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AN EVOLVING MODEL OF DESIGN CULTURE

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1. Introduction

This paper addresses the difficulty of bringing about culture change; it is based on a project that is examining the role of design management in the context of large one-off projects in the mining and construction industries.

Traditional methods of project delivery in these industries are being challenged by Design-Construct [Design-Build in the USA and UK] and alliance contracting (similar to Partnering in the USA or PFI in the UK). In design-build projects, the design management function rests with the prime contractor or with an alliance partnership, rather than with the specialist designers or consultants. Design management practice is also being transformed by the uptake of information technology that supports distributed collaboration. As a consequence, construction companies which traditionally were not directly concerned with design management are now taking a proactive role in the design management function, which is essentially a matter of maintaining design integrity, within a total project management process.

However, the culture of a construction company is quite different to that of a design consultancy, the traditional design managers. Culture here refers to the values, beliefs and behaviours common to the various sets of professionals involved in the process. We need to better understand those personal attributes and organisational habits, systems and practices that foster an effective design management culture in projects that combine design and construction to get the best possible outcomes in the current changing circumstances.

In the traditional, "designer-led", projects consultants manage the design. They work with the client to develop the requirements and the design while the contractor is concerned primarily with construction of a predetermined design. Such projects usually involve a win-lose ethos through the adversarial and confrontational attitudes that have shaped the industry. The new procurement methods are based more on collaboration and partnering between client, consultants, contractors and facilities manage. There have been various approaches to systematising this complexity.

A group at Salford University have developed a generic model of the stages in the design and construction process, the Process Protocol [1]. The Process Protocol divides projects into three broad stages, pre-project, pre-construction and construction. These three are broken into nine distinct phases from demonstration of need through to operation and maintenance. Design Management is one of eight management functions that run through the nine project phases. Austin *et al.* [2], take an alternative approach based on information flows, the design structure matrix, to describe the relationships in building design.

However, such normative models do not reveal the human complexity, the contingent

interactions and decision-making processes that take place in design practice. Design management cannot be characterised simply as a technical function - it is both a technical and a social activity requiring "hard" and "soft" skills. Those usually considered to be the key skills include conscientiousness, initiative, social skills, controllability and commitment. While there have been some observational studies of design practice in architectural offices [3] similar studies of design management practice in construction do not appear to have been conducted. We are carrying out ethnographic investigation of the design management function and incorporating case studies, participant observation, surveys, social network analyses and even some experimentation in our techniques.

Design is a situated activity, profoundly shaped by the immediate circumstances and environment, involving continuous negotiation and unresolved ambiguity. It is probably safe to say also that whenever design happens it is not the only thing going on. Designers are simultaneously negotiating design, company interests and their own career prospects at the very least. The complexity of this situation only increases when the target activity is design management in large projects, as here, where the cultures of designers and engineers may clash. Designers typically have different education from engineers, develop different values and ways of organising work and ways of managing people. For example, while an engineer may see the world as raw material for transformation, a designer may be more interested in enhancement of and sympathy with the environment. Such clashes of beliefs and values, whether between engineers and designers or any sector of the industrial process, are at the root of many unsuccessful implementations of technology and industrial collaborations.

The social complexity of such situations make them ideal for ethnographic investigation. A number of ethnographic studies have explored the design process as a social activity [4]. They provide a rich picture of what really happens day-to-day and even minute-to-minute in real design work. However, traditional ethnographic methods are time consuming and costly and have not won favour with industry. Recent work in applied anthropology has produced a range of new methods including "quick ethnography", an iterative series of short investigations targeted towards particular questions, which can overcome this time / cost limitation while still providing the quality insights of a full ethnography and we have drawn on such methodologies in our work. The risk of such approaches is that the project breaks up into piecemeal and partial insights. In order to avoid this happening we have used a particular model of culture to frame our ethnographic questions. This model has evolved slightly over the life of the project as we have learned what aspects of belief and behaviour are most revealing for our purposes, and we expect that it may go on evolving if the focus of interest shifts. However, no matter how effective any model might be in capturing ethnographic detail, we argue that more is needed to arrive at a full explanation of all the facts of daily practice. We therefore link our model of design management culture to the more general practice theory of Pierre Bourdieu [5]. Only at that level can we fully comprehend why people do what they do when they design, manage design and construct.

