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Intelligent Project Delivery

Not all that long ago, the most advanced technology being deployed on a jobsite was a copy machine and a calculator. We have come a long way from those days and on some of today's high-tech project sites the technology being routinely deployed would have been considered science fiction in decades past.

RON PERKINS

I believe there are three principal catalysts for this rapid evolution of technology adoption throughout the AEC industry.

- 1) The United States Department of Commerce Technology Administration — National Institute of Standards and Technology (NIST) funded a study in 2004 entitled *Cost Analysis of Inadequate Interoperability in the U.S. Capital Facilities Industry*. This study concluded that the AEC industry was behind all other industries with the exception of farming when it relates to the adoption of technology to conduct business. The billions of dollars of waste due to the inefficiencies in capital projects alone got the attention of the federal government, most particularly the General Services Administration (GSA).
- 2) The introduction of Building Information Modeling (BIM) practices, standards and software technology. While the initial adoption curve of BIM standards was relatively slow, the rate of current adoption and the ensuing breadth of projects that leverage

these practices has put significant demands of technology usage on current projects. When the GSA mandated that all federal projects use BIM it had a widespread affect with contractors looking for work during industry low points in 2008 which subsequently forced these firms to embrace more technology usage on their projects.

- 3) An incredible development pace being set by both software and technology hardware providers. Computers are getting smaller and more powerful. Smart phones are in everyone's pockets. Businesses and consumers are all using cloud storage and services. Digital displays have higher resolution and printers are faster, cheaper and print at higher res too. Add to that all of the innovation being seen in 3D laser scanning equipment, virtual reality and visualization tools using gaming engines and we are experiencing technology that not long ago we could hardly even imagine. Who in this country hasn't heard about 3D printing and drones?

Firms of all sizes are embracing these technologies on projects that range from a few million dollars in total value to the one billion and higher mega-projects. We are even seeing the creation of new positions within these firms to address these needs. BIM Managers have now been around for a few years, but the title VDC (Virtual Design and Construction) Manager or Engineer has started to show up in firms across the country. This has also led to relatively new terms like Information Mobility that elicits the concept of using and sharing the right data on the right device, or medium, at the right time.

There are many examples and use cases of this happening from both the clients and the vendors providing these products or services. In the end of course contractors are paid to build buildings and the technology is only supposed to assist in that process. Applying these technologies and developing the best practices to meet the actual business challenges the technology addresses is the priority.

When fulfilling major contracts, clear communication and accurate documentation is essential to get the job done on time and under budget. Finding the best way to do this when working with a multitude of subcontractors has a tremendous impact on our success.

-Chad Neukirch, Area Superintendent,
Southeast District, Hensel Phelps

Technology designed to enhance communication and collaboration has been one of the areas where we have seen significant enhancements. BIM platforms such as Revit® have converted the standard 2D AutoCAD® process that consists of lines and arcs into a 3D model that is created using a database that includes a tremendous amount of meta-data to use during design, build, testing and other project phases. NavisWorks® software enables users to review integrated models and data with everyone on the project. The adoption of these BIM tools has certainly had a tremendous impact the collaboration happening around the project and has brought on another term widely used around the project site “BIM coordination meeting.”

Williams Scotsman, the largest construction trailer rental company in the world, developed a delivery method called techsuite™. As the name implies, this high-tech trailer solution is what they call their “answer to BIM” in the field. Their clients can now order a trailer fully decked out with whatever technology needed to either purchase or rent for the duration of the project. This practice has helped contractors of all sizes embrace the latest technology simply by adding it to the monthly rent. Williams Scotsman recognizes that one of the greatest changes they have seen is that the traditional plan table is being replaced with digital displays. Often times these displays have interactive touch capabilities that work well with the popular document management solutions being used today like

Bluebeam Revu®, PlanGrid and SmartUse by Newforma.

Many of the largest Fortune 500 tech firms are also developing new products specifically designed to serve the AEC industry. Hewlett Packard has been entrenched in the AEC industry for many years. During 2015 they announced truly innovative solutions for the jobsite and AEC offices. Their new PageWide Technology production printer spits out blueprints as fast as a copy machine makes a copy. The device they announced at Autodesk University, the Design Jet T830, was designed specifically for the construction site and includes enhancements like being WiFi enabled, faster speed and best of all a much lower price than previous devices.

We've been using the HP T830 printer/scanner/copier on site at our large hospital project in Atlanta and it has proven to be a very valuable jobsite tool allowing us to print everything from plans to full size architectural color renderings for use in planning and coordination meetings which not only saves us time, but saves us money as we don't have to outsource those printing services.

-Steve Karp, Project Director — McCarthy Building Companies, Inc.

Most people probably saw the announcement when Facebook bought the Virtual Reality platform Oculus for billions of dollars. How many people stopped to wonder how that

would impact communication and collaboration in AEC? Unity, the largest gaming engine in the world did. Couldn't you just see what would happen if you pair the actual geometry from a Revit® file to a gaming engine. It turns a real project into *Call of Duty*®. Not the guns and bombs of course, but the ability to free roam throughout a non-existent building in an immersive experience could have a real impact on the low tech users throughout the entire AEC industry. Unity evaluated the AEC industry for nearly two years, anticipating there could be a significant opportunity as the industry started to adopt visualization tools and related practices. Their final decision was to partner with a firm that has extensive experience in the AEC industry that could help them meet their objectives in a much shorter term. VIMtrek™ was developed on the Unity platform and had already built an application that converts Revit® content into the gaming engine while leaving all of the Revit® metadata intact.

Manipulating large and complex Revit® files to convey critical information pertaining to a high profile, mega-project can be a daunting task. Utilizing visualization tools such as Samsung Gear VR, VIMtrek, and Unity enabled our project team to communicate more effectively, collaborate in a virtual environment, and minimize project delays therefore minimizing cost impacts.

-Alex Malusky, VDC Engineer — McCarthy Building Companies, Inc.

Many technology providers have been expanding their interest into the AEC industry. Samsung Business has seen firsthand the results of using their Gear VR goggles that are powered by Oculus, to streamline decision making with owners and contractors. Their full product line is actually already widespread throughout the industry. Samsung smart phones, ruggedized TAB Actives tablets and their broad family of digital displays are in use on many jobsites.

The reality is that the technology adoption occurring throughout the AEC industry today has created significant challenges for contractors and other users while at the same time has got the attention of a huge number of technology providers. The one thing that everyone agrees on is that the AEC industry is no longer behind the curve. In fact, in numerous ways the AEC industry is leading the charge in many of these fields. Consider the 3D printed buildings being studied by the University of Southern California (USC). Mississippi State University College of Architecture, Art and Design just launched their Construction Training and Research Laboratory (CTRL) program to assure that students are not just educated in the technology available to them today but learn how to incorporate the use of drones, 3D laser scanning, 3D printing and many other developing technologies into the design and construction processes of the future. No doubt Mississippi State will be the first of many.

The AEC industry needs to adopt these practices in order to address the ever increasing needs of technology demanding projects as well as the needs of building owners and developers who need to manage and maintain these buildings for decades to come. It is also a crucial part to attracting the brightest and most creative minds of the next generation to consider the AEC industry as an exciting and challenging field to enter in to. All things considered, there has never been a more exciting and demanding time to be part of this incredibly dynamic industry.

Ron Perkins is the president of Jobsite Tech Group and an active member of the Associated General Contractors (AGC). He has been involved in the AEC industry for more than three decades and has been very involved in technology deployment at the construction site for a number of years.

Notes:

General Services Administration (GSA)
<http://fire.nist.gov/bfrlpubs/build04/PDF/b04022.pdf>