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Article *in* International Journal of Production Economics · October 1997

DOI: 10.1016/S0925-5273(97)00091-1

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Project management system design: A social and organisational analysis

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Abstract

Project management systems are seen as important tools in an industrial enterprise in terms of providing management information to effectively plan, monitor and control, material and labour resources. While much project management, and indeed, technology management literature is concerned with rationalistic or hard systems analyses, rarely does the commentary consider the social and organisational impacts influencing technical change, or indeed the rationalities that lie behind the utilisation of project management systems. In this paper using case study evidence I stress the importance of the need to develop a more critical perspective of project management software and technology change management.

Keywords: Project management; Project and managerial control; Work organisation; Technology strategy

1. Introduction

To date while much research has been conducted on micro-electronic technologies and their impacts few studies have investigated the nature of project management software, its control capabilities and how it can be designed and used to increase managerial control over human resources. This is surprising given that project management philosophy, indeed project management work structures and organisation focuses on the close control and monitoring of labour resources, costs and time constraints. As Levine suggests "in a typical project situation organisation structures and relationships are likely to be different from the norm, and this in itself will have a major impact on the function of management" (Levine, 1986).

Further, while it is recognised that working arrangements are different in a project environment and that management and technology structures will be affected, analysis of technical strategy remains largely technicist in orientation. Project discourses like much technology management literature present the introduction of technology as responding to the "competitive pressures and the need to use the technology effectively" (Child, 1986; McLoughlin and Clark, 1988). Technologists in essence focus on the "content" factors of technology strategy, that emphasise the technical capabilities and features of project software systems. Factors which explore the human and social aspects of project management work organisation or the "contextual" and "process" dimensions of technological change are often ignored (Buchanan, 1991; Jones et al., 1994).

The intention in this paper is to critically assess project planning software from a labour process

PII S0925-5273(97)00091-1

perspective and utilising McLoughlin and Clarks processual model of technical change, highlight the political and social dimensions that influence project technology strategy.

2. Organisation setting

The findings are based on DatCo, a division of one of Britain's largest electrical and defence organisations. DatCo specialises in the design, build and management of national computer networking systems. The division was formed in 1987 as the corporation sought to move away from its traditional defence technologies. The organisation employs approximately 350 personnel with the majority comprising mainly of computing, system and design professionals. I was employed as Project Manager in the Project Management Division with the responsibility for leading a change programme to establish company wide project management systems and project work structures.

The central theme throughout this paper is labour control and its link to project technology strategy. Undoubtedly project software as a communication and knowledge system has a tremendous impact on workplace organisation, and thus affects the experience of work. As Child (1986) and McLoughlin and Clark (1988) rightly argue new technology plays an important role in shaping work organisation and control structures. Many commentators though have stressed that work organisation and control issues rarely plays a role in senior management strategy and decision making. Much of this analysis emerged from a critique of Braverman's assessment of Taylorism as a control strategy (Littler, 1978; 1982; Littler and Salaman, 1982; Wood and Kelly, 1982; Storey, 1982). Nichol, for example, (1983 in McLoughlin and Clark, 1988) points out that managers are primarily concerned with productivity, quality and predictability. Similarly, Wood and Kelly (1982) stress that strategies aimed at exercising labour control ignore the diversity of management decision-making processes. Storey (1982) further highlights the complexities of control strategies by addressing the socially constructed nature of management practice. The implication of this analysis is that technology advancements and labour process developments are tenuously interlinked.

In this paper, however, I stress the importance of labour process analysis in shaping managerial control strategies and technology change management. I will critically assess:

1. The control and surveillance capabilities of project technology and the way project work organisation is socially engineered to exercise increased control over human resources.
2. The processual nature of project technology strategy.

The case study investigation questions rationalistic accounts of technology decision making. Research data suggests that labour control issues *are* a priority at senior level both in terms of how technology is used, and how technical change processes are managed. I suggest that management at DatCo use project software as a "disciplinary mechanism" (Robson and Rooper, 1990; Clegg, 1994; Rosen and Baroudi, 1992).

Research evidence also supports Child's (1986; 1972; 1984) strategic choice theory. The processual analysis illustrates the multiple purposes, objectives and rationalities of managers and computing professionals to shape their identities and influence their working structures and systems (see Buchman, 1991; 1983; 1986; Buchanan and Boddy, 1983; 1992). The research study also draws attention to the political nature of managerial decision-making, so that not all organisational actors have the power or knowledge (Morgan, 1986; Pichault, 1995) to influence the change of processes. Given these circumstances the view of management as a coherent and indeed rationale whole is not borne out by the DatCo case.

