

## **CONSTRUCTION ENGINEERING MASTERS DISSERTATION ABSTRACT**

### **What Role may Drawing and 2D Representation Play in a Digital Future?**

Technological and business process pressures are pushing the Architecture, Engineering and Construction (AEC) industry towards digital design methodologies that are beginning to move away from an established paradigm of two-dimensional (2D) representation and analysis via drawing and drawings, situated in a contractual environment centred upon drawings, towards three-dimensional (3D) model centric representation and production processes. The methodology currently employed remains rooted in the structures of the earlier paradigm, perhaps inhibiting potential benefits arising from digital representation. That the production of 2D drawings continues to be central to mainstream practice appears not to be simply the result of habit.

This study proposes that the activity of drawing and the drawing artefact are curatorial tools having attributes and benefits that may not always translate fully into digital design and construction processes. Via analysis of semi-structured interviews with practitioners from the primary AEC Design disciplines, this study sought to identify some of the communicative attributes and benefits of both drawing and drawings that may be beneficial in the context of future 3D model-based digital design and construction processes.

Review and analysis of the literature, in conjunction with analysis of interview content, found that the mental visualisation involved in the activity of drawing and the related cognitive engagement with drawings is central to fostering understanding while involved in both recording reality and expressing imagined reality. A consensus emerged from interview participants that while 3D modelling is in most cases essential for successful design coordination some limitations of current technology make drawing production via 3D modelling burdensome. However, participants also placed high value on the content and communicative attributes of drawings, observing that in many contexts they can be the most effective means of depicting the required information and situating that information in context. Concern was expressed over lack of training in drawing skills and that the adoption of 3D modelling as a default process may lead to a decline in the pervasiveness of mental visualisation skills among practitioners.

Recommendations emerging from the study were that software vendors should, in the near-term, address current functional limitations to ease the burden imposed by 2D production drawing activities. In the longer-term they should explore the possibilities for enhancing data visualisation in future products if the communicative attributes and artefacts of drawing content were separated from the drawing artefact. It was also recommended that tuition in hand sketching and projective drawing should be included in the formal education of AEC practitioners.

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