THE LANGUAGES OF PRODUCT AND SERVICE: BARRIERS TO THE INTEGRATION OF CONSTRUCTION AND DESIGN

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The desire to bring design and construction activities closer together is well established and has been generally welcomed by the industry through the adoption of concepts such as 'buildability' and the attempts to foster long term relationships between organizations up and down the 'supply' chain. This paper argues that the historical and traditional split in the construction industry between design and construction activities has given rise to separate languages derived from different meanings based on the notions of 'product' and 'service'. The existence of separate languages notably on what is being demanded of, and what is being supplied by the various parties involved in construction projects, is examined in the context of an ongoing research project focusing on integrating construction and design activities through supply chain management. The paper reflects on the project's implicit aims of developing a common language which can underpin and integrate both design and construction activities. Initial thoughts on what might form the basis of such a common language are presented.

Keywords: language, meaning, product, service, supply chain.

INTRODUCTION

"In modern times, especially in England, there has been a sharp antithesis between the designer of buildings known as an architect, and their constructor, called generically a builder"(Harvey 1971: 13). As a result of historical trends, "we suffer the absurdities of professionals excluding the expertise of the constructors from the design and value seeking process and taking responsibility for the design of elements which they cannot understand fully" (Saxon 1998).

The lack of logic to this situation has been raised recently in the Egan Report (1998) but this is now a well-established tradition in reports on the industry from the Emmerson Report (1962) through to Bennett *et al.* 1996. All have generated much discussion and attempts at change but these have tended to concentrate on changing structures and processes to improve information flows and reallocate risk through new mechanisms such as design and build, prime contracting, partnering, alienating, management of the supply chain and other novel procurement methods.

A fundamental part of these attempts at change is bringing together the design and construction activities by introducing those who do the building earlier into the design phase of the project or improving the design-construction interface. However, this is seen primarily as a structural problem, one which redesign of the construction process

can solve and as such is a classical example of the "engineering fix" (Seymour and Rookie 1995) which views the construction process as an objective reality.

It is only more recently with Latham (1994) and Egan (1998) that 'culture' has been widely accepted as a major factor. However, even here it is treated as a barrier to be overcome (to change the 'adversarial culture') to allow these new mechanisms to be adopted, (treating 'culture' as a sub-system within the 'objectivized' building process). Little attention is given to it as a mechanism in changing or propagating 'better' (as opposed to 'best') practices. Thus, the attitudes of those in the construction industry are expected to change following the successful adoption of these practices (changes to the process) which are being driven by client organizations such as BAA or the DEO, and client groups (DBF Client Syndicate and Construction Round Table). The combination of the changes in attitudes and practice should therefore allow a new 'culture' to emerge.

It is argued here that merely to change the formal aspects of the process through new contractual relationships, procurement routes and the introduction of new management tools and techniques ignores the possibility of harnessing the concurrent processes of cultural change and development. Embedded attitudes and work practices are recognized as barriers to change leading to 'stagnation' in the adoption of innovative practices (Bennett *et al.* 1996, Root and Hancock 1996), but the role of 'language' in expressing shared meanings fundamental to the notion of 'culture' (Seymour and Rooke 1995) is ignored. And yet, shared meanings between the parties to the building process expressed through a common language could be a valuable mechanism for developing cultural change. Equally, the existence of different languages and meanings adopted by different parties would act as a significant barrier to the desired change.

THE PRE-INDUSTRIAL BUILDING PROCESS

Horstmann (1946) argued that the role of architect as a "controller and designer of buildings" first emerged in the Elizabethan period (*ibid*: 107) and that "previously, someone had to be responsible for the main scheme of a building, and as stone was the great building material of medieval times, the master stone mason must have had much to do with the design of the structure." (*ibid*: 107) Harvey (1971) indicates that the term mason refers to "*the* builder who had direction of works and was responsible for their design: what we now think of as the architect. Although the word came later to be used in contradistinction to carpenter, a builder in timber, a mason might have expert knowledge of both stone- and wood-working, and throughout the Middle Ages there were survivals of this overall competence in spite of the tendency of the later craft guilds to insist upon a specialized delineation of jobs"(*ibid*: 12).

