'What I've found is that your related experiences tend to make you dissatisfied': psychological obsolescence, consumer demand and the dynamics and environmental implications of de-stabilisation in the laptop sector

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Abstract

Research on product life-spans tends to link the causes of psychological obsolescence of products with end users and product designers, and posits the consequences of obsolescence in terms of increasing e-waste and energy use (Coopers and Mayer 2000; Van Nes 2010). Drawing upon qualitative fieldwork conducted with employees of a global computer firm and users of its laptop computers this paper brings together the poles of production and consumption to explore the dynamics of de-stabilisation in product qualities, connecting the intensification of this process to psychological obsolescence and unsustainable patterns of consumption. Firstly we demonstrate that consumer facing functions within the firm such as user research, sales and marketing play a key role in driving the pace of technological change within the firm by specifying consumer demand. We argue that by distilling an imaginary demanding consumer from various sources, the firm justifies and drives rapid de-stabilisation in product qualities and specifications. We show how this prompts end consumers to constantly re-evaluate product qualities, devaluing existing products and contributing to psychological obsolescence and disposal of functioning products. We then go on to discuss the environmental implications of this process, suggesting that whilst premature disposal due to perceived obsolescence may not increase waste in the short term (Gregson et al 2007), it is still likely to contribute to an increase in material and energy use in manufacturing.

Introduction

Psychological obsolescence and waste

This paper critically engages with literature on sustainable consumption and production, and in particular a dissatisfaction with explanations of the causes and consequences of decreasing product life-spans (Cooper 1994, 2010; Cooper and Mayer 2000; Hekkert 2010; Park 2010; Peattie 2010; Van Nes 2006). Specifically what we are concerned with in this paper are accounts of 'psychological obsolescence' - when a product still functions adequately but becomes 'worn out' in our minds and is replaced whilst still functional (Packard 1963:58-59, see also Van Nes 2006). As Lindley and Barrett (2003) note, "clearly something is adrift in that products do not always survive the lifetime for which they are designed. Users are for a variety of reasons disposing of, or mothballing products well before their lifetime is over. We need to gain an understanding of why this happens and relate it back to the creative process" (70).

Many product sectors such as consumer electronics experience an increasing ratio of product 'churn' where specifications, aesthetics and other product qualities are constantly being updated at the expense of existing adequately functioning products (Cooper 2005; Park 2010; Thompson et al 2005; Verbeek 2006). As a result the average life of a computer for a first owner has dropped from 4-6 years in 1997 to 2 years[1] in 2005 (Hai Yong & Schoenung, 2006) and according to the environmental charity *Waste Watch*, 2 million working PCs are dumped in UK landfill sites each year (Waste Watch, 2007). As such figures imply, the literature is quick to suggest that churn and psychological obsolescence contribute to e-waste and increasing resource and energy use required in the manufacture of new products to replace them (Cooper 2010:19).

A further dissatisfaction arises with the product life-spans literature in terms of how it frames the causes of psychological obsolescence. Research frequently

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[1] This is particularly pertinent in the consumer electronics industry where the energy and resource implications of manufacture are far bigger than other sectors (Meadows et al 1992).

points to the ways consumers become dissatisfied with products because they lose symbolic value or aesthetic appeal, suggesting that consumer decisions on whether to replace functional products are often prompted by new product developments which render existing ones inferior (Cooper 2010:17, see also Campbell 2001; Harvey et al 2001; Van Nes 2010). Despite producing useful typologies regarding the decision making processes leading to acquisition and disposal (C.f Evans & Cooper 2010; Pantzar 1997), with few exceptions (see Peattie 2010), the literature says very little about how the processes of devaluation and re-qualification which underpin psychological obsolescence are structured by other economic agents, instead placing the onus of responsibility very much on the individual consumer and product designers (Van Nes 2010).

The dynamics of de-stabilisation and specification of demand

Seeking to move beyond notions of individual choice, Jackson et al (2006) note that theories of social practice illustrate how consumers become skilful and knowledgeable as members of a community of practice. Thus how shared meanings regarding purchasing are negotiated and become grounded in social reality are of central importance (48). As a result consumer behaviours should be viewed as social accomplishments rather than the choices of sovereign individuals (ibid). Accordingly, more recent accounts of the causes of consumption, obsolescence and disposal have been embedded in social practices (Kjelberg 2008; Miller 1998, 2002; Sanne 2002; Shove 2003; Shove et al 2005; Warde 2002, 2005).

According to Thompson (1979), from their moment of conception material goods are on a continuous journey; transformed from valued 'high quality' products to valueless 'low quality' products which will eventually see them achieve the dubious honour of 'rubbish status'. As Thompson (1979) goes on to argue, the consumer is engaged in a constant process of judging the value and qualities of a product which serve to define its lifespan regardless of its functional state (see also Appadurai 1986; Ilmonen 2004).

Thus as Crewe (2003) notes, consumption is as much about processes of disposal; "…about acts of casting-out that may or may not connect to replacement or substitution" (2003:357). Disposal she argues tells us a lot about how "…consumers negotiate the product cycle and the twin imperatives of fashion and technological change that underpin this" (357). As she rightly points out, whilst the focus in consumption studies has largely been on value and valuation, processes of devaluation and re-qualification have much to say about the linkages between production and consumption.

