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FRAMING WORK THROUGH A SOCIO-TECHNICAL ENSEMBLE: THE CASE OF BUTLER CO.

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ABSTRACT

The paper argues for conceptualising technology as a socio-technical ensemble which emerges from the socio-political context of the organisation. This perspective is used to inform a case study carried out within a consumer goods company, where the focus is upon the configuration of work and technology associated with the job of sales representative. It is argued that the acquiescence and compliance of the sales reps is to be understood primarily on the basis of senior management's effective deployment of its power resource through 'enacting the environment', the configuration and utilisation of the ensemble, and its employment strategy. 'Closure'and 'stabilisation' had occurred, and the ensemble was operating on a number of levels. [1]

INTRODUCTION

The argument that technology plays an important role in the exercise of power is not a new one. It is not possible to separate the 'purely technical' aspects of power from the 'purely social', and as a result the unit of analysis is not merely the combination of social and technical factors, but the 'socio technical ensemble':

> Each time the 'social institution' is written as short hand for 'socio technical ensemble' we should be able to spell out the technical relations that go into stabilising that institution. Society is not determined by technology, nor is technology determined by society. Both emerge as two sides of the socio technical coin during the construction processes of artefacts, facts and

[1.] Data collection took place over a two year time period, and involved around fifty semi-structured interviews with a range of managers and staff from all levels of the organization; participant observation (for example, attendance at monthly meetings between sales reps and Area Managers); and the examination of company documentation.

relevant social groups. [2]

Bijker [3] has made an important contribution to 'social construction of technology' (SCOT) theorizing through the incorporation of a politics of technology:

> My argument for a politics of technology involves three steps. First I will argue that a constructivist analysis, in some form, is a *conditio sine qua non* for such a politics. Such an analysis stresses the malleability of technology and the possibility for choice, the basic insight *that things could have been otherwise.* But technology is not always malleable, it can also be obdurate, hard and very fixed. The second step is to analyse this obduracy of socio technical ensembles, to see what limits it sets to our politics. [4]

The argument, then, is that if technology is socially constructed, the process of construction is an outcome of the exercise of power, the political process. If an organisation is considered as a constellation of relevant groups, each of which has a particular technological frame, then political behaviour will centre around attempts to achieve ascendancy for a particular technological frame. Often, those groups which already have more power are the most successful in this process, which can be likened to the formation of a 'dominant ideology'. [5]

The organisation can thus be viewed as an socio technical ensemble, embodying a web of relationships between individuals, groups, technology and the internal and external contexts. The ensemble is dynamic, around which organisational power flows, shaping and molding it. The paper explores this circulation of power through data gathered from a longitudinal case study, focusing on technology as a conduit of power.

INTERPRETING TECHNOLOGY

The majority of theories of technology attribute at least some degree of influence to social processes in the construction of technology. As Grint and Woolgar [6] note, there is no evidence of 'hard determinism' within social scientific writing and research, this being limited

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2. W. Bijker *Of Bicycles, Bakelites and Bulbs, Towards a Theory of Socio-technical Change* (Cambridge, MA: MIT Press, 1995), p274.

3. W. Bijker (op. cit.)

4. W. Bijker (op cit., p280)

5. Abercrombie, Hill & Bryan, *The Dominant Ideology Thesis* (London, Allen and Unwin, 1980).

6. K. Grint & S. Woolgar, *The Machine at Work: Technology Work and Organisation* (Cambridge, Polity Press, 1997).

to the more populist managerialist publications. Understanding the process of social construction is thus of major import in understanding how a recognisable technology comes into being. The social construction perspective focuses attention upon attempts to shape technology in particular ways, whilst at the same time also examining how technology shapes particular forms of social knowledge [7].

The emergence of social shaping approaches was associated with a shift of academic interest in this area from the sociology of scientific knowledge (which focuses upon how scientific theories are socially shaped) to the sociology of technology [8]. As a result, the basic themes of the sociology of scientific knowledge, which Bijker, Hughes and Pinch [9] term 'the empirical programme of relativism (EPOR), were inherited by the social construction of technology perspective. The SCOT approach seeks to problematise the emergence of particular technologies in order to question the ways in which they emerged.

