IGLC-12 WHITE PAPER

Focus Area: Product Development and Design Management

Champions: Mike Kagioglou, Carlos Formoso and Stephen Emmitt

INTRODUCTION

This White Paper has been prepared as an aid to the development of papers for presentation at the 12th Annual Conference on Lean Construction to be held in Helsingør, Denmark in August 2004. Rather than provide an academic review of past papers and research reports we have provided a series of topical issues (key research issues) that we hope will stimulate and guide papers for presentation at the conference.

Product development and design management

Product development is defined as the process by which, the inception, conception, development, realization, use, maintenance and demolition/decommissioning of a facility (constructed works), can be described and managed. Terms such as architectural management have also been used to encompass these processes within a whole life framework. The Product Development process in construction encompasses a wide variety of traditionally disjointed tools, techniques, organizational and management structures and practices. The underpinning theories governing such a process have been evolving more rapidly in the past two decades. It is possible to trace this evolution of product development in construction and other industries in a number of areas. Furthermore, the way in which technology and contemporary organizational structures have influenced and enabled such an evolution can also be observed. Design management is an evolving and integral part of the product development process, in which the term 'design' is interpreted widely to encompass the contribution of all 'designers' involved in the product development process, from architects, technologists and engineers, to product and component developers and manufacturers, artisans and suppliers. The creation of value and setting of value parameters is seem as key to the subsequent transfer and implementation of design intent through efficient product development.

Product development can be achieved both at the macro (business, company view) and the micro level (project, activity view). However, it is recognised that both the understanding of product development and its enactment within construction projects is less than optimal. There are a number of key research areas and issues, which cut across functional areas of specialization, highlighted in this paper with the aim of stimulating research papers for presentation within the IGLC community. These are summarised below.

KEY RESEARCH ISSUES

The key areas on which we would welcome research with an emphasis on lean thinking and application are provided here. The list is not exhaustive and associated areas of research are also welcome (authors are welcome to contact any of the champions via the email addresses below).

Concurrent development of products and processes: the integration of design and construction can achieve significant benefits such as reduced lead times, increased quality of the product and process, increased profits for the whole supply chain, improved values for clients, users and society, etc. The lean philosophy is one of a number of approaches aimed at trying to close the gap between design and production activities while also improving value.

- What are the methods and ways that facilitate and enable integration to take place?
- What are the demonstrable benefits of an integrated approach?
- How can our understanding be improved with the development of new theories and philosophical frameworks?
- How can we produce mass customizable products and enabling processes?
- How can the different actors contribute to the concurrent development process?
- In what way does a performance approach enable a concurrent approach?
- What are the most appropriate methods of managing the trade-offs between different actors' requirements?

Integrated teams: multidisciplinary teams are still the exemption in the industry. Recently there has been a move toward more collaborative working arrangements based on the philosophy of partnering and strategic alliances, although it is difficult to see evidence of real integration throughout the entire supply chain, instead there are 'pockets' of collaborative work.

- How can functional teams come together to develop a product (constructed works)?
- What are the requirements and pre-requisites for developing multi-functional teams?
- What are the required competences of the actors?
- What are the practical barriers to integration?
- How does inter-firm and inter-personal communication aid integrative processes?
- How is knowledge incorporated within the product development process?
- How can integrated teams help in the identification and realisation of client and user requirements?

Process Modelling: the use of process models has enabled the visualization and communication of project and process activity within product development and design/construction management. Furthermore, process models can enable the understanding of fairly complex webs of activities and processes under a common framework.

- How can these models further improve the communication, standardisation and enactment of projects?
- How can process models be implemented in real life situations?

- What are the most appropriate frameworks?
- What are the benefits and challenges associated with process modeling?
- How do process models help to facilitate constructability?
- How can process models facilitate the dissemination of updated client requirements (design changes) during the product development stages?

Procurement: Traditional methods of procuring construction projects have tended to perpetuated adversarial practices in the construction sector and have had a negative impact on the product development process. Focus has tended to be on avoiding exposure to risk and avoiding blame, at the expense of creativity and innovation, not on the creation of dynamic and integrated teams. Furthermore, the emphasis on a whole life approach raises a number of questions regarding the appropriateness of established approaches to the procurement of constructed works.

- How does client briefing (value creation) and the communication of design intent affect the product development process?
- What is the (formal and informal) role of each actor in the delivery of client requirements?
- How do contemporary procurement practices affect the product development process and how can they be improved?
- How do we create and maintain a collaborative culture that adds value to the product development process?
- How can we measure the effects and level of project and organisational culture?
- What are the most appropriate procurement options given a whole life approach to our built environment?

Technology Utilisation: Technology and in particular information technology (ITs) offer increased benefits in the communication, visualization and examination of very complex products. In many cases the development of ITs has not taken sufficient account of the process and the people issues involved in implementing such technologies. Furthermore the rate of component development has resulted in a vast choice for the specifier charged with improving constructability, performance in use and disassembly strategies.

- What were the implications of technological development for the construction sectors' actors?
- Which are the good examples of technology utilisation and its effective management?
- How can a better alignment of people, processes and technologies be achieved?
- How can technology enable the consideration of whole life issues such as whole life costs and performance in use?
- How can technologies aid information flows and the utilisation of information?
- How best can ITs be harnessed to support the management of client requirements?

Performance measurement: should be an integral part of the product development process and associated activities since effective and transparent measurement can help to provide real insights to the effectiveness of the processes being implemented and help to highlight areas for improvement.

- What is the degree to which existing performance measures can provide this insight?
- To what extent do government and industry initiatives help in the achievement of performance measurement?
- How can new performance measurement and management methods offer increased value and improve our understanding of the processes?
- How does the cost of measuring performance relate to the perceived or actual benefits, i.e. is it cost effective?
- What are the links between performance measurement and the realisation of client values?
- How are user requirements best measured and incorporated into the product development process?

PAPERS

Papers are invited that address the key research areas for the focus area of Product Development and Design Management and thus help to increase our understanding of the processes involved, propose innovative ways in which some of the present deficiencies can be overcome, and hence demonstrate understanding through case studies and/or real life applications. As such both theoretical and applied papers are sought that tackle these issues from a 'lean' perspective.

Authors are welcome to contact the product champions to discuss issues relating to the submission of papers. Contact details are:

Mike Kagioglou: m.kagioglou@salford.ac.uk
Carlos Formoso: formoso@vortex.ufrgs.br
Stephen Emmitt: se@byg.dtu.dk

MK/CF/SE - January 2004