Ethics in Action

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INTRODUCTION

This paper forms part of a larger study with the general title A Framework for Participative Design. The companion pieces are Depersonalising Tacit Knowledge and The Justification of Technology: an argument from foolishness. The purpose of this study is to begin the process of developing a sociological frame of reference within which to approach the design of novel technologies. That is to say, our hope is to spell out some systematic ways in which sociology can act as a resource for designers. The emphasis here should be on the word systematic, for we are very clear that sociology has already had a major effect in one part of the design field, at least with respect to computational techgnologies.[1] However, it would be our contention that this effect has been motivated more by good intentions than a working through of a theorised connection between sociological concerns and design. In particular, it has not been premissed is a clearly articulated sociological framework for design which takes cognisance of what might be called the artifacts and environments of design.[2]

We begin this work of clarification and development by focussing on participatory design and on the ETHICS method in particular.[3] We do so for two major reasons.   First the proponents of ETHICS justify their approach in part by pointing to the sociological theory or theories which underpin crucial elements and which motivate key activities. ETHICS, then, is self-avowedly a strong sociological programme in design.[4] Second, ETHICS is a prominent member of what is sometimes called the socio-technical approach to organisations. The approach originated at the Tavistock Institute in London, as a outgrowth of a particular meshing of sociological and psychological theories of work in organisation.[5] This meshing, as we shall see, places just as much emphasis on job satisfaction and the quality of working life as it does on efficiency and effectiveness. Indeed, the socio-technical approach wants to reshape organisations to provide maximum opportunity for improvement in the quality of working life and hence job satisfaction.

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[1]　See for instance, I. Greif (ed) *Computer Supported Co-operative Work* New York, Morgan Kaufman, 1987 and volumes such as J. Vaske and C. Grantham. *Socialising the Human-Computer Environment*. Norwood NJ. Ablex 1990.

[2]　By this opaque (but we hope soon to be clarified) phrase, we mean objects or technologies which are designed and the social, organisational, working and physical locales or ecologies in which they are to be found.

[3]　ETHICS is a summary acronym for **E**ffective **T**echnical and **H**uman **I**mplementation of **C**omputer-based **S**ystems. See E. Mumford. *Designing Human Systems*. Manchester. Manchester Business School. 1893

[4]　This is a direct reference to the Strong Programme in the Sociology of Science which has similar ambitions to ETHICS in that it wants to have sociology imbricated into scientific practise in some way. However, the kinds of sociology involved and their specifying assumptions are somewhat different. See D. Bloor. *Knowledge and Social Imagery*. London. Routledge

[5]　A. Olerup. Socio-technical design of computer-assisted work. *Scandinavian Jounal of Information Systems*, vol 1, pp 43-71, 1989 and E. *Mumford Socio-technical systems design:evolving theory and practice.* G. Bjerknes, P. Ehn and M. Kyng. *Computers and Democracy*. Avebury. 1987

THE MOTIVATION FOR ETHICS

ETHICS offers the possibility of integrating four increasingly important desiderata for the design of computational artefacts. These desiderata are (in no particular order) (a) that novel systems should enhance (or at least not diminish) the quality of working life; (b) that such systems should should mesh with the social and organisational environments in which they are to be located; (c) that they must make a contribution towards increasing the efficiency and effectiveness of the organisations into which they are introduced; and finally (d) that those who use such systems should be involved in shaping their design. Desiderata (a) and (b) seem to be related to the relative acceptability of any technology; (c) has a kind of managerialist ring to it, while (d) is, in effect, about motivation. Looking at it another way, one might say that these desiderata are in fact claims of various sorts. Thus, (a) and (b) are disguised empirical claims about what makes a system acceptable; (c) is really a claim about the motivation for introducing systems; while (d) expresses value claims of various kinds. We have no interest in (c) here and no evidence to offer for (a) and (b). (d), though, interests us a great deal. So it is to that we now turn.

At the heart of the ETHICS method is a conviction that participatory design and the use of socio-technical systems (STS) analysis are better than any current alternative methodologies for the successful development and implementation of end-user systems. In turn, this conviction rests on three major planks. These are: (a) an acceptance of the explanatory adequacy of the STS model of work in organisations; (b) a commitment to the pre-eminence of self-determination as a moral value; and (c) an empirical claim about the pragmatic value of user incorporation. Of these three, obviously (b) is in a category by itself. In Mumford's own words

> .....people have a moral right to control their own destinies and this
> applies as much in the work situation as elsewhere. In many countries
> this philosophy is now part of the policy of main political parties.
> (Mumford and Macdonald. 1989, p 21.)

