

The Utilities in Transition: Gazing through the IT window

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Abstract

The ongoing global deregulation of utilities industries is argued to be encouraging the development of more complex customer supplier relationships, supported by new information and communications technologies (ICTs), within the provision of services to the home. The UK is understood to be at the forefront of these developments, which initiated a huge demand for new software applications as utility companies seek to upgrade, or replace, their information systems to cope with competitive markets. In response to this demand, IT companies have produced a plethora of new software products designed specifically for utility companies, as well as adapting their existing merchandise to appeal to this market. The software products designed to support more complex customer supplier relationships are usually referred to as customer relationship management (CRM) 'solutions'. Using case study research of two CRM technologies and their implementation within four UK utility companies, between 1999 and 2002, this paper illustrates how concepts drawn from the social shaping of technology (SST) can inform research concerned with social implications of technological development. One of the main concerns of this paper is to demonstrate how notions of technology as text and socio technical enrolment are utilised to form the methodological basis of the research presented. This work explores how new business practices within the supply of utility services are constructed and sustained within the design and consumption of CRM technologies. In doing so the research presented in this paper provides a 'window' onto the changes that took place within the supply of UK utility services at the time the research was undertaken, and a contribution to the theoretical literature concerned with the relationship between social and technical development.

“It is now widely understood that utilities must change from simple providers of electricity to database-driven marketing firms - firms that, in some cases, will offer electricity as only one of a bundle of services” (Voien 1997:19).

INTRODUCTION

The landscape of public utilities in many countries has undergone rapid changes. The traditional model of government owned utility monopolies has given way to a new competitive environment. The UK is at the forefront of these developments. Regulatory measures, market forces, and new information and communication technologies (ICTs) have encouraged the separation of the generation, distribution and supply functions of the utilities industries in the US (Arocena, 2007), Australia (Energy Action Group 2001), the UK and the rest of Europe (Domanic 2007). This ‘unbundling’ of the utilities industries’ functions and service diversification¹ are illustrative of the emergence of new organisational structures and business practices, through which both access to, and the content of, the services supplied by the utilities sector are mediated.

The competitive environment within utility supply is argued to have promoted new marketing tactics, involving the development of more complex supplier-customer relations (Payne and Frow 1997:463, Guy and Marvin 1998:320-321), supported by new customer relationship management (CRM) techniques and technologies (Booth 2001, Houghton 2003, Lazenby 2003). These new marketing methods involve dividing markets into identifiable sub markets or segments, each having its own particular customer profile² and buyer characteristics, and then targeting particular service packages to particular types of customers (Payne and Frow 1997). Thus, “[a]lthough this new trend in marketing practice is based on the old idea of relating to customers as individuals, customer relationship management actually rests on segmenting consumers into groups based on profiles developed through a firm’s data mining activities” (Danna and Gandy 2002:373). It is argued that “[i]ndividuals whose profiles suggest that they are likely to provide a high lifetime value to the firm will be provided with opportunities that will differ from those that are offered to consumers with less attractive profiles” (Danna and Gandy 2002:373).

In the 1990’s academic debates concerned with the UK’s utilities industries began to describe a market driven by profit hungry companies, using methods of electronic control (Marvin et al 1999:117) and digital surveillance (Graham 1998a:494-496), to mediate access to products and services. These arguments are underpinned by the idea that technologies of control and surveillance are being incorporated into our everyday lives, permitting massive amounts of personal information to be gathered and stored in data warehouses, which is used to manipulate consumers via database marketing techniques (Marvin and Guy 1997:121, Graham 1998:494-496, Marvin et al 1999:117). The technologies designed to enable the customer segmentation and targeting techniques necessary to database marketing are predominantly described as CRM systems or solutions in the literature designed to promote them for use by utility companies (Crosbie 2004).

¹The deregulation of the utilities markets has encouraged utility supply companies to become multi-utility suppliers, and also prompted many to diversify beyond the traditional service boundaries of the utilities industries. Deregulation has also encouraged new retailers to enter the utility supply markets. (Crosbie 2004).

²Customer profiling involves generating suspects or prospects from within a large population by inferring a set of characteristics of a particular class of person from past experience, then searching data - holdings for individuals with a close fit to that set of characteristics (Clarke 1993).

The very notion that utility suppliers employ the customer segmentation and targeting techniques, associated with CRM, in the marketing of the essential services supplied by the utilities sector has produced a polarised debate. On the one hand, it is argued that the utility industry is focusing on lucrative market segments and withdrawing from unprofitable social and spatial commitments (Guy et al 1997, Graham and Guy 2002), whilst on the other, it is commended for improving access to services (D'I 2000:9) and providing consumers with both cost reductions and service diversity (National Audit Office 1999).