Thus possessing skill in both the design and production (construction) activities, "the craftsmen possessed a tradition and a feeling that enabled them to carry out the idea of their employer as though that were part of themselves" (Horstmann 1946: 107). Therefore there was a limited number of drawings for design and detailed purposes, because the technical information did not have to be transferred between parties. This tradition of a single party with the knowledge of activities of designing and building was followed by architects into the 18th century (*ibid*.) and where draughtsmanship was necessary, it was carried out by the craftsmen rather than an architect (Harvey 1971).

It was only during the 18th century that the 'gentleman architect' evolved. However, even at this stage, the amateur's role was to be in dialog with the craftsman, craftsman which because of the historical tradition "were possessed of a very high level of technical skill, which was allied to an almost equally high sense of rightness in design. They were working to satisfy a clientele priding itself on its artistic knowledge and judgement" (Horstmann 1946: 132). However it was only during the later half of the 18th century when the economic and social changes, that were to become known as the 'industrial revolution', began to put pressure on the organization and allocation of roles within the building process. Consequently "design as a professional activity separated from the making of things is only a relatively recent phenomenon" (Lawson 1994: 1).

THE HISTORICAL SEPARATION OF CONSTRUCTION AND DESIGN

Powell (1980) identifies successful changes arising from the demands of building between 1815-1870 which "made for fluidity, roused contention and stimulated the search for effective organization and ways of working" (*ibid*: 27).

Therefore in this period of transition, those who were involved in the building industry were ill defined due to "the transition through which their relationships and activities were passing and … to the practice of combining roles so that some individuals were at once builder and architect and surveyor" (*ibid*: 27).

This transitional period of chaos resulted from radical changes in the size and nature of the industry (*ibid*.) and the type of buildings demanded. This, in turn demanded innovation in technology (Bowyer 1966) putting unsustainable demands on existing practices, relationships and organization within industry. The evolutionary approach of the craftsman could not cope with rapid developments in materials technology (Lawson 1997: 22). Such chaos was bound to lead large sponsors to push new forms of 'organization' to protect themselves from the uncertainty that resulted in much the same way as today's clients are driving changes in the UK through entities such as the Design Build Foundation or Construction Round Table. These new forms caused change in the contractual relationships setting the pattern for the UK industry for the next 150 years.

The large sponsors at this time were, in contrast to the previous dominant sponsors of church and state, primarily commercial arising from the new industries and associated urbanization. Consequently such sponsors inevitably would look to their own experiences in organization and the model of factory production. Hence "from the 1820s architects gradually divorced themselves from direct involvement in building" as the activities became specialized and concentrated into roles which separated design (seen as an adjunct to the management function) from the directed 'manufacturing' activity of building. There is no surprise that it was about this time that most of the current professional institutions emerged in recognizable form (for example, Royal Institute of British Architects in 1836, The Surveyors Institute 1868).

Saxon (1998) also identifies these developments but considers them to be a result of class changes where the architect retreated from practical implementation and shed the master mason role to deal with the increasingly numerous and self-aware middle classes as equals in a way that was never necessary with the nobility or ecclesiastical classes.

However the industrialized model of division of labour had supervision carried out by a 'management cadre' as it ceased to be an all-pervading activity. The results of such change were the de-skilling (Braverman 1975) of the craftsmen, through the removal of self-management and the removal of involvement in design. However the corollary of this was a de-skilling of the Architect (and similarly the other design and management professionals) through the removal of their direct contact with the activity of construction.

Hellgardt and Perrie (1984) identify a dichotomy between "action as labour and action as significant gesture (a form of meaning)" (*ibid*: 78) which was less emphatic in the feudal and pre-industrial period. The process of deskilling (Braverman 1974) and the creation of the modern commoditized concept of labour, which is its result, is the removal of the component of "action as significant gesture". It is essentially a degrading of the value relationship (meaning) between the worker and his work where the "ideal worker is seen as a type of extension of the machine, with repetitive movements and without opportunity to use his creativity or intellectual ability"(Rossi Residencial 1998). The "functional art" aspect (Mintzberg 1983: 204) of craft in contrast acknowledges that products perform a function (value in use) but also has aesthetic values and therefore are capable of action as meaningful gesture.

