

# AEC Tech Gamechangers:

## 21 Essential Technologies for 2020



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As investment in AEC technology grows, we're rapidly shifting from technology that is being tentatively tested to those that are being put to work in the field in every day use. What was once a wish is now a reality. Scanning systems, in particular, have evolved with features designed to streamline workflows, saving time via automatic registration or cloud processing. Utilizing more automation – even robots – and new ways of visualizing information makes 2020 feel like the future of AEC technology has arrived.

The following list of AEC technologies is not in ranked order, but we have divided the list into two categories: hardware and software. The technologies listed include reality capture and laser scanning, modeling technology, project management, mixed reality, and innovative applications for construction documentation, and a whole lot more.

## ✓ HARDWARE

### Trimble X7 system

**What is it?** The [Trimble X7 3D Laser Scanning System](#) is a high-speed 3D laser scanning system that integrates several user-friendly innovations with the goal of increasing adoption and ease of use. The compact and lightweight system includes a new automatic calibration feature as well as [automatic registration](#) and self-leveling.

**Who is using it?** Surveying, Construction, Forensics, Industrial, Facilities Management, Civil Engineering

**How is it making an impact?** Because the X7 is safe and effective to use in public buildings, it can be used to create as-built models for scan to BIM and for renovations. With the survey-grade self-leveling function, it is able to detect floor flatness and to analyze deformation of beams and columns. In-field registration verifies the entire project has been captured to eliminate the risk of return visits, which can reduce project costs.



HARDWARE



# HARDWARE

## RIEGL VMX-2HA

**What is it?** The [RIEGL VMX-2HA](#) is a high speed, high performance dual scanner mobile mapping system which provides dense, accurate, and feature-rich data at highway speeds. With 2 million measurements and 500 scan lines per second, this turnkey solution is ideally suited for survey-grade mobile mapping applications.

**Who is using it?** Construction, Engineering, Transportation Infrastructure, Mining, Asset Management, Rail

**How is it making an impact?** VMX-2HA won a [MAPPS Excellence Award in 2019](#) for the Technological Innovation category. According to the MAPPS award statement, "The latest solution developed by [RIEGL](#) that furthers the evolution of mobile mapping for the industry is the VMX-2HA high speed, high performance dual scanner mobile mapping system, introduced at INTERGEO 2017. With its upgraded technological factors and upgraded camera capabilities, this system is now the most advanced development of the already proven, compact [RIEGL VMX](#) mobile mapping platform."



## LEICA BLK2GO

**What is it?** The mobile, compact follow-up to the [BLK360](#), the BLK2GO handheld imaging laser scanner recreates spaces in 3D as it moves. It captures images and dimensionally accurate point clouds in real-time and uses SLAM technology to record its trajectory through space. The smallest dual axis lidar available with best-in-class accuracy, enclosed in a protected dome that scans up to 700,000 points per second.

**Who is using it?** Manufacturing, Architecture, Engineering, Construction, Facilities Management

**How is it making an impact?** With the BLK2GO, professionals can take advantage of never-before-seen mobility for scanning complex indoor environments, [broadening the user base](#) of laser scanning. The handheld-imaging laser scanner combines visualization, lidar and edge computing technologies to scan in 3D, allowing users to be more agile and efficient in capturing objects and spaces. Efficient and mobile capturing opens opportunities for new businesses from adaptive reuse projects in the architecture and design industries to location scouting, pre-visualization for media and entertainment. At a keynote from HxGn Live, Francois Chardavoine, head of production and technology at Lucasfilm and Industrial Light and Magic, sums up its portability and ease of use: "Take the famous quote: 'The best camera is the one you have with you.' For us, the best scanner is the one you have with you."





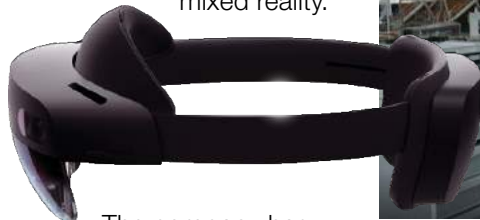


## Microsoft HoloLens 2

**What is it?** [Microsoft HoloLens 2](#) is a mixed reality headset developed and manufactured by Microsoft and the successor to the pioneering Microsoft HoloLens. The redesigned headset is intended for enterprise use, and several AEC applications have already been developed to take advantage of it, including [Bentley Systems SYNCHRO XR](#) and Trimble's hard-hat integrated version, the [XR10](#).