As with many of the academic arguments surrounding technology and marketing³, those concerned with the utilities industries are often built around a simplistic acceptance of the capacities and capabilities of new ICTs as presented within IT companies promotional literature. This implicitly assumes that ICTs are used precisely as their designers imagined, and therefore does not take into account that the uses to which technologies are put are contingent upon the contexts in which they are used (see Silverstone and Haddon 1996). Research examining technological innovation has shown that social and technical arrangements develop as part of a relational process (Russell and Williams 2002:3) and therefore the context in which any technology is used is integral to both the design and use of that technology⁴. Thus discussions of the impacts of marketing technologies on society, based upon the sales material designed to promote these technologies within the business world, offer a distorted picture⁵.

The research presented in this paper moves beyond the technological determinism implicit in the notion that marketing technologies are used precisely as their designers intended. This is achieved by case study research exploring how two examples of the CRM technologies, used for marketing in the utilities sector, are designed and how that design was completed in the consumption of those technologies in four utility companies, between 1999 and 2002. This provides a 'window' onto the changes that took place within the supply of utility services in the UK, at the time the research was undertaken, and a contribution to the theoretical literature concerned with the relationship between social and technical development.

The remainder of this paper is divided into four sections. The first contextualises the research for the reader. To do so, it discusses the debates surrounding the social and environmental implications of competitive utility markets and new marketing and technological innovations which began to be introduced within utility markets in the 1990s. The second section discusses the theoretical underpinnings of the research presented in this paper. This section illustrates how concepts drawn from the social shaping of technology (SST) are utilised to form the methodological basis of the research presented. The third section presents the empirical research and draws some conclusions as to what can be learnt from the research findings. The final section concludes the paper with some remarks concerning the implications of the research findings for studies concerned with the utilities industries and domestic and urban production and consumption.

³ See for example Novek et al (1990), Gelernter (1991), Larson (1992). Clark (1993,1998), Lyon (1994, 2001, 2003), Goss (1995a, 1995b), Staples (2000), Campbell and Carlson (2002), Danna and Gandy (2002).

⁴ For instance, research designed to uncover the nature of the relationships between private households, public worlds, and ICTs in the innovation process (Silverstone 1996, Silverstone and Haddon 1996) has shown that technological design and innovation are processes which are completed in the consumption of ICT products within the domestic environment.

⁵ Some authors, such as Goss (1995b) explicitly base their arguments surrounding the impacts of new technologies on society on the promotional material of those who design and sell these technologies. Others are less explicit in doing so, but by their failure to examine how marketing technologies are actually implemented and used, do so by default. See those listed in foot note two for examples.

THE RESEARCH CONTEXT

The social and environmental effects of competitive utility markets

Since the early 1990's the UK's policy approach to the regulation has been committed to driving competition in the utilities sector (see DTI 1998, DTI 2000:9, DTI 2006). This is argued to create a spur for companies to innovate, improve efficiency and drive down prices, thus benefiting all consumers (DTI 1998, 2006). From this perspective, the improvements in efficiency achieved through technological and other innovations since the privatisation and liberalisation of the utilities industry are a key component of the social and environmental dimensions of that process; the arguments being that the cost reductions made benefit lower income groups who can now afford more energy (DTI 2000:9) and increased efficiency gained through innovation within utilities markets is reducing harmful atmospheric emissions and therefore improving the environment (Pollitt 1997:11.)

However, increasing competition within utilities is argued to be creating inequalities in the distribution of energy, water and telephony services and the newer forms of home based services⁶, such as tele-mediated banking, retailing and media, as service providers 'cherry pick' the most profitable customers (Marvin et al 1999, Utility Europe 2001, Child Poverty in Action Group 2005). Many also argue that the new business practices arising out of the deregulation of the utilities has caused the 'social dumping' of the poorest domestic customers off the utility networks (Graham and Marvin 1994, Guy et al 1997, Energy Action Group 2001), supported by new ICTs of electronic control (Marvin et al 1999:117) and digital surveillance (Graham 1998:494-496). The idea that utility companies may be withdrawing service provision from less profitable customers has profound implications for the processes of social and spatial polarisation taking place in contemporary society (Guy et al 1997). As lower income groups tend to live in particular areas associated with low housing costs, any withdrawal of services from less profitable customers is inherently spatial. Underprivileged sections of society will be further disadvantaged if their access to essential services, such as energy and water, are limited (Guy et al 1997:210). The arguments surrounding the negative social consequences of competitive utility markets are accompanied by claims the commercial and regulatory constraints shaping different utility sectors are negating the possible environmental benefits of competitive infrastructure provision (Guy et al 1997, Guy and Marvin 1998).