As such, though, this is not an argument for ETHICS *per se*, nor even for user participation as a design strategy, It is, an argument for a re-distribution of organisational power, if it is anything. To be sure, ETHICS and user participation presume some movement in this direction, but the two are not necessarily related. One could well imagine other devices for ensuring self-determination at work. In addition, there is the question of what moral autonomy is supposed to mean here. How is this autonomy realised? How does the individual as an autonomous agent, define and choose

among alternatives? Moral autonomy is clearly a "contestable concept" in as much as when, where and how far the concept may be applied is not uniformly agreed upon.[6]

We do not raise these issues to sabotage ETHICS, only to point out that if an argument from moral autonomy is to be used, it has to be worked out from within a theory of moral action. That is, it will have to be derived from a theory of the autonomous subject and the exercise of free will which locates the place and character of contractual relations such as those which obtain at work. It is certainly not sufficient to say people have a right to control their own destinies without at the same time indicating why this is true for this domain of activity, just mechanisms it is legitimate to invoke and within what limitations. That is, by indicating how, for instance, the moral autonomy of the individual is preserved in society in such a way as to allow self-determination. This line of argument would be necessary if only because contemporary moral philosophy has severe doubts about the coherence of such notions as the moral autonomy of the individual *qua* individual.[7] Individuals have moral rights as members of moral communities which define the boundaries of their personal freedoms for them. The tie between participation and modern political parties which Mumford makes, is precisely one of the grounds for wishing to re-think the concept of self-determination. The conclusion drawn is that such parties are little more than instruments for bureaucratic domination of the individual, not devices for their participation in decision making procedures.[8] What Mumford would have to show, it seems, is that ETHICS as a means of achieving moral autonomy, is not simply a reproduction of the same tendency.[9]

On the surface, the first and third arguments (those about explanatory adequacy and the pragmatics of user involvement) are somewhat easier to deal with. The pragmatic argument is, itself, a set of three very different sub-arguments.   Participative design, again assuming the ETHICS or similar method, should mean that people are involved in contributing to and hence should feel some sort of responsibility for the eventual decisions made. This is the age-old princpile of co-option first systematically analysed at work in large scale public ventures by Philip

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[6]   Cf. K. Donnellan for the origin of this notion

[7]   See for instance, Alistair MacIntyre *After Virtue*

[8]   The study of participation in and through political processes is a world all of its own. The role of the formal Political Parties within it has been in contention ever since Weber and Michels. The debate continues (recent post-Lukes and post-Poulantzas debates) (refs to be inserted).

[9]   Some readers will no doubt be impatient with this line of argument, among them, we suspect, proponents of ETHICS and STS themselves. They would assert that they are interested in the practical application of the method to real world problems not the abstract and purely theoretical considerations we are mulling over. Our response to this would be to ask whether the justification for ETHICS is purely to be the efficacy of outcomes - a strict pragmatism. In which case, why bother with the sociological and moral theory at all? If, however, it is felt that (somehow) these two help put ETHICS on a firmer, less adventitious foundation, then the order of questioning we are currently raising becomes extremely pertinent. After all, we do want to know if these foundations are secure, don't we?

Selznik.[10] The second sub-argument suggests that users are 'local experts' in doing their work and so have the necessary expertise and knowledge in how it should be carried out. To 'leave them out of the design loop' would not only be to waste a potentially valuable resource, it is likely to jeopardise the possibility of successful design. This position is, of course, virtually unassailable. It makes good design sense to tap all the resources for design that one can. Again, though, it is not an argument for strong participative design in the ETHICS mould, simply for having recourse to users at some point.[11]

It is the third sub-argument that really carries all the weight. This states simply that if individuals are involved in the process of design and hence decision making about the technologies they use, they will be more motivated to perform their tasks well and gain more satisfaction from their work. That is, participation offers the possibility of avoiding a motivational divergence over the 'effort bargain' between the individual and the organisation.[12] Such motivation arises in virtue of the satisfaction which the individual derives from their work. The more satisfied someone is the more motivated they are likely to be. Satisfaction, in its turn, derives from a fit between the needs which an individual brings to the work situation and the requirements which the organisation places upon them in that situation. The better the fit between the two, the more satisfying the job will be. Here is Mumford's summary of the fit.