Bijker [10] views the SCOT approach as 'socio technical' as the elements analysed are both social and technical:

> Purely social relations are to be found only in the imaginations of sociologists or amongst baboons, and purely technical relations are to be found only in the wilder reaches of science fiction. The technical is socially constructed and the social is technically constructed. All stable ensembles are bound together as much by the technical as by the social. [11]

The development of technology involves an alternation between variation and selection, and thus needs to be studied via a 'multidirectional' model. Typically, in the development of a particular technological artefact, many forms and variations of the artefact appear. With the multidirectional model it is possible to ask why some variants 'die' whilst others 'survive'. [12]

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7. W. Bijker, (op. cit.); D. Edge 'The Social Shaping of Technology', in Heap, N., Thomas, R., Einon, G. & Mackay, H. (eds), *Information Technology and Society: A Reader* (London, Sage, 1995).

8. S. Woolgar, 'The turn to technology in social studies of science', *Science, Technology and Human Values*, Vol 16, 1991, pp20-50.

9. W. Bijker, T. Hughes & T. Pinch, (eds) *The Social Construction of Technological Systems: New Directions in the Sociology of History and Technology*, (Cambridge, MA: MIT Press, 1993).

10. W. Bijker (op. cit.)

11. W. Bijker (op. cit., p273)

12. T. Pinch & W. Bijker, 'The social construction of facts and artifacts: or how the sociology of science and the sociology of technology might benefit each other', in W. Bijker, T. Hughes & T. Pinch (eds) *The Social Construction of Technological Systems: New Directions in the*

An emphasis is placed upon the relevant social groups who define the 'problem' for which the artefact is intended to be a 'solution', and the understandings and meanings attributed by them:

> The use of the concept of the relevant social group is quite straightforward. The phrase is used to denote institutions and organisations (such as the military or some specific industrial company), as well as organised or unorganised groups of individuals. The key requirement is that all members of a certain social group share the same set of meanings, attached to a specific artefact. In deciding which social groups are relevant, we must first ask whether the artefact has any meaning at all for the members of the social group under investigation. Obviously, the social group of 'customers' or 'users' of the artefact fulfils this requirement. But less obvious social groups may need to be included. [13]

A key concern of the SCOT approach is to show how a particular technology becomes 'stabilised' or 'closed'. These terms are used to describe the critical junctures at which a technology-organisation configuration is 'frozen' [14], in the sense that 'the interpretive flexibility of any given technology is not infinite, being partly constrained by the material characteristics of that technology'. [15] There are a number of mechanisms by which this is possible, including 'rhetorical' closure, involving the disappearance of the 'problems' surrounding the artefact (that is, the 'problems' are 'solved'), and the redefinition of the problem.

The construction of a technology should not, however, be seen as an *exclusively* political process, as other factors limit the possibilities for action, such as current working practices, organisation structures, and, not least, existing organisational technology:

> with most technologies...their organisational adoption and adaptation shape them in specific ways. That is, they are not simply applied to organisations. Rather, there is a complex process whereby the technological possibilities open to a specific organisation are constructed, mobilised and assessed. And further, the way in which this process of construction and assessment develops is critically influenced by existing organisational practices, structures and cultures. In other words, the use of any technology is the result of complex decision-making processes which do not simply flow from the given state of markets and technologies. Rather, those decision-making processes are crucially dependent on habituated practices and relations

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Sociology of History and Technology (Cambridge, MA: MIT Press, 1987)

13. T. Pinch & W. Bijker, (op. cit., pp31-32)

14. T. Pinch & W. Bijker (op. cit.)

15. W. Orlikowski 'The duality of technology: rethinking the concept of technology in organisations', *Organisational Science*, 3, 1992, pp398-427.

of power between diverse specialisms in organisations. [16]

Technology, then, is socially created and shaped by the ideas, interests, objectives of, and interactions between, designers, technologists, engineers and other actors. [17] This happens from the earliest stages of the creation and design of the technology in the design laboratory or software engineering department. [18] There continue to be opportunities for the technology to be shaped during the period when it is being introduced into an adopting organisation and, indeed, during everyday utilisation. Fleck has termed this latter process 'innofusion', others talk about 'post-adoption innovation'. [19] Prima facie, it would appear likely that some actors and groups will have more opportunity than others to shape the social-technical ensemble during implementation and utilisation, and this is one reason why it is important to know who has those opportunities, and their orientations towards work, the organisation, people and technology. [20] The later that particular actors enter the technology creation-design-implementation-configuration-utilisation process, the less opportunity they can be expected to have to influence the technology-organisation configuration. Or, to put the matter a little differently, the later the phase, the narrower the 'design space'. [21]

Thus, a social creation/construction theorisation of technology is compatible with a perspective which sees the technology as itself making a difference. Technology-in-use has, at any given point in time, a fixed material character which presents itself to people who may wish to use or modify it:

> at critical junctures during the process of change, for example through particular design decisions over architectures or choices of technology concerning their implementation, the key technical features of a given engineering system become 'frozen' into a specific form...whereby the form of an artefact is 'stabilised' as consensus emerges among key social groups with a stake in the design process... these technical influences subsequently become one factor shaping ...