My intention in this paper, is to firstly explore the methods of data collection. I then examine project management philosophy and the control features of project software. The case material is structured using McLoughlin and Clark's technical change model. The paper analyses each *stage* of project technology change at DatCo, the intervening process *agendas*, their contextual situations and their impact on technology plans and actions.

3. Methodology

My research strategy incorporated a diary of the log of events over a 2-year period and also processual and interactive discussions with the majority of social actors involved in the change process. As a change driver and a change researcher I was contributing to the research subject and research action. This experiential and diary method enabled me to track events more closely as I reported on the differentiation and contradiction in management processes. This had two distinct advantages. Firstly, I could attempt a preliminary analysis of the situations. This then lead me to ask more searching questions regarding the actions and behaviours of people, in essence the contextual factors influencing technical decision making. Secondly, I was attempting to clarify and categorise what was going on in my research situation, allowing me to close the gap between research and management life.

Numerous commentators have emphasised the benefits of this processual/experiential approach in exploring change (Schein, 1985; Watson, 1994; 1995) in that the investigation consciously seeks to understand the detailed processes of human sense making and social interaction "within" actual work settings, in essence to explore *how* things are done rather than *what* is done. Thus, my approach was working on the "inside" in order to understand the "performative definitions" of how organisational actors define their sense of technology and organisation (Czarniawska–Joegres in Watson, 1994). In this respect my knowledge of the "inside" enabled me to explore the historical, contextual and processual nature of project technology change. As Dawson rightly suggests "the shapers and determinants of change", are different "during different time periods in the process of organisational change". (Watson, 1994).

4. Project management systems and management control

Control over the labour process has been the primary problem of bureaucratic (or administrative) organisation (Dermer, 1986; 1988). The labour process in traditional bureaucratic organisations was largely controlled by adherence to formal rules and administrative systems. Technology has proved to be a powerful tool in exercising bureaucratic control largely because advanced information software provides decision support systems, and enables greater "diversity and dispersion" of control structures (Rosen and Baroudi, 1992). In the following discussion, I will highlight that project management systems and work organisation possess unique qualities that assists organisations in asserting greater control over labour, through a logic and structure held within the technology itself, and supported by specific relations of production.

Project management principles can be defined as managing and directing time, material, labour and costs to complete a particular project, in an orderly economical manner; and to meet established objectives in time, costs and technical results. A project is normally a non-routine undertaking, thus planning work is concerned with who does what, when how and why, and is an essential aid to organising the people involved, and to executing, managing and controlling the work on a project (Harrison, 1985).

How then does project management software organise and coordinate time and labour? I would argue that project computing calculations can be divided into three categories, time analysis, cost analysis, and resource analysis:

Time analysis – Using the critical path method, time analysis tools calculate a time schedule for a network of project tasks.

Cost analysis – Software with cost analysis capabilities are used to compute direct costs, on the basis of labour requirements and labour rates, and also costs associated with material and equipment purchased for the project.

Resource analysis – Project systems produce a project time forecast illustrating how many labour resources are required to complete each activity and for how long these resources are required. A further sub-time/resource analysis can also be performed – *resource levelling*, which smoothes the peaks and troughs of labour deployment so that optimum use of resources can be achieved. It is this resource levelling technique that is attractive to organisations running large multi-project operations. Labour resources are not attached to single projects, but are allocated to

different projects as the need arises. This type of integrated human resource planning system enables management to assert full control over labour resources, through:

1. *specific task allocations* (normally related to skills) (the *what*),
2. *dedicated time schedules* (the *when*).

This facilitates maximum human resource utilisation. How these features facilitate labour control and predictability is addressed in the following section.

5. Project control

Adherence to the control rationality is demonstrated by the monitoring and evaluation of project progress and achievements (Harrison, 1985; Meredith et al., 1995). Once a project is launched and budgets and schedules produced, progress and performance are continuously assessed. This assessment is essential to the establishment of the control cycle, as shown in Fig. 1. From the diagram it can be seen that visibility of operations is greatly improved through the measurement and assessment of project activities. Control analysis represents a decision-making process that assesses how the project situation can be brought under control in order to ensure predictability and avoid uncertainty. Fig. 2 (Timesheet International, 1992) demonstrates the extent to which a centralised system depicting "central control and accountability" can be obtained if the full system features of project management systems are employed. From a labour process perspective the work experience in a project environment means that many discretionary and autonomous behaviours and decisions are lost as *project systems attempt to assert discipline in terms of specified tasks and time schedules.*

Following Foucalt's (Robson and Cooper, 1990) ideas I would stress the efficiency, rationality and control features of *project network* systems. Sakolsky (1992) links power to the concept of "panopticism" which Focault identified with disciplinary mechanisms. Rosen and Baroudi (1992) share a similar empirical focus and liken the advance of technology as contributing to unobtrusive forms of control in a post-bureaucratic organisation.

