. London, Routledge.
- Livingstone, S. and M. Bovill (1999). *Children, Young People and the Changing Media Environment*. London, London School of Economics and Political Science.
- Lull, J. (1990). *Inside Family Viewing : Ethnographic Research on Television Audiences*. London, Routledge.

- MacKay, H. Ed (1997). *Consumption and everyday Life*. Milton Keynes, Open University Press.
- MacKenzie, D. and J. Wajcman, Eds. (1985). *The Social Shaping of Technology : How the refrigerator got its hum*. Milton Keynes, Open University Press.
- Mallein, Ph. And Toussaint, Y. (1994) *Technologies de l'information et de la communication: une approche sociologique pour la conception assistée par l'usage*. *Communications and Strategies*, IDATE 5. pp.315-335.
- McCracken, G. (1988). *Culture and Consumption: New approaches to the symbolic character of consumer goods*. Bloomington, IN, Indiana University Press.
- Mick, D. G. and S. Fournier (1995). *Technological Consumer Products in Everyday life: Ownership meaning and satisfaction*, Marketing Science Institute.
- Mick, D. G. and S. Fournier (1998). "Paradox of Technology: Consumer Cognizance, Emotions and Coping Strategies." *Journal of Consumer Research* 25 (September): 123-143.
- Miles, I. and G. Thomas (1996). *User Resistance to new interactive media: participants, processes and paradigms*. *Resistance to new technology*. M. Bauer. Cambridge, Cambridge University Press.
- Miller, D., Ed. (1995). *Acknowledging Consumption: A Review of New Studies*. *Material Cultures*. London, Routledge.
- Moore, S. (1993). *Interpreting Audiences: The Ethnography of Media Consumption*. London, SAGE.
- Morley, D. (1986). *Family Television: cultural power and domestic leisure*. London, Comedia.
- Morley, D. (1992). *Television , Audiences and Cultural Studies*. London, Routledge.
- Nippert-Eng, C. E. (1995). *Home and Work*. Chicago, University of Chicago Press.
- Sheth, J. N. (1981). *Psychology of innovation resistance*. *Research in Marketing* 4: 273-282.
- Silverstone, R. (1994). *Television and Everyday Life*. London, Routledge.
- Silverstone, R. and M. Hartman (1998). *Methodologies for media and information technology research in everyday life*. EMTEL Working Paper n. 5. Brighton, CULCOM, University of Sussex.
- Silverstone, R., E. Hirsch and Morley, D. (1992). *Information and Communications technologies and the moral economy of the household*. In Silverstone, R. et al (Eds). *Consuming Technologies: Media and Information in Domestic spaces*. London, Routledge.
- Silverstone, R. and E. Hirsh, Eds. (1992). *Consuming Technologies: Media and Information in Domestic spaces*. London, Routledge.
- Stern, B. B. (1998). *Representing consumers : voices, views, and visions*. London ; New York, Routledge.
- Stevens, R., W. Warren, et al. (1989). *Non adopters of Automatic Teller Machines*. *Akron Business and Economic Review* 20(3): 55-63.
- Stewart, J. (2000). *Cafematics: the cybercafe and the community*. In *Community Informatics*. M. Gurstein. Toronto, Idea Group.
- Stewart, J. (2002). *Encounters with the Information Society: Personal and social issues in the appropriation of new media products in everyday life: adoption, non-*

- adoption, and the role of the informal economy and local experts. PhD Thesis. Research Centre for Social Sciences. Edinburgh, University of Edinburgh.
- Szmigin and Foxall (1998). Three forms of innovation resistance: the case of retail payment methods. *Technovation* 18(6-7): 459-468.
- Venkatesh, A. (1996). Computers and other Interactive Technologies for the Home. *Communications of the ACM* 39(12): 47-54.
- Venkatesh, A. and N. Vitalari (1992). An emerging distributed work arrangement: an investigation of computer-based supplemental work at home. *Management Science* 38(12): 1687-1705.
- Wallendorf, M. and E. Arnould (1988). My Favorite Things: A Cross-Cultural Inquiry into Object Attachment, Possessiveness, and Social Linkage. *Journal of Consumer Research* 14(March): 531-547.
- Weilenmann, A. and Larsson, C.(2001). "Local Use and Sharing of Mobile Phones." In *Wireless World: Social and Interactional Aspects of the Mobile Age*, London; Springer.
- Wilkes, R. E. (1995). Household Life-cycle Stages, Transitions and Product Experiences. *Journal of Consumer Research* 22(June 1995): 27-42.
- Williams, R. and D. Edge (1996). The Social Shaping of Technology. *Research Policy* 25: 856-899.
- Woolgar, S. (1991). Configuring the User: the Case of Usability Trials. In Law (Ed) *A Sociology of Monsters* . London, Routledge.

