

Penn State-led Team to Study Digital Modelling on Capital Projects



It takes a lot of data to move a large-scale, costly building project from design to reality. Digital modelling, otherwise known as building information modelling, or BIM, increases construction efficiency and saves time and resources on building projects by compiling large amounts of project data into a well-organized central repository.

John Messner, Charles and Elinor Matts Professor of Architectural Engineering at Pennsylvania State University (Penn State), is leading a US\$240,000 Construction Industry Institute (CII)-funded project to study building projects that have utilized digital modelling and to compile recommended best practices for organizing, retrieving and analyzing project data, which often includes a three-dimensional model and other disparate sources of facility information.

“This project focuses on how we can improve as a construction industry in our use of digital modelling and how to leverage models throughout a project’s lifecycle,” Messner said. “We’ll look at high-performing facility projects and learn how they did it and whyâ€ they’reâ€ successful, and then come up with best practices and approaches to take it to the next level.” â€

Co-principal investigators Robert Leicht, associate professor of architectural engineering, and Chris McComb, assistant professor of engineering design and mechanical engineering, will work with Messner on the research for the grant, as well as representatives from several industry partners including Smithsonian Institution, Autodesk, Fluor Corporation, Oracle Corporation, Dow Chemical Company and others, who will help identify projects for use as case studies.

Democratized manufacturing processes

McComb said the team will look at distributed democratized manufacturing processes, or processes that are not centralized in a specific factory and are controlled by people, like 3D printers, passenger jets, massive energy products like gas turbines and projects from several aerospace start-ups like [Gilmour Space Technologies](#).

In examining high-performing case studies, researchers will determine best practices and ways to leverage data to support increased collaboration and integration, and then extend those best practices to develop guidelines for industry professionals to plan and deliver future projects using a digital model-centric approach.

“We’re looking beyond traditional construction to identify paradigm-breaking best practices,” McComb said. “Leveraging data-informed models throughout the construction life cycle will make it easier for different stakeholders to communicate and exchangeâ€ data. Thisâ€ will fundamentally alter the bottom line, making it possible to deliver projects more quickly, safely and inexpensively.”

Digital model

One of the challenges in the construction industry is getting interdisciplinary teams – consisting of designers, suppliers, consultants, owners and skilled workers – to work together and communicate effectively on a large capital project, according to Messner. A digital model could ensure a team is on the same page when it comes to construction schedules, cost evaluations and every other detail it takes to deliver a project.

“If it’s deployed early in a project, digital modelling approaches set up a focus for a team to follow,” Messner said. “That entire team could define the best way to work together by getting information from the models, which would be the foundation of their daily work activities.” Hopefully this study is a catalyst to help project teams more effectively deliver their projects using digital models in the future.”

Better understanding of data-centric technologies

Based at the University of Texas at Austin, [CII](#) is a membership-based research and development centre for the capital-projects industry. It is a three-way research partnership among owners, contractors and researchers in academia and funds research on construction, commercial buildings, manufacturing and life sciences, power and utilities, oil and gas, infrastructure and more. It provides several webinars and events throughout the year, including an annual conference, where Messner and his team will present their findings in 2021.

“This study will allow CII members to better understand the data-centric technologies and processes that can lead to more collaborative delivery of capital projects,” said Daniel Oliveira, associate director for funded studies at CII. “The integrated data management strategies and illustrative case studies will guide members to make more informed decisions and navigate the increasingly complex aspects of data management when planning for new projects.”

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