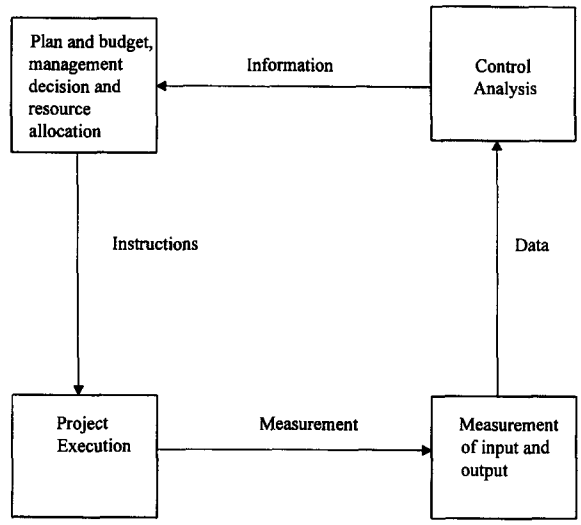

Fig. 1. Control cycle (Harrison, 1985).

I would argue project systems and their technical power act as a disciplinary *force*. This force represents a form of technical/rational control. Workers consent to:

1. *Ideational control* – reflective of project management philosophy and the need to use the technology effectively;
2. *System control* – representing the software capabilities to plan/control work activity;
3. *Structural control* – where work breakdown tasks (project network structures – technology designed) and team plans (matrix structures–organisation designed) legitimises the organisation and coordination of work.

Through monitoring and surveillance of the "subject" (project worker), knowledge of the skills, abilities and workloads (held within the project system and used by management) results in greater discipline, control and effective resource utilisation. "Power and knowledge have thus combined to produce the individual as object of knowledge under increasing forms of subjugation" (Robson and Cooper, 1990).

I would suggest that this power is realised through project control. This is represented via *ideological* and *system* relations that are bound together by the operation of project structures. By emphasising control planning in the form of project