2. Models of culture

The notion of culture has gained some vogue in management circles in the last few years as there is ever-increasing demand for more and better production in all sectors of the economy. While there is general recognition that the culture of the workplace and the professions are limiting factors in the organization of work, and hence its productivity, existing approaches to workplace culture still routinely bemoan the difficulty of dealing with culture change [6]. In our view this is because of two flaws in these approaches. One of these flaws arises from the

appropriation of the culture concept by management. From this viewpoint, culture becomes something that can be controlled and managed by a few senior personnel [7]. A more comprehensive view of culture recognises that it is constantly negotiated by all the actors in the workplace and is resistant to management by a few. The second, related flaw is in the piecemeal understanding of culture in many analyses. The tendency is to treat it as either a matter of organisational procedures or as a matter of values [8]. Our model seeks to integrate these aspects of culture with another that is always present but particularly important in the field of design engineering, that of technology. Anthropology is the parent discipline for the culture concept and we have gone back to basic anthropological understandings of culture, and the place of material culture within culture, to avoid the problems identified above. The key insight we draw on here is the awareness of the interconnectedness of technology, values and social organization in the totality of culture.

From the very earliest days of the discipline anthropology has taken account of material dimensions of culture, particularly the technology of hunting and warfare, alongside interest in values, symbols and myth. In the 1940s the American anthropologist Leslie White urged the tripartite Marxist model of culture as made up of three subsystems: technology, the social system and ideology. He said “there is a type of philosophy proper to every type of technology...but experience of the external world...is filtered through the prism of social systems also” [9]. This conception of culture as having ideational, material and organisational dimensions has been most popular amongst those working with problems of material culture such as archaeologists but it is mirrored in the work of theorists coming from other disciplines also. For instance, Pacey’s [10] representation of technology practice (Figure 1) depends on very similar features.

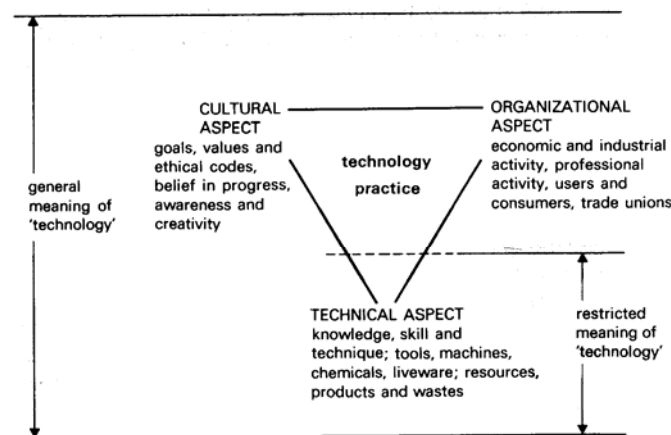


FIGURE 1 Diagrammatic definitions of 'technology' and 'technology practice'

Figure 1: From Pacey, Arnold. *The Culture of Technology*. (1996) MIT Press.

The fact that Pacey restricts the notion of cultural aspects of technology to the ideational illustrates a common trend, which we alluded to above. Our notion of culture lies much more in the region of Pacey’s ‘technology practice’, a matter of the taken-for-granted accomplishment of everyday life. Design culture is for us the totality of the values, knowledges, and behaviours that surround the act of design. That is, we are concerned to describe how design gets done, but this necessitates including consideration of all those things that are not design but which impact on design performance in regular ways