Gregson et al's (2007) account for example explores consumer decisions regarding the disposal, reassignment and handing down of many different household items and is full of judgements and re-qualification of products which are informed by notions of self, identity, family and love (see also Clarke 2000; Gregson and Crewe 2002). Yet a similar problem pervades such sociological accounts in that the ways in which consumer judgements about product qualities and value are structured by other actors which would perhaps help to provide a more rounded account, remain absent. whilst acknowledging for example that the newness and functionality of consumer electronics and digital appliances are constituted by producers as the means to 'enacting particular consumption practices' (Gregson et al, 2007: 683) and that choices are positioned within wider social and cultural processes, Gregson et al pay little attention to the fact that practices of consumption and disposal are also the manifestation of relational processes of de-stabilisation, re-qualification and devaluation which are in part prompted and proposed by other actors and actants in the supply chain as Warde & Martens (1998) have suggested.

In line with this, and drawing upon the work of Callon and numerous collaborators on product qualities (Callon 1998; Callon et al, 2002; Callon and Muniesa 2005; Callon 2005; Cohoy 2007, 2008; Reijonen 2008), a growing number of studies have attempted to trace "…market attachment through a detailed focus on merchandising, packaging and grocery retailing practices as well as at the ground level of ordinary, routine supermarket transactions" (McFall, 2009: 276). Azimont and Araujo (2007) for example recount through

an analysis of retailer category reviews in the soft drinks sector, the way in which manufacturers attempt to shape the qualities of products by positioning them within specific discourses such as weather patterns, global instability and health (2007:853-855). They also show how the boundaries between categories – and thus the qualities associated with particular products are moved by manufacturers seeking to reposition products and gain access to markets (2007:857). Similarly, in an account of clothing fashion buyers, Entwistle (2006) shows how they are active in "...defining, shaping, transforming, qualifying and re-qualifying products" (706). Entwistle notes how this re-qualification results in particular configurations of products appearing on the shop floor (ibid) which attempt to re-define what is fashionable and thus prompt consumer judgements regarding the worth of what they already own. As McFall (2009) notes, "the focus on market devices is important because it helps overcome the dualism that pervades much of the sociology of consumption whereby 'subject's' desire for objects is magically mediated by devices like advertising" (276).

Whilst such accounts are extremely insightful, one element that has been given little attention is the importance of dynamism in animating product qualities in order to prompt re-qualification, or where this dynamism comes from. If we accept that psychological obsolescence is partly premised upon processes of relational re-qualification then it follows that re-qualification is likely to be more successful if the difference between the qualities of any two products is greater. Therefore the speed with which product qualities are de-stabilised is particularly important to the success of re-qualification because at any given moment the perceived difference in qualities will be greater if the pace of change is greater.

Michaels for example notes the existence of a relation with rates of acceleration and futures in western societies suggesting that the potency of any rhetoric is directly related to speed and the development of technologies that enable this (Michaels, 2000:32). Literature on product innovation generally positions the pace of innovation as a function of inter-firm competition and R&D capacity, (Rogers 2003, see also Andrews & Sirkin

2005; Womack & Jones 2005)**.** However, as both Slater (2002) and Foster (2007) argue, the inherent instability of product qualities is increasingly harnessed and intensified by firms seeking to encourage consumers to re-qualify and ultimately devalue and dispose of existing products in favour of newer ones. Whilst the operation of particular market devices has received much attention in this literature, the specification of demand within the firm as a rhetorical device to both legitimate and drive the pace of change has been relatively neglected.

In order to mould their products and innovations, McMeekin et al (2002) note that the development of new products may require "…interaction between (imagined) consumers and the innovators and designers" (7). Miller and Rose's (2001) account of making up the subject of consumption theorises it as a 'complex technical process' (408). In particular they point to the importance of psychology in shaping the subject of consumption suggesting that it has helped to mobilise rather than dominate consumers (ibid). They go on to argue that it is not easy to 'make up' the consumer, rather the consumer has been treated as complex and problematic. At the same time they also note how new techniques of consumer research don't just uncover new anxieties and desires, they force them into being through making them observable and recordable (2001:438).

Similarly, Schot and Bruheze critique many accounts of consumption for taking the consumer for granted, neglecting the ways in which "…consumers and consumer images constructed in laboratories, factories and marketing departments influence actual consumption" (Schot and Bruheze, 2003:230). As a result numerous accounts have focused on the everyday workings of design teams in firms in order to understand how consumers are constructed (Araujo 2007; Keats 2001; Livingstone 1992; Oudshoorn & Pinch 2003; Oudshoorn et al 2004; Saviotti 2002; Thomas 1991; Woolgar 1991).

Whilst extremely insightful, there has been a relative over-emphasis on the fields of design and user testing in the construction of consumers with a corollary neglect of marketing and sales functions in the development of

technology and users (Pinch, 2003:248). Pinch (2003) provides a rare account of technological development which focuses on the role of traveling sales people in recruiting and training users for a new technology, and feeding back information on domestic use to designers. Through another rare and insightful account of the marketing of one technology, Simakova and Neyland (2008) show how shaping the market and meanings of a product involves articulating a very precise version of the world which includes and excludes particular actors (2008:106). As these accounts suggest, the causes of de-stabilisation (and thus psychological obsolescence) reside with many different actors. The primary focus of this paper is the construction of the user within the firm because we argue, it is this image of the user that is deployed to both legitimate and drive the dynamic of de-stabilisation and in turn drive processes of re-qualification, purchase and disposal.