[Insert Fig 1]

The concept of 'fit' here is not simply a fortuitous one. It reveals the structure of the relationships which Mumford is exploring. They are functional in form. In other words, ETHICS and participatory design are defined as a means (functional mechanisms if you will) for ensuring the continued reproduction of stable organisational relationships. They are, to be sure, mechanisms for change. But such change is the movement from one stable state to another. It is here that STS plays its role, since it is a functional theory of the stability of organisations. Hence its attractiveness to managers. It looks as if it offers a way of managing change more sensitively and successfully. It would be as well, then, to put the lineaments of STS in place before considering the 'motivational component' in more depth.

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[10]   Philip Selznik. *The TVA and the Grass Roots*

[11]   In *Depersonalising Tacit Knowledge* we look to forge a principled sociological connection between design and participation by users. ETHICS clearly sets itself against formalised techniques for eliciting user knowledge such as those promoted in AI, but without saying why.

[12]   It is not too difficult to see why ETHICS, and participatory design in general, are viewed with some suspicion by many organisation and labour process theorists.   For the approaches to be successful on their own terms , they require a rapprochement with and acceptance of the status quo. See the discussions in I. Varloes, M. McNeil and S. Yearley. *Deciphering Technology and Science*. London. MacMillan. 1990

SOCIO-TECHNICAL SYSTEMS THEORY

The central component of STS is a way of representing relations and associated activities within organisations. This representation divides these relations into three: formal or managerial; technical - economic; informal - social. These domains are systemically related to one another since all three are treated as sub-systems of the larger organisational system. The aim of STS is to track the pattern of systemic exchanges from within each sub-system, up through the organisational system and out into the environment which surrounds the organisation, and vice versa of course. Within this tracking, as with all system theory, exchanges across boundaries are taken to be crucial. They will require exchange procedures and exchange media of various kinds.[13]

It is this determination to inter-link internal adjustments within sub-systems to external environmental processes through 'tracer studies' which makes STS so suitable for describing and theorising the consequences of technical change.   To take but one example of a documented innovation from elsewhere in DEC.[14] When DEC decided to introduce 'high performance work systems' at its Ayr plant, it did so in the belief that such work groupings would enable it to meet a perceived challege from the Far East to its hold on its traditional markets. Unless it could do so, the Ayr plant would very quickly become obsolete - or its manufacturing base would. The challenge in the external environment had obvious implications for the organisation. These were conceived in terms of internal sub-system responses and those responses designed accordingly.[15] The response consisted of changing the product and changing the pattern of formal and informal work relations. Instead of a formal managerial hierarchy, the production process was to be organised around autonomous and semi-autonomus groups operating as 'high performance work systems'.

> *Barriers to effective communications were removed through appropriate adjustments to organisatin structure and process layout. The number of hierarchical levels was reduced. The job of the 'first line manager', the team leader, was to encourage group autonomy, remove the need for the leader's role, and let the groups deal directly with the business manager. Support functions were organised within the business, not as separate site (and business) wide central services.*

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[13]   We are talking in this way for a very deliberate reason. We propose to build a conception of organisations and in particular user knowledge which utilises these concepts. See *Foolish Technology* and *De-personalising Tacit Knowledge*

[14]   D. Buchanan and J. McCalman. *High Performance Work Systems: the Digital Experience.* Routledge 1989.

[15]   That this design actually invoked STS as a legitimation device only makes the situation more complicated.

The process layout on the shop floor was consciously designed to allow freedom of movement and of vision, and partitions were only waist high so that conversations could be held over them. Support personnel had desks in and around the production areas so that they could be contacted rapidly when required, and so that they could, by daily observation and conversation, keep up to date with events in the production process which they served.(Buchanan and MacCalman. 1989. p 195)

That the experiment failed, or at least was not the success which was hoped for, is in itself explanable in terms of the shift in the pattern of forces working their way through from the external environment and the nexus of relations in place within the organisation itself. In short, events moved to fast and the organisation could not provide enough flexibility to meet the changes comfortably.

As the sketch we have just given implies, STS teases apart the structures of relationships within organisations. The 'model' (the term is Willocks and Mason's[16] not our own) consists in itemising the components of organisation, technology, people and tasks which compose the social and technical sub-systems of the major managerial, informal and technical-economic systems which make up the organisation as a socio-technical system.