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16. D. Knights, & F. Murray *Managers Divided: Organisation Politics and Information Technology Management*, (Chichester, Wiley, 1994, p91).
17. P. Dawson *Technology and Quality: Change in the Workplace,* (London: International Thomson Press, 1996).
18. D. MacKenzie & J. Wajcman *The Social Shaping of Technology* (Milton Keynes, Open University Press, 1985).
19. J. Fleck 'Innofusion or Diffusion: The Nature of Technological Development in Robotics',*Edinburgh, University of Edinburgh Dept. of Business Studies Working Paper Series*, 87, 1987.
20. D. Preece *Organizations and Technical Change: Strategy, Objectives and Involvement,* (London: Routledge, 1995).
21. D. Preece (op. cit.)

> the design space available to organisational actors, within which choice and negotiation over organisational outcomes may be made. [22]

Technology suppliers and their products can be seen as two important sources of this stabilisation process for adopting organisations, in the sense that the purchasing of a technological package actually creates constraints on choice. For instance, purchasing the product involves acquiescing in the pre-emptive 'choices' and knowledge of the supplier which are embodied in that product. Given the predominance of a few large technology suppliers in certain sectors, this degree of constraint may be significant. [23] Similarly, 'much new technology...is itself produced by a few firms and sold as a package to others, seriously limiting the scope for local management or employee manoeuvre'. [24]

The material facticity of technology is an important component of the socio-technical ensemble. As McLoughlin and Clark [25] have observed:

> the ways in which technology can or cannot be used, cannot **themselves** be reduced to these subjective perceptions. That is, the technical capabilities and characteristics will provide **material** influences which enable certain subjective interpretations of, for instance, how tasks can be allocated or work organized, and constrain others-at least in the sense that their plausibility is more likely to be prone to challenge (emphasis in original).

The principle that no single explanatory category of analysis is acceptable in analysing social systems [26] must be maintained in the analysis of technology. If the analysis decays into using a single category, the charge of determinism may be made. The challenge which is taken up in the next section of the paper is to understand the emergence and consolidation of a particular socio-technical ensemble, where the exercise of power played an important but not exclusive role in shaping action.

KNOWLEDGE AND POWER AT BUTLER CO.KNOWLEDGE AND POWER AT TOBACCO CO.

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22. I. McLoughlin & J. Clark *Technological Change at Work,* (Buckingham, Open University Press, 1994, p133).

23. H. Scarbrough & J. Corbett *Technology and Organization: Power, Meaning and Design,* (London, Routledge, 1992, p22).

24. M. Beirne & H. Ramsay 'Computer Redesign and Labour Process Theory: Towards a Critical Appraisal', in J. Jermier, D. Knights & W. Nord (eds) *Resistance and Power in Organisations: Agency, Subjectivity and the Labour Process*, (London, Routledge, 1988, p4)

25. I. McLoughlin & J. Clark (op. cit., p134).

26. M. Foucault *Power/Knowledge: Selected Interviews and Other Writings*, (Brighton, Harvester Press, 1982).

Butler Co. is a UK- based company which retails its products into a mature and highly competitive market. The company has changed ownership twice in the past ten years, and has been 'de-layered' and rationalised, resulting in a very flat organisation structure. The sales team is charged with two key objectives: to increase market share and to gather marketing information. As a senior manager expressed the matter:

> It has been a strategy of the company to work in the most efficient way possible, and a necessity of the market. We cannot afford a complex and rigid administrative structure which limits our flexibility, that's why the company is driven from the top. All the troops have to worry about is doing their job, we pay them well enough for it. I know that may sound draconian, but in such a competitive market we cannot afford the luxury of pluralism, decisions must be made and acted on as quickly as possible. Information technology plays a central role in that, in fact without it would not be possible for us to be such an aggressive market - led company.

