


# DESIGN MANAGEMENT IN ARCHITECTURE, ENGINEERING AND CONSTRUCTION: ORIGINS AND TRENDS

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## ABSTRACT

**Proposal:** Design management in the architectural engineering and construction (AEC) sector is a rapidly evolving discipline, with many interpretations and applications. Management of architectural design is essential for delivering design intent and maximising value to a wide range of stakeholders. This has resulted in the rapid growth of design managers working for contractors and greater attention to design management issues within professional consulting firms. This article explores the origins of design management in AEC, provides an overview of the practical application of design management by contractors and professional consultants, and concludes with some thoughts on current trends and future developments.

**Keywords:** Architectural Management; Design management; Education; Generic issues; Practical application.

## **1. INTRODUCTION**

Since the turn of the century there has been a rapid increase in the number of construction design managers employed by major contracting organisations in the UK as contractors seek to provide better value to their customers and increasingly recognise the strategic power of design. Many of these individuals have previously held positions as architects, engineers, project managers and cost consultants and now find themselves, through choice or circumstance, in a new and rapidly evolving role. Terms such as 'design manager' and to a lesser extent 'design integrator' or 'design coordinator' have become commonplace, although according to research by Tzortzopoulos and Cooper (2007) the exact nature of the construction design manager's role is not well defined or understood. Part of the confusion appears to stem from the wide interpretation of the role between different contracting organisations; part from the paucity of education and training programmes for construction design managers; and part from the way in which the terms design management and design manager are used in separate fields of literature, such as industrial product design, architecture and construction.

This article explores the origins of design management in AEC, provides an overview of the practical application of design management by contractors and professional consultants (in the UK) and concludes with some thoughts on current trends and future developments.

## **2. ORIGINS**

Many reports have questioned the ability of the construction sector as a whole to deliver value to the construction client (customer) and by implication the wider society. In the UK a number of Government led reports have called for change, examples being Latham (1994), and Egan (1998). Clients are increasingly demanding better value from those employed to deliver a physical artefact. Combined with research findings and associated articles in the professional trade press these reports have brought about pressure to change, with the adoption of new forms of contract and shifting roles and responsibilities within the AEC sector. One of these changes is the growth of contractor led procurement and the development of the design manager role in contracting organisations (Gray & Hughes, 2001; Bibby, 2003).

The need to manage design activity has been recognised for some time, in industrial product design (e.g. Farr, 1966; Cooper & Press, 1995); architecture

(RIBA, 1962) and more latterly construction. In the concise review offered here, the origins of design management are explored from three perspectives; that of design management in industrial product design (generic design management); the field of architectural management; and also the construction design management discipline. The intention is not to provide narrow definitions, but to look for trends and overlaps between these separate fields of literature.

## **2.1. GENERIC DESIGN MANAGEMENT**

It is the field of industrial product design that design management is most established. An early publication *Design Management* by Michael Farr (1966) put a convincing case for the design management role as an essential aid to attaining and maintaining competitive advantage. Farr (1966) made the observation that the design management role was not particularly well understood at the time of writing his book, since which time the design management field has developed (see for example Best, 2006). The creation of the *Design Management Institute* (see [www.dmi.org](http://www.dmi.org)) in the United States in 1975 was instrumental in legitimising the role of the design manager and has helped to stimulate a growing knowledge base. Although this body of work does not address design management from the perspective of a construction professional, it is possible to see parallels between the literature and the specific characteristics of construction projects. Many of the generic approaches appear to offer some value to construction design managers and may, with care, be applied to the management of construction design. The message is that:

- design management is integral to new product development
- design management relates to the entire life cycle of the product
- design (management) is a strategic asset

An all embracing definition that has relevance to the AEC sector can be found in Boyle's book *Design Project Management*. 'Design management involves understanding, coordinating and synthesising a wide range of inputs while working alongside a diverse cross-section of multidisciplinary colleagues' (Boyle, 2003). From this we can deduce that design management is concerned with interfaces (people, places, processes and products).

## **2.2. ARCHITECTURAL MANAGEMENT**

In the architectural literature the term 'architectural management' first appeared in the 1960s in the book *Management Applied to Architectural Practice* (Brunton *et al*,

1964), although it was not until the 1990s that the term started to be used more widely (e.g. Nicholson, 1992, 1995; Emmitt, 1999a, 1999b; Emmitt *et al*, 2009). Architectural management describes the synergy between the management of the professional office (often referred to as office or practice management) and the management of individual projects (often referred to as project or job management) (Brunton *et al*, 1966). The vast majority of publications concentrate on the management of the business (e.g. Sharp, 1986; Littlefield, 2005) or the management of projects (e.g. Green, 1995; Dalziel & Ostime, 2008). The two exceptions to this are both by Emmitt (1999a, 2007a), where the philosophy advocated by Brunton *et al* (1996) has been further developed. Indeed, it is the synergy between the management of the business and the management of individual projects that comprise the project portfolio that makes architectural management unique.