**Who is using it?** Manufacturing, Architecture, Engineering, Construction, Facilities Management

**How is it making an impact?** Airbus—a pioneer in aerospace technology and leading designer and manufacturer of commercial and military aircraft, satellites, and launch vehicles—has made a commitment to transform traditional industrial processes through use of mixed reality.



The company has partnered with Microsoft to use Azure mixed reality and HoloLens 2 as a way to accelerate the design and manufacture of aircraft, while increasing safety and functionality and ensuring professional development opportunities for employees. Airbus is using Azure mixed reality to unlock the full potential of HoloLens 2 and, as a result, expects to [reduce design validation time by 80%](#) and accelerate complex tasks during assembly by 30%.

## Matterport Pro2 3D Camera

**What is it?** The [Pro2 3D Camera](#) from Matterport is an all-in-one device for high definition reality capture. This powerful camera is made even more versatile with its new spatial awareness functionality that enables users to interactively measure and share the dimensions of any space – including floor plans, doorways, windows and walls – automatically.

**Who is using it?** Architecture, Real Estate, Marketing, Historic Preservation, Insurance

**How is it making an impact?** In 2019, [Matterport partnered with insurer EMC](#). EMC first used Matterport scans of properties when they were examining properties affected by natural disasters to document losses and damages.



HARDWARE



With the new partnership, Matterport's tech will be adopted across EMC's other disciplines – which include claims, loss control, and innovation. For Matterport's Director of Business Development Tomer Poran, this relationship has some very clear positive outcomes for the insurance industry.

“When a Matterport scan is done for a loss, adjusters have noticed that they spend a lot less time on the back and forth between the contractor and building consultants because they have a much more transparent view of the site,” says Poran.

### Topcon GTL-1000

**What is it?** The **GTL-1000** from Topcon Positioning Systems is a single instrument to layout and scan on a single set up - a unique combination of 3D scanner and integrated total station. Combined with ClearEdge3D Verity software, the all new solution offers a new standard of evolutionary construction verification workflows.



**Who is using it?** Construction, Engineering, Plant, Prefabrication, Survey

**How is it making an impact?** The new construction verification ecosystem has been tested on site for 12 months by leading infrastructure group Balfour Beatty. Their principal laser scanning surveyor, Nick Salmons, said: “At Balfour Beatty, we are dedicated to driving innovative new working practices across our business as part of our ‘25 percent by 2025’ initiative. The new Topcon robotic scanning solution will increase productivity on site by accelerating the construction process and identifying design challenges more efficiently than traditional methods.”

### NavVis M6

**What is it?** The **NavVis M6** is a cart-sized indoor mobile mapping system that includes 4 laser scanners and six additional cameras for capturing 360 imagery. For enhanced connectivity, it has sensors for tracking Bluetooth beacons, Wi-Fi signals and magnetic field data. The system can handle mapping SLAM in "six dimensions" making it possible to capture data even in environments without a flat floor.

**Who is using it?** Mapping, Construction, Surveying, Real Estate, Facility Management

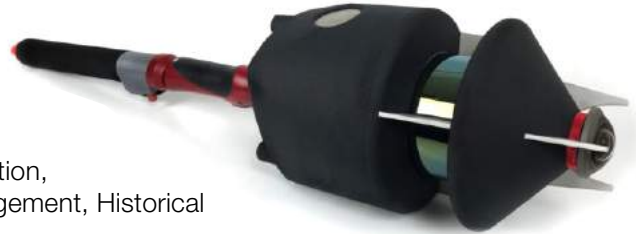




**How is it making an impact?** As part of the preparations for the research project, NavVis Mapping Partner DiConneX was contracted to [digitally capture the Polarstern](#), a German icebreaker and scientific research vessel. Using innovative methods powered by NavVis, DiConneX mapped and scanned the ship to create a digital twin, so that research activities on the vessel could be better coordinated. In the brief time allotted for the scan, only half of the vessel was expected to be captured. Due to the speed of the capture process, however, they found that they were able to capture over 80% of the vessel's interior.

## Paracosm PX-80

**What is it?** Paracosm's PX-80 generates automatically colored point clouds with high point density, low point noise, full environmental coverage, and even detail. The [PX-80](#) scans 300,000 points per section at a range of up to 100m. With the help of an iPad, the scan can be previewed in real time. In addition, a HD camera on top of the sensor captures up to 50FPS with a 350 by 250 field of view.

