

BIG DATA, SMART BUILDINGS, POST-COVID OFFICE REAL ESTATE DECISION MAKING, AND MULTI-DISCIPLINARY UNDERGRADUATE LEARNING: A CASE STUDY IN DISCOVERY THINKING

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ABSTRACT

Smart buildings, complete with various IoT devices, have been collecting lakes of underused data prior to, during, and after COVID pandemic stay-at-home orders. Office building vacancy rates continue to rise in 2023 and it is estimated that 10-20% of existing office space will require repurposing [Forbes] as work from home and other hybrid work arrangements are stabilizing as commonplace. A multi-disciplinary team of undergraduate students from an experimental honors degree program worked with a Real Estate Investment Trust (REIT) company to translate big data sensor information into immediate, actionable cost saving decisions accompanied by recommendations for future space reutilization. The team leveraged discovery and collaboration skills taught in the program to deliver an innovative solution for current market challenges.

Discovery Thinking

The program is built to teach collaboration and innovation sufficient to tackle complex problems by leveraging diversity in both team construction and mentorship. In this instance of the program, the team consisted of 14 third- and fourth-year students from six colleges across the university. This experience complements their individual pursuits of discipline-specific undergraduate degrees in data analytics, industrial and systems engineering, business information technology, computer engineering, smart and sustainable cities, industrial design, finance, or management. They were joined by faculty from Business, Engineering, and Architecture & Design, and industry partners consisting of a VP of Finance, a Chief Technology Officer, and a Director of Technology Initiatives from the REIT. Together they explored a problem space using a novel complex problem-solving framework called Discovery Thinking as presented by [Smith]. Over the course of two semesters, the team explored the problem space from a sociotechnical perspective to discover an innovative set of recommendations that their industry partners could put into action for desired outcomes. Innovative, sociotechnical solutions are discovered through a four-set assessment of Desirability, Feasibility, Viability, and Sustainability and producing business and system artifacts: a concept of operations, systems architectures, risk matrices, verification and validation requirements, business plans, and assessment of sustainability concerns such as legal, regulatory, or operational barriers, and more. The case study demonstrates the process and outcomes of teaching discovery thinking.

REFERENCES

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[2] Smith, Robert, Sagheb, Shahabedin, "Discovery Thinking: A Complex Problem-Solving Technique" in *Proceedings of the 27th World Multi-Conference on Systemics, Cybernetics and Informatics*, 2023, pp. 453-459.