

## **Dissertation Defense**

Effects of Social Network Configuration on Collective Design and Innovation

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Available via Zoom:

<https://binghamton.zoom.us/j/96692560997?pwd=TXU3bEdMS0tMM2VzUVFFaGY5OStiUT09>

### **Abstract**

Organizations are increasingly relying on collective design and innovation during which network configuration played a dominant role in the performance. This research is aiming to investigate how the collective design and innovation would be affected by the network topology and the background diversity of collective individual members. Three human-subject online experiments were conducted which involved nearly 617 student participants who worked together anonymously in a collective network structure using a custom-made computer-mediated collaboration platform. Several measurements including the collective idea generation, idea diversity, idea quality, and participants' experience which can quantify a collective's performance and experience were compared among three different background distribution conditions under a same spatially-clustered network topology with the help of the "doc2vec" text representation machine learning algorithm. Similarly, the same measurements were compared between spatially-clustered and fully-connected collectives. To help analyzing the collective activity, this research introduced three new visualization methods called "Idea Cloud", "Idea Geography" and "Idea Network" which can be used to monitor the collective idea posting and innovation activity, and intuitively tracks idea clustering and transition. The results showed that spatially-clustered collectives with clustered background allocation tended to explore more diverse and innovative ideas; collectives with random background allocation have the ability to produce the best design idea with highest utility values; meanwhile, collectives with dispersed background allocation are good at filtering out low quality ideas. The results also suggested that high connection density of a network may help to improve individuals' overall experience in the experiment, but unexpectedly, may not be able to improve the collective performance regarding the idea generation, the idea diversity, or the final idea quality.