



# TOP 2022 TRENDS

## ARCHITECTURE, ENGINEERING AND CONSTRUCTION

→ E-BOOK

16 top architecture, engineering and construction companies share the trends they think will shape the industry in 2022



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# 40%

of industrial companies either plan to implement digital twins, computer vision, interactive/3D visualizations, AR, or VR or have already done so.



## EXECUTIVE SUMMARY

COVID-19 has posed significant barriers to traditional workflows. It's been especially disruptive to the architecture, engineering and construction (AEC) industry. Over half of decision-makers report that their employees' ability to collaborate and innovate across work phases has become much more challenging since the pandemic, according to a commissioned study conducted by Forrester Consulting on behalf of Unity, published in November 2021.<sup>1</sup>

Despite the disruption, the pandemic also afforded companies a unique opportunity to reinvent their operational strategies and offerings. Companies are turning to technology such as digital twins, augmented reality (AR), virtual reality (VR), and real-time 3D to change how the AEC industry designs, builds and operates buildings.

We spoke with our industry-leading customers to see what top trends will shape the AEC industry in 2022 and beyond.

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<sup>1</sup> "The new way of working is immersive," [Forrester Consulting on behalf of Unity](#).





- Last year, digital twins gained momentum in the AEC world as part of a movement toward standardization to make the most of physical assets and facilitate collaboration across multiple platforms. New technologies will complement digital twin platforms to “further enhance the way information can be communicated to the end user from collaborative early design reviews through to virtual training and asset maintenance.”<sup>1</sup>
- Greater awareness for AR and VR will turn what was seen as a “nice to have” into “an integral experience for both design development and stakeholder engagement” in the years to come.<sup>2</sup> There will also be “an uptick in the use of virtual simulations that can be led on-demand, just in time, and in a safe and controlled environment.”<sup>3</sup> This will create a clear message that “everyone has the right to refuse an unsafe environment.”<sup>4</sup>
- The industry will be able to glean more insights with tools that “provide better information (with BIM [building information modeling] and cloud review software) quicker and more accurately than ever before.”<sup>5</sup> In-house software development will create a competitive advantage and empower “stakeholders with a continuous and comprehensive project understanding, instead of just snapshots,”<sup>6</sup> to save money and allow for a better built environment.

Read on for more insights from top AEC companies on the trends they expect will define 2022.

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1 Tom Greener, Principal Real-time Developer, [Atkins Global](#).

2 Ben Lillywhite, Architect, [P+HS Architects](#).

3 Virtual Insights Group, [Mortenson](#).

4 Michael Galbraith, Immersive Technology Specialist, [Arup](#).

5 Warren Curry, Architect and Matt Neaderhiser, Director of Innovation, [Holland Basham Architects](#).

6 Adam Chernick, Director | Interactive Visualization, [SHoP Architects](#).



# DIGITAL TWIN AND METAVERSE





Courtesy of AECOM



## DIGITAL THINKING: A METAVERSE INFRASTRUCTURE MARKET

The world is entering the third year of the COVID-19 pandemic. The concept of “social distancing” persists. The eagerness to revitalize urban spaces is impelling AEC innovators to rethink the design and operation of public infrastructure.

Thus, digital platforms and access are no longer supplementary – they have become essential channels to public services and for many people’s daily jobs. As online collaborative tools have become indispensable in the AEC industry, the next foreseeable step would be the virtual presentation of cyberspatial information.

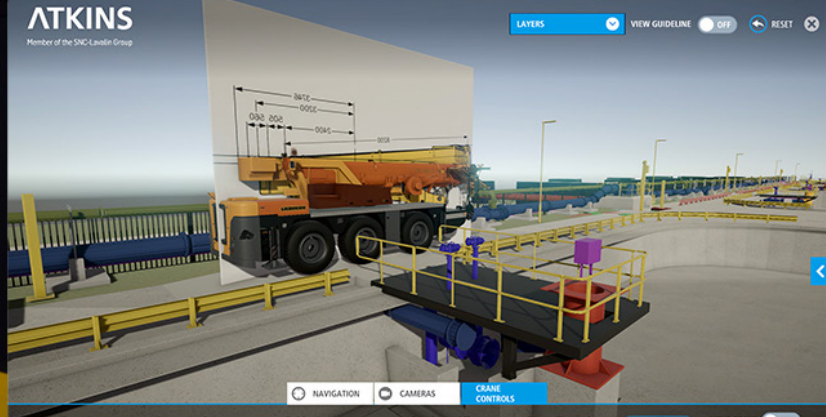
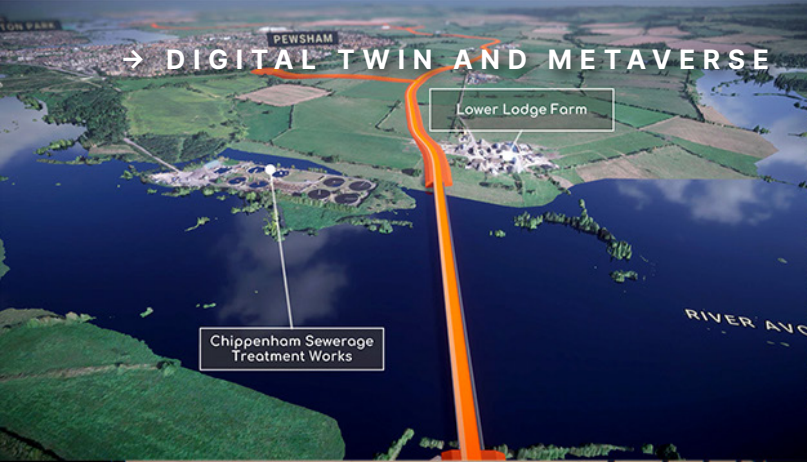
For example, as the core of the metaverse concept, extended reality (XR) is a desirable solution with a visually friendly, instructive and accessible interface to connect people with the built environment. Inspired by the new norm of the world, we can expect a boom of pilot attempts ranging from VR tourism, AR facility instructors to mixed reality remote site inspectors. In other words, digital solutions as a part of AEC services will lead to a new wave impacting the entire industry.