The current version of our model is represented diagrammatically in Figure 2. The arrows are not intended to represent any necessary flow between the three nodes, but merely that each node will both affect and be affected by each of the other nodes. While in the social sciences we are used to concentrating on the ways in which technology is brought into being by particular organisational processes, and embodies identifiable sets of values and worldviews, both engineers and designers are much more likely to focus on the ways in which technology affects processes and serves (largely unexamined) values. Both of these views could be seen as overly deterministic and we would like to suggest that a more ‘systems approach’ is appropriate. We suggest that there are inevitably connections between all the features of design culture that we have identified and this means that we have to think of culture as a system in which changes to one part will affect the whole, as Raymond Williams recognised long ago. The exact nature of the effect will be a matter for empirical consideration in any given case, but this insight should at least alert us to the limitations on any attempts to bring about changes in any culture by attention to any single facet, such as the value system, as so many managerialist approaches do. First, we must understand the content of the culture, a task our heuristic model is well suited for in design industry settings. Then we must bring a comprehensive theory of social action to bear to explain how the connections between the elements of culture result in a particular culture and particular behaviours. We will outline below how we propose using Bourdieu’s theories to do this.

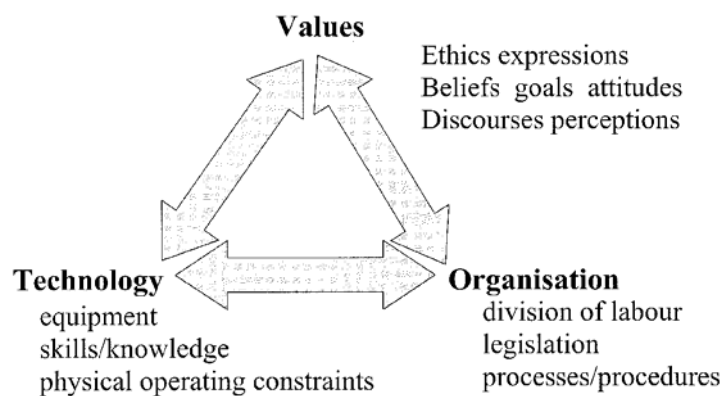


Figure 2: the working heuristic

The node labelled Organisation represents all of the structural constraints particular to the situation. This ranges from large-scale issues such as various legal responsibilities and types of contract to the internal organization of the firm and the division of labour within particular offices. Organisation can thus be described at a variety of levels from the most global to the most individual and it is often the interplay or lack of coherence between these levels which generates the most significant behaviour. Take, for instance, the case of a firm entering into alliance contracts or joint ventures for the accomplishment of large projects. Whether or not the design is produced in-house or subcontracted, there will be legal and contractual restrictions on such organisational matters as the flow of information within the project and back to the parent company or companies. One firm’s protocols for the conduct of negotiations between parties, including user groups, habits of document control and the very language in which the project is conceived is perforce modified by the organisational structure generated by such contracts. At the individual level, staff who are employed for a given project have no necessary allegiance to the organisational habits and ways of working of any particular employer and commonly stick to the micro-processes they feel most comfortable with, regardless of the protocols of the employer. There are thus a number of

ways in which organisational factors can impact on design outcomes from project to project. The basic problem for our project concerns the division of labour between design managers, project managers and others. The perception is that projects with new types of operating conditions can be either very profitable or very risky according to the quality, style and amount of design management employed. But historically the construction industry has operated with a “can do” set of values where “construction is king”. Even though there is encouragement from upper levels of management for more attention to design issues, the culture of individual undertakings within the firm still tends to downplay design. The position of those doing the design management on the organisational chart is not commonly high and they may have other duties to perform as well. Typical engineering values could be seen in this case as determining organisational patterns which undercut design.

This introduces the interplay between values and organization in our model. The Values node incorporates all of the symbolic dimensions including ethics, corporate myths and sets of beliefs about the nature of the world (or how it should be), taken as axiomatic. We have already noted a contrast in our experience between a set of values we associate with designers and those more common to engineers, the typical manager of design integrity in our fields. In a recent novel Terry Pratchett described the work of engineers thus: “They hadn't dreamed, in the way people usually used the word, but they'd imagined a different world, and bent metal around it”, a characterisation which neatly encapsulates the empiricism and energy of the engineering profession. However, such an approach to the world tends to mean that amount of bent metal becomes the primary measure of accomplishment. This impacts on design managers' behaviour in the long term as well as in the immediate conduct of any given project. Career structures and promotion opportunities in the mining and construction industries still tend to rely on a record of ‘bent steel’ accomplishment rather than meticulous attention to well-integrated design and so it is necessary for individual practitioners, no matter what their personal values, to devote a lot of their energy to working in ways that pay more attention to time and budget than design. Thus the relatively low value put on design issues and design management by the industry as a whole may lead to a poor culture for design.