However, whilst the craftsman was faced with this degradation of the value relationship, the designer/architect/management cadre was not. Building on the tradition of the 'gentleman architect', the evolution of the professions adopted values representing 'residues' from pre-capitalist society (Larson 1970, Root 1992). Such values are the concepts of universal service, the intrinsic value of work and a belief that their heightened status within changing society as part of the emergent middle class imposed duties as well as conferring rights. Consequently the emergent professions in construction were able to maximize the component of work as "significant gesture" whilst minimizing the component of "action as labour".

While Mintzberg (1983) may argue that "one major industry, construction has also remained largely in the craft stage", the organization of the delivery of projects has not, such that standardization, whilst not possible in terms of the design or site, has been possible in the relationships, roles and practices of the parties involved. The development of standardized practices through the concurrent development of the professions (closely aligned to the growing middle-classes who were the dominant sponsors of building in the 19th century) may have initially come from the power of the middle-classes. But, their widespread adoption allowed these practices, roles and structure of organizing the delivery of projects to be institutionalized through the emerging professions. These institutionalized roles and practices "which people draw upon without thinking often embody assumptions which directly or indirectly legitimize existing power relations" (Fairclough 1989: 33). The result of this is that "the professional specialized designer producing drawings from which others build has come to be such a stable and familiar image that we now regard this process as the traditional form of design" (Lawson 1997: 23).

DIVERGENT FORMS OF LANGUAGE

The emergence of different groups through set roles and practices and the related control of particular bodies of knowledge is expressed through, and directly relates to, language. "As we negotiate with those who share our views and dispute with those who disagree, we do it through language" (Dant 1991: 1). Fairclough (1989) implies

that the expression of knowledge is an expression of power, using the example of the doctor/patient relationship to illustrate how conventions and practices in a consultation will embody 'common-sense' (ideological) assumptions on authority and hierarchy as natural and inevitable:

- the doctor knows about medicine and the patient doesn't

- the doctor is in a position to determine how a health problem should be dealt with and the patient isn't

- it is right (and 'natural') that the doctor should make the decision and control the course of the consultation and of the treatment, and that the patient should comply and co-operate (*ibid*: 2)

It is easy to see parallels between the doctor -patient relationship and the client-consultant and consultant-contractor relationship. There is certainly little argument that the control of knowledge by the professions is a major factor in their development and behaviour (Morgan 1990, Johnson 1972). Thus we can see the possibility of two different languages evolving: that of the architect/consultant ("free professional catering to an unorganized clientele"; Moore 1970: 65) concerned with action as gesture (meaning) and represented in the notion of the 'professional service'; and that of the 'builder' concerned with action as labour, (this language being the language of product, the physical solution to the prescribed design). Two languages, which are maintained through the position of the consultant professional in the building process legitimized through the existing practices of the industry.

These different languages are similarly identified by Hellgardt (1984) as two forms; the 'codified language'; and the 'language-act'. "The codified language which corresponds to the "language of architecture" as codified by formal rules and connecting functions, which must be distinguished from the meaning of the actual building act, i.e. the production of building" (*ibid*: 88). The language of building in contrast is uncodified and built up of the multiple language acts of building. Thus analysis on the basis of function (and so within the construction process the roles of 'architect' and 'builder') confuses specific human forms of labour with human activity in general" (*ibid*: 78).

Hellgardt proposes; "The history in both fields, in architecture as in philosophy, is full of confusion concerning those two realms of meaning. This is based on the denial that building has a perceptual or epistemological value of its own, which depends on particular contexts and cannot be conceived universally." (*ibid*: 89) The reason for this denial is that the act of building (as opposed to the overall building process) has been stripped of the design activity that would provide the 'action as gesture' component.

IMPLICATIONS IN THE LANGUAGE OF THE BUILDING DELIVERY PROCESS

While Mintzberg (1983) may argue that construction is craft based, the forms of organization are essentially those of the industrialized model separating design and production. The result is a view of the building process, which might typically be that given in Figure1 with opposing flows of information and materials.
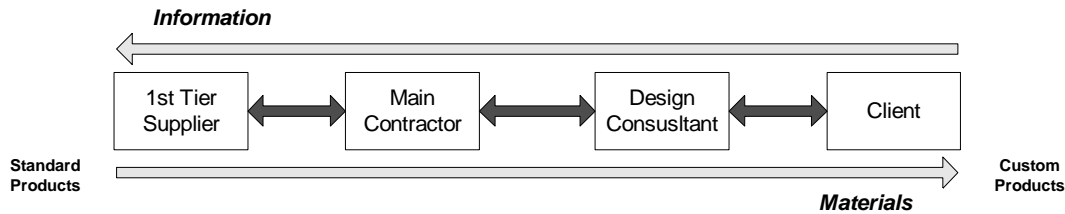
 Figure 1: Product-focused model