**Yuan-Po Li**  
Immersive Lab Lead







Courtesy of Atkins Global

**ATKINS**

Member of the SNC-Lavalin Group

## INTELLIGENT DIGITAL TWINS COMMUNICATING AN ACCESSIBLE SINGLE SOURCE OF TRUTH

Digital twins allow real-world assets of any scale to be connected to their historical and live datasets via multiple external environments or a central data environment (CDE). This presents information in a spatial and understandable way, allowing greater accessibility for users to interrogate and review the data.

Combined with machine learning this information can further be used to predict and inform future trends and allows asset managers to react more intelligently and efficiently.

Digital twins can complement a project from conceptual design through to completion, and even extend to operations and maintenance. The earlier the information is integrated into data sources, the more holistic a picture can be created, aiding in promoting new and innovative ways to communicate with stakeholders.

Extended reality (XR) systems will complement the digital twin platforms to further enhance the way information can be communicated to the end user from collaborative early design reviews through to virtual training and asset maintenance.



Tom Greener

Principal Real-time Developer

[@tgreener1991](#)

[Atkins Global](#)





Courtesy of Sitowise

## SITOWISE

# DIGITAL TWINS ARE GAINING TRACTION ACROSS INDUSTRIES BEYOND MANUFACTURING

2022 will see the rise of digital twin solutions in the built environment.

The potential of digital twins is well recognized, and the topic is more alive than ever. The technologies available for building solutions, and their associated standards, have matured and are now accessible to developers outside of the AEC area as well.

Yet somehow, actual use cases bringing realized value to users are still few and far between. On the other hand, interestingly enough, the competition within the industry is getting more intense.

The discussion of the possibilities of digital twins has gone on long enough; we're looking forward to seeing more solutions that have been actually integrated into their users' operations.



**Samuli Hyttinen**

Application Developer

[@seamule](#)

[Sitowise](#)



Courtesy of Worley

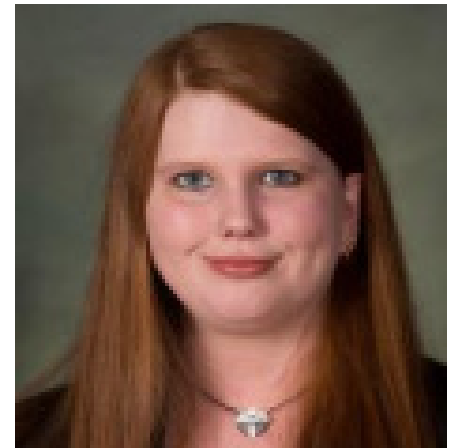


## DIGITAL ENABLEMENT TO IMPROVE SAFETY AND EFFICIENCY

We've seen a large uptick in using different technologies to drive safety and efficiency of construction efforts. Our focus is taking information that we have and using it in ways we haven't before.

What can we repurpose so that it lives beyond the design phase and moves into construction and operations? Things like using a 3D model to simulate construction sequences. What behaviors are unsafe or unproductive that we can resolve by simply providing more information to people in the field? Things like digital twins. What challenges can we overcome by making small process changes? Things like digital forms on tablets. What can we do to remove unnecessary people from the field? Things like video conferencing for remote site visits.

The COVID-19 pandemic forced us to think differently. Pushback wasn't an option, and successes were proven. 2022 is going to ask for more.



**Carrie Knight**  
Digital Delivery Lead

[Worley](#)





Courtesy of Zutari



## A CURIOSITY EXPLOSION

With the introduction of the term “metaverse” into the mainstream, we are going to see a huge increase in the number of people seeking to understand real-time technology in general. This will spill over to the AEC space too, opening up opportunities to build digital worlds that simplify projects, improve outcomes and support operations. It is up to us to convert curiosity into valued products. The industrial metaverse will grow rapidly from this point on.