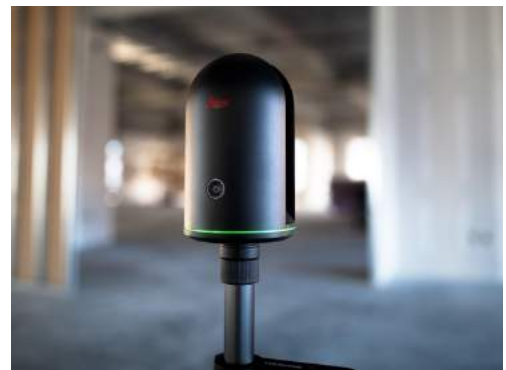


**Who is using it?** Construction, Architecture, Facilities Management, Historical Preservation

**How is it making an impact?** nmcn, formerly known as North Midland Construction, is a major general contractor delivering built-environment and critical-infrastructure projects across the UK. The firm uses PX-80 to [capture detailed 3D site geometry](#) on brownfield, greenfield, and refurbishment sites—both at the beginning of each project and regularly throughout the construction process. After handing it to a completely untrained user to test on a complex of derelict farm buildings, nmcn determined that this handheld SLAM-based scanner was not only simple to use with very minimal training, but also fast and accurate enough for 95% of the firm's scanning needs.

## Leica BLK360

**What is it?** The Leica [BLK360](#) captures the world with full-color panoramic images overlaid on a high-accuracy point cloud. Simple to use with the single push of one button, the BLK360 is the smallest and lightest imaging laser scanner of its kind. Anyone who can operate an iPad can now capture the world around them with high resolution 3D panoramic images.





# HARDWARE

**Who is using it?** Architecture, Cinematography, Historical Preservation, Real Estate

**How is it making an impact?** Using the Leica BLK360 and the Matterport Pro2 3D Camera, Multivista conducted a series of 3D digital imaging [laser scans of Frank Lloyd Wright's winter property](#), Taliesin West, generating a highly accurate, 3D point cloud of the property, along with a high-definition virtual reality model.

## Triax Spot-r Clip

**What is it?** [Spot-r](#) is a wearable for construction that automatically tracks worker locations, detects hazardous situations, and alerts supervisors if a worker is in distress. In situations that require evacuation, authorized personnel can trigger emergency alarms emitted by each worker's device. Spot-r is the first scalable, non-GPS solution to automatically collect jobsite data without restrictions such as Wi-Fi or GPS coverage.



**Who is using it?** Construction, Inspection

**How is it making an impact?** The device detects falls at the jobsite, identifying who, where, and the distance of the fall, improving injury response time by up to 91%. The Spot-r Clip and dashboard have enabled supervisors to see the location of works in real-time and monitor evacuation progress, resulting in a reduction of evacuation times by up to 72%.



# SOFTWARE

## ✔ SOFTWARE

### Procore

**What is it?** Procore is an all-in-one construction management software built to help finish quality projects safely, on time, and within budget. Now built out into a comprehensive suite of tools, **Procore** is growing in popularity among general contractors, architects, and project managers.



**Who is using it?** Architecture, Engineering, Construction, Project Management

**How is it making an impact?** Robins & Morton is an industry leader in both the quality and safety of their projects and consistently rank amongst the 100 largest U.S. builders by Engineering News-Record (ENR). While using a combination of other software, ensuring drawings and costs were up to date could take up to several weeks. Now with Procore, they are able to upload a 400-page revision into Procore and inform all stakeholders of the changes **within 30 minutes**. This helped to ensure that field teams were always working off of the most up-to-date drawings, minimizing costly rework.

### Unity Reflect

**What is it?** Unity Technologies, primarily known for their 3D development and gaming platforms, has introduced its first AEC-focused product with a real-time 3D viewer that integrates with Autodesk Revit. The new product, named **Reflect**, allows users to seamlessly import BIM and CAD data and create a single, interactive rendering that is accessible on a variety of devices.



**Who is using it?** Construction, Design, Engineering, Architecture

**How is it making an impact?** SHoP Architects is known in the AEC industry for its unconventional approach to design. The traditional workflow for bringing their projects into Unity required decoupling the geometry from the BIM metadata, via FBX and Excel, and then forging them back together in Unity, a process that took an estimated 60% of their time. Unity's Reflect plugin with Autodesk Revit and other design applications offered a **much-needed solution**.

With one click, SHoP's design teams can bring one model together in real-time 3D from different systems (e.g., architectural, MEP, structural) with both the geometry and BIM metadata intact.





# SOFTWARE

## Bentley ContextCapture

**What is it?** Bentley's [ContextCapture](#) is a 3D model creation platform allowing for the creation of 3D models at any scale, using any camera. ContextCapture provides real-world digital context using [3D reality meshes](#) derived from photographs and/or point clouds, available as an on-premises solution or cloud-based service. Within ContextCapture, the latest version allows for the application of machine learning to automatically detect and locate objects in 2D and 3D using captured reality data.