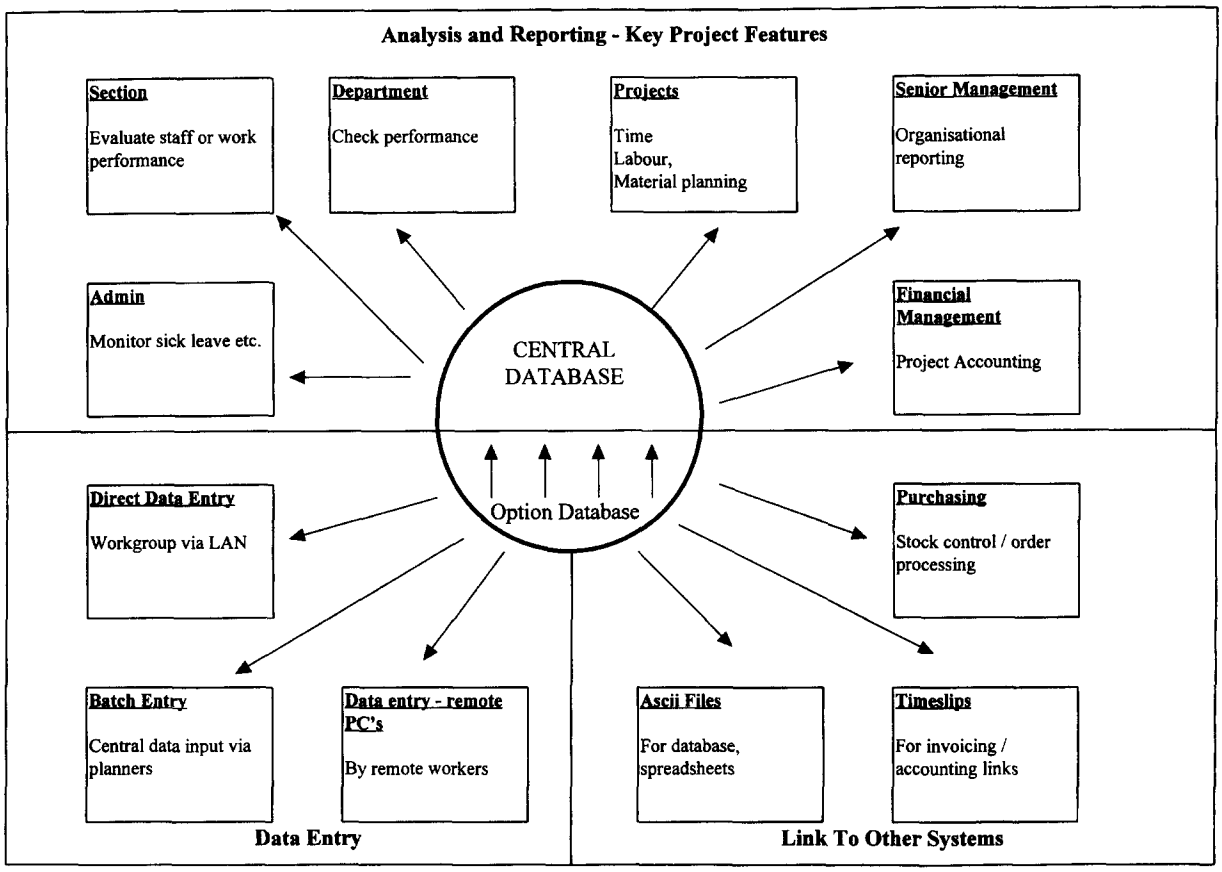

Fig. 2. Central control technical features (Timesheet International 1992. Users manual).

networks and monitored through project software, power is embedded in "a more or less coordinated hierarchical (*Network organisation – my insertion*) cluster of relations" (Cousins and Hussain, 1990). Project software power is maximised by the visibility of individual work tasks and time schedules (some systems also have detailed information of skills). Workers under the surveillance of project systems are "objects of power", observed and monitored by project systems.

Project technology and its control rationality represents the "normalisation" (Robson and Cooper, 1990; Cousins and Hussain, 1990) of working practices, reinforcing ideational and system control. Unlike the invisibility of power relations that Foucalt highlights, technical control and power is visible. However, project management systems represent what I will term as a *Rational Technology*, since it rests on maximising performance of all project inputs/variables, and so power effects are not questioned. Structural controls further assist this rational technology. Matrix teams are formed from different functional departments and sections. This permits flexible labour deployment.

Project software can be used as a *disciplinary technology* as a means of surveillance, as well as enhance the "calculability" of individuals through developing measures of routine predictability and control (Clegg, 1994). Project management capabilities seek to assist management in the formalisation and control of organisational activities as well facilitate the manipulability of human movement and action. Overall I argue that as a rational

technology project software represents a technical surveillance system where:

"Discipline has been concerned to organise bodies time and space. By distributing bodies ... into a network of relations that can be surveyed, discipline provides not only an increased domination (subjugation) but an increase in productive force (ability)" (Robson and Cooper, 1990).

Using McLoughlin and Clark's technical change model the following sections will seek to explore the project implementation process at DatCo and critically assess technology change management from a social and organisational perspective.

6. Project management technology strategy (initiation, decision to adopt)

In order to critically assess the formation of technology strategy McLoughlin and Clark (1988) and Child (1986) highlight the need to establish the objectives behind introducing new technology. As already suggested at the beginning of this paper technological solutions are presented as scientifically or market driven. Noble (Jones et al., 1994) however suggests that social power has more influence in the selection of new technologies. There were two key objectives for introducing project software,

1. To establish strategic level programme management
2. The power motivation of the Operations Director

DatCo had experienced several long-run projects in software development, and it was felt that an integrated strategic planning system would identify critical project issues. The software development manager complained that he was not controlling work allocation and planning. A principle aim of strategic programme management was to improve control over work operations and utilise human resource skills as efficiently as possible. The nature of project development results in peaks and troughs for specific types of skills (see section on resource analysis). Human resource planning system capabilities allow human resources to be assigned task responsibilities and to be spread over a diverse range of projects. Senior management at DatCo believed human resource planning would enable more effective control over work tasks and provide – maximum use of human resources through scheduling techniques; accountability for project tasks; and visibility of operations.