[Insert Figures 2 and 3]

What makes STS distinctive from other approaches is, as we have said, that it incorporates an account of motivational fit between the individual and the organisation. Without this fit organisations will be unstable and organisational change chaotic and fragmenting. Without a theory of the fit, STS would lack any sense of the good organisational reasons why and how changes to the organisation and its technical practice could lead to improved performance. Achieving this fit is what counts as good management. By extension, the aim of STS is contribute to understanding how to bring such a fit about.

INDIVIDUAL NEEDS AND ORGANISATIONAL REQUIREMENTS

Let's go back to the basic schema set out above. Job satisfaction is generated by a fit between the individual's needs and expectations and the organisations policies and procedures. What we have here is a version of the schema by which Parsons analyses the basis of social action. The unit act is

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[16]   L. Willocks and D. Mason. *Computerising Work*. Paradigm. 1987

defined in terms of an actor, a set of goals, a normative environment and a set of situational conditions. Unit acts are encountered as components of systems of action. In its simplest case, that of the joint action of two actors, the unit act reveals the possibility of a double contingency. Each actor is defined in terms of a set of orientations towards the situation of action and expectations concerning the other's orientations. These define the range of role expectations on any occasion. For joint action to occur, some co-ordination of orientations and expectations has to occur. That is to say, my definition of the situation (who I am for this occasion and what I can do and who you are and what you can do) must mesh with yours. Parsons whose work Mumford relies on, solves this problem and thus motivates the action system by proposing that patterns of action are institutionalised.[17] Our membership of our culture ensures that we can recognise these patterns. We share a culture and thus just do know how to go on. The patterns which we recognise and orient to in aligning our actions with others are the pattern variables.

Mumford takes this analytic schema and applies it to the relationship between individuals and organisations. Here the contingency is between individual needs and organisational requirements.

[Figure 1]

This involves the following set of stipulations:

(a) conceive the member of an organisation as a bundle of needs (for job satisfaction, interesting work, financial rewards, security, and so on);
(b) Conceive the member's attitude towards work as a function of the relative satisfaction of these needs.
(c) Conceive the organisation as a complex of policies and practices for achieving its goals.
(d) Conceive the stability of the organisation as the relative fit between the requirements of (b) and (c).

Mumford then turns to the pattern variables to tease out the institutionalised patterns of it between the requirements of the organisation and needs of the individual. In Parsons' scheme, these variables are

affectivity - affective neutral: the relative emotional involvement attached to a situation

self orientation - collectivity orientation: relative priority to be attached to individual rather than group goals

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[17]   T. Parsons. The Social System. London. Routledge 1952.

> *particularism - universalism*:: the standards of evaluation to be applied may generalised or ones associated this encounter
>
> *ascription - achievement*: : the relevant properties of the other actors may with general performance criteria (eg knowledge or skill) or with non-performance criteria (eg gender or age).
>
> *specificity - diffuseness* : are the properties of roles relevant to this encounter generalised across encounters with this other (as with a parent/child) or very precisely defined (as with economic transaction).

To apply these to to the issue of job satisfaction in organisations, Mumford translates the variables into the following dimensions of fit

(a) ethical: values and norms

(b) knowledge: skill and knowledge

(c) control: effort-reward bargain, supervision

(d) psychological: motivations,

(e) task: the activities engaged in.

To be stable, or to manage change, every organisation has to strive to endure a 'goodness of fit' along these dimensions.

[Insert Fig 4]

Each of these different lines of fit represents a vector of potential tension between the value orientations of the organisation and those of the individual. Ideal typically, individuals are presumed to cluster their value orientations in contradistinction to organisations. The point of these polarities is to be able to delineate the major bundles of motivations associated with typical courses of action. The suggestion Mumford is making is that individuals tend to cluster their value orientations along the diffuse/ascriptive/universal/self/affective dimensions while organisations tend to cluster along the specific/achievement/particular/collective/affective neutral ones. In any situation, then, this possibility will be expressed in terms of perceived job satisfaction and quality of working life and hence have consequences for the relative stability of the organisation.

Alongside the purely organisational relations which any individual stands in are the informal social relations within the work group. Mumfords incorporates these as a further component of the overarching socio-technical system.