**Who is using it?** Design, Construction, Infrastructure Development, Electric and Gas Utilities, Oil and Gas, Mining, Mapping and Surveying and more.

**How is it making an impact?** Using ContextCapture, the [City of Helsinki](#) generated a 3D mesh representation of its city as part of a three-year smart city initiative to improve Helsinki's internal services and promote smart development. Bentley's advanced software capabilities enabled the team to generate models at costs lower than expected. Upon completion, the 3D city model will be provided as open data to involve the public and encourage commercial research and development.

## Bentley SYNCHRO

**What is it?** [SYNCHRO](#) is a portfolio of integrated software and services for digital construction management. Powerful 4D scheduling and task management capabilities help plan and optimize even complex construction projects across civil, building, and industrial sectors. With access to the latest data in the field via apps, web browser, or even in a mixed-reality [HoloLens application](#), teams at the jobsite can access the information they need, tailored to the context in which they need it.



**Who is using it?** Architecture, Construction, Project Planning, Demolition

**How is it making an impact?** By planning the exact steps involved in complex construction projects, and being able to visualize them, planners can more quickly spot errors, make corrections to sequencing, and decide how to best manage their resources. Whether visualized on screen or by a headset, SYNCHRO brings what used to be on a spreadsheet to life before our eyes.



# SOFTWARE

## HoloBuilder

**What is it?** **HoloBuilder** is an enterprise-ready platform to document, share and monitor construction site progress with 360-degree photos that take less time and less effort than traditional documentation efforts.

**Who is using it?** Construction, Engineering, Facilities Management

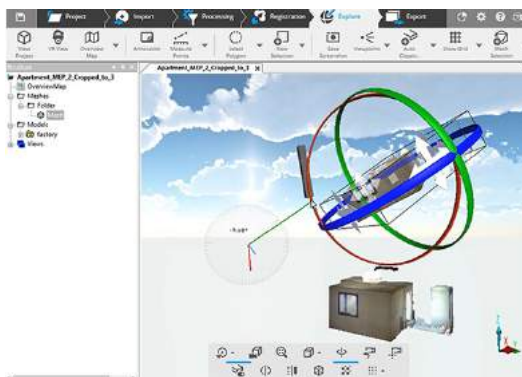


**How is it making an impact?** HoloBuilder launched a new application designed to work with partner Boston Dynamics autonomous Spot robots. The **SpotWalk** application can allow one of the robots to autonomously follow a path through a jobsite, collecting scans and 360-degree photos along the way at prescribed intervals. Further reducing the time and manpower allocated toward site progress documentation, the autonomous system has particular applications in challenging or hazardous construction sites.

## FARO Scene

**What is it?** **FARO Scene** is a 3D documentation software designed for the FARO Focus laser scanner product family and third-party laser scanners. SCENE processes scan data efficiently and easily by using real time, on-site registration, automatic object recognition, scan registration, and positioning, generating **high-quality data** in full color quickly and conveniently.

**Who is using it?** Architecture, Engineering, Construction, Forensics, Surveying, Law Enforcement, Mining, Tunneling, Wind Power



**How is it making an impact?** The Clackamas County Sheriff's Office (CCSO) has seen a tangible return on their investment in a FARO® Focus Laser Scanner and SCENE software, introducing new ways the team leverages 3D technology to assist with cases. Since purchasing the scanner, the team has not only reduced road closure times due to car accidents but also reduced the time and staff on the scene by 50%, **saving CCSO more than \$73,000** in overtime costs alone within 32 months. In addition to these savings, the team has more man-hours available to assist in more investigations, provide analysis in point of view and liability cases and deliver powerful courtroom presentations.

## OpenSpace

**What is it?** OpenSpace's cutting-edge technology helps **document sites quickly and efficiently with helmet-mounted cameras** (even smartphones). OpenSpace now seamlessly integrates with industry tools like Procore,



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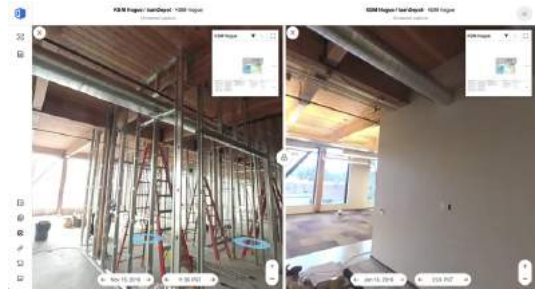
PlanGrid and Autodesk's BIM 360, making communication, reporting, QA/QC, RFIs and billing more efficient.