Marketing and technological innovation within the utilities supply industry

The global privatisation and liberalisation process taking place within the utilities industries has created a huge demand for new information technology (IT) products and services, as utility companies seek to upgrade their information systems to cope with the mechanisms of competitive markets⁷. Technological innovation within utility companies' information systems in the UK has also been fuelled by the demands of the regulators, which require a great deal of information from privatised companies⁸, and therefore

⁶ This term is used to refer to services commonly consumed in the home.

⁷ For example, within the UK's electricity industry, the introduction of the Electronic Data Interchange (which enables competitive supplies to pass through monopolistic networked systems) necessitated enormous investment by utility companies in their information systems (Utility Week 1995; Management Accountancy & Computer Education 1997).

⁸ For instance, the UK energy regulator requires energy suppliers to provide a large amount of detailed information. This includes information concerning levels of customer debt; numbers of disconnections, self disconnections, and re-connections; use of different payment options; numbers of customers receiving energy efficiency advice; number

necessitate information systems capable of supplying that information (Management Accountancy and Computer Education 1999). Ostensibly, utility companies' information systems are not merely being re-designed to support the mechanisms necessary to the mechanics of unbundled utilities and the regulators auditing requirements, but also to facilitate sophisticated marketing techniques.

Sophisticated marketing techniques demand a wide "knowledge" of customers and hence the processing of large amounts of information about customers gained from any sources available (see Jiang 2000, Boyce 2002, Houghton 2003). Writing in 1997 Payne and Frow claimed "*in the residential market, although utilities have huge data bases of customers' billing information, there is little data about the individuals within a household who use their products*" (Payne and Frow 1997:466). They also maintained that, "*sophisticated approaches to marketing are unusual within utilities*" (Payne and Frow 1997:466). Thus, the idea that utility companies are employing complex marketing strategies assumes that they have upgraded their information systems to support the processing of information about customers these strategies demand.

Many of the software products marketed to the utilities, during the late 1990s and on to the present day, are described as being capable of carrying out the business process vital to CRM, which include service differentiation and target marketing via customer and market segmentation. Many of the applications described as capable of carrying out these processes fall into two categories. The first, call centre or contact centre technologies, are designed to control the interactions between a company and its customers. The second, data storage and mining technologies, are designed to record and manipulate the information with which to differentiate between different groups of consumers. The contact or call centre applications provide the technical capacity to target differentiated services and products to different classifications of customers by tailoring the interaction between a company and its customers, whilst the data storage and data mining applications provide the technical capacity to manage the information upon which to base this differentiation. In this way they lie at the crux of the debate concerning whether utility companies are withdrawing from unprofitable social and spatial commitments (Graham and Marvin 1996, Guy et al 1997), or offering consumers diversity, choice and cost reductions (National Audit Office 1999). In this sense, CRM technologies can be understood as the point at which the actions of individuals and groups, in both local and global contexts⁹, coalesce in the construction of technological configurations which structure social relations. Therefore CRM technologies are 'obligatory points of passage', in Latour's (1987) sense of the phrase.

Thus, by exploring the design and use of CRM technologies within utility supply, the case studies presented below provide an insight into how a 'global network', made up of competing utility companies, government bodies, and consumer groups, together with the 'local network', made up of IT professionals and utility companies' employees, structure social relations within CRM technologies.

METHODOLOGY

The research presented in this paper is rooted in the idea that the social and environmental potentials of technology are not innate to the technology, but rather they are built into their functionality during the design and implementation process (Akrich 1995). Following this perspective, the case studies discussed

of customers benefiting from energy efficiency schemes; and number of customers suffering a loss of supply (OFGEM 2003).

⁹ See Law and Callon (1992) for a discussion of the ways in which a distinction can be drawn between "local and global networks".

here explore how new business practices within the supply of utility services are constructed and sustained within the design and consumption of CRM technologies. To do so they examine the design and implementation of two CRM technologies in four UK utility companies between 1999 and 2002. Due to concerns surrounding questions of business confidentiality, it was only possible to gain access to the research sites by promising complete anonymity. Therefore, pseudonyms are used throughout this paper to identify the technologies examined by the case studies and the utility companies in which their implementations were examined¹⁰. The first of the CRM technologies examined we have called Business Information Support (BIS) and the second SellIT. The utility companies we have called, Quality Electric, Superior Electric, Freshwater and Clean Energy.

In order to move away from deterministic interpretations of technology, the theoretical perspective adopted in the case studies draws on the notion of technology as text¹¹. Conceptualising technology in this way allows technology to be perceived as written by its designers and read by its users. This in turn allows for the notion that users are configured within the technological text (Grint and Woolgar 1997), in that technologies can control users' actions, in as far as the technological text can be written to support a particular interpretation of that text. This configuring of the user involves more than defining the identity of the user "*[f]or along with negotiation about who the user might be comes a set of design (and other) activities which attempt to define and delimit the user's possible actions*" (Grint and Woolgar 1997:71). However, this approach also leaves room for the notion that technologies can be used in unintended ways. As viewing technology as text also allows emphasis to be placed upon how users can critically reinterpret the technological text.