[Insert Fig 5]

The aim of the ETHICS method is to focus discussion upon discrepancies between the situation as perceived and experienced and the ideal work situation where there is a close fit between organisational and individual requirements. Once such discrepancies have been identified, it should be possible to design alternative ways of working, utilising differing technologies perhaps, to bring about a closer approximation to the ideal. In the next section we will look at an instance of ETHICS in action.

Xsel: an example of ETHICS in action

For a number of years, Mumford has used ETHICS to help the Digital Electrical Corporation (DEC) develop an expert system for configuring networks.[18] As Mumford well recognises, the corporate and organisational culture of DEC is particularly amenable to the introduction of innovative design methodologies, particularly ones as heavily premised in participatory design as ETHICS is. In addition, the problem which was being addressed was well known to those working within the Company to be difficult, not to say wicked, in character. In essence, the problem was to ensure the correct configuration of software and hardware at the point of original sale, that is when initial orders were being placed. As a result of hiring policies, sales staff just do not have the necessary technical expertise to draw up specifications would would be routinely acceptable. The solution was to develop an expert system (XSEL) which they could interact with and which would have knowledge of the current component parts and the rules for assembling them efficiently. Since the sales force did not have any expertise in building expert systems either, it is clear that the solution would have to be designed on their behalf. And yet, if they were not involved, what guarentee would there be that they would actually use the system when it became available? Hence the need for ETHICS.

What ETHICS does is to structure design around a list in inter-connected questions and tasks. Mumford clusters these into five stages or steps.

Step 1 Diagnosis of Needs:

What is the problem? Why should it be solved? Which groups and users are effected by it? What are the boundaries of the problem space?

What is the business mission and key tasks of those who will use the new system?

What is the existing work system? How efficiently and effectively are tasks currently carried out?

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[18]   See E. Mumford and W. Bruce Macdonald. Xsel's Progress . New York. John Wiley. 1989 for the published record of this project. The rest of this section is heavily dependent on this volume.

What changes may occur if the system is introduced? What are the needs of the user and other related groups?

Step 2 Discrepancy Analysis:

What has to be changed to bring the situation more in line with the ideal?

Step 3 Agreeing Objectives

Is there a set of objectives for the new system which can be agreed by all parties? These should relate to efficiency, effectiveness, job satisfaction and future change.

Step 4 Design

The system should be designed using socio-technical systems analysis. This Mumford summarises as follows:

> *Sociotechnical analysis incorporates a logical analysis of the technical components of work (machines, procedures, information) and the grouping of these into logically integrated sets of tasks - one set being separated from the next by a change of state of the input or product. (The) sociotechnical approach identifies a sets of integrated tasks and allocates one or more to each work group. The work group then has responsibility for allocating tasks amongst its members and for training its members so that each individual is competent to carry out all tasks. This form of work organization is often referred to as 'autonomous' or 'semi-autonomous' groups. (Mumford and Maconald, 1989, p. 36)*

Step 5 Implement System

Develop the system so that it can grow alongside the existing one and gradually allow the transition from one to the other. This involves management commitment to the values enshrined in the design itself.

XSEL was designed using this methodology.   To ensure success in the project, the design group was collected from right across the spectrum of those affected by the introduction of the new system. Its work was supervised by a Steering Committee of senior managers. In addition, Mumford herself acted as facilitator for the process. The eventual system has been introduced and can be counted as a qualified success. While it is not used to produce original configurations, it is used by sales staff to check configurations which have been put together. There is now an attempt to extend the use of Xsel beyond North America. Here though there may well be user resistance. The sales force

in Europe, for example, does not necessarily feel committed or involved in a system which they did not contribute to.

ETHICS: SOME UNRESOLVED QUESTIONS

It is not our intention in this discussion to review ETHICS as a technique or strategy for participative design.[19]   Our concern is with its methodological underpinnings - the theoretical orientations it espouses and their specifying assumptions. In our final section, we will summarise a number of questions or issues which we feel remain unresolved by the current explications of the ETHICS approach to design. The most important of these is the extent to which ETHICS wishes to be assessed as therapeutic rather than analytic in aspiration.[20] One could argue that the whole approach operates rather like the Freudian frame of reference does in Psycho-therapy. It locates key lines of questioning , sensitivities which might well arise, traumas which may lie buried beneath the surface of the workaday world. The therapist's skill is in reading behaviours as symptomatic of such conditions and in helping patients to recognise and excavate these for themselves. As such the only question the therapist needs to feel obligated to answer is 'Will this line of action help solve the problem in hand?' where the only reasonable criterion of judgement must be the therapist's proven professional competence. Acting in the best interests of the patient is all the legitimation that is needed.