The structure of this paper is as follows: Firstly we demonstrate how the demanding user is brought into being in a process of selective distillation within the research, sales and marketing functions of MC, and how this demanding user provides a mandate for rapid de-stabilisation of product qualities and specifications. We then move on to examine consumer understandings of this landscape of de-stabilisation. In particular we demonstrate how rapid de-stabilisation of qualities leads consumers to constantly re-qualify and devalue their existing laptop, ultimately leading to its psychological obsolescence and premature disposal. In conclusion we discuss the environmental implications of this process, suggesting that whilst caution needs to be exercised in linking rapid de-stabilisation and consumer practices of disposal and waste, it is likely that premature disposal of functioning goods still contributes to increased throughput of materials and energy in manufacturing.

Methodology

The empirical research that informs this paper was carried out in 2009 as part of a larger project at the University of Surrey. The initial impetus for this research was to explore some of the ways in which aspects of 'production' – in

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particular marketing and consumer research – inform the consumption, use and disposal of things. As a result the research design in line with numerous similar studies (Lien 1997; Howard-Grenville 2008; Shove et al 2006; Simakova and Neyland, 2008) used multiple qualitative methods and was formed of two complementary parts.

The first was a series of in-depth interviews with employees of a global computer manufacturer – Mercury Computers – all of whom worked in the laptop sector. A total of fifteen interviews were conducted with twelve employees (two female, ten male) in marketing, category, advertising, environment and user research divisions. These interviews explored issues around how the company knows its consumers, consumer testing, product design and life-span, innovations and expectations in IT, and corporate environmental strategy. In addition a series of 6 participant observations were conducted at computer stores in the South East of England.

The second and related strand of the project focused on domestic users of MC's laptop computers. A total of twelve participants aged between 21 and 70, all ABC1, were recruited as 'recent purchasers'. The sample was generated so far as possible in consideration of diversity across gender and age categories. The participants were interviewed twice over the course of three months, keeping a diary of laptop use for a period of two weeks between interviews. Participants were initially asked to give a biography of their computer use (including their ongoing use of desktops in the home), followed by questions regarding the acquisition and disposal of their laptop computers, upgrading and maintenance, everyday uses, and home energy use. The diary asked participants to record what, where, when and who used the (desktop or) laptop. In addition, ethnographic fieldnotes recorded where computers were located in participants' homes and the software they had on the machines. These field encounters added additional 'thickness' to the narratives garnered from interview data.

The analytic strategy was largely inductive, taking its cue from participants' narratives in the development of analytic themes. These interviews and field notes were coded and analysed both manually and using NVivo qualitative

coding software. Participants' accounts have been anonymised throughout the following analysis in respect of ethical considerations.

Consumer research in Mercury Computers

Mercury Computers (MC) is a very large company based in the United States with offices worldwide and its manufacturing[2] out-sourced and concentrated in South East Asia. One of the problems associated with conducting research within such a large company is that insights into many aspects of the business are partial at best. However it became clear to us that the company was dedicated to 'knowing' its consumers; the only reason we were given permission to interview employees was because of the research we were doing with consumers and the possibilities that might give for MC to gain some consumer insight[3].

MC engages in two principal forms of consumer research; exploratory which is conducted by specialist teams and seeks to study everyday use 'in-situ' in order to understand user motivations and explore avenues for future innovation; and instrumental or applied research which is both formal and informal and seeks to test the desirability and ease of use of potential product features with end users (Walsh et al 2002:170). In MC exploratory research was far less common than instrumental research primarily because the company is effectively engineering led[4] and because of the prohibitive cost and timescales involved in exploratory research.

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[2] At the outset it is worth noting that MC much like many of the other large brand-name technology companies is an assembler of products as opposed to what would traditionally be termed a manufacturer. MC designs and specifies the chassis for the product and specifies and draws together component suppliers but the product itself is then assembled by an Original Design Manufacturer (ODM) who may well assemble products for many other companies.

[3] This initially struck us as somewhat strange; after all what insights about its consumers could a small study of laptop users give to a multi-million dollar company that it didn't already know?

[4] There are far fewer User Research Experts (UREs) in the company than computer scientists and engineers: a typical research division would have between 25 – 60 computer scientists and engineers for each URE.

Putting the 'I' in user

Product research whether exploratory or instrumental is conducted both formally and informally within MC. Whilst attempts are generally made for the users involved in this research to be representative of end users, there are a number of reasons why this is often not the case. UREs noted that they tried in principle for their research participants to be representative; so for example it was common when choosing households for a study to have a range of social categories for example those with older children at home, those with young children and those whose children had left home. As one URE put it, they tried "to be principled and a bit scientific" (URE2, 30/09/10). However the same URE noted that in reality their choice of users was quite haphazard. He noted that finding participants was generally a process of sending an email message to the whole research site for requests for families to take part. As a result participants were inevitably either MC employees or friends of MC employees. At the instrumental level such inward sampling was even more common with most product testing done using MC research staff and the URE qualifying this by saying that "anyone is better than no one" (URE2, 30/09/10). This tendency to sample inwardly was backed up by another URE who despite asserting that research was 'objective' and 'data-driven', when talking about a study on netbook[5] use repeatedly referred to anecdotal evidence of netbook use by friends, family, colleagues and himself:

"So…I like to have an impassionate view around it all but on the other hand it helps to see…it just makes it come more alive so you have some anecdotal evidence to put in […]. So I know from the guys here who bought one, they just take it everywhere; into the kitchen, by the telly" (URE1: 27/04/09)

"…for me the Netbook has become my laptop…I got the pre-production unit - which is what this is - a year ago […]. With the Netbook I take it everywhere. It's the lack of weight which is absolutely brilliant…" (URE1: 27/04/09).