The decision to develop strategic level project management can also be attributed to the political aspirations of the Operations Director who perceived he would gain "power" – in essence "influence who gets what when and how" (Morgan, 1986). This approach reflected the importance given by DatCo's sister companies to project management methods and techniques. Project departments are the nucleus of the company controlling all strategic and financial aspects. As Foucalt stresses "power and knowledge directly imply one another" (Robson and Cooper, 1990) This supports Child's "political contingency" (Child, 1984) approach which suggests that technological decisions are determined by individuals or groups within management who are in positions of power from which they select organisational choices they prefer.

7. Analysis

It can be seen that although DatCo's senior management appreciate some of the technological benefits of project management systems, the important strategic objectives were based on politically driven values which are socially constructed. The resultant effect is that strategy is a "mechanism for power" (Rosen and Baroudi, 1992). This power was to be realised through labour control. Also of significance is the absence of middle and lower level employees in technical decisions. Previous research has highlighted objectives for technical change differ between managerial levels and functions (Buchaman and Boddy, 1983).

It is useful here to refer to McLoughlin and Clark's analysis of the process of change. The political choices were only afforded to senior decision makers. This gives some indication as to the "process agendas" evident in DatCo, in terms of the "political system" (Morgan, 1986) that I was

experiencing working in, in that strategy formation and decision making were often the result of "power coalitions". Thus, it is important to appreciate power drives in DatCo as a network system of allegiances and partnerships, particularly at the senior level, and which change according to the situation and professional interests.

To summarise: project management technology has specific capabilities to control labour resources, (system control) and these are manipulated by senior managers who want to increase managerial control (ideational and structural control). Further, in deciding to adopt project technology choice and negotiation in the initiation and decision to adopt stages of technical change was only afforded to senior managers and directors. In essence, I would suggest that the *managerial prerogative is control, and this control rationality is supported by the technical rationality*. Given this control rationality then how did DatCo manage the implementation process?

8. Datco's project management implementation strategy (selection/implementation)

In the previous section, it was revealed the objectives for introducing project management were primarily strategic and control issues. These objectives were expressed by DatCo's directors and senior managers. It was also emphasised that middle and junior managers played a miner role in the decision to adopt new technology. Senior managers strategies can be seen to act as "steering devices" (Child, 1986; 1972) which define parameters within which lower level managers can act. However managerial "subgroups" may develop "substrategies" (Child, 1972; 1986; MaLoughlin and Clark, 1988) in implementing and using new technology and affect the extent to which the strategic objectives are implemented in practice.

Rather than use existing management staff (my line managers) to manage the technology implementation process consultants (Mogador and Touche Ross, who were also employed on software development projects at DatCo) were employed by the operations director. Information regarding project system selection, design and structure was collated by the consultants, via interviews with *selected* senior personnel (selected by the operations director). My role involved providing technical advice on system requirements and coordinating consultant activities.

The consultants proposed a *centralised* planning function using ARTEMIS and PLANTRAC. The phasing of project management installation was devised by myself, the Operations Director and the consultants. The existing projects office managers (my line managers) were not party to the time planning, nor were they directly responsible for managing the implementation process. The managing director communicated that project strategy decisions would be formulated via the newly formed Network Change Control Board (NCCB – Chaired by the operations director). In addition to this, the senior managers also received instructions that any new development work or capital expenditure was to be processed through the projects management department, and that the department was to be a central focal point in the organisation for: (1) receiving information; (2) storing information; (3) reporting information.

The research indicates the management at DatCo adopted a "top down" non-participative approach to implementing change (Child, 1986), which ensured tight control and maintained continuity of management responsibility. This can be clearly seen by the fact that the consultants terms of reference was to discuss system requirements and the phasing of project management introduction with *selected* senior personnel only. As the operations director commented: "*The issue is to get it (project management) into place, not to communicate – people hate change*". He further commented that if managers did encourage consultation you would never get off "*first base*".

It is important to examine DatCo's decision to introduce a centralised planning system which contradicts Child's and McLoughlin and Clark's (Child, 1984; 1986; McLoughin and Clark, 1988) analysis that senior management rarely take into account patterns of work organisation. This point will be explored more fully in the next section.

9. Project management technology, work organisation, supervision and control (routine operation stage)

Decisions to adopt new technology raise questions about the pattern of work organisation and how the work is to be supervised and controlled. According to Buchanan (1986) when new technology is to be introduced "the key decisions that affect organisational performance are those concerning the re-organisation of work that accompanies technical change".