A number of features of ETHICS look as if they would, of themselves, have beneficial therapeutic effects. For instance, since it stresses the need for managers to become concerned with issues which might at first sight appear to be tangential to their primary obligations, it is likely to lead to less emphasis on the purely calculative aspects of technological change. Similarly, since it requires the involvement of all levels of members of the organisation, the process itself is likely to give an opportunity to express concerns. It also provides an opportunity for issues of technophobia to be addressed. Finally, ETHICS stresses the temporal features of change and the need to take account of the long drawn out periods of adjustment which are necessary. Again, such reminders or emphasises can only be beneficial. But to say all this is simply to indicate the kinds of claims which could be made on behalf of ETHICS. If it is best conceived as a (successful) therapeutic frame of reference, indeed if that it how it conceives of itself, then claims to validity, veracity, falsifiability, logical rigour, consistency and coherence (that is, to any canon for the determination

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[19]   A lack of experience in using it is one reason. Another is that despite a voluminous number of accounts of ETHICS by Mumford and others, details of how to do it are rather scarce. Perhaps the analogy with therapy introduced below holds on this front too.

[20]   Mumford herself offers this argument in her paper Socio-technical systems design:evolving theory and practice. G. Bjerknes, P. Ehn and M. Kyng. Computers and Democracy. Avebury. 1987

of logical status) fall by the way. Those need not be the standards which ETHICS would wish to be measured by.

Now, of course, things are seldom that clear cut. As with Freudian theory, not all the legitimation is derived from therapeutic efficacy. Some is felt to come from the explanatory adequacy of the theory *qua* theory. The trouble is in disentagling which parts are supposed to be therapuetically legitimated and which are supposed to be good explanations (by whatever criterion of explanatory goodness is appropriate). In very large measure, it is to help focus this kind of discussion that we have shaped both this paper and this final section in the way we have.

We want to pick out a number of issues where the standards of evaluation (that is the character of the claims) seem to be deeply ambiguous or at least in need of clarification.

The logical status of the moral imperative: it is unclear what the relation between participative design and the natural right to self determination actually is. Putting it another way, one might ask whether participatory design features in the moral imperative argument (and hence in ETHICS) as a premiss rather than a conclusion. ETHICS does not seem to reason its way from the natural right to participation as the most effective or just way of providing for it.   The reasoning runs the other way if anything. The natural right is invoked to legitimate participatory design which is considered a highly valued social good in its own right.[21]

The consistency of evaluative standards: the second and third arguments for participation draw upon a utilitarian game theoretic calculus of benefits. That is, in a given set of circumstances, it is assumed to be possible to determine what the net costs and benefits might be. A strategy of mini-maxing (giving away involvement in exchange for co-optiveness, trading speed of change against drawing in user knowledge) is an algorithm for determining outcomes and their associated lines of action in the context of uncertainty. The problem is such utilitarianism runs directly counter to arguments from natural rights.[22]

What we are talking about here is the difference between appeals to *logical compulsion* and appeals to *the weight of evidence*. It might very well be the case that both are going on. However, it is important for us to know which claims are being defended on the basis of what. Participation in decision making might well be justified as both ethically superior to any alternatives and as the strategy most likely to bring about the greatest happiness for the greatest

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[21]   The tangle here derives, of course, because as we indicated above, the ethical basis of ETHICS, its theory of how to value social goods, remains under-specified.

[22]   See John Rawls *A Theory of Justice* and A. Sen and B. Williams*Utilitarianism* CUP 198

number.[23] However, the former rests upon first a defined set of agreed premisses and second on a consistent and coherent set of arguments from them. The latter rests upon an argument about the applicability of prior cases to any specific one (about its inductive 'normality' so to speak) and then how to generalise across the new set.   In both cases, tried and tested recipes exist and might be invoked. What is missing from the accounts of ETHICS is just which is being used when and where.