**Murray Walker**

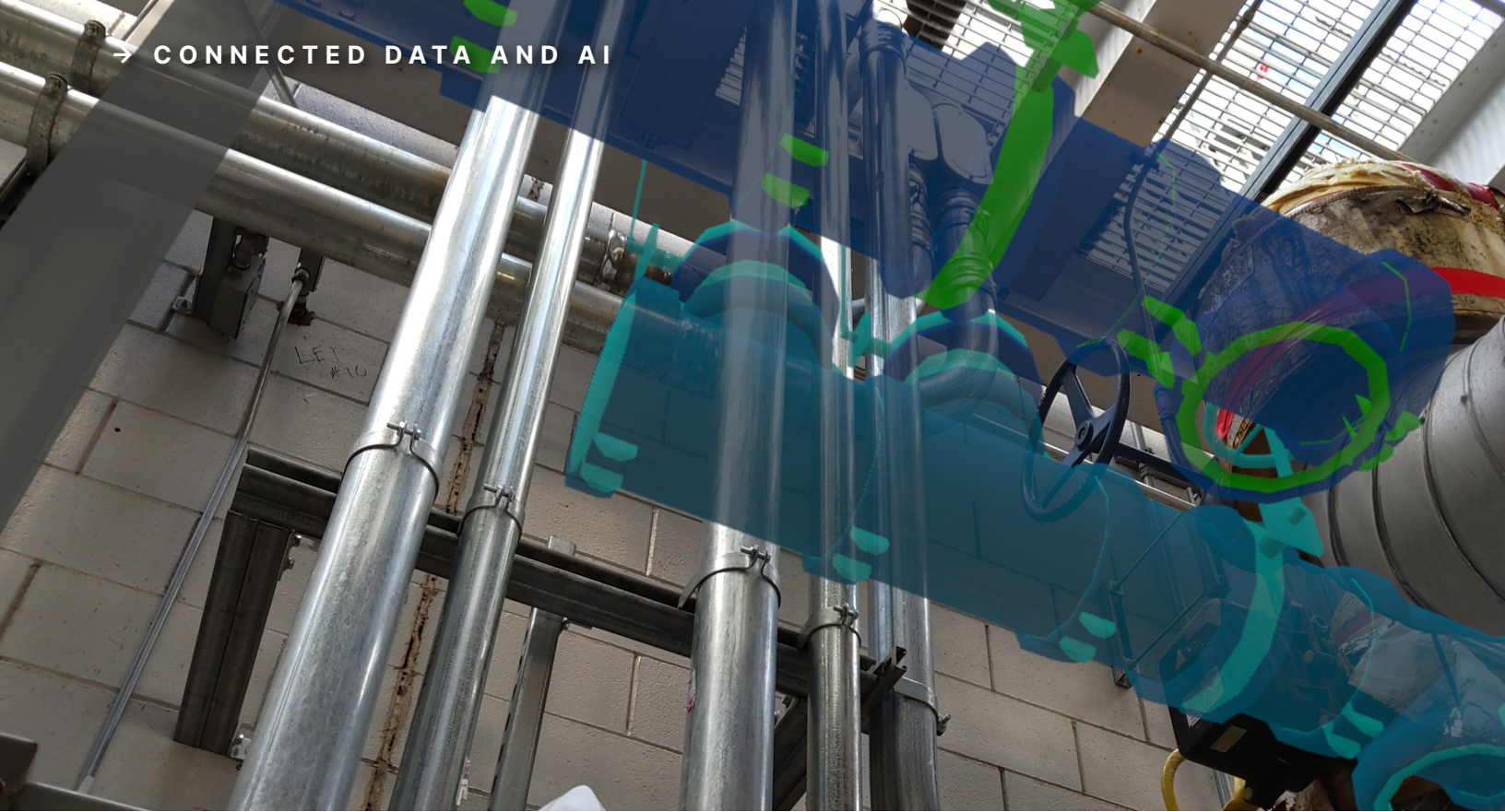
Digital Lead: Interactive Visualisation

[@murrayjwalker](https://twitter.com/murrayjwalker)

[Zutari](https://www.zutari.com)

# CONNECTED DATA AND AI





Courtesy of Apollo Mechanical



## FUTURE TECHNOLOGY WILL LEND A DIGITAL HAND TO SIMPLIFY DATA COLLECTION

I believe the continued trend is for the construction industry to adopt and experiment with emerging technology. Applying new technology at the fundamental levels of construction – i.e., fabrication, field installation and daily execution levels – will bring about a generational leap forward within construction.

While construction is opportunity-rich for diagnostic data, the industry struggles to quantitatively measure people's performance. In short, we want to understand why we perform well and why we fail. Consequently, we strive to understand where change needs to be injected, and what to leave alone, from a holistic point of view.