Finally, the Technology node does not just include hardware. In its most general application it means any tool for accomplishing the work, dealing with structural constraints and maintaining values. Although the engineers we have worked with privilege certain types of hardware and techniques for its use, much of the relevant technology is managerial, addressed to achieving right behaviour and successful business outcomes. Of course, what is judged to be ‘right’ behaviour and outcomes is a function of the underlying value sets. As far as design and its management is concerned, the technology with the most impact, in our observation, relates to the sharing of documents among the design team and between the design and construction teams. Such technology is particularly significant where the teams or members of teams are geographically distant from one another and/or from the construction site, as is likely to be the case. This technology must integrate well with the organization of work in each site, and as we noted above this cannot be assumed to be the same, even within the same firm. Its use must also be organised to fit with the values predominant at each site.

For instance, we have seen design teams who are very protective of their design ideas and expertise having to deal with the different tempo of work and sets of priorities of managing engineers through the medium of electronically shared documents. While a specially designed platform with version tracking was intended to be in place, technical difficulties had led to delays in its implementation. The pressure of demand from the client to see documents led to more than one of the managing engineers individually bombarding the design consultants with requests and comments. While the designers wanted time to refine their thinking, the

engineers were insisting on visible production in line with their notions of productivity. Eventually issue of documents from the design team ceased altogether as they felt that the engineers were asking the wrong questions in the wrong way. If time had been put into establishing the file-sharing platform, some of the pressure could have been alleviated by reducing the number of versions of documents and duplication of requests. But the method chosen was fast (for the engineers) and immediate and as such embodied the values, one team at least felt perfectly happy with. Under one manager, such a situation can lead to delays and uncertainties in the design, whereas someone who understands the values and organisational arrangements concerned can ensure smooth completion of the design process. So the content of the culture is not entirely determining of the outcome; it can be negotiated more or less well. To explain this kind of accomplishment more fully we need to link our model of culture with a theory of practice. For this we turn to the work of French social theorist, Pierre Bourdieu [5].

3. Explaining practical action

Bourdieu understands practice as the constant negotiation between the demands of the *field* of action and the *habitus* of the various actors in the field. These key concepts of field and *habitus* allow us to relate our model of culture to the practical action of accomplishing a design. They can be understood by reference to the often-used analogy of the game or playing field.

In Bourdieu's [5] theory any field of action is constituted by actors' contest over capital, in the way that a football field is that area in which players compete for possession of the ball (capital) and the chance to score goals (another kind of capital). We know the football is worth something because that is what players compete for. Similarly, in the field of design and design management, the relevant capital is made visible by what the players in this field compete for. We have already noted that there may be disagreement on some points as to what exactly is of utmost value or the relative value of various things. Financial gain, either by the individual or by the firm is only the most obvious kind of value. From the company perspective reputation, a good safety record, diversification into a new area and so on may all be facets of capital. These kinds of capital may synchronise or conflict with individual estimations of what is worth having: certain kinds of experience, a particular design outcome and so on. The position in the field of various actors (players) is defined by the kind and amount of capital that they hold. Some kinds of capital translate more directly into monetary capital than others and for Bourdieu, as for most of industry, all capital is ultimately reducible to financial capital. The notion of competition (sometimes called contest) that is implicit in this analogy should not be pushed too far. Sometimes players in any field collaborate to increase capital, or find ways of gathering capital without any overt conflict being necessary, as when someone builds a successful career in a firm or (more usually) government department where the organisational arrangements guarantee advancement to players who just observe the local rules.