The theoretical approach adopted shaped the structure of the data collection process within the case studies, which was carried out in two stages (see figure 1). The first stage of the research focused on collecting information about how the technologies under examination were designed (written); while the second stage concentrated on collecting information concerning the ways in which they were used (read). In effect, the first stage of the case studies is concerned with how the utilities supply industry was configured within CRM technologies, whilst the second stage is concerned with what happened when the configured user met the actual user (see table1).

The second stage of the case studies draws on the notion of enrolment embodied within what actor network theorists call 'translation', which has at its heart the idea that actors within a network will try to enrol or manipulate the other actors in that network into a position that suits their purposes (Callon 1986b). From this perspective "*[w]hen an actor's strategy is successful and it has organised other actors for its own benefit it can be said to have translated them*" (Summerville 1997). Drawing on this idea, the second stage of the case studies paid particular attention to the socio-technical enrolment of the user. Hence, this stage of the research was designed to investigate the extent to which those working within the utilities industry are enrolled into the assumptions underpinning the technologies designed for, and marketed to, that industry.

¹⁰The use of pseudonyms due to a need for confidentiality is common practice within research examining information and communications technologies in industrial environments. See for example, Bloomfield and Vurdubakis (1994) and Grint and Woolgar (1997, chapter 3).

¹¹ A number of studies of technology (e.g. Grint and Woolgar 1997, Hill 1992 and 1998, Bloomfield and Vurdubakis 1994) have argued that technological objects should be 'read' as texts. Some have argued that such claims should not be seen as purely academic/theoretical import but relate to the practical aspects of the knowledge and use of such artefacts (Bloomfield and Vurdubakis 1994).

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In doing so, the case studies examine the extent to which IT professionals' assumptions concerning the future of the domestic utility markets, and the changes in business practices necessitated by these assumptions, are built into the functionality of actual implementations of BIS and SellIT.

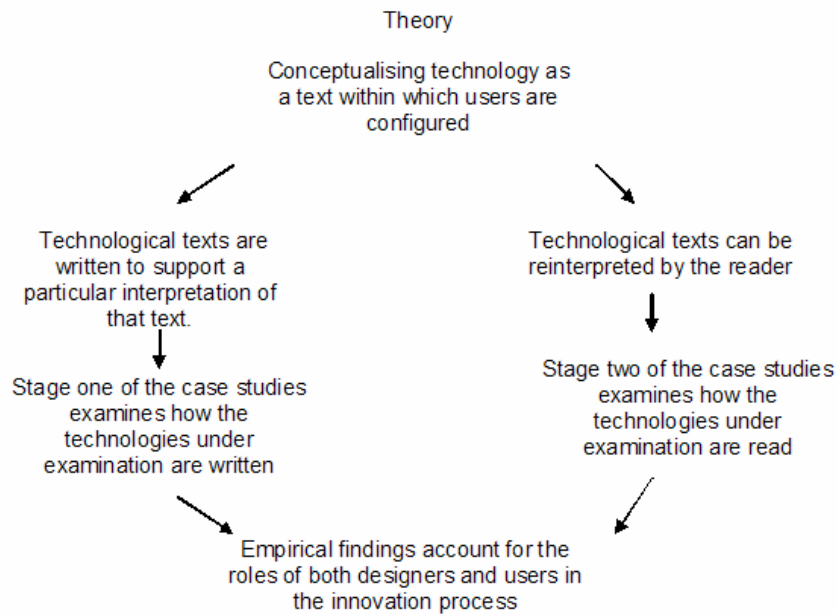


Figure 1 The interface between theory and method

Table 1 The Case Studies: Questions and Methods

Stage one of the case studies	Stage two of the case studies
Examining how the user is configured within the technological text-This stage of the case studies involved examining how those that designed the technologies under examination intend them to be used.	Examining what happened when the configured user meets the actual user- This stage of the case studies involved examining how the designs of the technologies under examination are completed within their consumption by utility companies.
The main questions addressed – What kinds of assumptions about the future of domestic utility markets are built into the functionalities of the technologies under examination?	The main question addressed – To what extent are those working within the utilities industries enrolled into the assumptions concerning the future of domestic utility markets built into the functionality of the technologies under examination?
The main sources of data – interviews with individuals from IT companies that designed, marketed and help to implement the technologies which formed the focus of the case studies and documentary evidence in the form of product descriptions and marketing material.	The main sources of data –interviews with individuals working for utility companies that purchased, implemented and used the technologies which form the focus of the case studies.