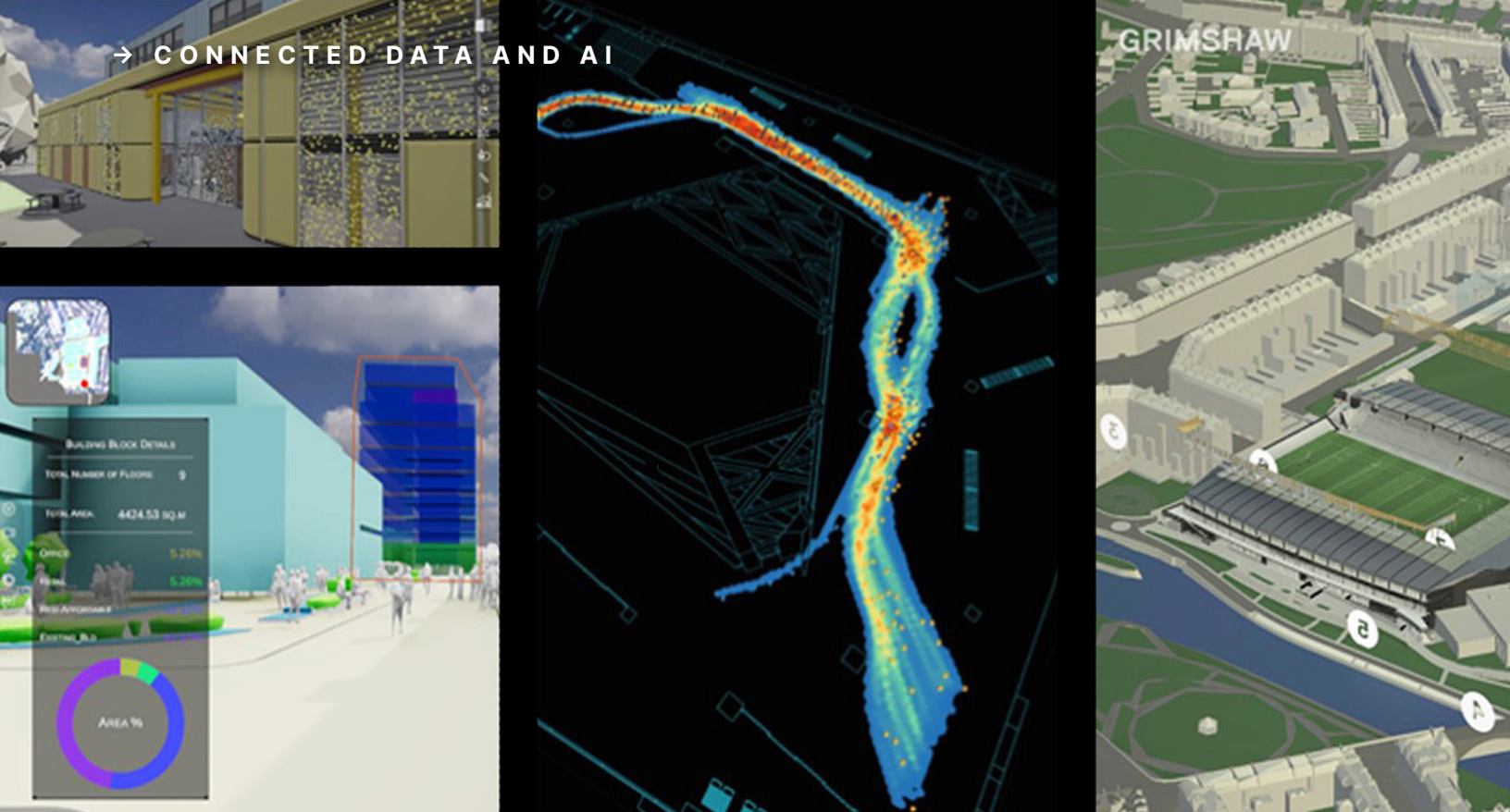
The problem, in part, is due to the complexity involved with measuring people's performance in construction. For example, why does Tommy install 100 lf in a 10-hour workday, while Steve installs only 50 lf in the same time period, even though it's the same job, same material, same route. As technology improves, we slowly find ways to document and record information previously unattainable. The construction world is always improvising on the fly and is very dynamic. I see future technology trends lending a digital hand to simplify the data collection and, in turn, help make sense of this data.



**Eldon J Parry**  
Project Executive  
[@ApolloMech](#)

[Apollo Mechanical](#)





Courtesy of Grimshaw Architects

## GRIMSHAW

# ENHANCED MULTI-STAKEHOLDER COLLABORATION

The swift adoption of readily available digital platforms, which attempted to replicate in-office communication methods, as a result of the extensive remote-working practices forced by the global pandemic, should be viewed as merely the beginning of a major effort to develop the new generation of tools to enable innovative design and collaboration beyond the limitations of our current AEC platforms.

The key to the future development of resilient and sustainable designs is the access to data-rich content of multidisciplinary teams, powered by the real-time exchange of information through consistent interoperability protocols. Moving away from the notion of a single “silver bullet,” both software vendors and design tech specialists should be focusing on the development of a range of interconnected platforms, to facilitate the complete downstream process, from the day-to-day early-stage design to the fully developed digital twins of constructed assets.

To this end, Grimshaw Design Technology will continue to explore the potential of game engines, in leveraging their well-established capacity to process and visualize data, and their undoubtful power to convey narratives within multimodal interfaces, including virtual and augmented reality applications.