This type of model is a typical mechanical systems view that forms the basis of the original concept of industrialized system which "recognized that planning and doing were separate activities, that the one should precede the other, and that planning would not happen if mixed with doing" (Ashford 1989: 3). In such models "the human is removed for the equation; only the materials and the processes it undergoes remains from this imposition of rationality on the work situation" (Root 1992: 50). This objective approach is easily taken where power is exerted by coercion (Thompson 1983), in this case legitimized though the prevailing organizational forms determined by the design elite/management cadre.

An aspect of this objectivized/rationalist conceptualization is that inputs and outputs of the rational model such as 'information' have to be understandable in the language of 'product' since the language of 'service' has been stripped out of the construction activities. Whilst the design elite have minimized the 'action as labour' component, they have sufficient knowledge to attempt to act as translators between the language of service and product. Thus 'information' is given the status of 'objective reality' (Crook *et al.* 1996) but only when it leaves the domain of the designer and has to be transmitted to another party (designer or builder).

In attempts to objectively model the design process such as ADePT (Austin *et al.* 1993), the existence of these two languages is recognized in that the creative design action (of gesture, of meaning) is treated as a 'black box'. Within this box the concurrency of synthesis and analysis (Lawson 1994) causes the objective logic model of the industrial process to break down. The cognitive operations inherent in the language of service can not be separated into distinct phases. The language of product in terms of design information can. This is not an attempt to ignore what is in the 'black box' but an attempt to isolate the non-deterministic elements of design activity from those that readily fit a deterministic model.

In essence this is an explicit example of separating 'tame' and 'wicked' problems in the design activity. Rittel and Weber (1973) first coined these terms in relation to social policy, but the terms are capable of wider application in design (Lawson 1994) but also the activity of building. In the engineering/scientific tradition of the industrial process, Rittel and Weber ascribe the predominance of the 'tame' or 'benign' problems were an objective is clear. Thus a problem viewed through the scientific tradition is "definable and separable and may have solutions that are find-able"(*ibid*: 160). In contrast the 'wicked' problem is concerned not just with what objectives are being sought, but also the context in which those objectives were determined and whether they are the "right thing to do". That is to say we have been learning to ask questions about the outputs of actions and to pose problem statements in valuative frameworks" (*ibid*: 159).

Thus the 'building act' and its language of product is essentially seen as a 'tame' problem, because it is objective and 'value-free', whilst the act of gesture and of meaning which makes up the language of service, is perceived as a 'wicked' problem. In reality design and construction activities have elements of both, but the predominance of each means that as well as two distinctive groups controlling two distinctive bodies of knowledge, the process is perceived using two different concepts.

INTEGRATING CONSTRUCTION AND DESIGN

The existence of these two concepts with their two different languages can be seen to be a significant barrier to the changes that are desired by Latham, Egan and others. Previous initiatives on 'buildability' have sought to increase designer awareness and knowledge of the production phase but have not addressed the problem of the different languages and their translation nor the different philosophical perspectives that underlie them because the existing practices have reinforced those perspectives.

However, just as the demands of the clients forced changes and the establishment of practices based on the 'division of labour' model during the industrial revolution, so the demands of contemporary clients such as BAA and MOD for practices more in line with their experiences in organization, are leading to the introduction of new practices present in other industries supported by new conceptual forms and philosophies. These philosophies have typically been drawn from manufacturing concepts and approaches such as lean production (Barlow 1998) which shift from focusing on the product to focusing on the process; a theme picked up by Egan (1998), in the need for the construction industry to "rethink the process through which is delivers its projects"(*ibid*: 21).

The desire for the "integrated project process" (*ibid*.) as opposed to the process as a "series of sequential and largely separate operations undertaken by individual designers, constructors and suppliers" (*ibid*: 16) where each is focussing on the product it supplies to the other (information or material) requires a common language and conceptual view of the project process. At present such language exists only at the technical level (common meanings on what 'bricks' are) not at the level of the language of product and service, of tame and wicked problems. Yet the need for a 'holistic' approach to the 'product delivery process' demands it for without the common meanings and values of a common language, there is no hope of generating common aims and objectives within the process or project to supply the client's needs.