THE CASE STUDIES

Configuring the user

It is accepted by the IT industry that both BIS and SellIT are configurational technologies (Fleck, 1994) in the sense that they are made up of separate components or modules that can be configured together in different ways. The business literature designed to promote these technologies claim that they are flexible and can be adapted to fit the particular IT needs of any given company. However, like all packaged software applications BIS and SellIT have certain functions in that they are intended to perform particular tasks. Thus, they are designed to automate particular business practices and in this sense their functionality is based on assumptions about how utility supply businesses should operate in competitive markets (Crosbie, 2004). This paper now turns to the question of what these functionalities are and what assumptions they are based on.

Controlling the interactions between a company and its customers

BISs basic modules are a software development or authoring tool used to develop databases for storing and structuring customer service and other information; a sophisticated search engine for accessing this information; and a call centre module for designing the screens used by call centre agents to access the information stored in the database. One of the explicit functions of BIS is to ensure that all customer enquiries are dealt with in accordance with company regulations, and in the case of the regulated industries government regulations. To put it succinctly, it is intended that BIS will control the interactions between a company and its customers. To this end, the central database at the heart of BIS is designed to record the answers to customer enquiries, using a technology called case based reasoning (CBR).

In order to understand the ways in which BIS can be used to control the interactions between a company and its customers, it is important to understand how CBR works. First, the questions customers ask most frequently are programmed into a central database; second, the way in which the company using BIS wants those questions answered is also programmed into the central database; and third, these predefined answers are used to answer customer enquiries. Thus when a customer rings the call centre, or accesses a company's website and asks a question, the answer they will be given is encoded as the solution to that particular problem (or at least a very similar problem) within the database.

Those charged with selling BIS to utility companies were very explicit in their descriptions of how BIS should be used to differentiate between customers that are perceived to be profitable and those that are not, as illustrated in the following quote from an interview with one of BISs Sales Consultants. *“We allow companies to approach customer service in a slightly different way. For example, if you know that a customer is a really ‘grow-able’ one, and lets say they call up and say something has gone wrong with their mobile phones battery, the response by the agent in the call centre might be ‘sorry to hear that, we will send you a replacement battery and we will get it off to you tonight’. However, if it was a below zero, for someone who is an undesirable, well the interaction in the call centre might be ‘we can’t replace it, you need to go to your local dealer and it will cost you forty or fifty pounds to get them to change the battery’. So, how the call centre agent, who might not be experienced, can just come on and interact differently in those two situations is in the database. The profile of the customer combined with the database will allow the agent to tailor those two interactions differently.”*

Notions concerning service differentiation on the grounds of the perceived profitability of customers were not exclusive to the sales team, but were echoed by many of those working for the IT Company that

market BIS to the utilities. Importantly, when considering how BIS might be implemented, the IT companies technical support team also described BIS as a means of differentiating the service supplied according to the perceived profitability of the customer to the company. When asked to describe how BIS might change the ways in which companies deal with their customers, one of the Technical Consultants, who was at that time working with three utility companies, described it as a means of controlling the answers given to customers according to the 'value' of the customer.

Supporting market segmentation customer targeting

SellIT is built around a core database. SellIT's promotional literature lists the following components which can be used in conjunction with the core database: product delivery, research, planning, call centre, targeting, profiles, sales/contact management and, prior to 2000, energy online management. According to those who market SellIT for use by utilities, its' functionality is predominantly concerned with supporting market segmentation customer targeting and the development of new services based on the marketing information it generates. SellIT's promotional literature claims it can turn 'a £2 billion utility into a £35 billion home service provider' by increasing what it describes as utilities 'wallet share'. Essentially this means that utility companies can use SellIT to help them move into supplying new services such as financial services and even leisure goods, thus increasing the proportion of each customer's household budget spent with them.

SellIT's core database is designed to recorded information about customers. This marks a distinct change of approach in the way information systems are designed for utility companies. Prior to the deregulation of utility markets, the kind of database which SellIT's core database is designed to extend would have merely been concerned with recording how much gas, electricity or water had passed through a particular meter, and who that meter belonged to. This change in focus from recording consumption information provided by utility meters, to recording information about customers reflects the changes that those involved in the design of SellIT thought should be, and to some extent are, taking place in utility companies' orientations towards their customers. For example, one of the Technical Consultants working at the IT company which developed SellIT claimed that "*they [those in charge of utility companies] need to stop thinking of customers as merely extensions of their meter, they need to see them as the basis from which they can diversify and expand their business. Some people are beginning to recognise this but others are still sticking their heads in the sand*".

Although SellIT's core database is designed to be user configurable, in that it will allow users to change the kinds of data stored about customers, prospective customers, and competitors etc, it is however pre-configured to record particular information. SellIT's promotional literature claims that the particular information which SellIT's core data base is designed to record will allow utility companies to track a complete history of all the accounts a customer might have, maintain a history of all premises a customer may occupy and all occupants of a specific premises.