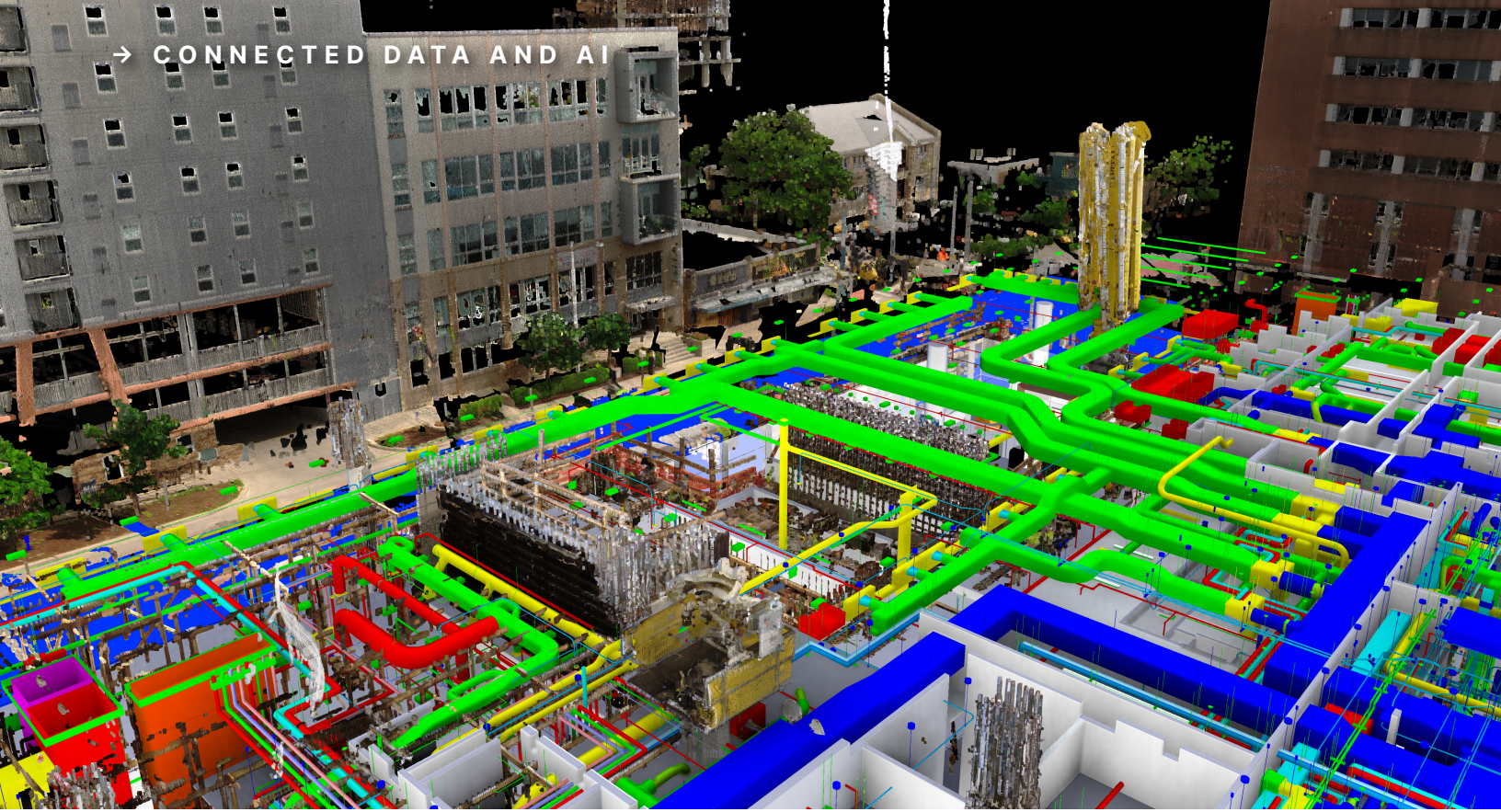
**Georgios Tsakiridis**

Studio Computational  
Design Manager

[@tsak\\_ge](#)

[Grimshaw](#)





Courtesy of Hensel Phelps



## CONSTRUCTION TECH ADOPTION AND EVOLUTION TO MATURITY

As BIM, virtual design and construction (VDC), and construction technology get past the first decade of adoption, we will start to see how the foundations that have been laid are going to support further growth into new areas. While true ROI is as elusive as ever, owners have become educated in how the processes and technology are providing value during design and construction, and in building management. This will serve as a catalyst for the continued development of the next wave of construction technology rooted in AI, machine learning, software, and the robotics that will help in all aspects of safety, quality, and production for our project sites.



**Will Plato**  
Sr. VDC Manager

[Hensel Phelps](#)





Courtesy of Holland Basham Architects



## INCREASED DEMAND FOR QUALITY OF INFORMATION WILL PUSH COLLABORATIVE EFFORTS FORWARD

Just as 2020 introduced a new way of working for offices everywhere via cloud and remote services, 2021 saw that trend propel forward and it is expected to evolve further for 2022.

Along with the gradual return to office during 2021 came new workflows integrating the skills learned from working remotely. Designers returned to the office working with a new sophistication of communications technology, cloud software and collaborative BIM workflows. Software reacted by enhancing related features.