9.1. Management choice and work organisation

In the previous discussion reference was made to the decision made by senior management to introduce a centralised planning function. McFarlene (1990) states that managers are faced with two choices when implementing a Project Management System (in terms of work organisation), a centralised system or a distributed system. It would be appropriate to adapt McLoughlin and Clark's model of CAD work organisation here in order to illustrate more clearly McFarlene's point. Fig. 3 represents work organisation in terms of whether the system is operated by "dedicated" or "non-dedicated" operators, and whether planning systems are "centralised" or "distributed". Fig. 4 illustrates the "system concept" of distributed project management as defined by McFarlene.

The approach chosen by DatCo senior management was a centralised planning function, with dedicated operators, principally because their strategy was to develop an integrated management information system. Moreover, as already highlighted, the prime objective was control over labour and financial resources. A centralised system it was felt would provide maximum visibility of all work operations. This indicates that labour process considerations played a key part in the managerial decision to invest in project management technology. Existing project technology *can* be organised on a distributed basis to support professional work structures. The case of DatCo contradicts those (McLaughlin and Clark, 1988; Child, 1972) who postulate that the rationale for introducing new

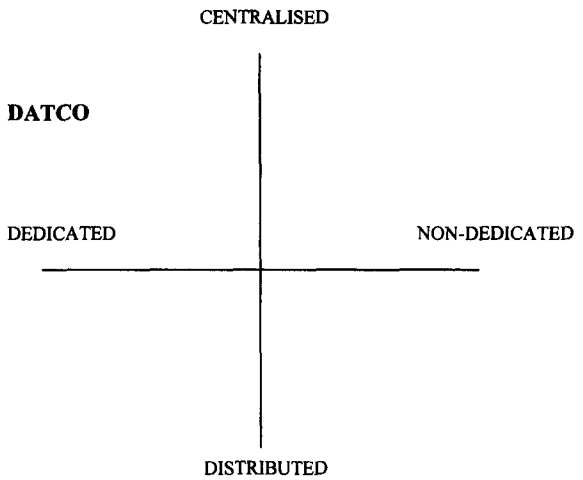

Fig. 3. Forms of work organisation using project management systems (McLoughlin and Clark, 1988). (Adapted from McLoughlin's CAD work organisation).

technology may have labour regulation outcomes in terms of increasing managerial control, but a strategy to control labour resources is often absent. McLoughlin and Clark (1988), in particular, offer a distinction between "labour control objectives" – aimed specifically at improving human performance and productivity, and "operational control objectives" – aimed at the overall improvement of the production process itself. The case of DatCo indicates that "labour control objectives" would facilitate both labour and operational improvements.

While I have stated that technological outcomes are dependent on managerial choices it is important not to exclude the independent characteristics of project technology which were discussed at the beginning of this paper. As Buchanan and Boddy (1983) suggest organisational control is exercised through control of information processing, by capturing, storing, manipulating and distributing information. Project management technology as already suggested is a form of "control and disciplinary technology". This suggests that changes in work organisation "reflect partly the capabilities of the technology and partly the objectives of expectations of management" [Buchnann and Boddy, 1983).

The preceding discussion suggests that control is either centralised or distributed thus implying

