

MISQ Archivist

The Complex Effects of Cross-Domain Knowledge on IS Development: A Simulation-Based Theory Development

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Abstract

Information systems development (ISD) requires both business domain and technology domain knowledge. How cross-domain knowledge affects ISD outcomes is one of the most fundamental and persistent problems in the IS field. We argue that the effect of cross-domain knowledge depends on its distribution across business and IT units and ISD complexity in terms of level and pattern of design element interdependencies. We systematically investigate the complex effects of cross-domain knowledge on ISD performance by using simulations based on the *NK* fitness landscapes model. We find that cross-domain knowledge not only increases ISD performance but also reduces its variability. These effects are greater when ISD complexity is greater. Cross-domain knowledge is found to increase the robustness of ISD performance across different patterns of design element interdependencies. Interestingly, ISD performance is higher when cross-domain knowledge is unevenly distributed across business and IS units and when its distribution pattern matches the pattern of the design element interdependencies. These findings suggest that the effect of cross-domain knowledge on ISD performance is not fixed but depends on its structural pattern, the level and pattern of design element interdependencies, and their interactions. This study illuminates how and why challenges in ISD might be structural and how, why, and when cross-domain knowledge might help to overcome these challenges. We develop a theoretical framework and propositions based on our findings.

Keywords: Cross-domain knowledge, information systems development (ISD), design element interdependence, complexity, *NK* fitness landscapes model, simulation, theory development