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[5] Effectively a smaller less powerful laptop computer primarily intended for web-based tasks and applications.

As these narratives suggest, use is inferred both from the product experiences of other employees who are seen to use the product in specific ways, and also from the individual employee whose preferences and uses also inform the 'impassionate view' of the URE. One of the key problems here is that computer science and IT engineering are overwhelmingly male-dominated. As a result, where research draws participants from within the research facility it is almost certain that more men will take part than women.

What Akrich has termed the I-methodology (a process in which "designers consider themselves as representatives of the users" (Oudshoorn et al, 2004:41) is clearly evident in the above accounts where the use of the Netbook by employees and friends is used to back up the 'objective' research undertaken by the URE. This process was also evident in the more informal evaluative research conducted by employees from category, advertising and environment, all of whom pointed to the ways in which they imagined consumers to be much like themselves:

"…in MC we tend to look at MC products when making purchases so a lot of them [employees] feed back to us as category managers as product evangelists to say I bought this product, I thought it was really good but it needs this or it doesn't really work at home because of this and it's much easier to get the feedback from them…so there's a lot of feedback within the organisation internally" (Mkt2, 23/11/09).

As this account demonstrates, feedback on product qualities and performance is often sought informally from within the company itself. The prevalence of such a strategy was backed up by an advertising employee who told a similar story of how employee competitions were held to get feedback on products. However the dangers of this internal focus were articulated by other employees who problematised the location of the company on an out of town site surrounded by other technology companies implying that they are geographically separated from consumers. This awareness of the limitations of

such an internal focus demonstrates a degree of reflexivity that is arguably underplayed in the academic literature on the construction of the user, even if a social scientist might articulate these limitations in a more differentiated or sociological manner. Akrich (1992) for example sees I-Methodology as largely unconscious (in Oudshoorn et al, 2004:41). However, notwithstanding the awareness and explicit acknowledgement of the dangers of using employees to represent consumers, the internal focus was still widespread.

There are two points that we want to make with regard to this inward focus. The first is that the users who take part in research and give feedback are likely to be much more technologically literate than the average user. This means they will have a better idea of what is technologically possible and have higher expectations of what technology can do. As a result these technologically savvy consumers are very close to what the literature terms 'advanced users' or 'early adopters' and are certainly not representative of all users. The second point is the way in which partial use and non-use is framed out by these methodologies and practices. Employees noted how focus groups and even the product-focused exploratory research always focus on use: those who are not users for whatever reasons are not included, and as we note in the next section, those who exhibit partial or conservative use are also marginalised.

Following the creative user

As we have noted, exploratory research[6] is conducted within MC but much less often than more product-focused instrumental research. Exploratory research was even less common in the laptop sector and this was confirmed by URE1 who had only taken part in one piece of exploratory research around Netbooks[7]. Whilst exploratory research has the potential to understand the

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[6] It is worth noting at the outset that exploratory research projects are not commissioned just to understand everyday use; a business case always has to be made based upon the URE's judgements about what is good for MC and thus when these studies of everyday use are planned they are generally linked to existing projects in order to understand whether adoption would be successful or not (URE2, 30/09/10).

[7] The employee went on to comment that this was the first time research of this kind had taken place in his time at the company and he stated that he would be surprised if it was

'average' user in 'real-world' settings, the Netbooks study that URE1 discussed is particularly interesting because of the insights it gives around how particular uses are given precedence. The rationale and methods of the study were outlined by the URE:

"I went to some schools and this was a mixture of questionnaires with a large sample, observations in class rooms with a small sample, interviews with a small sample including parents and teachers and also cluster analysis of the data.[…]. We took loads and loads of video and other data and these videos sort of capture the essence as to what the product proposition is. […]." (URE1, 27/04/09).

As this account attests, the product already existed but the study was conducted in order to better understand how the Netbook was different to other portable products, in which direction to innovate it and how to market it. On the face of it the methodology appears very user-centred; almost ethnographic and the URE went on to describe a keen attentiveness to the nuanced use of the Netbook in the classroom. This would appear to be a big step up from the inward focus of the i-methodology discussed in the previous section. However the URE commented that Netbook use by some children in the study was given precedence in the findings:

"…we had two age groups; one 11-12 and the other 13-14 years old and they were vastly different; the younger ones were a bit more traditional…whereas one class further were interested in totally different games. […]. We focused on the older kids because I think we were just much more gripped by how the older kids used it; I hate the word sexy but it was much more interesting what they did with it than the younger ones and we also started to feel that their use was in the direction of the mobile phone and intensive users" (URE1: 27/04/09).

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replicated because it had come about due to the drive of one individual who had since been made redundant.