NOTES

ⁱ Doctoral research done at the University of Edinburgh entitled "Encounters with the Information Society: Personal and social issues in the appropriation of new media products in everyday life: adoption, non-adoption, and the role of the informal economy and local experts

ⁱⁱ Weillenmann and Larsson (2002) investigate the sharing and social use of mobile phone, reflecting a strong general theme found in my research of a range of ICTs.

ⁱⁱⁱ Nippert Eng (1995) identifies 3 types of workplace – one with fixed boundaries, the greedy employer, and the discretionary workplace., which leaves it up to the employee to decide their own boundaries.

^{iv} Many companies have recognised this and provide their employees with computers to use at home. This is not only to give them the facilities to work at home, but also to give them the opportunity to learn at home, by using the machines for personal, family and community activities. Some would say this avoids having to provide time for learning during working hours, but in many would say it was a fair exchange given the costs of computer equipment. It is also a way of extending the useful life of otherwise redundant computers.

^{vi} Arendt (1958) suggests that quotidian artefacts serve to stabilise human life: they provide practical and symbolic supports and continuity to our lives. Others have the same approach. Silverstone (1994) uses the concept of 'ontological security'^{vi} as he argues for television as a support and reference point for our self identity and our relationship with the rest of the world. Csikszentmihayli and Rochberg-Halton (1981) suggest domestic objects are used in formation of our self identity, particularly for emphasising integration or separation from the social context. Taking this further, Hickman (Hickman, 1988) investigates what he calls the "Phenomenology of quotidian artefact", to show how people use technologies for self stabilisation^{vi}. He suggest fives roles for technologies: Personation - technologies allow us to play at being ourselves; Authentication - they help define who we are ; Distraction - from obligations, unpleasantness; they are the Focus of Desire; and appear to be Magic – something we do not quite understand, but enchants us. An example of expressive relationships with technology is the

motorcar (Lamvik, 1996): we can have a very personal intimate, existential relationship with the car itself.

^{vii} Technologies are *Necessary* - they become essential parts of everyday life e.g. (washing machine) female. The necessity is interpreted differently by different family members which reveals their concerns and priorities etc

They allow *Control* over things, time, and other people. For example, the housewife's control over domestic lives and children. There is also the example of relinquishing control to get out of responsibility for doing it. Men also express a strong controlling wish to 'controlling nature' or their family

They are *Functional*. This can be interpreted in two ways. For some, generally male there is an interest in the intrinsic functions of technologies. For others, a more female attitude, it the utility for the technology as a tool, rather than its complete and often unusable functionality

Technologies allow *Sociality and Privacy* - ICTs facilitate social contact with outside world. We talk to each other on the telephone, and watch the world on TV. Social contact appears to be more important for women, especially the telephone. In reverse it allows people to keep the privacy of their own home, or their own room such as teenagers reinforcing home boundaries by playing their own music in their own room music etc. More recent research by Gournay and Mercier (Gournay and Mercier, 1998) on this issue highlights the way people use the telephone in different ways, depending on their job, and their life stage..

^{viii} We normally have to 'retro-fit' new technologies into the physical and social spaces of the home – but history tells us that if the technology is attractive and useful enough we are willing to make radical changes, such as the installation of electric circuits or gas pipes.

^x Mick and Fournier (1998) conducted a series of in depth studies of the paradoxes of using and owning ICTs and found a range of coping strategies.

^{xi} Bauer (1995) who contrasts this with resistance to Nuclear power and weapons, to computerisation in the 1970s, and genetic technologies today.