Sometime during 2021, new variables of supply chain issues and market instability were introduced. With the trend forecasted to continue in 2022, contractors will rely on designers to provide better information (with BIM and cloud review software) more quickly and more accurately than ever before so they can secure pricing sooner. This push will ultimately further the obsolescence of the printed plan set as the sole deliverable, ushering in an era of increased emphasis on BIM and digital collaboration.



**Warren Curry**  
Architect



**Matt Neaderhiser**  
Director of Innovation

[Holland Basham Architects](#)





Courtesy of Pomerleau

## POMERLEAU

# ROBOTICS AND AI AS ENABLERS FOR A FASTER ECONOMIC RECOVERY

In 2022, we'll see a continuation of the past year's trend as robotics and AI have been gaining importance. They now play such an important role in enhancing onsite security and safety, but also in improving the quality of our projects and reducing time spent on non-added value tasks.



**Carolyn Filion**  
Innovations Manager –  
R&D & Special Projects

[Pomerleau](#)





Courtesy of SHoP Architects



## CONNECTED DATA – THE WILD WEST OF AEC

AEC firms will hire more software engineers and game developers. The competitive advantage of an in-house software development team has been validated. Bespoke tools have proved to increase communication, help make decisions, and add transparency to the design and construction process.

The open application programming interface (API) ecosystem (connected data ecosystem) will continue to grow rapidly, ushering in a new wave of opportunities to connect tools and data. It has become critical for AEC technology companies to build APIs that empower AEC firms to build the tools they need.

These tools will turn many clicks into few. Will empower stakeholders with a continuous and comprehensive project understanding, instead of just snapshots. Will save money and allow a better built environment.



**Adam Chernick**  
Director | Interactive Visualization

[SHoP Architects](#)



# VIRTUAL AND AUGMENTED REALITY



Courtesy of Arup

# ARUP

## USING VIRTUAL REALITY TO CREATE AN ENGAGING SITE SAFETY TRAINING EXPERIENCE

In recent years, the number of severe accidents and fatalities in construction has decreased. However, there's an ongoing challenge to find new ways to communicate essential safety information in an engaging way.

Using virtual reality, we developed an application that delivers site safety training through a thought-provoking immersive experience with a focus on common site hazards, responsibilities and a key message that everyone has the right to refuse an unsafe environment.

The application transports the user to four site locations: Urban, Rural, Transport and Construction. A voice-over helps users become familiar with each site, testing them on hazards and other important details they need to be aware of while onsite via an "identify and learn" approach. Use of the Oculus Quest headset and built-in hand tracking provides seamless interaction.

We hope to deploy this application across Arup offices globally for new joiners attending mandatory Site Safety Training Briefings.



**Michael Galbraith**  
Immersive Technology Specialist

[Arup](#)





Courtesy of BNBuilders



## AUGMENTED REALITY – HANDS-FREE IN THE FIELD

The use of augmented reality in AEC has been a rising trend for the past couple of years, and I feel it's only going to continue to grow. Being able to go onsite to perform quality control of trade systems, ensuring they are installed as we coordinated them, allows us to proceed with peace of mind.

Using a head-mounted display (HMD) such as the Microsoft HoloLens or a mobile solution like an iPad in conjunction with VisualLive, we can perform QC walkthroughs while external stakeholders view remotely from their PC or device and provide feedback verbally or using collaborative onscreen mark-up tools.

As this technology is refined – becoming smaller, more user friendly and compliant with personal protective equipment (PPE) requirements – I anticipate seeing even more of this technology in AEC.



**Michael Dulberg**  
Sr. BIM/Innovation Engineer

[BNBuilders](#)