At the senior management level three themes are constantly reiterated: the market place is highly competitive and volatile, the only way to manage this is through a centralised decision making mechanism, and central to the latter is information technology. These themes are regularly alluded to throughout the organisation, and are much in evidence in company documentation. The pivotal role played by IT is illustrated by the following observation of a member of the Board:

> We meet once a month, in our game you have to, a brand that you have invested millions in can go down the tubes in a matter of weeks, so you need to be in a position to change tack very rapidly. These days you also have to watch out for legislation and public opinion, the tide is against us now so we have to be very careful. Not proliferating these issues across the company means that decisions are taken quickly. The technology allows us to get all the information needed and fast, we don't have to wait around for it, at the worst its only a day old, it allows us to control every aspect of our business very quickly. I suppose you could summarise our approach as market led, rapid response using information technology.

Senior managers were at pains to emphasise that, due to 'the pressures of the competitive market place', centralised decision making is vital as decisions have to be made rapidly.

Using Information Technology

> Lets make no bones about it, the technology is the eyes and ears of the organisation. I suppose the best analogy is that of a brain, the brain is the Board and the technology is the nerves, gathering information and passing it to the brain. Impulses from the brain can also travel very quickly to where something needs to be done. Despite the fact we are a trading company we are kept profitable and in business by the technology (CEO).

Butler Co.'s IT-based management information system was described as 'state of the art' by a number of managers and other staff. It is highly confidential, only the most senior managers being allowed access to the data and analyses which are produced:

> We paid a lot of money for the MIS to be written, and it does some very hard sums! The market analysis section is particularly complicated and uses all the goodies-factor analysis, cluster analysis, data mining, you name it. The best part is that this is all brought together into a simple-to-use clicky-button front end. They [the senior management team] sit there in their meetings huddled over the group decision support system; its rather like a cross between NASA and a witches huddle (Technical Director).

A strong emphasis is placed by senior management upon using the IT for analytical purposes. Due to the wide geographical spread and diversity of the organisation, it is contended by them that it is only possible for information-and the organisation itself- to be controlled through IT by a small central group of senior people:

> As an organisation we are structured around the insight that information is our key resource. That information flows to the centre and forms the basis of our management decisions. We draw this information from right across the organisation, and bring it together into an integrated whole. The senior management team then interpret this and the decisions made are fed back out through the system to the individual units; this can be from a whole division right down to an individual employee. I don't see any way that a modern organisation can be responsive and provide a significant return on investment without taking this approach (Marketing Director).

The Golden Handcuff's

The management style of Butler Co. is Tayloristic and autocratic:

> We employ them [the employees] to do what they are told, I don't see anything wrong with that. We make it perfectly clear before they join that that's the way it is, they are paid to do their job and do it well, and that's it. Quite frankly, we pay them well above the odds, and we never have any shortage of applicants (Human Resources Director).

During a training session for new sales reps the Divisional Director used the analogy of the reps being the 'worker bees' of the organisation. The implication was that they were paid to work and not to think, the latter being the province of senior management. As a sales rep commented:

> We are just the hired hands, we are paid well to do our job well, and that's it. They [senior management] don't want us to take part in the running of the company in any way. I suppose that's the deal: 'We pay you well to do your job and to keep your nose out of our business'. As long as you can detach your self esteem from your job, then its bearable, otherwise you can end up feeling demoralised.

The remuneration package that Butler Co. offers its sales reps is relatively generous, and, as a rep pointed out, "it's the 'golden handcuffs'-you rapidly become used to the money, and can't leave, and they know it, so they've got you by the balls". Put simply, the remuneration package secures compliance:

> Of course that's the case, it suits the organisation. We are here to maximise the profits to our shareholders, nothing else. The shareholders benefit greatly from our approach, but so do the employees. Their emotional and spiritual welfare is not our problem, naturally we hope they enjoy their jobs, our approach is 'do your job well and we'll give you generous pay, pensions, bonuses and holidays'. Simple, that keeps most of our reps very happy (HR Director).

The number of line managers between a rep and the CEO is only three. They work from home, and so do not require any costly office space; their interaction with the organization is strongly mediated by information technology.

