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The coevolution of AEC professional work practices with technology: collaborative delivery framework modelling for BIM projects

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Abstract

Despite BIM's potential to alleviate persistent construction industry challenges, its use does not guarantee results. Therefore, it was argued and established from a theoretical and practical standpoint that the implementation of BIM, an evolving technology, within pre-BIM organisational and project team work practices (as activity systems), induces their evolution through dysfunctions created in the systems and their resolution. A multi-stage\multi-method research design involving a study of BIM implementation cases, documents analysis, swimlane modelling and multi-domain-mapping (MDM) of pre-BIM and BIM-enabled project delivery processes was employed. This was to develop an understanding of how construction professional work practices evolve with the implementation of BIM. The findings show that evolutionary change of work practices within organisations precedes that of project teams. The findings further suggest a link between organisational attitude towards BIM as a method of working and success at implementing it. Using activity theory, a novel conceptual analysis of BIM induced change in professional work practices aided a theoretical understanding of the implications of implementing BIM on construction professional work practices. The theory provided a basis for analysing historical and future change patterns in professional work practices with BIM and indeed similar work mediating tools. An in-depth conceptualisation and new theoretical insight were developed on the phenomenon of new role legitimation, establishing that new BIM role takers are legitimated to exercise authority within project teams and organisations mainly because they leverage knowledge as a strategic resource. By implication, they will remain legitimate only as long as the constraint or dysfunction prompting their creation subsists. Furthermore, using swimlane and MDM modelling methods in complement, the BIM change impact on pre-BIM workflows was modelled. An objective evaluation of the BIM change impact at the pre-construction phase showed that the BIM-enabled project delivery workflows structure, compared to the pre-BIM is more connected and integrated.

Keywords: *Building Information Modelling, Activity Theory, Multi-Domain Mapping Matrices, Change, Roles, Professional Work Practices*