The very notion that SellIT and BIS were being promoted for use in the domestic utility sector, illustrates that those who designed and market these technology assumed that utility supply companies need to employ CRM techniques in the supply of energy water and telephony. However, if we are to move beyond the research based on the promotional claims of technology manufacturers, it is also necessary to understand how SellIT and BIS were implemented and used within the utilities industry. This allows an assessment of the level to which those in charge of utility companies were enrolled into the assumption that their companies must transform themselves into database marketing concerns.

The configured user meets the actual user

Two implementations of BIS in energy supply companies

Both of the implementations of BIS examined took place in Regional Electricity Companies (RECs). Due to the need for anonymity, discussed earlier, they are referred to as Quality Electric and Superior Electric. The main roles played by both companies prior to the liberalisation of the electricity and gas markets, was the supply and distribution of electricity in their given regions, during the time the research was conducted both companies had also begun to supply gas and telephony services.

Quality Electric completed its first implementation of BIS at the beginning of 1999. The costs associated with the number of what were considered to be unnecessary call-outs by field engineers, was the main problem which this implementation of BIS was intended to solve. This problem was in turn linked to inconsistencies in the answers given to customers by call centre agents. However, it was mainly associated with pre-payment meter customers, who are usually those customers on low incomes and are therefore not considered to be profitable. The Customer Services Director at Quality Electric pointed to this implementation of BIS as allowing the company to reduce the cost of energy for pre-payment meter customers. He stated, “[o]nce the system was up and running and we knew how much we were saving, we were able to begin to pass these savings on to our prepayment customers. We have reduced the cost of our prepayment surcharge by almost three pounds, making it one of the lowest in the country, and we are currently piloting schemes which align the cost of prepayment with normal quarterly bills and if they prove to be financially viable, we hope to extend them to cover all of our prepayment customers”.

The way in which BIS is used at Quality Electric reflects the opinions expressed by the staff at this company concerning the value of different types of customers. Quality Electric’s Call Centre Manager when asked if some customers are more valuable to his company than others replied “*we supply an essential service and it is imperative that all of our customers receive the best standard of customer service.*” He then went on to state that “*I would never condone giving a customer poor service, regardless of how much that customer spends with us.*” Other members of Quality Electric’s staff also echoed this position. For example, their Customer Services Director said, “*in energy supply, profit margins are low and so we make our profit from numbers, we need to keep all our customers happy to keep those numbers high and have a good turn over, it is just not good business to concentrate on any particular customers.*”

At the end of 1999, Quality Electric upgraded their version of BIS. The problem at this time was considered to be the ability to make ‘out-of-area sales’, or in other words the ability to sell gas and electricity to customers outside the limits of Quality Electric’s distribution boundaries. This problem was complicated by regulatory requirements, which oblige Quality Electric, in their role as distributor, to act independently of their retail interests. Thus, this implementation of BIS was designed to ensure that call centre agents did not have access to a customer’s supplier information when dealing with distribution queries. This, in effect, allows Quality Electric to continue in both its roles as supplier and distributor, by creating a virtual rather than actual spilt between the two. Part of this implementation of BIS involved the development of an electronic form designed to enable customers to register for discounted joint gas and electricity services over the telephone. This service is available to all customers, which as we shall see, is not the case at Superior Electric.

One of the first problems to be identified at Superior Electric and dealt with by their implementation of BIS was the signing up of current electricity customers to their ‘dual fuel’ energy package over the

telephone. This package involved supplying customers with both gas and electricity at a reduced rate in return for buying both services. The request for electronic contracts, which could be filled in over the telephone, arose because while customers were asking for information about this new product from call centre agents, they often failed to return the paper contracts sent out in the post in response to these requests, or did not fill them in correctly. Thus, it was felt that there would be more sales if customers could be immediately signed up to the new contract when making their initial telephone inquiry into the 'dual fuel' offer.

In response to this problem, a computer-based form, called dual fuel, was developed as part of Superior Electric's implementation of BIS. The call centre agent fills in this form according to the responses given by the customer over the telephone. Incorporated into the form is a warning to the call centre agent not to sell the 'dual fuel' package to prepayment customers or customers who use the special payment methods set up for low-income customers. The author of the database which formed the basis of Superior Electric's implementation of BIS made this quite clear, stating, "*[t]he whole process of signing up online is very specific. For instance, it will tell the agent specifically not to sell to an account one customer [prepayment card customer] or a prepayment meter customer. In fact, the system is set up so you can't set the account up without detailing payment method. It's done that way so new agents don't make any mistakes*".