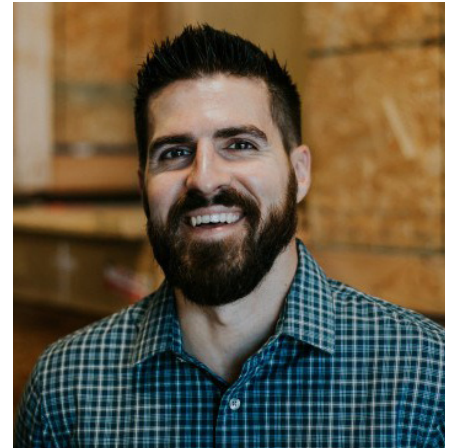


Courtesy of Miller Electric



## BUILDING AUTOMATION AND VISUALIZATION (DIGITAL TWINS)

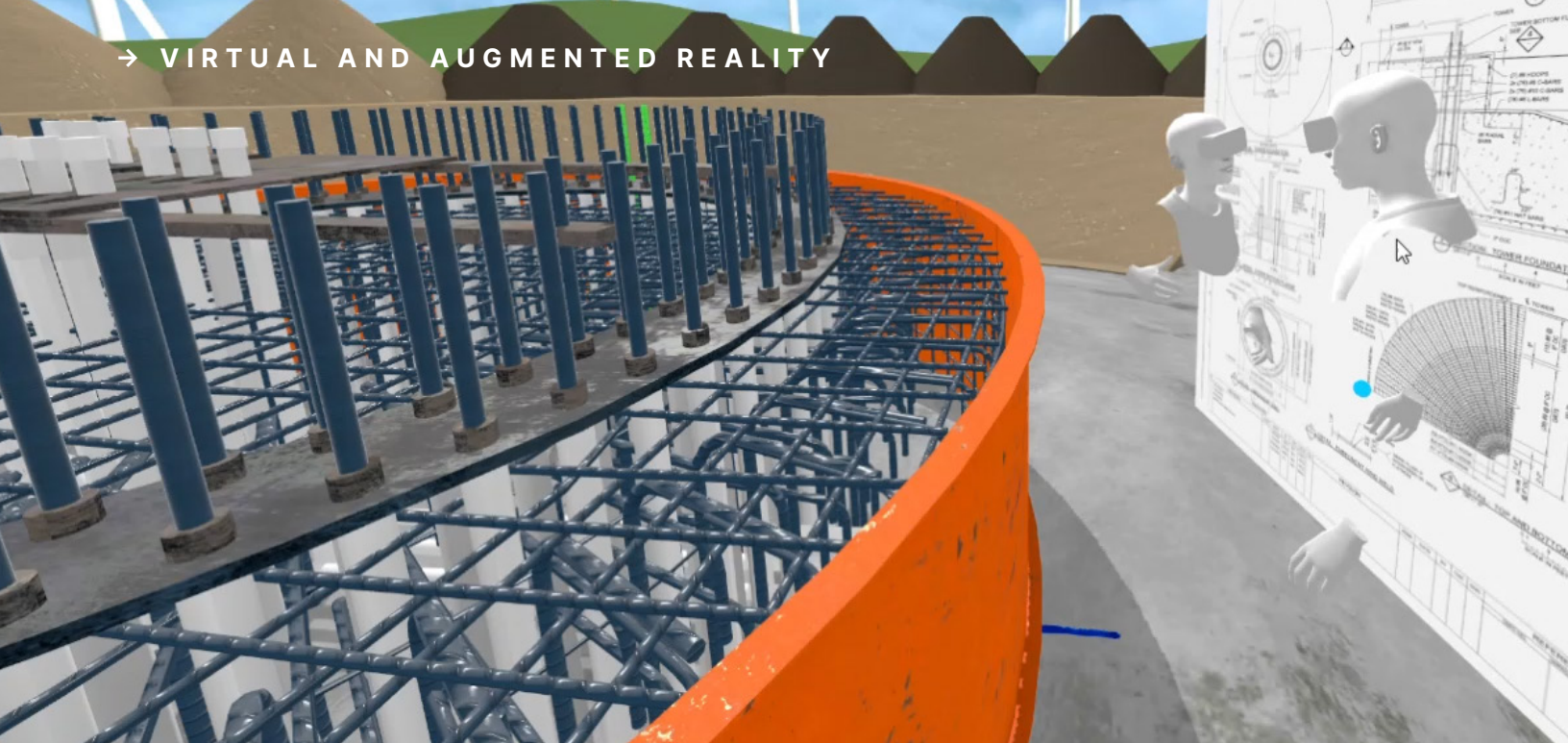
In addition to digital twins and building automation and visualization as a service, we anticipate mass growth and adoption in virtual and augmented reality for use in prefabrication processes, construction and project collaboration. Specifically, we should see an increase in remote team communication and coordination using 3D visualization tools such as Unity Reflect, as well as VR safety training module applications.



**Tim Hogg**  
Application Developer

[Miller Electric Company](#)





Courtesy of Mortenson



## INVESTMENT IN VIRTUAL INTERACTIVE TRAINING RAMPS UP

The recent trend toward remote work has increased the need to efficiently and effectively connect subject matter experts with team members who are spread across the country. We anticipate an uptick in the use of virtual simulations that can be led on demand, just in time, and in a safe and controlled environment. This minimizes the cost and time for travel, exposure to onsite hazards, and the limitations of physical classrooms and schedules. These simulations might be consumed over the web on tablets or workstations, or experienced using new enterprise VR platforms coming to market.

