Four Big Construction Problems Solved by AR and VR

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Despite all the changes that have hit the market, the construction trifecta — scope, schedule and costs — hasn't changed much. Regardless of the project, these three factors are what contractors live and breathe by. Over the past few years, their scale and complexity continue to grow as the industry changes to accommodate shifting time and cost deliverables, shifting regulatory and environmental considerations, supply chain issues, and new technology.

In today's world, it seems like the only way to stay on budget, remain within scope, and deliver projects on time is to predict the future. Because most contractors don't have access to that coveted crystal ball, they have to find other ways to thrive.

In many cases, the answer may lie not so much in predicting the future but in integrating augmented reality (AR) and virtual reality (VR) into construction practices and processes. According to a 2020 study featured in Data, a peer-reviewed, open access journal, its usage within the AEC industry is rising each year.

"This technology provides lots of benefits," explains Josh Rodgers, integrated construction manager at Mortenson, "but technology is also not a problem solver in and of itself. You need first to identify which problems you're struggling with and what type of technology investment will help you improve your daily work. Virtual reality isn't a substitution for good design and construction, but it's a valuable tool in our tool kit."

Let’s take a closer look at four construction problems that can often be solved using AR and VR.

01 Justifying building designs

When architecture and design firm Valerio Dewalt Train was working on plans for a 36-story tower that would forever change the impressive Denver skyline, it needed to justify the design to the City and County of Denver and prove that it would look seamless.

The team chose to make its case through the use of AR, relying on real-time 3D to geolocate the building onsite. From there, a prototype was created to help stakeholders understand the true size and feel of the building at scale and appreciate how the tower would fit with its surroundings.

How AR and VR can help: By doing site walks with the client and getting feedback in real-time through the use of AR, Valerio Dewalt Train was able to show the City and County of Denver exactly how the end result would look, cutting down on design iterations and rework. When an issue arose, it could be communicated right away with team members in the office and in the field with no additional meetings needed and no time wasted.

“The first time I opened up Unity Reflect Review to get the 1:1 experience of the tower, it was breathtaking,” says Adam Farooq, marketing director and lead XR developer at Valerio Dewalt Train. “Your eyes light up the first time you do it. Having that perspective on the ground and looking up, knowing that’s the view most people in Denver will see, is special.”

02 A failure to communicate

Good communication is often the driver behind project success — and poor communication is often blamed for project failure. Why? Because communication is at the heart of every construction project. You can employ the best workers in the business, work with the most reasonable clients, and create the most accurate estimates possible. But miscommunication can launch a project into a tailspin.

"Miscommunication can also end up turning into rework if you don't communicate early on or if you miscommunicate and, as a result, end up designing or building something that doesn't meet the client's expectations," says Rodgers.

A few years ago, the Fails Management Institute (FMI) and PlanGrid surveyed 600-plus construction leaders about construction sites, project communication and technology usage. The results are astounding: $177.5 billion is spent each year in the United States on fixing construction mistakes and managing conflict. During this survey, FMI and PlanGrid also examined rework caused by miscommunication. The findings: Rework costs the industry more than $31 billion each year. The majority of these expenses can be avoided by improving communication.

Often, the attempted solution to poor communication is more meetings. But this rarely solves the problem. Instead, it eats up valuable time and creates even more barriers, according to Saeed Eslami, founder of VisualLive and head of the AEC industry vertical at Unity Technologies. Even if the meetings are working for you, that doesn't mean they're working for everyone else.

“The technology lets you start seeing the project through other people’s eyes and from the other disciplines’ perspectives, which drives alignment.”

Julien Faure
General Manager of Verticals, Unity Technologies

“When I worked for Hensel Phelps, we used to have meetings almost every day. We spent hours doing this to try to avoid miscommunication, but those meetings were the enemy of our schedules and budgets,” Eslami explains, “and there were still instances of miscommunication.”

How AR and VR can help: Using AR and VR technology helps people visualize and immerse themselves into spaces, bridging the communication gap between parties. Instead of guessing or trying to describe it, everyone can see exactly how things will look. By interacting with the space as if it were built (instead of relying on 2D images) and getting a sense of scale, viewers better understand the intended outcome and can ask specific questions based on what they see.

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Take a hotel, for example. Before a project begins, you can use AR and VR to introduce maintenance crews to the new boiler system planned for the basement. They can look closely at the pipes in true-to-life size and location to offer feedback about how the layout will (or won’t) work. Because everyone is looking at the same thing simultaneously, project team members can collaborate and bounce ideas off one another instead of describing and predicting how and where potential problems may exist.