As was the case at Quality Electric, the way in which BIS is used at Superior Electric was reflected in the opinions expressed by their staff concerning the value of different types of customers. Superior Electric's Call Centre Manager, when asked whether some of their customers were more valuable than others replied: "*well of course we make more money from our large commercial customers and it is very important that we keep those customers happy*". When pressed on the question of whether some domestic customers were more important to his company than others Superior Electric's Call Centre Manager said, "*we prefer our domestic customers to pay by direct debit, and therefore we reward customers who choose this payment option with a small discount*". When asked if this was a fair approach given that some customers do not have a bank account and would be unable to use this payment option, he said, "*really that is a social issue and not something energy companies should have to worry about*".

Two implementations of SellIT by an energy and a water supply company

In the late 1990's, a UK water company, which we have called Freshwater became Utility IT Systems first UK customer for SellIT. Freshwater also began to sell new domestic services, including insurance services, energy services and telephony services at this time. The initial intention was to implement SellIT in stages. The first involved implementing SellIT's core database, selected parts of the Sales/Contact Management module and the Product Delivery Management module which would be used to store the details of some 700 of Freshwater's largest and most profitable industrial and commercial customers. The second stage was to involve expanding the system to cover all of Freshwater's industrial customers and the third was concerned with further expanding the system to cover domestic customers.

Stage one of the proposed implementation of SellIT at Freshwater was completed in the late 1990's. The information stored on Freshwater's implementation of SellIT is primarily used to store and analyse the water consumption patterns of 700 of their largest industrial and commercial customers. This analysis of consumption patterns is used by Freshwater's sales team to advise these companies on ways of reducing their water consumption. This enables Freshwater to offer more competitive rates. When the data collection phase of the research came to an end, almost four years after the implementation of what was

to be stage one of SellIT's implementation at Freshwater, stage two had still not begun. When asked about using SellIT to offer end use water management to their smaller commercial and industrial customers, Freshwaters sales manager said, *"I can't see the point of trying this. The amount people could save would be minimal, and the way things are at the moment I just can't see it happening"*.

In the domestic market, it was felt that because water was not widely metered, it was pointless contemplate using SellIT. Freshwater's Sales Manager claimed that, *"we don't meter many domestic customers, without that basic step there is no way forward and again I don't think people would be interested"*. Thus, despite the fact that since the implementation of SellIT at Freshwater this company had begun to sell new domestic services, including insurance services, energy services and telephony services, their sales team felt it was not worth extending their implementation of SellIT to record information about their domestic customers. This highlights the notion that those working at Freshwater had a completely different picture of the functions of SellIT to that presented in its promotional material which, as discussed earlier, presents SellIT as the means by which to target different services at different segments of both domestic and commercial markets.

The second UK Company to buy SellIT we have called Clean Energy. At the time of their purchase of SellIT Clean Energy supplied gas and electricity. However, despite being in a different market to Freshwater when it implemented SellIT, Clean Energy's implementation of SellIT is remarkably similar to that at Freshwater. Here once again only SellIT's core database and parts of its Contact and Sales Management Component and Product Delivery Component were implemented. Also, in common with Freshwaters implementation of SellIT, the system at Clean Energy was used as a key account management system for large industrial and commercial customers.

Initially it had been intended that Clean Energy would also purchase a customer information and billing system, from the company that deigned SellIT, which would be integrated with SellIT, allowing the system to be extended to cover all of their customers. However, due to a contractual disagreement over the delivery of this customer information and billing system, the relationship between Clean Energy and the IT Company supplying SellIT disintegrated. Neither, the customer information and billing system, nor the planned extension of SellIT were implemented. Instead, Clean Energy adapted their legacy billing systems. Despite this however, Clean Energy were still using their implementation of SellIT to manage their largest industrial and commercial accounts in 2002. Thus SellIT is used at Clean Energy in the same way as it is used at Freshwater, as a Key Account Management System rather, than the fully integrated Sales and Marketing System envisaged by its promotional material.

Analysis of the case study findings

The case studies demonstrated that, at the time the research was conducted, many working within the UK utilities industries were not enrolled into the assumptions underpinning the functionality of the CRM technologies designed for, and marketed to, that industry. However, it was also shown that in some cases those working within the UK utilities industry, at this time, embraced many of the tenants of CRM. These different levels of acceptance of the tenets of CRM produced very different implementations of CRM technologies which have contrasting social and environmental implications.

CRM technologies and the withdrawal of services from unprofitable people and places

In the case of Superior Electric's implementation of BIS evidence was found to support the claim that some utility suppliers are using CRM technologies to support the withdrawal of services from those deemed unprofitable. One of the most problematic aspects of the way in which BIS was used at Superior Electric is that the act of discriminating against pre-payment customers was automated within the system, as it was configured in such a way as to prevent pre-payment customers from being registered for joint gas and electricity services. Thus, Superior Electric's implementation of BIS is part of the "*proliferation of automatic systems which raise clear concerns that social exclusion itself will be automated*" (Graham and Wood 2003 233-234). It is interesting to note that since the research was carried out, Superior Electric's energy supply business has been sold and the company now operates predominantly within energy distribution. This might suggest that differentiating between customers in this way within domestic utility supply markets was an experiment, and that the trials in this area are not always successful.

