

## The New IPD Paradigm: Lessons Learned at Worcester State College

### **Redefining Project Partnership with BIM**

“Collaboration” has long been a buzzword in the A/E/C industry—from architects promoting design as a partnering process to contractors and engineers boasting of being team players. It’s no wonder why. Teaming ability can mean the difference between winning and losing a client, and project success—from schedule and budget control to building function and aesthetic—often hinges on the ability of a team to work together and share information efficiently.

That’s what makes BIM technology both revolutionary and challenging. As a database facilitating a central, three-dimensional, dynamic model in real time, BIM represents a quantum leap for collaboration among project teams. Many benefits are immediate, including enhanced ability to communicate new designs, streamlined construction deliverables, and error prevention. But the true paradigm-shifting potential of BIM, defined in part by completely Integrated Project Delivery, empowered client decision-making, and dramatically lower costs, can occur only when a full project team including consultants, construction managers, and clients, unites within an integrated BIM environment.

In short, BIM today offers unprecedented collaborative potential, but it’s only as powerful as its weakest user. What’s more, as clients become more aware of its benefits, they will respond by selecting teams based on BIM fluency.

A dorm expansion built on behalf of the Massachusetts State College Building Authority (MSCBA), offers a compelling snapshot of this dynamic—highlighting BIMs opportunities and potential limitations in its practice today, as well as its transformative impact on the client/project team dynamic.

## **Case Study: Worcester State College**

A client that demands integrated project delivery, MSCBA represented an ideal fit for BIM technology and its potential for dramatically enhanced coordination amongst project teams. PCA has used Autodesk's BIM platform, Revit Architecture, since 2006, and was selected for a Boston Architectural College study on effective implementation of BIM into the architectural workplace. Our existing understanding of the tool helped us assemble a team equipped to leverage it.

From the project outset this collective expertise helped the team transcend the typical goal-setting process. Along with establishing project goals for program enhancement, construction budgets, sustainable outcomes of LEED Silver and use of renewable energy sources, the team established BIM protocols for model usage and sharing. Chief among these was the establishment of an FTP site to which all disciplines would upload their models every Friday. PCA would then assemble and post a coordination model the subsequent Monday.

Efficiency was realized immediately. Sophisticated, expressive renderings could be quickly generated and immediately shared for team review using Revit's built-in rendering engine, and the dorm's uniform rooms proved ideal for leveraging BIM capability by allowing PCA to create "model groups" of rooms, each of which could be easily modified or duplicated (with all changes automatically replicated throughout the overall 168-bed model). Through the use of BIM, coordination issues were automated and streamlined. In the past, coordination of the door schedule, for example, may have taken days for a dormitory containing nearly 200 doors. With BIM's model groups and streamlined coordination between component, tag and schedule, the process took only hours.

This design model was complimented by a structural engineering model that was seamlessly integrated in Revit using shared coordinates (a tool allowing the team to manage and share the project's position/location and true elevation). Having set up "phasing" within the project to specify which items were "new construction" versus "existing" PCA was easily able to communicate the required extent of the engineering scope within the model. Using the Copy/Monitor functionality the models were analyzed in weekly Coordination Reviews which notified the structural engineer to PCA's architectural changes. Subsequently, the engineering model could be updated or an alternative could be proposed

immediately. These “linked” models streamlined the dialogue between the two disciplines and caught potential issues and mistakes early on in the design phase preventing costly errors which could manifest in the field during construction. Moreover, they fostered and continuously reinforced a shared understanding of the project’s big picture goals and concepts.

### **BIM Streamlines Construction, Coordination**

The construction process was also aided by working through Revit. Linking to the A/E model, the team’s construction manager created 3D logistical plans for phasing and sequencing—areas required for construction operations that they communicated to the client. Revit’s 3D capability afforded a clear understanding of how the building’s components worked together, reducing spatial ambiguity and offering more certainty to the construction bidding process.

This seamless coordination between much of the team at Worcester State illustrated BIM’s remarkable efficiencies, but it also revealed the growing pains of its rapid proliferation throughout the A/E/C industry. Revit’s architectural and structural engineering capabilities are robust, but its MEP capability is newer and lesser used industry-wide—a technical gap that can limit Revit fluency among full project teams, and curb its potential benefits. At Worcester State, renewable energy aspirations required a specialty MEP engineer who was not Revit-equipped. The project’s sustainability goals were met, but opportunities for coordination, automation, and efficiency were missed with the complete team unable to link to the BIM model.

### **Conclusions**

Nonetheless, the Worcester State project ultimately leveraged BIM to minimize errors, empower the client to make educated decisions, and improve the project’s overall design integrity. This successful result despite the team’s varied BIM expertise is instructive to the industry. As the technology gap between MEP and architectural Revit quickly closes, and successful projects like Worcester State increase client awareness of BIM’s benefits to them, the ability to maximize BIM benefits will only continue to emerge as a key factor in selecting project teams, offering BIM-proficient firms a clear edge.