Josh Cheney, senior manager of strategic alliances at Autodesk, has seen this benefit play out in real life and consequently prioritizes bringing AR/VR integrations into his company’s partner ecosystem. During a visit to a microchip-manufacturing plant, he paid a visit to the plant floor. “It was nearly four times the size of a football field with 24-foot ceilings,” he explains. “It was going to house the most complex spaghetti of plumbing and electrical runs. We put on headsets to see the real-world space combined with these models. Watching team members tweak the design and take notes on it in real time was incredible.”

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Josh Rodgers
Integrated Construction Manager, Mortenson

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03 Finding time for training

The labor shortage has created all sorts of setbacks for construction companies, but finding the right talent is only half the battle. Once you’ve hired a worker, they often need training — or at least some onboarding to get up to speed. With so much work to manage, new hires have a lot on their plates from day one.

The need for training and onboarding holds true for existing staff, too. Sharing as much information as you can upfront about a project means that workers can safely approach a job site with a plan and be prepared to handle whatever they encounter. This helps reduce jobsite injuries, shortens learning curves and reduces mistakes based on misunderstanding or misinterpretation.

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How AR and VR can help: Instead of encountering a new situation on a job site for the first time, AR and VR allow workers to experience these situations beforehand in a controlled environment where they can take their time without the pressures of schedules or people standing around waiting for them to finish.

Mortenson is currently developing training that supports remote education for staff in various locations so they can get up to speed on time-intensive scopes of work. Once they get to the actual job site, they're ready to go. As plans change, the technology helps ensure accurate communication so everyone involved can better avoid rework.

This training can also help improve safety. Integrating VR and AR technology allows construction companies to develop highly realistic, virtual scenarios so workers can learn about job hazards and practice making decisions in risky situations before they have to do so in real life.

04 Ever-increasing client expectations

Owners' expectations are changing — especially as COVID-19 sped up digital transformation and technology by several years. As owners experience pressure to do more with less, stretch their budgets, grow their organizations, and meet the growing demands of their clients, those same expectations get passed on to their contractors.

Today's clients expect more complex projects to be delivered under tighter schedules and amid strict budgets to align with their internal business goals. As their own relationships with technology deepen within their personal and professional lives, they'll also hold contractors to these same expectations.

How AR and VR can help: "The entire industry is on a sprint to deliver faster without compromising quality," says Faure. "In fact, contractors are being asked to raise the bar significantly. To do this, you can only go so far with the standard way of doing things."

To help deliver the experiences clients expect, using AR and VR is key. Mortensen uses VR for new hospital and operating-room designs. By showing clients interactive, 3D spaces, surgeons and other clinical staff are transported into a virtual version of their new space to fully visualize and interact with medical instruments, work areas, and technologies to ensure efficient, ergonomic layout. From there, they can provide feedback on equipment placement and experiment with how the room will accommodate their foot positioning and hand movements.