In this account the more conservative, 'traditional' and partial use by the younger children is marginalised in favour of the more 'gripping', creative and 'intensive' use of the older children. Despite an ostensibly exploratory emphasis, those users who are deemed to have 'limited imagination' and demonstrate 'conservative' or partial use are framed out by the research team to focus on more intensive users. Indeed URE1 noted the presence and significance of this tendency to focus on intensive users in all research:

"On the other hand sometimes you might look for…someone who is not typical but who would use the technologies to the hilt just to get the feedback – a bit like when we work with artists; they are in no way typical of the normal consumer but they do push the boundaries. So as long as you keep in mind that they are not typical…but at least they would use as many features as they could and probably invent a few in the process. And that's a useful tool to advance things…" (URE1: 27/04/09).

Again, this account suggests that designers and researchers pay attention to consumers not according to how well they represent consumers as a whole but on the basis that they use the product and its features to its full potential and thus highlight opportunities 'to advance things', 'push the boundaries' and invent a few product features in the process. Again this focus was not confined to pre-launch research but was also observed amongst Category employees as a way of getting feedback on products already in the market place:

"...key to me in Category are things like professional reviews such as 'PC Pro' or people like that who have actually taken the time to go into the depths of the product and give it a genuine spec all the way" (Mkt2, 23/11/09).

Again the focus here is not on everyday use but on those users who take the time to go 'in depth' with the product, using and testing all its features. In Schot and Bruheze's terms the users evident in these accounts are what are termed 'lead users'; those who are competent users who can define problems in the

relevant language, distinguish the trivial from the fundamental, and formulate their experiences in a form useful to developers (Schot & Bruheze, 2003:234). The key role played by lead users in this respect, and the problems of taking them as representative of a more general category of user have been noted (see for example Haddon, 2002; Woolgar, 1991); however we would also wish to stress its further implications. Whilst the resulting product may fulfill the desires of these advanced users, the partial or conservative user is effectively marginalised and the product is innovated according to the desires of intensive users. As a result, product qualities are de-stabilised much more rapidly, an intentional strategy as the Category manager confirmed:

"Because it moves so fast we're refreshing product really quickly so we're able to transition through technology at a very high speed. So the specifications that you'll see now if you look at some of the hard drive sizes that are out there to buy today they are excessive of what any customer would ever need but a lot of that is driven by sales pattern because retailers need something to shout about and get people's attention and the easiest way to get people's attention is big numbers, whether they need them or not is another point" (Mkt2 23/11/09)

Thus the construction of the consumer as a 'lead user' who demands greater specifications and features plays a key role in legitimizing a rapid cycle of product innovation and enhancement.

Sales data and product use

Whilst MC is a 'global' company, research regarding product was almost overwhelmingly conducted in the US with US consumers as the head of UK consumer marketing noted: *"of course, I mean from a country perspective, by the time a product comes to us it has gone through all the focus groups etc in the US…"* (Mkt3, 08/09/09). Certainly it was rare that such research was conducted by or even fed back to region or country teams:

"We don't get to see the results of the focus groups, again I'm not sure if it's because we haven't asked the right people. Or if like I've seen Maurice (Head of Consumer Laptop Design) once presenting to us in a video conference and that was the only time I've ever seen him…" (Mkt3, 08/09/09).

"We don't have much contact with the focus group data, not as much as we would like because it's very difficult for it to transition down through the big corporate engine…" (Mkt2, 23/11/09).

As these accounts suggest, where primary research with users was conducted it is often instigated at the global level and the information is not necessarily fed back to the UK marketing and sales team. The 'big corporate engine' is flagged as a problem here which mitigates against communication in addition to the short time frames in which teams have to work because of the speed with which they transition through technology. Miller (2005) for one has commented on the tensions which can arise between global and local interests in global firms (8) and there was some evidence of this in the accounts of MC employees with a feeling from UK employees that the US controlled consumer information. Due to this lack of primary consumer insight the UK team relied heavily on feedback from secondary sources for consumer insight:

"Well our interaction with end-users 'Joe Bloggs in the street' is very limited so a lot of what we do is always based on what our customer feedback is so the people that buy the product from us being our retail partners. […]. So we get their feedback on what they would like to have on a range of product and where they see that product fitting" (Mkt2, 23/11/09).

As this account attests, the marketing and sales team often have little or no contact with the consumer and instead rely on the retailer who effectively acts as a 'spokesperson' for the end consumer (Araujo, 2007:220). This feedback

could be face to face in meetings with channel[8] partners but it was more likely to be in the form of sales data and the UK business relied heavily on two sets of sales data in particular to inform their ideas about consumers and their use of the laptop:

"…we use both IDC and GFK data to ascertain exactly what we can do. Those are both industry indices used to track things. IDC measures your market share of what's called 'sell in' which is the volume going from manufacturer into distribution" (Mkt3, 08/09/09).

"We also use at the same time GFK data. So GFK is sell-out based data based on price points and specifications, trends in the market. (Mkt2, 23/11/09).