Sales reps: working practices

The marketing database and associated systems are linked to the reps via a specially designed computer terminal which resembles a small lap top. The terminal has a data communication port and external modem, at the end of each day the data recorded is downloaded to the company's marketing database. The terminal calls for the rep to enter all the details of the call, such as the brands sold, competitor brand details etc., by cycling through a number of defined screens, each of which must be completed before the next may be accessed. When all have been completed, the call may be closed.

For the majority of sales reps the working day starts at 8am, with the first job of the morning being to turn on the terminal and log in, which takes the rep to the outlet screen. As

noted earlier, the rep operates on a cycle basis agreed with the Area Manager; the calls for the current working day being displayed on the terminal. The reps work with the terminal constantly, thus it is not possible to meaningfully divide their work into parts, one involving the use of the terminal and one not: their work is constantly mediated by it. The terminal is not seen by the reps as a thing in itself: 'In the old days you would fill in a form with a biro, now you use the terminal- its the same thing. The terminal is harmless in itself, the problem is that management just don't trust us' (Sales rep). The terminal program guides the reps through each screen, and calls cannot be closed until all the screens have been completed:

> The terminal makes sure that you do all that the company wants for each call, you can't close a call until all the data is entered. But that's not enough, the terminal tells you what to do, but in a broad way. The points system is like a fine control, the company tells us exactly what should be done to the finest detail. The terminal gathers all the information to make sure you have done it, and you know that you will be measured against the points system and rewarded or punished depending on how you did. Its rather clever really, on the face of it you work from home, but in reality its just like having your manager standing right beside you every second of the day from the time you log on to the time you download your data (Sales rep.).

This cycle is repeated throughout the working day. Once the allotted number of calls have been completed the rep returns home. There are then a number of 'house keeping' procedures which must be carried out. Finally, the terminal is connected to the modem and recharger to download data and recharge batteries for the next day. This whole process takes between one and two hours.

Surveillance and Control

Once a week each sales rep receives a print out of his/her performance for the previous week from his/her Area Manager. The analysis compares each rep against the others in the region on key factors such as days worked, surveys made (sales calls), 'out of stocks' encountered, 'out of stocks' rectified, new introductions (new brands taken on by the retailer). This is also captured in simple statistics. Often the Area Manager will include comments on the weekly performance. A rep observed:

> It makes me laugh, 1984 isn't a work of fiction-its our management handbook. Big Brother watches us all the time, we have only one objective, determined by the party, and any contradictory thoughts we may have we must submerge with doublethink. But the sweetest paradox of this is our desperate compliance, we engage in this insanity because our very lifestyle depends on it, we cannot believe this is the best way to work, and yet we must preserve

this way of working because we do so well out of it. We are trapped by our own greed !

Once a month there is a meeting is of all the reps within a sales territory, led by the Area Manager. The first part of the meeting discusses the territory's overall performance over the month. The key indicator for reps is the product of the 'brands introduced' scores and the relevant retail outlet grades. The scale begins at zero and increases, zero being the best possible. The exact nature of the calculation is not revealed, though it is said to be a complex equation based on various marketing factors. One Area Manager commented 'They [the reps] don't need to know exactly how its calculated, all they need to know is that it is essentially the product of the outlet grade and the brand points, that's enough'. The main focus of the meetings is upon comparisons between the performance of the reps within the sales territory, between territory and territory within a sales region, and between regions.

Area Managers have access to whatever level of detail they require; for example, they can 'drill into' the results of an individual sales rep in any region of the company. Thus comparative and absolute performance measurement is used as a form of surveillance and control, and emphasises the (electronic) Panoptic eye of senior management: 'if reps in one area can see that other reps are out performing them, they are more likely to believe that it can be done than if their sales targets are purely set by managers at head office' (Area Manager). As the formulae and means used to calculate these figures are not open to them, the degree to and ways in which head office managers intervene is not known to the sales reps:

> The metrics have two functions, the first and most obvious is to put pressure on the reps to work hard, that's why the bonuses are so closely linked to them. The second function is that information is perhaps the most important resource to the company. The reps are our front line, and most important source of information about our brands and customers. We have to ensure that they gather all the information we need, so the metrics are also used to put pressure on them to do so (Distribution Director).