It is proposed that both construction and design should be recognized as 'wicked problems'. With design, it is recognized that whilst deterministic processes and modelling are of use in mapping information flows (the action of labour), it is within the context of a broader non-deterministic environment (Crooke *et al.* 1996). A similar view is now becoming more common in the construction phase in the "need to accept uncertainty and change, indeed, chaos, as the normal state of affairs and, therefore, the need to re-evaluate the fundamental processes of human organization" (Fellows *et al.* 1996, Groàk 1992). However, the chaotic analogy is not quite valid for whilst chaotic behaviour may be unpredictable, it is deterministic whereas the fundamental nature of the 'wicked' problem is not.

The validity of treating the whole process as a series of 'wicked' problems comes from the increasing influence of the constructors on the design process through prime contracting and design and build, and the increasing specialization of the industry with increasing amounts of design work being carried out by first tier suppliers and sub-
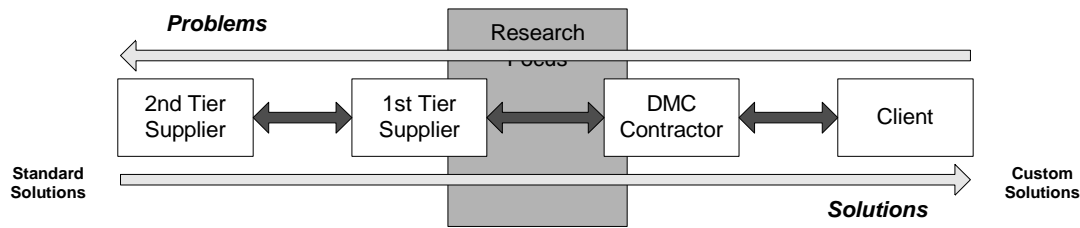
Figure 2: Service-focused mode**l**

contractors. The gradual dispersal of the previously centralized design activity, is effectively a return of some aspects of the 'craft tradition' whilst retaining the benefits of mass-production; the original objective of lean production (Barlow1998).

SUPPLY CHAIN MANAGEMNT AND THE DEVELOPMENT OF A COMMON LANGUAGE

'Lean production' thus provides a conceptual framework through which to approach the development of a common language and within lean production the need to adopt a 'holistic approach' has led the authors to concentrate on supply chain management (SCM) as a strategy to encourage the development of the shared meanings that the language requires. However the dispersal of design activity throughout the 'supply chain' means that the traditional labelling (Figure1) is no longer appropriate. Information now clearly flows both ways (as opposed to merely being represented as lower status 'feedback') as the analysis and synthesis of the problem solving takes place concurrently. Instead, the authors propose a model of the 'supply chain', which uses the language of service throughout the supply chain with problems flowing down from the end user and solutions flowing in the opposite direction (see Figure 2).

Within the context of such language, all problems are recognized as requiring a concurrent solution during the problem's formulation. The definition and solving of the problem thus requires a dialogue between adjacent parties within the supply chain forcing integration but on the basis of common understandings and meanings.

Using this as a basis, the authors are currently working on developing a "Supply Chain Framework" for an international DMC (design-manage-construct) organization to assist in developing closer relationships with its 1st tier suppliers. By seeking to change the language the parties use, the framework intends to use the language of service to encourage change in the perceptions of the parties in conjunction with more traditional tools and techniques in developing a SCM approach.

Although this project only began towards the end of 1998, there is early evidence indicating a wide range of perceptions within the supplier base and within the DMC organization as to whether suppliers/sub-contractors provide a 'product' or 'service'. This was seen as a major cause of misunderstanding and resultant conflict requiring highly prescriptive specifications and contracts on each project. It was recognized by the participants through extensive discussions that it was necessary to simplify these project relationships by deepening the long-term inter-organizational relationships between the DMC organization and its suppliers.

By providing a conceptual and normative framework through the adoption of a common language, within which the tools and mechanisms of partnering etc. are

used, it is hoped that the DMC organization and its suppliers will institute a "lingua franca that will promote better communication and, therefore, decrease the occasions for dispute and conflict and provide a framework which will facilitate the management of change" (Fellows *et al.* 1994) at a greater rate than might be otherwise achieved.

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