In 1992 the first international conference on architectural management was held at the University of Nottingham and such was the interest in the subject area that a working commission was set up by the CIB (International Council for Research and Innovation in Building and Construction) – CIBW096 Architectural Management (Nicholson, 1995). Selected proceedings of the Nottingham conference were published as an edited book by Nicholson (1992), although there was no attempt to provide a definition of the field (Emmitt, 1999b). This followed a few years later in Nicholson's PhD thesis (Nicholson, 1995). Since 1993 the working commission has been active in organising international conferences and publishing peer reviewed papers. It was not until 2009, however, that the first book by members of the CIB W096 was published *Architectural Management: international research & practice* (Emmitt *et al*, 2009). While this book reflects the work of the commission, it also forms a foundation for future research and practice. The message is that:

- Architectural management is integral to the successful management of individual projects and the business
- Architectural management relates to a wide range of activities conducted by building designers
- Architectural management is a strategic asset; however, the role of the architectural manager is rather vague.

It should be noted that within the domain of architecture the term 'design management' tends to be used to describe the effective management of the design process and the management of design content within individual projects (Allinson, 1997), with the majority of publications addressing the subject from the perspective of individual projects. Although this body of knowledge addressed

design management from the architect's perspective there is significant overlap between this and construction design management.

### **2.3. CONSTRUCTION DESIGN MANAGEMENT**

In the construction management literature the term design manager started to be used in the 1990s as procurement shifted in favour of design and build, early examples being a seminal report by Gray *et al* (1994) and the resultant book *Building Design Management* (Gray & Hughes, 2001) in which the growing importance of the design manager in construction was noted. In 2007 the Chartered Institute of Building (CIOB) recognised the term 'design manager'. However, the need to improve design management techniques (Bibby, 2003) and to better understand the design management role from a contractor's perspective (Tzortzopoulos and Cooper, 2007) illustrates the fact that the discipline is still developing. Bibby (2003) noted that while there was growing interest in design management within the UK construction sector, there were a number of barriers to be addressed before design management could be successful. These barriers related to the nature of the design process and (then) current construction practices. Tzortzopoulos and Cooper (2007) suggest that the issues also relate to a lack of clarity and understanding of the design manager role within the industry. Clearly the lack of guidance to construction design managers is an issue to be tackled as the role matures. The message is that:

- Design management is implemented at the level of the project; it is not integral to the successful management of individual projects *and* the business (as argued in the architectural management literature).
- Design management is largely a coordinating and integration function, and does not yet relate to the entire life cycle of the product (built asset), as argued in the generic management literature.
- Design management is not yet considered a strategic asset, although the role is evolving.

Similar to the architectural management literature, this body of knowledge is rather modest and lacks clear terms and definitions. Although there is some variation in interpretation within the literature it is evident that the construction design manager is responsible for managing the process of design implementation within projects on behalf of the contractor.

### **3. APPLICATION**

Having reviewed the literature, the obvious question to ask is what is happening within the AEC sector. Similar to the literature, there appears to be differences between the architectural community and the contracting community. A number of informal conversations with practitioners, both architects and contractors, suggested a lack of knowledge and understanding of the design manager role. Therefore, a number of interviews were conducted with 30 architects and 40 construction design managers. Some of these interviews were conducted with small groups of architects or construction design managers, some were conducted individually. Approximately two thirds of each sample comprised young architects and design managers, with between one and five years experience. The other third comprised more senior professionals with considerable industry experience. The interviews were conducted sporadically over a three year period and were opportunistic in nature. The concise summary of the points reported below is not meant to be conclusive, indeed, the main finding is the need for a more structured and rigorous study. However, the comments gleaned from the interviewees do provide a glimpse into the practitioners' world and provide some information to compare with the literature.

### **3.1. DESIGN MANAGEMENT BY ARCHITECTS**

It is still not common to hear the term 'design management' (design manager) or 'architectural management' (architectural manager) in the daily workplace. Interviewees reported that their offices are still using terms such as 'office manager' (to coordinate resources and workload) and 'job architect' (to administer individual projects). Only one of the interviewees was able to discuss the design manager role with any confidence, and that was related to the contractor's role. None of the architects interviewed felt that they needed a design manager or an architectural manager since the roles were implicit in the work of individuals within the office. Here the emphasis was on the managerial skills of the partners of the architectural offices. The senior members of the sample claimed to have the experience to manage design projects and their design businesses. This was questioned by the less experienced members, with the majority claiming that there was very little evidence of managerial skills in the practices they worked in. The sample confirmed that they had received little or no training in design management or architectural management during their training and that they were left to learn on the job. None of those interviewed were familiar with the term architectural management. From this small number of interviews one could tentatively propose that:

- The CIB commission W096 Architectural Management needs to do more to explain the benefits of architectural management to practitioners. This should include giving clear guidance on the role of an architectural manager.
- Educational institutions need to do more to include architectural design management within the curriculum.
- Professional bodies need to do more to promote architectural management to all members of the profession.