Both GFK and IDC are standard industry resources used to understand and forecast consumer purchasing patterns. By comparing IDC – which products had been sold to retailers, and GFK data – which products had been sold by retailers, the marketing and category teams assembled a picture of which products were selling the best:

"So we get that data on a weekly, monthly and quarterly basis […]. You can see the average unit price, you can see the ratio of sizes of laptops, where people are buying; whether it's mass merchants like John Lewis or Tesco or a computer store like a PC World. You can see Intel vs AMD; what kind of processors people are buying. And all of that will then be turned into category: okay what does the population want?" (Mkt3, 08/09/09).

"…we use that [sales data] to give us a picture, we then model that picture based upon what we think we can do and achieve from a margin and revenue perspective internally and we try and sell that to our retailers based on what

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[8] In the language of the firm the channel indicates a particular retail route to market. In the context of MC each retail or distribution partner whether virtual or on the high street was treated as a separate channel.

they think they should have…it's very much a specification for price…" (Mkt2, 23/11/09).

As is evident from these accounts, the category and marketing team used this data to look at which specifications were being bought, from where and by whom to inform the configuration of new laptops. Zwick and Knott (2009) assert that the practice of consumer recording in databases allows the very lives of consumers to be captured, stored and interpreted (226). However, in contrast, what we found at MC was a more crude process. Sales data in MC appeared rather as a tool of 'disentanglement' (Miller, 2002) because of the absence of data on use leaving basic data on specification, price and location. The point we want to emphasise here is that such sales data visualise consumption, not use, and certainly not non-use or partial use. Accordingly these sales data are a representation of the consumer rather than the user and this is an important distinction: the consumer can be assumed to be using all the features of a product because they have purchased it, whereas the user is observed to only use some of those features. Sales data thus scripts the conflation of the consumer and the user. The result of this conflation is that even though many product features and innovations are unwanted and unused (C.f Thompson et al 2005), the feedback that MC receives is in a form that confirms the existence of the demanding and creative consumer as conceptualized within the firm's research process. One marketing employee offered an apposite example of what this meant in practice:

"So like we saw that people really liked webcams and blogging, making videos etc so now as standard all AS PCs have webcams…because we saw that that is not something people should pay for, that's now become part of their life so you could argue that you're adding extra cost because do people need a webcam? But actually it's having the foresight to say this is the future; you too alongside all the rest of the people want to be able to create their own concept so we're not going to say yes you pay a premium initially, we're saying this is

the standard because people should be at this technological point…" (Mkt3, 08/09/09).

This account is particularly interesting because it exemplifies the way in which the tastes and preferences of some users come to be materialized in a product for all users. According to this account all PC users like webcams and blogging, therefore all PCs will incorporate webcams as standard because all people *should be* at this technological point. The notion that not everyone may want or need this technology is glossed over with the result that the non-user or conservative user is marginalized in favour of the demanding user. Even though the company segments consumers according to income with cheaper products having fewer features, products are not manufactured for these less demanding users. Indeed discussion regarding what a product for such partial and conservative users might look like was virtually non-existent. The idea of creating a product for these users only came up in a discussion we had with three non-product focused employees who conducted research into strategic sustainability. These were the only employees to acknowledge the existence of partial users, and the result of this narrowing of who and what counted as the user was succinctly summed up by one of them:

"… the market is being driven I suppose by the techno-literate in that maybe 20% of the market for laptops want the new features and the new OS or some of the new features that the new OS will provide. As a result the OS keeps developing and the laptops and the OS are developing hand in hand" (Env3, 12/08/09).

What we want to emphasise in this account is the fact that whilst this employee states that the market is being driven by the 'techno-literate', what is not articulated is the fact that this happens because of the way the firm's processes of consumer insight filter out other users to leave a representation of the market disproportionately dominated by the demands of lead users. This comment also illustrates that the result of conceptualizing the consumer as a

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creative, technologically proficient user who demands ever-increasing specifications with new features is that both the hardware and software move forward very swiftly. One marketing employee offered an apposite example of the kinds of re-qualifications they hoped this rapid de-stabilisation would encourage in consumers:

"With product life cycle and rolls of products, every three months we're moving up a gear of basically, what you can get for your money is the easiest way to think of it. So we may do something today then in three months time you may be able to pay the same price for a lot more so it's much more value for money. So if you extend that over a period of time of 3 years, by the time you take your laptop in to exchange it and you look at the price of what you can get for what you paid for that it's astronomically different" (Mkt2, 23/11/09).

As the MC Category Manager states here, constantly changing specifications are seen as an opportunity for re-qualification as consumers will see bigger differences in key product qualities for the same (or lower) price every three months.[9] Thus as Slater (2002) points out, the dynamic of the stabilisation-destabilisation process has become increasingly institutionalised and instrumentalised for economic actors (103). Certainly the dynamism of specification outlined in these accounts becomes a central tool in promoting a re-qualification of the product because of the way it presents frequent changes in product qualities. Our main contention here has been to demonstrate that this dynamism is premised not just on competition between

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[9] Identified in all consumer narrations of purchasing a new laptop in this study was a tendency to focus on particular specifications - what the manufacturer terms 'feeds and speeds' – in order to judge the product qualities in relation to price and calculate whether the object can contribute to the individual or family's lifestyle. In all consumer accounts the principle qualities of the laptop were variously defined by participants through features and specifications such as warranty, brand, video card, screen size and battery life. However, particular aspects of the laptop computer such as Hard Disk capacity, Random Access Memory (RAM) and processor (CPU) speed were universally used as metrics that defined the product's qualities. Familiarisation with these product qualities can take place through encounters on the internet, with friends, family and consumer magazines to name a few, but retail spaces (both real and virtual) were the most talked about sites where product qualities were discovered. We have also observed however, that the process of becoming familiar with qualities is clearly uneven; gendered and aged in particular in the technology sector, and also premised upon the social networks of users.

firms or R&D capability, but upon a particular construction of the consumer within the firm.

