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The dynamics of design & construction management

Hans Wamelink

In the past 25 years I have worked in both the practical and the academic domains. Exciting times! Looking back, I can only conclude that alternating between the two has given me a great deal. It has enabled me to experience the changes in the construction industry from different perspectives: as a participating practitioner and as an observing academic, and in both cases with the drive to work innovatively and to change the industry. Moreover, those 25 years have been a period of interesting developments.

Much has changed, but much has remained the same as well. Not least the constant quest to find the optimum process, with integration and cooperation always as a core theme within the "loosely coupled system" that construction seems to be. After 25 years of research and experience, though, one thing is clear to me: there is no optimum process in general. Rather, we have to learn to respond better to the specific requirements of our construction assignments, and to make the right choices accordingly.

The whimsical history of management in construction

The spirit of an age seems to greatly influence its management methods. Researchers like Fayol and Taylor laid the foundations of the first management theories early in the twentieth century, developing "design rules" for effective processes (Taylor, 1911). At the heart of their thinking were the division of labour (specialisation) and the allocation of specific tasks and responsibilities to particular employees. In addition, they believed that no single person was capable of directly managing more than five or six others. Although still relevant in certain situations, these ideas have obviously been superseded by new concepts of management resulting from changes in society.

With regard to construction management in particular, the past fifty years have seen huge intellectual changes. "Project management" emerged as a fully-fledged discipline in the 1960s and 1970s, a period of much research and many publications on its methods and techniques. For example, this was when the "network scheduling" technique was developed and first applied within the construction industry. By the late 1970s into the 1980s, that had become the "main course" in construction management education. From my own student days, I remember the assignments to produce complicated network schemes along those lines. The appearance of the first computers reinforced the idea that network planning could be used to keep every detail of a project completely under control.

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In the late 1980s and 1990s, however, it became clear that traditional project management methods did not always provide the right answers for the coordination problems inherent to the construction industry. The fragmented process required new structural solutions. Whilst such fragmentation had always existed, in those years it was exacerbated by increasing specialisation within the industry as well as by such phenomena as the rise of information and communications technology. The availability of information and the ease with which it could be modified made it difficult to maintain the strict phasing propagated by traditional project management theories. The amount of information to hand and the level of redundancy resulted in inefficiencies and misunderstandings, increasing the risk of coordination problems and hence of failure costs. Another trigger of fundamental change was the way construction companies dealt with tenders. The habit of discussing these in advance, which was common practice – and a regulated activity – until 2002, led to questions in the Dutch Parliament and what would become known as the 'Construction Fraud' scandal. From that point onwards, demands that the industry change structurally in certain areas became more and more urgent: its performance and image were in need of substantial improvement. In response, the industry initiated various programmes in the process innovation domain. For example, Process and System Innovation in the Dutch Construction Industry (PSIBouw, 2004-2010). These called for a fresh new approach, one that is less project-based and more integrated, in order to tackle the coordination problems mentioned earlier. Since then, integrating phases, actors and products has become a clearly recognisable thread in the research conducted, also in my chair. With the result that many new ideas have emerged about how to organise and manage the process. Integrated Project Delivery, Best Value Procurement, Lean Construction, the Living Building Concept, Supply Chain Integration and Building Information Modelling are all notions launched during the last two decades.

Reflection on current developments

Personally, I have two somewhat contradictory views of all these developments. On the one hand they have certainly brought a lot to our industry: (pilot) projects have demonstrated the practical applicability of such concepts as Supply Chain Integration and Integrated Project Delivery. Partly thanks to our research over the past ten years, we now know the exact causes of project failures and also how particular solutions can be made to work. We know what factors facilitate cooperation on major projects, how best to implement Building Information Modelling and the dos and don'ts of Supply Chain Integration. In these areas, huge advances have been made (Vrijhoef, 2010; Bektas, 2013).

The flip side of the story, however, is the confusion brought to the industry by all these initiatives in the field of process innovation. Experts advocate their concept in order to convince important stakeholders that their approach is the best. The problem is that some of the improvements suggested and then tested in experiments and pilot projects are successful and some are not. And what may work with major public-sector clients on large projects, such as the use of Integrated Project Delivery, cannot be transposed directly to smaller ones, let alone to the private sector. For example, we know that the implementation of BIM works completely differently in large and small projects, but in each case can provide more or less added value (Wamelink & Heintz, 2015).