### **3.2. DESIGN MANAGEMENT BY CONTRACTORS**

In direct contrast to the architectural profession the terms design management and design manager are in common usage within the contracting sector. The interviewees confirmed that the design manager role tended to be confined to the construction site (a similar role to the 'resident engineer') with the design manager coordinating design changes as the work proceeded, acting as interface between the design team and the construction team. In the majority of cases it was reported that the design manager was subservient to the construction project manager. However, three of the sample suggested that the design manager role and the construction project manager role were more equal in their organisations. It was reported that over the past few years the design manager role had extended into pre-contract activities, i.e. responsible for management of client briefing (architectural programming) and conceptual design. The sample were aware of the benefits of design management to their projects, although none of the sample could articulate the link to their employer's business, their focus was entirely on projects. Furthermore, the majority of the sample claimed that the construction sector was ignorant of the role of the design manager, which often made it difficult for them to work with fellow project participants who tended to hold stereotypical views of established roles. The younger element of the sample had undertaken education in design management, while the more experienced element of the sample had mostly moved into a construction design manager role as their career developed; few of them had any formal training in the discipline. From the interviews one could tentatively propose that:

- The construction design managers wanted better recognition for, and understanding of, their role.
- There is a need for more educational and training programmes in construction design management

- Professional bodies need to do more to educate other members of the construction sector as to the role of the construction design manager

#### **4. EDUCATION OF DESIGN MANAGERS**

Despite the rapid growth in the number of individuals working as construction design managers in the UK, few have undertaken formal education or training in the discipline. This is because there are very few institutions that offer a dedicated construction design management programme. A small number of institutions offer modules in design management as part of a Masters degree in construction management, but there are few opportunities to study construction design management as a dedicated award programme. One exception is the Architectural Engineering and Design Management (AEDM) undergraduate degree programme at Loughborough University which was established in 1999. Accredited by the Chartered Institute of Building (CIOB) the programme continues to educate a small number of graduates who enter industry as construction design managers working primarily for large contracting organisations. Feedback from the AEDM alumni indicate a wide range of responsibilities and duties, ranging from the management of design content in the pre-construction phase and/or the management of design information during construction. In the majority of cases the graduate design managers are working as coordinators and integrators.

In architectural education there has been much debate about how much management should be included in the curriculum (see for example Emmitt, 1999a) and in the UK it is rare for architectural programmes to give the subject much prominence. One exception is the undergraduate architectural programme at the University of Northumbria where design management has been successfully incorporated into the design studio, as reported by Daws & Beacock (2009). Looking to mainland Europe there is one example of an effective postgraduate programme in architectural management at Eindhoven University of Technology. The Architectural Design Management Systems (ADMS) programme was established in 1996, offering a project based education programme which leads to the final award of a professional doctorate of engineering (PDEng). Since 1996 graduates have been implementing architectural management in architectural and contracting organisations, often with great success (Emmitt & Otter, 2010). The uniqueness of this programme helps to highlight the rather specialised nature of architectural management.



Comparing what is happening in industry with developments in education one can see a contrast between the construction design management field and the architectural management field. Industry has embraced the construction design manager role and appears to be leading the development of the field, with education and research following. In contrast, the majority of architects have not embraced architectural management, nor has architectural education. Here, the research appears to be leading developments in practice.

## **5. CONCLUSION**

Whatever terminology we choose to employ, be it design management, architectural management or construction design management, it is clear that the role is rapidly evolving within the AEC sector. In many respects it is the construction industry that is setting the agenda, with the majority of research following industry application and the architectural profession yet to respond. Given the relative scarcity of research into construction design management and architectural management there would appear to be numerous opportunities for researchers. Reviewing the literature reveals an incomplete picture, which is typical of an emergent discipline. Currently there are inconsistencies in philosophy, theory and use of terminology. This appears to be mirrored in industry with wide variations in interpretation, application and understanding. Indeed, Tzortzopoulos and Cooper (2007) have argued for clarity so that different stakeholders can apply appropriate tools and methods to establish the most effective processes and hence generate best value. This could be achieved if more contracting organisations were to publicise their operating methods in regards of design management. Unfortunately, the majority of contractors regard their internal operating procedures as confidential and of competitive advantage, hence the shortage of published information about what design managers do.

Special editions of the peer reviewed journal *Architectural Engineering & Design Management* ('Aspects of Design Management', Emmitt (ed.), 2007b; 'Design Management for Sustainability', Emmitt (ed.), 2009; and 'Lean Design Management', Emmitt (ed.), 2011) may go some way to help illustrate the complexities of design management. However, it is clear to this author that more needs to be done to both promote and clarify the design manager role within the AEC sector. This applies equally to the construction design management field and the architectural management field.

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## **7. BIOGRAPHY**

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