It is also interesting to note that the way in which BIS was used by Superior Electric does not support the idea that utility companies are using 'virtual identities', or consumer profiles, to make decisions about who has access to particular goods and services. Although Superior Electric was differentiating the services offered to different groups of customers, this did not involve the use of sophisticated technologies for customer profiling: customer differentiation was dependent solely upon the information given to call centre agents by customers over the telephone. The detailed examinations of the use of SellIT also suggest that the notion that all utility companies are using sophisticated customer profiling would appear to be something of an overstatement. Rather, in both of the implementations of SellIT examined in depth, it was being used to store information about large industrial customers as an aid to reducing their levels of consumption and therefore the cost of energy or water services to those customers.

CRM technologies and the promotion of social equity and sustainability

The case studies also illustrate that the use of CRM technologies by utility companies to withdraw from unprofitable customers and the places in which they live is only part of the picture. For example, BIS was used at Quality Electric to reduce the cost of supplying prepayment services, and therefore reduce the cost of these services to customers. Thus, in this instance, it can be argued that BIS was used to help increase the inclusion of prepayment meter customers within the same levels of consumption as the rest of society, by reducing price differentials between prepayment and other modes of paying for utility services and thereby increasing the amounts of energy prepayment meter customers can afford to consume. The extensions made to BIS after its initial implementation at Quality Electric also indicate that those working at this company are eager to build deeper relationships with all of their customers, not just with those deemed to be the most profitable. For instance, the extension of BIS, designed to support the sale of Quality Electric's joint gas and electricity service is configured in such a way as to allow all customers to sign up for this service over the telephone, regardless of payment type.

The ways in which SellIT was used to reduce the amounts of water and energy consumed by Clean Energy's and Freshwater's largest industrial customers illustrates the potential offered by SellIT for promoting demand side management (DSM) initiatives. On initial consideration, the ways in which SellIT was used at Clean Energy and Freshwater seem to be a wholly positive development. However, the fact that DSM services were offered only to large industrial customers, rather than all industrial customers, does point to a creeping differentiation in service provision. The potential offered by SellIT to increase social inclusion by encouraging more sustainable consumption patterns in the poorer sections of our

communities was not exploited in any of the cases examined. Although this was not because those domestic customers deemed unprofitable were not offered these services, as indicated by the earlier research in this area (see Marvin and Guy 1997, Marvin et al 1999). Rather, it was found that the potential offered by SellIT to increase sustainable consumption patterns, by identifying consumers that might benefit from energy efficiency advice and targeting them with advice on energy saving appliances and so on, was simply not exploited at all in the domestic sector.

DIRECTIONS FOR FUTURE RESEARCH

Research based on SellIT's and BIS's promotional literature would have presented a picture in which new technologies of control and surveillance are used to segment markets and discriminate between different classifications of domestic and commercial customers. However, the realities of the implementation and use of SellIT within the UK's utilities industries is that it is predominantly used to support DSM services in commercial markets. While the way in which BIS is used, in the cases examined, highlights that the characteristics of CRM technologies, and other methods of what has been described as 'digital surveillance', are extremely flexible and ambivalent. On the one hand systems can be designed to socially exclude, based on judgements of social or economic worth: on the other hand, the same systems can be programmed to help overcome social barriers and processes of marginalisation.

Therefore the findings presented show that research concerned with utilities industries and domestic and urban production and consumption must move beyond the notion that technology is used as its designers intended and examine the 'realities' of the implementation and use of new ICTs. This is essential if ways are to be found to encourage the development of appropriate incentives "*for the socially and economically beneficial use of electronically codified knowledge*" (Mansell 1996:187) within the provision of utility services. For this to occur it is necessary to understand how new ICTs, which are argued to be "*the key to sustainable development*" (World Energy Council 2001), are being incorporated into the generation, distribution, transmission and supply of essential utility services. The notion of technology as text within which users are configured, and concepts of socio technical enrolment could be applied here to examine the 'realities' of implementation and the use of these supposed 'keys to sustainable development', and in doing so provide an understanding their actual social and environmental implications. Conceptualising technology in this way allows for the notion that users can challenge the ways in which existing political, economic, and cultural factors shape technological innovations; acknowledging the possibilities for developing strategies to steer the implementation and use of technologies in ways which engender social inclusion and environmentally sensitive consumption patterns. This approach also has the major advantage that it uncovers to the roles of both designers and users in the innovation process.

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