The epistemological status of the pattern variables: the device by which psychological needs and social organisation connect is the contrast set summarised as the pattern variables. What is their epistemological status within the ETHICS argument? Within Parsons' own theoretical work, their position is somewhat ambivalent.[24]   Certainly, they occupy a transitional phase in his thinking. More important than this, though, is that within his thinking the pattern variables (and all Parsons' other schema) are just that -schema. They are devices by which an analytic system is constructed and motivated. They function, then as *aprioria* for any institutional analysis on which they might be used. They are certainly not taken to be straightforwardly descriptive of some given empirical system except in and through a series of transformations. The mapping between any of Parsons' schema and descriptions of actual consditions is far from obvious, as is the integration of any of Parsons' theoretical developments with those going on elsewhere in the social sciences.[25] None of these difficulties are really resolved in ETHICS in that what Mumford offers[26] is an interpretation and operationalisation of Parsons' "model" by stripping out the analytic motivation it had for Parsons. The concepts are used, instead, as a handy way of making *a* connection between needs and social organisation, without explication of why this connection is a good one, or the most appropriate one, or whatever.

What is social about 'the social' in socio-technical systems?   In STS, the social appears as a residual category. It is what is not task or work directed, or what lies outside the domain of actions defined in terms of managing the organisation and its technological base. Now, of course, this is in one sense true (and trivially so) and it is also true that work and tasks are socially organised, which STS recognises and emphasises.

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[23]   Which was Bentham's principle after all.

[24]   See T. Parsons *Social Systems and the Evolution of Action Theory*. New York. Free Press 1977 for a discussion of the development of the analytic schemas.

[25]   Evidence for this claim can be found by looking at any of Parsons' analyses of institutions, for instance family life and comparinf it to the accounts in standard texts. There is the further issue of whether *operationalising* Parsons is an appropriate thing to be doing in seeking empirical reference for his concepts and categories. Or does the process of operationalisation (choosing variables and measuring devices) indicate a total misunderstanding of Parsons' project? This is a much broader topic than we have space to develop here. Parsons always argued that his work could have utility for empirical investigations and indeed demonstrated this claim in several studies. However, operationalising his concepts was precisely not the approach which he adopted.

[26]   Cf. Mumford. Values, Technology and Work. The Hague. Martinus Nijhoff 1981 pp 28-32

But wherein does the social reside? Or, to put the matter more clearly, can we seperate the individual from the organisation in quite the way in which STS seems to wish to do. After all, the individual is an individual-in-an-organisation of relationships, some of which are managerial, technical, and 'informal', but all of which are social. There are two issues here. The first is the notion of 'organisation' which is in play. This is an encapsulation of one representation of the activities in an environment - in essence that expressed in the management hierarchy and division of labour.[27] The second is the nature of the processes by which members of an organisation determine *in media res* which interrelationships between work, organisation, people and technology are appropriate on any occasion? How do we determine that what is at issue just now is the character of the ethical rather than the knowledge, psychological, task or whatever fit? And how do we draw the differences in *this* case?   It would be our argument that STS and ETHICS in striving for a match between sociological and commonsense conceptions of organisations, has emptied its theoretical grounds of any way of describing the character of the social processes at work. It has simply to take them for granted. It would, further, be our argument, that a clear and close understanding of the character of these processes might allow a theoretical (as opposed to ethical) argument for participatory design to be be made. The companion papers we mentioned at the begining and the project of which they form part is intended to open up one line of approach to this.

CONCLUSION

By way of conclusion, let us summarise the major themes which we have sought to bring out. They can be expressed as a set of four sets of unresolved oppositions and the considerations which apply to them.

Therapy v theory: does ETHICS see itself as primarily a therapeutic as opposed to an analytic method? That is to say, are the needs and requirements of solving real world problems to be given greater priority in the dealing with issues within the framework and hence with the legitimation which resolutions of those issues might claim?

Conceptual v empirical claims: are the claims made on behalf of ETHICS premissed in evidence about the method and its achievements or in arguments which derive from the presuppositions of an ethical system?

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[27]   For an initial discussion of these issues, see our *Three Papers on Organisation*, Unpublished Working papers, Rank Xerox EuroPARC, April 1990.

Social science v management science: are the relevances for the approach derived from the orientations of practical managers or the 'academic' concerns of social science? If this is felt to be a false dichotomy, and it might well be, then what are the grounds for suggesting that position is defensible?

Participation - means or end in itself: is the attractiveness of participation that it is effective in various ways or that it is or should be what we called a highly valued social good in its own right.

In our view, unless and until STS and ETHICS offers some resolution of these, and there are no doubt other, ambivalences, it will be difficult to know just how to take its arguments and how much strength to attribute to its claims. Hence it will be difficult to know how to promote and defend both approaches as the basis of design of new technologies.