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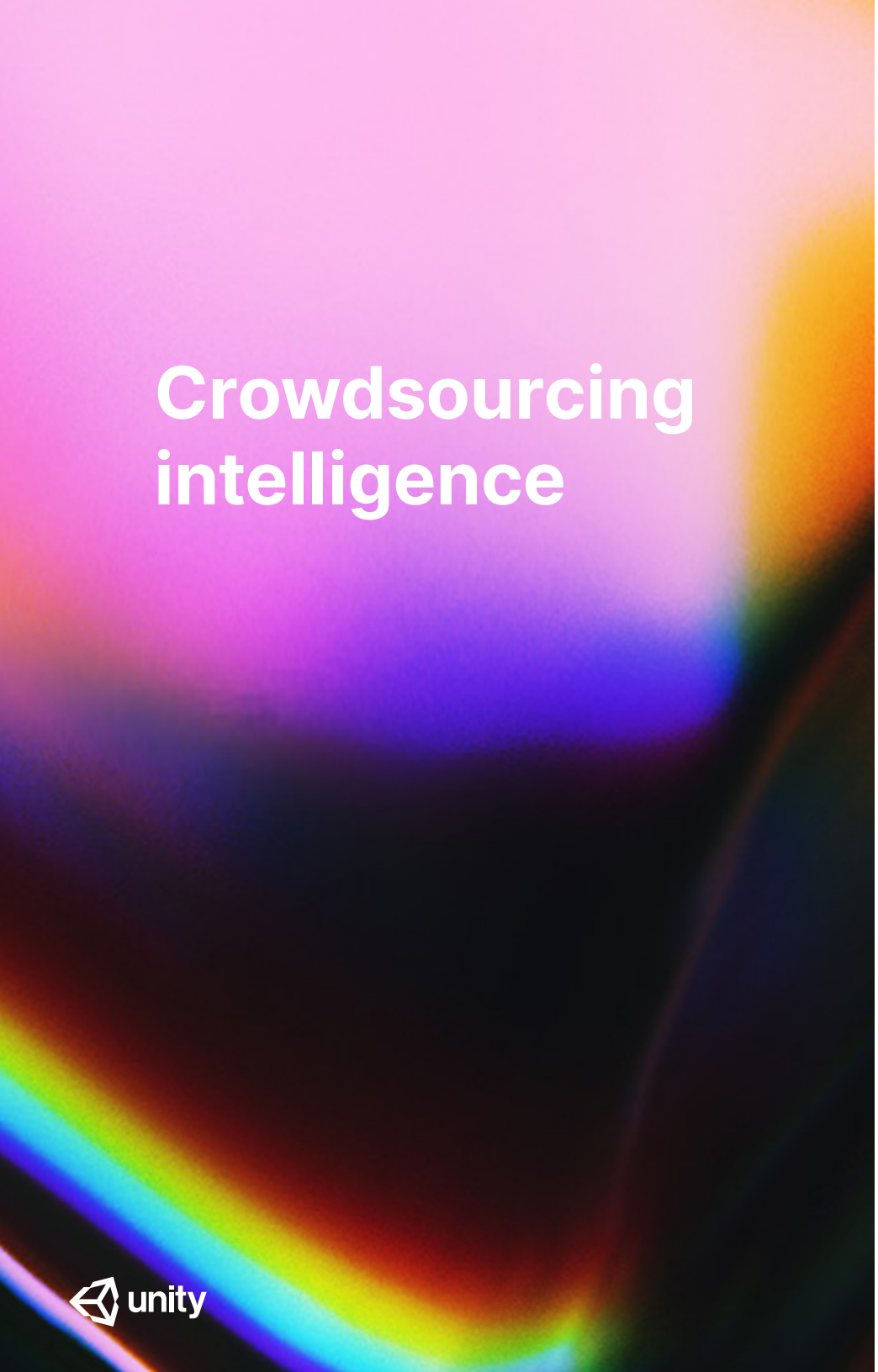
Will Adams
VR Developer, Mortenson

VR provides a way to capture precisely what end users want and need from a space without expecting them to decipher complex Excel spreadsheets and 3D CAD models to offer their perspective. Instead of conference calls to define actions and explain the next steps, participants can view a model together and understand exactly where material and equipment will be positioned.

Mortenson has also found success in using VR in sports venues as well. “When we were doing work on Climate Pledge Arena, we developed an environment to help management understand the suites and premium components and discuss operations way ahead of project turnover,” explains Will Adams, VR developer for Mortenson. “Typically, that part of the design lags. But virtual reality using Unity Technologies and Oculus Quest headsets allowed us to facilitate many people in the space at the same time to make sure expectations were aligned. It’s fully networked, so anybody with a headset can see the other people in the room.”

Mortenson also used the technology to help align expectations on a budget- and space-constrained project for a university softball team. Adams helped create various layouts and facilitate sessions with the coach and players to walk through each iteration to see the facility’s footprint and make sure they had room to swing bats in batting cages.



Crowdsourcing intelligence

Remember that ever-elusive crystal ball we mentioned earlier? As Faure describes, technology can serve as its own form of fortune-telling. It helps contractors visualize, anticipate and predict what will happen with a high degree of accuracy at every stage of the process — something that can't be done with spreadsheets, PDF documents or DWG drawings.

"VR and AR crowdsource the intelligence that exists across teams that otherwise speak their own languages within their own specialty areas. With the right technology, everyone engaged in the process can understand and take down barriers ahead of time," Faure explains.

By bringing data from many systems together in one location to create a single source of truth, breaking down silos and providing a platform for increased communication and collaboration, AR and VR are set to help contractors manage increasingly complex project scopes, schedules and costs — all while meeting (or exceeding) client expectations.

Ready to implement AR/VR for your next project?

Unity Technologies creates solutions that help contractors increase cost savings, win more projects, establish a faster time to market and retain employees. Unity Reflect brings your BIM models into an immersive experience in AR and VR to facilitate interactive real-time design reviews. VisualLive overlays large BIM and CAD files onto job sites using AR to visualize designs and collaborate in real time.

Discover how to embrace real-time 3D technology to change the way buildings are designed, created, built and operated.

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