The first main component of the analysis is a comparison between reps within a given territory. The figures for each rep are broken down on a weekly basis and presented in a table which shows comparisons between reps. The performance of each rep is commented upon and discussed openly in detail at the monthly meeting with the Area Manager. Other reps listen in, but rarely offer any comments. There are two main possibilities: reps are either praised for their good performance, which typically takes only a short amount of time, and is usually presented as a 'lesson to us all' by the Area Manager, or 'poor performance' triggers a detailed

investigation into the particular problem areas and an attempt to understand why it has occurred. The Area Manager issues both warnings and advice in order to rectify 'the problem'.

The language commonly used by the Area Managers is admonishing and formal, for example 'This isn't meant to be a team building exercise. We are here to see how we did and how we can do better. The reps already have the carrot, I supply the stick' (Area Manager). As one rep captured the experience:

> Its rather like standing naked in front of a group of strangers-they can see all your embarrassing details. Though you know these people, its done in a way so you feel exposed and ashamed. If you have done well then you are exalted, and the others are encouraged to follow your good example, which is just as bad. The whole process is rather like getting an enema in public, you know its going to happen, all you wish is for your turn to be over as quickly as possible.

As noted earlier, the Area Manager also compares his/her sales territory's performance with that of other territories in the region over the relevant time period. If a particular territory has performed especially well or poorly, then the reasons for this are explored. Finally, a comparison is made across regions, with a focusing down to greater detail where this is perceived as necessary.

In addition to these monthly meetings the Area Manager visits each rep's patch twice a month. In the first of these, he/she will spend half a day with each rep, in a 'passive observer' role:

> The purpose of these visits with the reps is to see how they do their job. What I am interested in is 'Are they professional in their work and how could they do better?'. At the end of a visit I will spend some time with the rep offering advice on procedures and sales techniques, and, if its needed, pull them up short on areas where they are doing badly (Area Manager).

The observations and recommendations of the visit are written up and formally submitted to the rep, with a copy being placed on his/her file. A second, monthly, 'field visit' by the Area Manager is then undertaken to the rep's patch. This time the rep is not informed of when the visit will take place and the particular outlets to be visited, and it acts, of course, as a 'spot check':

> On the field visit I am checking up to see that the data the rep has entered for each outlet is accurate. Since our company relies so much on quality information, there is a need for some form of quality control. I also want to make sure that he is pushing as hard as possible and setting ambitious but achievable targets for himself (Area Manager).

After the field visit the Area Manager produces a report summarising what has been found, along with comments and recommendations. These are submitted to the rep, and a copy is placed on his or her file. As a rep observed:

> The field visits are there to make sure you do your work. You never know when or where you are being watched ! You have some control over the terminal, and can skip calls by entering the data though you haven't been to the outlet. But the field visits, well, you are always worried about where he will go and what he will see, but that's the idea, to make you paranoid ! You are being watched !

Usually, the sales rep will respond to these visits and any recommendations/comments raised through a memo to the Area Manager. As all the aforementioned are formal documents which are placed on the rep's file, they normally elicit only formal responses: "When you respond to these reports, you can never criticise or make excuses, you just 'doff your cap' and say 'Yes sir, I agree with everything you say, and I'll try harder next time'" (sales rep.)

DISCUSSION: POWER AND THE SOCIO TECHNICAL ENSEMBLE

The social construction of technology and interpretation(s) of what a technology is and can do are essentially political processes. Bijker [27], although recognising this, does not fully address the ways in which this exercise of power in the social construction of technology is achieved through the restriction of access to debate and the socio technical ensemble shaping process.

In Butler Co, as in the great majority (if not all) organisations, occupations, groups and individuals enjoy different degrees of power as a result of their position in the organisational hierarchy. Thus, senior management are a more powerful group in Butler Co. than the reps or area managers and determine the degree to which they contribute to the social construction of the company and its technology. Through controlling the socio technical ensemble, senior management controlled the structuring and working practices of the organisation.

A telling example of the way in which senior management acted to limit debate within Butler Co. was their enactment of the organisation's environment [28]. Talk of the 'necessity' to increase or preserve profitability levels, market share, etc., in the face of environmental turbulence and intense competition was used by senior management to legitimise the need for internal responsiveness and rapid (senior management) decision making [29].

[27.] W. Bijker (op. cit.)

[28.] J. Child 'Strategic choice in the analysis of action, structure, organisations and environment: retrospect and prospect', *Organization Studies,* 18, 1997, pp43-76.

[29.] P. Thompson & J. O'Connell Davidson 'The Continuity of Discontinuity: Management Rhetoric in Turbulent Times', *Personnel Review*, 24, 1995, pp17-33.