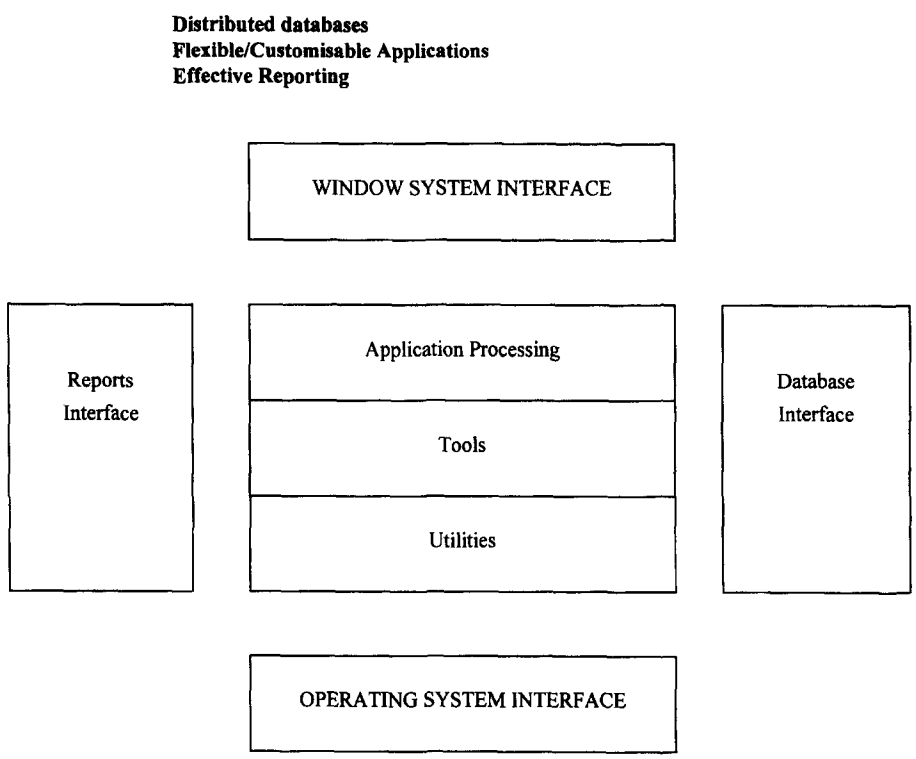

Fig. 4. System concept–distributing project management (Wooward, 1965).

a technical interpretation of control. However, as already highlighted throughout this paper there are choices regarding how you use the enabling characteristics of technology, and indeed how a centralised work structure is interpreted. The social and managerial dimensions of a centralised project system are discussed in the next section.

9.2. *Management choice supervision and control*

McLoughlin and Clark (1988) adapted Child's (1986) work on organisational control strategies to develop a range of control choices that face managers when new computing technologies mare introduced. These are:

1. *Management organisation* – the extent to which operational control is centralised or delegated,
2. *The role of supervision* – the extent to which workers are subject to direct supervision or impersonal "mechanical controls" built or incorporated within the technology,
3. *Work group organisation* – the extent to which decisions are devolved to the work group allowing them to become "self-supervising" or autonomous.

9.2.1. *Management organisation*

Computer systems can be designed to facilitate centralised or decentralised (distributed/delegated) decision-making. Centralised decision-making suggests that control over operations will be exercised by senior management, whereas decentralised suggests that control will be devolved to subordinates. This dichotomy is too simplistic in that choices about management organisation refer in effect to the emphasis given to centralisation and delegation in the allocation of decision-making authority (MCLoughlin and Clark, 1988). A more appropriate analysis is that computing and information technologies can open up a range of possibilities for

delegating decisions (Child, 1984). Similarly, Buchanan and Boddy (1983) claim that senior managers can use new technology to enhance the confidence of their own decision making, taking advantage of the visibility of subordinates actions, and even intervene in the decision making of lower level managers.

The preceding section highlighted that the project office would be the central point for receiving, storing and reporting information. For DatCo's directors and senior management then the form of management organisation is centralised, thus technical structures are supported by managerial structures. How then does this affect the actual process of managing employees?

9.2.2. Management supervision

The nature of project management technology involves the development of a project plan highlighting what work is to be done, how long it should take, which resources are to complete each task and a time period for its completion. The centralised system at DatCo therefore could be interpreted as a form of "mechanical or technical" control. This supports Woodward's thesis that control mechanisms will be automated (Woodward, 1965). However, Woodward's analysis also suggests that automated control will limit the requirement for direct intervention in the production process. DatCo are using the project management system as a database of management information upon which to make strategic decisions concerning the companies operating performance. Woodward's account therefore is not wholly relevant.

DatCo's senior management intentions could be seen to reflect Braverman's thesis (McLoughlin and Clark, 1988; Littler, 1978; 1982; Littler and Salaman, 1982) which identifies management control over labour as a driving force for technical change. This is supported by senior managers objectives to utilise computing information to exert what I call *control decisions*, in respect of improved labour utilisation. This control is significant in that for computing professionals although they have control over *how* they perform a task they are restricted in terms of *what* they do, the *time* it should take and also *when* they have to do it. As highlighted previously the disciplinary power of project technology permits greater visibility and calculability of human movement and action and this facilitates managerial control.

Control and disciplinary power is not restricted to computing employees, there is also control exerted over middle managers and even some senior managers. As one Senior Project Manager (who was excluded from the NCCB board) stressed – "*the ability to make important decisions was being taken away from them*". This supports Buchanan and Boddy's (1983) belief that the capability of computing technologies may erode the decision-making responsibilities of certain managerial roles.

9.2.3. Project management and team organisation

To a large extent, project teams had considerable autonomy in deciding how to perform project tasks. Technical and quality decisions were decided on a team basis, and project managers were free to liaise with clients without interference from Directors. In this respect project teams in undertaking their work were "self-supervising" (Woodward, 1965). However, the operation of the NCCB board illustrates how senior management can gain visibility of work operations utilising planning computer outputs, and *intervene* in project management activities. Further, operational arrangements also highlights the power of coalition groups to maintain control by selecting senior members who support or share the same interests. The operations director was responsible for chairing the NCCB and thus controlled entry to the decision- making board.