**Who is using it?**

Construction, Engineering, Site Documentation

**How is it making an impact?**

After evaluating photo subcontractors and competing 360 solutions for building Dickies Arena, The Beck Group chose [OpenSpace](#), because they found other solutions to be too limited, too slow, or couldn't handle a project as large as an arena. The building team was up and running quickly, using the software with ease from the beginning. No learning curve required.



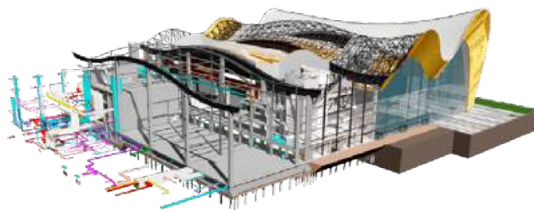
## GRAPHISOFT ARCHICAD

**What is it?** [ARCHICAD](#) is an architectural BIM CAD software that offers computer-aided solutions for handling all common aspects of aesthetics and engineering during the whole design projects of a built asset.

**Who is using it?** Architecture, Design, Construction

**How is it making an impact?**

ARCHICAD 23 now allows architects to experience real-time rendering and photo-realistic visualization with the seamless workflow of the [Twinmotion](#) live connection. Thanks to Twinmotion's state-of-the-art rendering solution, creating real-time photo realistic renderings is now extremely fast and easy, while real-time synchronization enables architects to edit the model and make design decisions on the fly.



## Autodesk BIM 360 Design

**What is it?** [Autodesk BIM 360 Design](#) is a web-based design platform that now offers cloud collaboration on projects with both infrastructure and building features. BIM 360 Design's newly added cloud functionality enables cross-discipline collaboration across teams and locations on projects with vertical and horizontal structures.

**Who is using it?** Architecture, Design, Construction, Engineering

**How is it making an impact?**

Staff from AECOM, one of the world's premier global infrastructure firms, participated in the beta-program testing of





# SOFTWARE

the BIM 360 design collaboration tool for Civil 3D. "Collaboration for Civil 3D on BIM 360 Design has proven to align our site development and civil design teams so they can use BIM 360 holistically across all disciplines," said Russ Dalton, AECOM's BIM Director for the Americas. "By expanding the collaboration capabilities of BIM 360 we can align with other disciplines in real time at a point in the lifecycle when decision making is key. This will ensure we're in immediate step with all disciplines including civil, which will benefit the entire project team."

## Pointfuse

**What is it?** Pointfuse software transforms point clouds and data points collected by laser scanning and photogrammetry into 3D mesh models. Automatic segmentation of the mesh into discrete, selectable surfaces and the ability to classify objects within the mesh can have a significant impact on how the scans can be used, allowing contractors to get more out of their point cloud data.

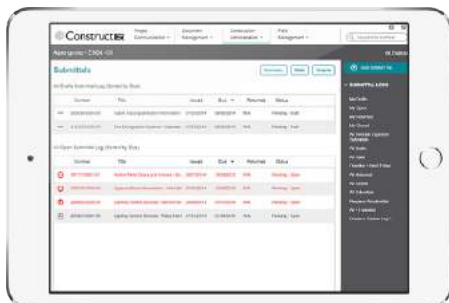


**Who is using it?** Construction, Design, Facilities Management

**How is it making an impact?** Pointfuse laser scanning software is helping a global construction services company, ISG, to maintain high levels of accuracy with BIM modeling, and significantly reduce time spent scanning scenes to create accurate 3D models. According to the company, with Pointfuse added to its workflow, what would take up to three days with traditional methods, such as creating a 3D model of a single floor, now only takes a few hours.

## Newforma ConstructEx™

**What is it?** ConstructEx™ is a cloud-based construction management software that streamlines RFI, submittal, and document management for architects, contractors, engineers, and owners.



**Who is using it?** Construction, Contractors, Architecture

**How is it making an impact?** Mascaro Construction company implemented ConstructEx to attempt to eliminate the printing, duplication, handling, shipping and filing of paper-based construction documents. They were able to reduce their paper use by 90%, **cut RFI turnaround time in half**, and eliminate delays of getting ASIs into the field. They were also able to decrease the risk of tasks "slipping through the cracks" because of ConstructEx's record of what files were sent to whom and when.



# EXPERIENCE IT LIVE



## About AEC Next Technology Expo + Conference

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Learn more at [www.aecnext.com](http://www.aecnext.com)

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