For all fields have some organisational structure and ground rules. As in football the rules of the game pre-exist and transcend any particular instance of the game, so in the kinds of field we are considering here, there are organisational structures, some of which we have outlined above, which tend to constrain individual action. But that does not mean that the rules of the game (organisational procedures) determine every play. Every player comes onto the field with their own particular values and their individual capital in the form of talents, experience and connections, and they each seek to maximise their capital (have the best game they can)

in some way. *Habitus* is the concept that explains how they do this. To continue the sporting metaphor, it can be likened to a ‘feel for the game’.

One of the many ways in which Bourdieu describes *habitus* is as “durable and transposable systems of schemata of perception, appreciation, and action”. It is a way of acting in the world which begins to be learned in childhood and in formal education and is based on cultural decisions about categories, what exists in the world, and the value to be attached to those categories, or how important such things are understood to be. If one’s training has prepared one to understand the world primarily in terms of physical entities and relations and to value those over, for instance, aesthetic entities such as space, that will influence how one approaches action in the field of design. Any *habitus* will be durable in the sense of tending to persist over time, although it is not unchangeable, and transposable in that it will be carried over from one field of action to another. That is, we tend to approach every new situation with understandings, habits and expectations that have already been learned and reinforced over time. One begins to see why cultural change is so hard to achieve.

For it is not only the case that culture is a system of interrelated parts so that changes in one part can affect the whole in unexpected ways. Added to that there is the strategising of various players within the culture. Each player encounters a culture with sets of values, technologies and organisational features which predate the individual’s interaction within them. But players are not social dopes, fated to behave just as the culture says they must, and in a myriad of ways each of them pushes the limits of the acceptable in ways they calculate will best suit them. The result is that a certain level of change is happening all the time and is a very healthy thing, allowing cultures to respond to changes in the environment, to evolve, if one likes. A model that describes the outlines of a given culture can only be a snapshot in time, and so heuristic models such as the one we proposed above are limited in what they can deliver, although the tendency is to read analyses based on such models as static descriptions. Even when they do capture large scale and enduring features of a culture, if it’s behaviour we are interested in they leave us with the task of relating how that culture results in certain behaviours. Bourdieu’s practice theory allows for that extra step.

Although we would not wish to make the correspondence too strict, there are ways in which our heuristic categories for the description of culture – values, organization and technology – mesh well with Bourdieu’s central concepts. The espoused and implicit values that drive people’s aspirations are acquired in education and experience as part of the *habitus*. They are individual, pervasive and resistant to change. They also help define what will constitute capital in any field. The entity we label organisation in our model is similar to Bourdieu’s ‘rules of the game’, the structures and rules which constrain but do not determine action. In the field of engineering design, technology can embody both values and organisational arrangements, but is perhaps most significant as the site at which values and organisation often become visible, because contested. In order to fully appreciate the effect of culture it is the interplay between structural givens and individual action that is central.

4. Conclusion

This paper has presented social scientific models of culture and action which have been found to be useful in the description and analysis of design and design management cultures. But the logic of our models suggest that there can be no formula for how to achieve cultural change in any given situation. The situation we have worked with has concerned the need for organisational change in parts of the mining and construction industries that are currently

having more responsibility for design outcomes than previously. It is our contention that the persistence of a set of values carried over from the days when construction output was the only measure of success is a barrier to change. Furthermore, we have identified the use of technology as an important factor in these cultural performances. Although there is a large literature on whether and how technology might lead, or alternatively follow, change, we see it more as a medium through which whatever cultural moves are afoot or being resisted are acted out and embodied forth. In different situations, different facets of the model – values, technology or organization – turn out to be most significant in understanding the state of the culture in that situation. But we then also need to make the link between culture and behaviour, before any intervention can be planned. This requires us to consider the heuristic model in dynamic motion, as a set of interactions between actors (who may be individuals, teams, professions or companies) and particular local cultures. Interventions can then target the relevant driver as individual needs demand rather than through application of a single-sided understanding of culture. The model provides a consistent and systematic analytic schema which still provides enough flexibility to deal with the complexity of real design workplace culture.

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