

## EDITORIAL: SPECIAL ISSUE ON EMERGING DIGITAL TECHNOLOGIES AND INNOVATIONS

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### 1. INTRODUCTION

Whereas the architectural and urban planning practices historically responded to strict urban and civic hierarchies and stylistic conventions, architecture practice find itself today in a competitive market environment, where architecture expression looks beyond the digital imagery produced by CAD packages to retrieve the architects control over the design process to produce sensory and experimental environments.

ASCAAD 7th international conference theme explores the linkages between digital design process thinking, constructability, the digital manufacturing process and their impact on the practice of architecture, engineering and construction. The conference aimed to trigger the debate on expanding the use of Computer-Aided Architectural Design and Information Technology to digital crafting of elements (I.e. Bricks patterns), the meshing of environmental assessment tools (i.e. CFD) with urban principles to allow for the expansion of use in urban environments, and how the educational environments inside the architectural design studio has an impact on the use of these tools to craft architectural environments.

In this issue, selected and updated papers points towards a suggestion that critical and key to the visualization of buildings and urban environments at their inception stages. It is acknowledged that users of these design tools face the need to overcome the adoption and implementation barriers associated with these tools and the need to control exaggerated expectations that these tools can substitute innovative architectural thinking and talent. While in use, the users should explore how these technologies would enable innovative new design patterns. Also, it is important to find out how these technologies should be used to overcome the present built environmental problems, and enable the users to introduce and allow for scripting and coding of spaces for new social and use constructs. In parallel rises the need for the use of effective digital design tools that promote collaborative working.

Ramilo and Bin Embi (2014) find that Digital technologies are rapidly develop and increasingly used in practice. Although not used to their full potential, these technologies have proven to improve productivity and design quality.

The reason is that substantial organizational and technological barriers inhibit the effective adoption of these technologies in architectural practices and particularly in small scale practices. The researchers conduct a pilot study on several small architectural organizations to find out how digital technologies are in use in the process of crafting and production of buildings.

They find that although the younger generations of architects are more computer literate, that the majority of parametric based tools (except Autodesk Revit) and building performance simulation tools are not being utilized in small practices. Technical, organizational and financial barriers are discussed in their work.

Technical barriers include the lack of technology related resources like software, computers, and specialist digital tools, insufficient technical knowledge between the team, lack of appropriate personnel to carry out the project from design stage to construction and lack of interest for digital innovation.

The study shows that organizational barriers such as poor leadership towards digital innovation, poor organization attitude to innovation, lack of empowerment and support to digital innovation construction and lack of interest for digital innovation, inhibit the utilization of digital technologies for digital innovation.

Financial barriers include inadequate design fee to support digital innovation, insufficient budget for digital innovation, the practice doesn't want to spend much for digital tools, digital tools are expensive to set-up equipment, lack of budget for training the team, high equipment (computer) maintenance cost, and practice-based cost doesn't support digital innovation.

Abuelmaatti and Ahmed (2014) suggest that companies adopting the collaborative technologies including Building Information Modelling (BIM) usually fail in achieving the full benefits from their implementations. This paper reviews how collaborative technologies promote collaborative working between large companies and SMEs in the AEC sector and it presents the current approaches adopted by construction organizations implementing collaboration environments. To enhance successful collaboration, a number of key elements should be focussed on, during the implementation of the collaborative technologies. These are: defining collaborative technologies responsibilities, ensuring top-level management commitment, common convention, and intellectual property rights. The study shows improvement in appreciating the importance of training. However, bringing the team members together is not appreciated which is considered as one of the weaknesses for effective implementation. The guidance for successful implementation lacks clarity on the management side. Therefore, this could be considered as another weakness for effective implementation.

Afsari K. et al. (2014) argue that current traditional tools do not provide interactive techniques for the design of brickwork patterns and these cannot manage constant changes parametrically, and inform and influence design process by providing design feedback on the constructive and structural aspects of the proposed brick pattern and geometry. On the other hand, present digital tools that can create the design of patterns on the brick walls have been limited and do not support interactive design. Therefore there is a need for digital tools in design would enable new methodologies for creating distinct patterns of brick forms in architecture. The authors discuss a methodology for an interactive brickwork design within generative techniques. These techniques can generate interactive arbitrary patterns and map it to the brick wall in real-time. An experimental prototype was demonstrated for designing interactive brickwork patterns.

Setaih et al. (2014) highlighted that more people are living in cities nowadays and this causes rapid population growth and dense urban developments. This by turn leads to the increase of phenomenon of urban heat islands thus deteriorating air quality and thermal discomfort in outdoor urban public spaces. The urbanization in hot arid countries accompanied with dense urbanization, high-rise buildings, and industrializing the building processes and materials has led to changes in the urban microclimate characteristics in many outdoor and indoor spaces due to reduction of vegetation and production of anthropogenic heat. The authors have used Computational Fluid Dynamics (CFD) to investigate the complex fluid flows in an urban street in the hot arid city of Madinah, Saudi Arabia. They find, that increasing the height of buildings that are located at the edge of the road and in the center and by

locating a new street in the wind direction would increase the wind speed and decrease the air temperature along several parts of the street. This would in turn, enhance the thermal environment conditions of the urban area under study and extend the potential use of CFD.

Sidawi (2014) reviews the educational acceptance and required educational environments to promote a healthy social interaction in design studios that supports students to undertake innovation design activities. It indicates that tutors and students should be flexible, open-minded, and should have shared understanding of how to apply creativity dimensions in the design project. This research argues that a healthy design studio engagement would positively affect the use of CAAD systems. Thus CAAD would support students in their attempts to develop innovative design solutions. The study recommends that design activities should be supported by ubiquitous and timely communications with tutors and colleagues. Using CAAD systems would then provide a platform for architectural exploration when used in conjunction with innovative design activities and the implementation of innovative scope and objectives for the design studio's curriculum.

## 2. ACKNOWLEDGEMENTS

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