This served to restrict the forms of argument and action which were deployed, and, although some of the specific decisions of senior management were occasionally questioned, this view of the organisation's environment and its implications was not. In addition, a 'Golden Handcuffs' employment strategy was deployed; summarised by a sales rep. as 'we pay you well, so put up and shut up'. The voices of middle management and the reps in shaping the socio technical ensemble were effectively silenced.

The generous remuneration package was effective in limiting resistance by creating dependence. Once individuals had come to rely on a particular income they did not wish to jeopardise it. This could be viewed as creating an ethical dilemma. If, for example, senior managers had created dependence by supplying and encouraging the taking of hard drugs, then this would no doubt have been seen as both illegal and morally unacceptable. But as in this instance no law has been broken, and the victims of this dependency relationship do not wish to complain, and in any event have no avenue with which to do so, it remains unquestioned. The possibility of alternative or competing narratives were silenced by securing the acquiescence of the reps.

It was within the socio technical ensemble that the nature of the relationships between the actors and between the actors and the technology are set out: senior management were the decision makers, the reps carried out the instructions given to them, and middle management ensured that the reps complied. Middle management utilised the pecuniary dependency of the reps and techniques of surveillance to enforce and ensure compliance.

The organisation's information system was designed and deployed to enable and enshrine this set of relations by gathering and channelling information to senior management, and directly conveying their requirements to the individuals concerned. Technology was the key means through which these relations were actualised and surveillance formed the central plank of management's control strategy. Sewell [30] found in his case studies that two main forms of surveillance were deployed in teamworking:

> vertical and horizontal. Vertical surveillance is achieved through electronic monitoring of individual work and performance and approaches the conditions of reach and immediacy demanded by panopticism…Horizontal surveillance, operating in nominally autonomous work teams, is enacted through peer group scrutiny…Although this is a direct form of surveillance, it is not panoptic, as equals, rather than superiors, perform it. [31]

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[30] G. Sewell 'The discipline of teams: the control of team–based industrial work through electronic and peer surveillance', *Administrative Science Quarterly*, 43, 1998, pp397-428.

[31] G. Sewell (op. cit. pp409-410).

In Butler Co, as we saw, vertical surveillance was deployed 'with a vengeance', but horizontal surveillance is not used, rather a 'divide and rule' strategy. This is in part an outcome of the reps working from homes which are located at some distance from each other, and rarely getting together apart from the monthly meetings. What is more, managers compare the productivity and effectiveness of individual reps and feedback information to them without their being able to assess whether these comparisons are valid or accurate. This isolation also, of course, reduces the possibility of resistance. Vertical surveillance occurs through both the 'electronic panopticon' and the covert visits of Area Managers to the reps' territories. No effort is made to conceal these surveillance practices, indeed they are presented as essential for the effective management of the organisation.

The material aspects of technology are important in the sense that they both enable and constrain the ensemble, but the ensemble, and the resulting technological frame, is primarily the outcome of the actions of certain individuals in creating and recreating the organisation, rather than constructions of knowledge of what a technology is and what it can do.

CONCLUSIONS

In Butler Co. closure and stabilisation has occurred: the socio technical ensemble is established and acts to define the relationships between individuals, hierarchical levels, and the role of technology. The ensemble functions on a number of interdependent levels:

- Knowledge, where the organisation is defined through the process of enacting its reality.
- Structure, through the dissemination of rules and resources across the organisation. This also defines the organisational actor-groups and their relationships and the technology which is to be deployed.
- Practice, where the content, ranking and timing of activities is defined.

The enactment, and resulting organisational form, is the outcome of the exercise of power, and consequently power can be seen to act on all of these levels. The form that technology takes is also an outcome of this enactment, being used in this instance to enforce senior managers' dominance through surveillance practices. Thus the technology-in-use is a material reflection of the power relations embodied in the enacted organisation.

In Butler Co., then, our argument is that power resides with senior management, being enforced through tight control, measurement and surveillance. As Beniger has noted, this mode

of control was common in many companies and industries of the industrial revolution. [32] Thus, in this company at least, innovations in information technology appear to be constrained to finding new ways of implementing old methods of managerial control.

[32] J. Beniger *The Control Revolution: Technological and Economic Origins of the Information Society*, (Cambridge MA, Harvard University Press, 1986).