Consumer responses to de-stabilisation of product qualities

We now move on to discuss consumer responses to this dynamic landscape of product qualities. Slater (2002) has noted the increasing "…routinisation and spectacularisation of innovation – not just the shock of the new, but the routine expectation of the new…" (104). This was certainly true in our study where all participants expressed an awareness of the rapidly changing landscape of consumer electronics:

"This (laptop) won't be worthless after 3 years but I expect there's a different version of this out already even though that was only 9 months ago; it's dated as soon as you buy it really, there's always a 'better' thing coming out: like the phone I just bought they bought out a newer version the next week! You know they'll be something extra on the new one, oh God!" (Jessica, 17/09/09).

"What I've found is that your related experiences tend to make you dissatisfied…you suddenly think at home 'perhaps I should begin to have a look round' and you go into Dixons and PC world and suddenly you're looking at something that is value for money; its about the same as you paid for your previous one but they've rammed in loads more hard disk, loads more features and you suddenly think Christ, can I arrange to drop this one?" (Brian, 05/08/09).

As Jessica and Brian state here, and as all other participants went on to note, even in the space of a few months there was an awareness that laptop specifications would change dramatically, prompting – as Brian attests here - a re-qualification of the existing laptop as less desirable. What we want to emphasise in these accounts is the fact that it is the pace of change that is important in prompting re-qualification between old and new products, and as Brian suggests in his account when he *says 'you suddenly think, Christ! Can I*

arrange to drop this one?', this often contributed to laptops being disposed of whilst still functional as the following accounts suggest:

"It will be time to upgrade if things change substantially in the market place perhaps? But at the moment I can't see it; it's quite fast; it's got a good graphics card, but there will come a time when you see what's available on the market and you think frew! That's a bit smart! That's a bit whizzo! I think perhaps I'll see if I can change it…but what do you do with the old one?" (Alan, 20/08/09)

"Well we'll use it and use it and use it, and after three or four years you'll think 'OK I'll get myself a new one and give away the old one because you think well I've had 3 or 4 years out of it, it's almost disposable and you can almost throw it away. […]. I could never bin it; I'd have to give it to someone who could get some use out of it" (Kay, 14/09/09)

As both Alan and Kay comment, through a process of re-qualification against newer laptops with different aesthetics and specifications, the existing laptop becomes devalued and 'almost disposable' whilst still functional, leading to anxiety regarding how to dispose of it. Certainly, as Kay highlights when saying 'I could never bin it', all participants went on to narrate disposal strategies of re-assignment, handing down and mothballing, rather than letting the laptop enter the waste stream.

We would also point out that what we are absolutely *not* trying to suggest is a simplistic link between rapid technological change, re-qualification and disposal. As Rose (2002) notes, structures are practiced phenomena and thus "there is no reason to believe that structuring acts actually result in a structured being: all we know is that they are represented as such" (page 392). Any final decision by participants on whether to replace an existing laptop was evidently very much embedded in an understanding of their own social worlds (Jackson et al 2006) and personal values (Van Nes 2010). Indeed as we demonstrate in a related paper, participants' decisions on whether to purchase

a new laptop – and thus contribute to the social death of the existing one – are shot through with 'entanglements' of love, comfort, convenience, identity and maintaining social and family relations (Spinney et al 2012 forthcoming).

In addition, routine practices of computing were sometimes interrupted because the laptop ceased to work or because it became perceived as too slow. The narratives of many participants highlight the frustrations associated with what are deemed to be poorly functioning or aesthetically out of date products. Such accounts no doubt reflect desires to be competent practitioners (Warde 1994) but they also suggest the presence of a re-qualification at work. Realisations that the laptop was getting too slow or seemed 'chunky' rarely happened in isolation. These re-qualifications were shaped by the knowledge that there was something faster or sleeker available which made the existing product feel out of date. What we *are* saying then, is that product re-qualification premised on an apparatus of comparison proposed by the manufacturer/retailer is far from the whole story, but the pace of de-stabilisation in particular forms a central part of the process of product devaluation which ultimately leads to disposal of functioning products.

Discussion: demand, disposal and environment

This paper has made a number of connections regarding the causes and consequences of psychological obsolescence. Firstly, it has brought together accounts of production and consumption to highlight the links between the practices of different market professionals and end users. As Foster et al (2006:164) have commented, the phenomenon known as consumer demand is not shaped in a vacuum, rather it is shown to be the product of a dialectical relationship between consumers and other actors in the value chain (see also Goodman and DuPuis 2002; Harvey et al, 2001; Harvey 2002; Warde 2005). As a result Foster et al (2006), McMeekin et al (2002) & Sanne (2002) all suggest a move towards studying production and the ways in which it structures and constrains consumer choice if we are to understand how better to move towards more sustainable patterns of consumption (172). This focus on the firm as a unit of analysis begins to fill a social research void which

McMeekin et al (2002) suggest has limited our understanding of the main sources of innovation precisely because it is the firm that sets the limits within which consumption takes place (7).

