When Bricks Meet Bytes

Navigating 21st Century Technology Pitfalls for Construction Professionals

By Dion Cominos and Laila Santana

The intersections and collisions between the worlds of professional services and technology are varied and numerous, affecting virtually every facet of modern business. Nowhere has this effect been more profound than in the field of construction, where electronic tools and innovations have revolutionized the processes of design and construction, resulting in a significant acceleration of both the conceptualization and development of buildings and structures worldwide.

However, this panacea of mechanization and automation comes with a price as a whole new range of liabilities and exposures emerge, presenting novel challenges and dilemmas for the architect and engineer (A&E) practitioner. Let's explore both the opportunities and hazards that can result from the convergence of technology and construction, and also examine ways in which professionals can steer clear of the perils that can jeopardize the unwary.

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The Good

As with any professional or social undertaking, technology can be a godsend, allowing an individual to leverage boundless speed, information, and resources at the push of a button. And the amount of available data and material continues to grow at an exponential rate. Nearly every facet of the construction process has been affected and enhanced by the use of technology, from the earliest stages of conceptual design to schematic development, bidding, and construction.

The first major advancement in this arena occurred with the

advent of building information modeling (BIM), a three-dimensional visual tool that allows participants in a construction project to create, develop, and, ultimately, build a project with the assistance of a robust and interactive model that continually evolves throughout a project's lifecycle. Its use extends from a design's initial ideation through final inspection, and even beyond to the building's ongoing maintenance, management, expansion, and modifications.

The plusses offered by BIM are many and include the following:

- "Living" model that can be continuously updated.
- Centralized design available in real time to all project participants.
- Allows for a more accurate preview of a project.
- Helps clarify design intent.
- Identifies conflicts not apparent in 2D renderings.
- Permits automatic integrations of various systems.
- Enables communication in real time among various disciplines.
- Results in time and cost savings.
- Makes it more likely that the finished product will resemble the design.
- Requires less time drafting and thus allows more time for designing.
- Results in faster bidding.
- Allows for automatic incorporation of product specifications/systems.
- Results in more accurate quantity estimations/bidding.
- Provides improved collaboration among stakeholders.
- Produces superior "as-builts."
- Is particularly advantageous to design/build teams.
- Facilitates operation and maintenance of buildings following construction.
- Provides useful information to first responders in the event of emergencies.

In addition to BIM, most modern construction projects also utilize sophisticated, technology-driven collaboration platforms to manage everything from project procurement processes to schedules, budgets, and daily communications.

While technology can greatly increase a project's efficiency, it also can create treacherous quagmires for the unprepared.

In fact, in this day and age, it is increasingly common for projects to utilize cloud-based technologies and extranet sites to facilitate different aspects of construction, including document management, real-time activity feeds, meeting calendars, minutes, videographic progress recordings, communications with review agencies/municipalities, and more. These various tools also present the advantage of centralizing project communications and information while expediting its immediate dissemination among the various stakeholders involved in the process.

The Bad

While technology can greatly increase a project's efficiency, it also can create treacherous quagmires for the unprepared. Like many other technologies, BIM can be a double-edged sword and a tool fraught with potential problems.

To begin with, BIM poses the risk of blurring important distinctions between the roles of the designer and the contractor and can lead to a loss of control over the "official" design if changes are made by those outside the authorized design team. Further, unless tight process controls are implemented and observed, it can be difficult to accurately track a design's history in order to determine who implemented changes, and when and under what circumstances. The use of BIM also can give rise to data security and intellectual property liabilities that otherwise might not exist or, if so, to a lesser degree than with more traditional 2D methodologies.

One must also be mindful of whether the modeling program being used is compatible with the existing technology systems employed by the project's participants, whether they in fact have the technological know-how and savvy to properly utilize the systems, and whether the software has any bugs or glitches that might interfere with the smooth administration of the project.

An interesting offshoot of this discussion can occur under professional liability policies, where a claim against a designer might result solely from issues involving technological competencies as opposed to architectural/engineering issues. In such circumstances, questions may arise as to whether the allegedly improper use of the modeling software constitutes "professional negligence" and/or the rendition of "professional services" as defined in the related policy.

Other possible problems can result when control of a project's official records—things like minutes or change order logs—are ceded to parties other than the architect. "Official project histories" are thereby created that can later be used in an effort to create a supposedly binding version of the events in question, such as documenting reasons for changes allegedly resulting from A&E errors or omissions, delays in responding to requests for information or submittals, budget or schedule busts, etc. And, as with any technology, the threat of third-party hacks, service disruptions, and other cyber-related liabilities always loom large.

Finally, issues can occasionally result from clashes between the 3D world of modeling technologies and the 2D world in which most building departments and reviewing agencies exist. Most importantly, regardless of the use of technological tools that may greatly aid in the visual development or construction of a building, there still remains a singular set of "official" construction documents that

typically consist of printed, physical documents, and architects and engineers are advised to maintain the sanctity, integrity, and predominance of them over any competing, technology-assisted models.

Potential Solutions

Proper risk management techniques and prudent forethought can help design professionals enjoy the benefits of new construction technologies while steering clear of its potential downsides.

First, it is imperative that any A&E practitioner utilizing a new design tool fully understand its functionalities, vulnerabilities, and limitations. It is also necessary that a consistent alignment exist between the particular technology in question and the project delivery model being employed—for example, is the tool appropriate for the job and capable of being properly used by the project's participants?

Additionally, does the A&E and its staff have the technological know-how and capabilities to correctly use and support the software program? Have sufficient tracking protocols and security measures been implemented to ensure the integrity, clarity, and precedence of the design record so that no questions exist as to who can make changes and how they are tracked or recorded? Does the A&E agreement appropriately address responsibilities and duties related to any technologies being utilized on the project and provide indemnifications and other protections to the A&E in the event that issues arise? And, finally, is the A&E's insurance program properly structured to encompass the coverages necessary to address liabilities potentially arising from the insured's use of new technologies?

A&E professionals should also be counseled regarding appropriate internal practices and policies to follow within their offices with regard to electronic technologies such as emails, texting, and instant messaging. Off-the-cuff, informal communications can later return to haunt in the event of a claim.

Similarly, sound document retention policies should also be developed and followed for electronically stored materials, including: A minimum retention duration that tracks with the corresponding statute of repose period in the subject jurisdiction; auto-archiving processes; disaster recovery protocols; institution of back-up systems; and documentary holds to be implemented in the event of a claim.

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Finally, irrespective of any computer-assisted modeling or display tools that may be utilized on a given project, it is essential for designers to identify and maintain the integrity of the "official" construction documents and ensure that no changes to them can be made without the proper processes being followed and recorded. In this regard, A&E practitioners would be well served by including suitable disclaimer language in the plans and specifications that clearly identifies what constitutes the project's actual design documentation, noting that it cannot be changed or altered notwithstanding the existence of any supplemental iterations generated by software programs or the like.

As seen with *Westworld*'s robots, the dinosaurs of *Jurassic Park*, and Hal9000 from *2001*, technology can produce a broad array of outcomes ranging from the magnificent to the horrific. So, too, is the case when revolutionary new tools are introduced into a well-established medium such as construction. However, careful planning and a properly structured risk management program can help ensure that architects and engineers are able to reap the benefits of useful technologies while avoiding the accompanying troubles they can present. ■

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