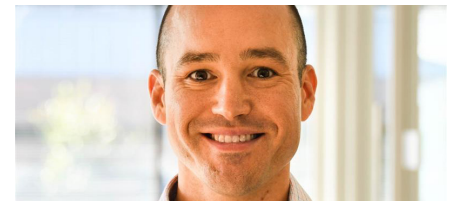
### Visual Insights Group



**Will Adams**  
VR Developer

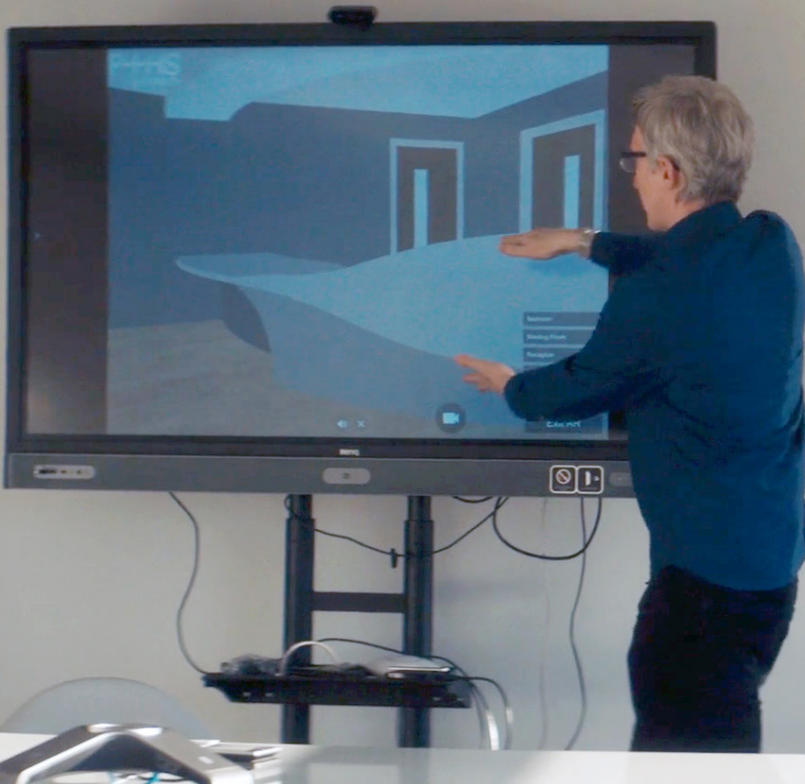


**Colin Sandeman**  
Immersive Technology Developer



**Josh Rodgers**  
Integrated Construction Manager

[Mortenson](#)



Courtesy of P+HS Architects



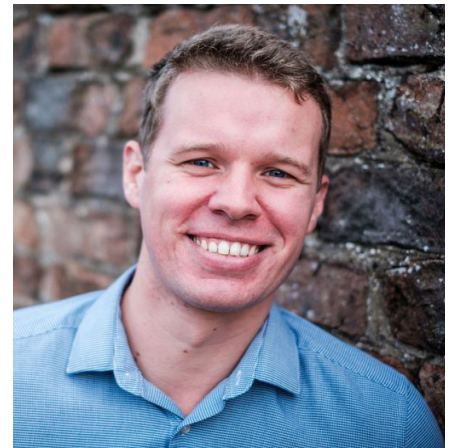
## WIDESPREAD USE OF AUGMENTED REALITY

Introducing AR into our practice workflow has allowed us to engage with clients in exciting new ways. All client feedback has been encouraging and motivated us to continually develop AR as a practice service.

Creating visuals was often a RIBA stage 3 (developed design) activity for us. However, we are increasingly using AR techniques to share concepts in RIBA stage 2 (concept design) to help clients visualize emerging design options within their context. The ability to place a 3D model within real-world scenarios quickly and with ease is an invaluable asset for our stakeholder communication.

During RIBA stage 3, we focus on the quality of materiality and interior design. We hope that in the years ahead AR graphic capabilities can generate real-time high-quality material renders, enabling a lifelike walkthrough experience for clients.

With clients having a greater awareness of augmented reality, the activity which was once seen as “nice to have” will in the years to come be an integral experience for both design development and stakeholder engagement.



**Ben Lillywhite**

Architect

[@PandHSArch](#)

[P+HS Architects](#)





# MAKE THE FUTURE OF AEC A REALITY

AEC companies face constant challenges when it comes to productivity and efficiency. Rework caused by fractured workflows and inefficiency costs the construction industry \$450 billion a year. According to a [McKinsey & Company report](#), 20% of construction projects run over schedule and 80% are over budget. Under the pandemic conditions of 2020 and 2021, these difficulties were exacerbated.

Companies using real-time 3D can better navigate these challenges. See what products the AEC industry is using to change the way buildings are designed, created and operated.

[Contact our team](#) to find the solution that's right for you.

→ [Unity Reflect](#)

A suite of products to create real-time 3D experiences, including AR and VR, from BIM models to enable more impactful decision-making.

→ [Accelerate Solutions](#)

Accelerate your real-time 3D transformation with our team of world-class designers, developers and industry experts. We can bring your concept to life even if you don't know where to start.

→ [VisualLive](#)

Overlay large BIM and CAD files onto jobsites using AR, allowing construction professionals to visualize designs and collaborate in real-time.



# DIVE INTO ADDITIONAL E-BOOKS

## Want to Reduce Costs? Start by Avoiding Rework in the Field



Unity | CONSTRUCTION DIVE

Custom content for Unity by studioD

### [Want to reduce costs? Start by avoiding rework in the field](#)

In this e-book, learn how AR technology help reduce rework in the field and cut costs, enabling contractors to:

- Ensure document control
- Coordinate design with existing site conditions
- Easily align design and details with trade partners
- Boost worker confidence and productivity

## Four Big Construction Problems Solved by AR and VR



Unity | CONSTRUCTION DIVE

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### [Four big construction problems solved by AR and VR](#)

In this e-book, we examine four construction problems that can often be solved using AR and VR, including:

- Justifying building designs through the strategic use of AR
- Using AR and VR technology to bridge the communication gap between stakeholders
- Reducing jobsite injuries and rework with training and onboarding