"The structural changes our industry is undergoing thus give rise to questions for parties across the construction process. They are asking themselves how they need to adapt to those changes, what their role is and – last but by no means least – what their own revenue model might be in this new situation"

The structural changes our industry is undergoing thus give rise to questions for parties across the construction process. They are asking themselves how they need to adapt to those changes, what their role is and – last but by no means least – what their own revenue model might be in this new situation. That prompted us to initiate research into the changes as viewed from the perspective of particular actors. The FuturA project is a good example of this approach, in which we are trying to analyse how the various changes and opportunities throughout the industry are affecting the role played by architects and architectural firms, and how they can respond to them business-wise (see www.future-architect.nl). Another example is the appointment of

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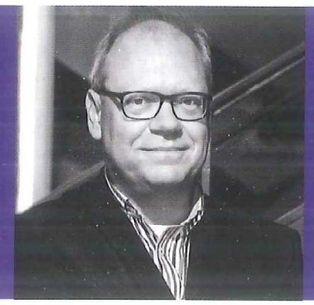
Hans is professor of Design and Construction management since 2006. Besides that, in 1991 he was one of the founders of the master track that is now called Management in the Built Environment.



Marleen Hermans as Professor of Public Commissioning. She is doing some excellent work investigating and clarifying the complicated position of the public commissioning bodies.

Future research in design and construction management

In the past ten years we have made considerable advances in the fields of process innovation and network cooperation, and also contemplated their significance for the individual parties involved. Over the next few years we intend to further develop our knowledge in these areas, particularly in the light of current developments like the emerging question of how our methods might influence the creation of a circular economy (Mohammadi et al, 2015).

As well as this work on particular aspects of construction management, research taking a more holistic view of the subject is required. The methods developed in recent decades need to be compared and contrasted, and we – by which I mean the industry as well as academia – have to learn to make the right choices for each specific construction job. With the ultimate aim of learning how to design appropriate project organisations for any given context. This is something I have already discussed in my inaugural lecture. Now is the time to make it concrete, drawing upon the know-how we have built up over the past ten years.

My experience is that successful project managers also apply such design oriented approaches. An experienced construction manager doesn't use a standard method, but adjusts it to the key challenges in the project. For instance, during the exciting relocation project of the Faculty in 2008, we have not hesitated to initiate a non-trivial process, regarding the selection of project partners, procurement and project control to meet the pressing time requirements. Our research will further substantiate this approach, explain and clarify. Eventually we will include the results in a book.

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Education and Design and Construction Management

The coming years we'll further develop the design approach to education: the 'project design school' (Heintz et al, 2016). Our purpose is to refocus education from learning the systems of for instance project management to learning how to be a project manager. To do this we propose an approach to project management that is based on the agency of the project manager rather than on the integrity of project management systems. We'll place the emphasis on the project manager's agency in selecting tools and actions from those systems and enacting courses of action using them. More specifically, we choose to see project management as a process of designing and enacting courses of action and "preferred situations". Doing so, we'll be able to prepare our students for a variety of careers in practice.

MSc track 'Management in the Built Environment'

Writing about education in Design and Construction Management brings me to the final issue I want to address: the future of the MSc track 'Management In the Built Environment'. Today's students make informed choices. They carefully decide upon the manner in which they live their lives and the way they study. In addition to that we see the market for graduates changing and a great variety of career paths developing within the global environment. The roles of architects, urban planners and project managers are shifting. The department (and faculty) needs to anticipate these often as yet invisible needs and link them to changes within the educational program we offer. Personally I think that developing the current MSc track into an independent MSc program (with specialised tracks) will create the opportunity to anticipate better to the needs of both students and market and will provide the possibility to open the program to students from outside the faculty (national and foreign) who deliberately want to pursue a management related career in the Built Environment.

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Concluding remarks

The past decade I have led both my chair and the Department with great pleasure. Much has been achieved in research and education. However, the dynamic environment challenges us to work on renewal continuously. In line with the above thoughts: we have to design our future cleverly to continue the success of the Department. I'm very confident that we will succeed!

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