The above discussion has concentrated on the choices that managers can make when establishing operating procedures once the technology has been installed. DatCo's experiences illustrate that choice and negotiation was limited to *selected* senior personnel within the organisation. Middle- and lower-level managers it would appear played no part in determining the eventual outcomes of project technology change. However, it became apparent that there was little support for the project management system and the new procedures. Managers and engineers perceived that centralisation would limit individual autonomy and impose bureaucratic controls. The nature and action of professional resistance is beyond the scope of this paper, but it is

suffice to say the new project controls resulted in a series of substrategies by engineers and computing professionals that thwarted the effective utilisation of project management software.

10. Conclusion and implications for future research

This paper has examined the process of the introduction of project management technology at DatCo. The analysis has attempted to focus on the complexity and unpredictability of organisational life by considering the social and political issues that influence technology decisions and action. As an experiential researcher, my focus has been on the human and organisational processes at workplace level, their relationship with technology strategy, and how they impact technological outcomes. Overall my findings depict technology management development and implementation as a social process.

The aim has been firstly to stress the control capabilities of project management systems by likening them to a *disciplinary and surveillance technology* (Robson and Cooper 1990; Sakolsky, 1992). Project software enables control to be exercised via *ideational, system and structural* processes. Secondly, my research provides evidence to reassert the importance of labour process issues in shaping senior management strategy. Senior management's key objective for using project technology was to improve labour control (*ideational and system control*). Centralised project work organisation and systems aided this control (*structural* control). Finally research data demonstrates the political nature of managerial decision-making and the processual nature of organisation and technology development (Child, 1972; 1986; McLoughin and Clark, 1988). Overall, the DatCo experience reveals that technology management and indeed strategy formulation and implementation is more complex than rationalist accounts of the tools and techniques of technology management literature provide.

It is evident in this case study that technological outcomes were influenced by the control capabilities of project technology and also how managers used the "enabling characteristics" (Buchanan and Boddy, 1983; Buchan, 1986) of the technology. As Rosen and Baroudi (1992) stress we are moving into an era where labour process control is increasingly hegemonic in nature. Project systems can be perceived as "information panoptican's" and "saturated with measurement" (Rosen and Baroudi, 1992). The choices open to organisational actors however, are such as to make the outcomes of technological change highly variable. As Littler (1978) has suggested new computing technologies offer:

> "... centralisation verses decentralisation... rigid controls verses delegation of decision-making".

However, as highlighted previously the managerial prerogative at DatCo reflected both the aim to design centralised computer architecture and exert rigid control over work operations. This was supported by the technical rationality/philosophy of project systems that shapes/disciplines social actions so that project work arrangements represent the normalisation of organisation rules. As Foucalt highlights:

> " ... the perfection of power should tend to render its actual exercise unnecessary; that this architectural apparatus.. (*project system and structure – my insertion*) should be a machine for creating and sustaining power relation independent of the person who exercises it; in short, that the inmates should be caught up in a power situation of which they are themselves bearers" (Cousins and Hussain, 1990).

Project and technical power is effective because workers internalise and accept its control rationalities. The emphasis on using systems to exercise control decisions reinforces project management software as a *rational technology*.

I would argue on the whole that my experience of project management implementation at DatCo supports the model of strategic choice developed by Child (1972, 1986) and that the way outcomes are politically chosen supports McLoughlin and Clark's (1988) "processual" nature of change. However, the idea that strategic choice allows all organisational actors to participate in the change process is rejected. Moreover, the argument that labour process issues are not considered by senior management is also rejected. DatCo's senior

management clearly had labour (Taylorist) control strategies in mind.

In view of these complex technological, structural and political process agendas, I would suggest that further experiential research be undertaken in order to extend our understanding of the relationships between context, process and human action as applied to the investigation of technological change. Specifically, research agendas need to address:

- The control dimensions of Project Management and how organisations are exploiting these technical controls.
- The human and social dimensions of technology work organisation and design.
- Professional resistance to project technology and technical control structures.

While technicist literature describes how to re-engineer people to fit into the technical system and management presents itself as rational and logical in executing technical decisions we are limiting our own understanding of technology, for as I suggest throughout this paper technology plans and actions are socially constructed. If professionals at DatCo cannot accept managerialistic technology solutions studies should consider more carefully technology implementation and aim to conceptualise resistance beyond the images of labourers and managerial elites.

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