Secondly, through focusing on the interplay between producers and consumers, we have demonstrated the ways in which an image of the consumer as demanding constant innovation is distilled within consumer research, sales and marketing functions, and deployed to promote and legitimate rapid de-stabilisation of product qualities. This focus on qualities draws attention to the inherent instability of products and the ways this is increasingly used by the firm as a resource, bringing the dynamics of the process to centre-stage (Foster 2007). As Slater (2002) points out, "…what has certainly changed...is both the increasing volatility of things – their shorter and more insecure social life – and the extent to which corporate practices respond to this by institutionalising, intensifying and reflecting on this as a normal condition of business life" (112).

Related to this, we have also shown how consumers respond to this landscape of rapid technological change by continually re-qualifying products, contributing to psychological obsolescence. Whilst we acknowledge the contingent and socially embedded nature of the replacement process (Gregson et al 2007; Van Nes 2010), we argue that the promotion of key product qualities and particularly the pace at which they change, are, in the consumer electronics industry at least, key drivers of obsolescence and disposal. As a result, whilst many accounts of product obsolescence suggest focusing on designing products differently (Chapman 2010; Park 2010) or changing consumer behaviours (Jackson 2005) in order to make products last longer, we suggest in line with Peattie (2010) that an examination and change of the destabilization practices of market professionals is also essential for more sustainable consumption patterns to emerge.

The third contribution this paper makes is to discuss the environmental implications of the specification of consumer demand and attendant de-stabilisation of qualities. Research into product life-spans has long problematised the psychological obsolescence of products as a direct cause of

consumer waste and excessive material throughput (Cooper 2010; Coopers & Mayer 2000; Lindley & Barrett 2003; Van Nes 2010). Due to the fact - as Hetherington (2004) has noted – that studies of consumption have overwhelmingly focused on the 'front end', part of the problem with the life-spans literature is that it often assumes that when a new product is purchased the old one, whether functional or not is discarded into the waste stream (Van Nes 2010).

However, more recent research (Evans 2012; Gregson et al 2007) has problematised the links between disposal and the entry of products into the waste stream. Whilst work by Gregson et al (2009) on repair suggests that unwanted low cost electricals (such as toasters and kettles) are more often placed directly into the waste stream whilst still functional (250) this is not the case in all sectors. As Gregson et al (2007) have demonstrated in the case of other household items and furniture, whilst psychological obsolescence may contribute to new purchases and thus disposal of functional goods, these unwanted goods do not automatically enter the waste stream, rather they are handed down, gifted, re-assigned or mothballed. Gregson et al note in their study of household consumption that only 29% of goods were directed into the waste stream whilst 60% were disposed of in some other way (2007:682). Such research moves beyond the immediate conjunction of disposal and waste (Evans 2012) which prevails in the life-spans literature.

Although not exhaustively reported here, our study into laptop computers is congruent with Gregson et al's findings in relation to household objects, suggesting that consumers use a variety of disposal strategies to avoid the laptop entering the waste stream. Consumer accounts of disposal suggest that through strategies of mothballing, re-assignment and gifting, very few laptops are deposited into the waste stream, and this is backed up by current research by Peagam (2012 forthcoming) on electrical waste. Peagam's research demonstrates that particularly in the case of consumer laptop computers, few get deposited in the waste stream, and of the few laptops that do make it into the waste stream, at least some are informally diverted from becoming waste by operatives at recycling facilities (Peagam 2012: pers comms). On the face

of it then, concerns about increases in e-waste connected to psychological obsolescence would appear to be unfounded in relation to the laptop computer. That is not to say we should be complacent about such disposal strategies for a number of reasons.

Evans & Cooper (2010) for example question the desirability of a second hand market created by handing down products suggesting in relation to their own research that whilst many regard handing down as commendable, far fewer would find the acquisition of second hand goods as attractive (343). In addition, little is known about what becomes of handed down products; are the recipients happy to take them or are they simply mothballed or consigned to the waste stream by another pair of hands. To what extent are handing down and mothballing simply strategies which defer entry into the waste stream whilst assuaging the guilt and anxiety of the original owner? Much more research needs to be done on what actually happens to objects which are handed down and mothballed before we can say for sure what effect product churn has on products entering the waste stream in the longer term.

In addition, the prevalence of mothballing and re-assignment of goods as disposal strategies to avoid the waste stream may do little to reduce resource and energy use in the production of new goods. Whilst practices such as mothballing can be said to reduce waste, at least in the near term, such practices are still only made possible by the purchase of a new updated product which requires energy and resources to manufacture. Indeed, a key point that we would make is that studies into disposal have often conflated the impacts on waste and material throughput: just because a functional product isn't deposited in the waste stream, by requiring a new product to take its place, increased energy and resource throughput is still implied. This is an important point and one not fully acknowledged in denials of the throwaway society by Gregson et al (2007).

Thus whilst this paper has demonstrated how a particular specification of the consumer contributes to increased de-stabilisation, product re-qualification, and ultimately psychological obsolescence and premature disposal, the environmental implications of this process remain ambiguous. Whilst the

impacts on increasing waste and throughput of energy and resources in manufacture may at least be slower than theorised, the disposal of functional products remains a cause for concern.

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