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Six Technology Innovations to Watch in Engineering and Construction

By Karen Keniff and Eric Lambert

Zurich's top picks for promoting productivity and mitigating risk.

Not long ago, when drones were making headway in the marketplace, some of our conversations with general liability customers were skewed toward privacy issues: A drone, they worried, could peer through windows! While acknowledging that might be one concern, we tried to communicate the larger picture by explaining how drones could boost productivity and reduce risk.

As forward-thinking engineering and construction (E&C) organizations started using drones and realized the associated safety and bottom-line benefits, more companies began to embrace this technology. In fact, JBKnowledge's "2017 Construction Technology Report" lists drones as the top emerging technology for the industry, with 37.8% of respondents reportedly using drones.[1]

Although innovation and technology adoption have not been priorities for many E&C companies, substantial opportunities exist in these areas. A recent report from McKinsey Global Institute notes that boosting productivity, achievable in part through the implementation of technology, could translate to $1.6 trillion a year in added value for the industry worldwide.[2]

With a barrage of new and emerging technology available, the intimidation factor is real. What technology do you choose? How, exactly, do you innovate?

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[1] "2017 Construction Technology Report." JBKnowledge, Inc. 29 December 2017.

[2] "Reinventing Construction: A Route to Higher Productivity." McKinsey Global Institute in Collaboration with McKinsey's Capital Projects & Infrastructure Practice. McKinsey & Company. February 2017.

First, identify the major problems that need addressing. As you seek solutions, remember that innovation shouldn't be limited to new or advanced technology. It can include both of course, but sometimes it's about combining time-tested practices with current technology to improve your customers' experience and your business results. An initiative by one of our customers, Winter Construction Co. (Winter), offers a classic example.

Water Risks: Rising to the Challenge

Winter is a privately owned and operated general contractor based in Atlanta that provides a wide range of commercial construction services throughout the Southeast. A key element of Winter's success has been the development and field execution of its Water Management Program, which addresses the profound impact of water intrusion events.

Water intrusion is one of the leading property damage risks associated with new construction and renovation projects. Our claims records from 2007 through 2016 show that nearly 50% of all builders risk claims resulted from some form of weather or escape-of-water event. Internal water system failures accounted for almost 25% of our builders risk claims over the same period. Moreover, water intrusion-related issues that surface after project completion can lead to claims under general liability, professional liability and environmental liability insurance policies. Additionally, most construction defect claims are water-related.[3] Sometimes these problems can be avoided with relatively simple fixes, such as proper material selection.

Winter recognized that the potential loss costs as a result of water damage and mold can be astronomical, including (but not limited to) costs associated with field rework and restoration, schedule delays and, ultimately, reputation.

In response, Winter created the Water Management Program, a real-time, schedule-focused interactive tool that helps field personnel proactively manage construction activities to prevent water intrusion issues—all with the goal of improving the overall quality of a building.

Developed by its in-house IT professional, this web-based application is accessible from any device. It's digital, portable and easy for field personnel to use. The program not only focuses on construction quality, but also is incorporated early in the construction process by collaborating with architects and engineers during the design phase.

[3] "Water Intrusion Mitigation Program for Construction." Zurich North America. 24 April 2018.

Because the tool engages all Winter staff, all involved parties are held accountable for critical activities and dates, sequencing of construction activities and quality control. The application has become a valuable communication tool that keeps water management activities ever-present via automated messaging on upcoming specific items in the water management plan. The program sends emails not only to the relevant Winter employees but also to the appropriate contact with the subcontractor involved. Furthermore, it allows personnel to augment the database with project-specific information and all associated tasks and deadlines.

The company's leaders also use the system, which sends automatic weekly reports to alert Winter management of any issues that arise on a job, allowing them to provide support as needed.

"Having this system in place gives us the communication framework to promote best practices as they relate to water intrusion," said Margaret Rauber, vice president of operations at Winter. "The Water Management Program has become an integral part of our overall quality control programs and our quality control culture, discussed during preconstruction, at project startup, during weekly team coordination meetings and throughout the course of construction."

Tim Thomas, Winter's vice president of risk management, credits the program for the company's track record at preventing big water issues. "Overall, the program has improved our quality and reduced or eliminated the frequency of water intrusion mishaps," Thomas said. "We believe the larger benefit of our plan is that we're giving the owner a better-quality building every time."

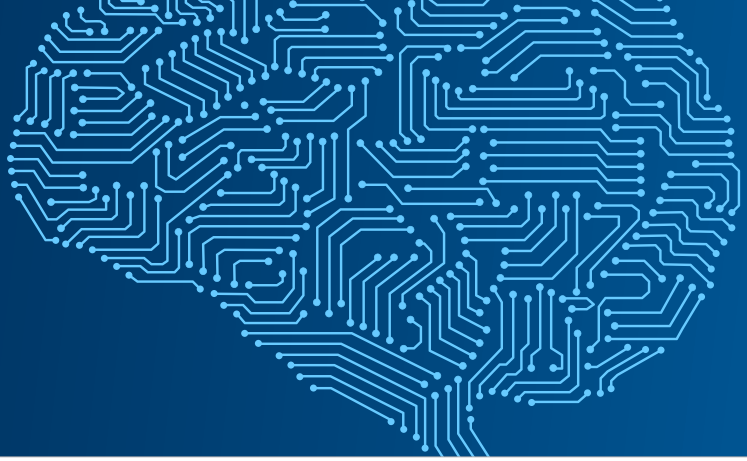
Six Innovations That Interest Us Most

As a leading insurance provider for the construction space, serving customers is our top priority —but we can't tell them which innovations to choose or how to implement them. E&C company leaders need to assess and decide what technology solutions are best-suited to solve their unique business challenges.

We focus on the innovations that improve our customers' ability to manage risk effectively. With that in mind, here are six technology categories we're assessing in collaboration with our E&C customers. Our brief descriptions of these categories belie a world of benefits we don't have the space to fully communicate.

1. **Wearables/employee tracking devices:** These smart devices attach to clothing or are worn by employees as personal protection equipment to capture and monitor data in real time. They're being used to improve efficiency, communication, productivity and safety. We're especially interested in wearables' ability to alert workers when they are performing tasks in an ergonomically harmful way, because musculoskeletal disorders (MSDs)—including sprains and strains—are a leading cause of injuries and lost days in the construction industry. In fact, a recent study shows the average risk of work-related MSDs is higher in construction than all industries combined.[4] Other safety boons of this technology include the ability to locate workers during an emergency or when they're entering areas with fall hazards.

[4] Lehman, Shereen. "Construction Workers Still at High Risk for Strains and Sprains." Reuters. 16 January 2017.



2. **Artificial intelligence (AI):** AI turns video data into digital models that can help document on-site progress, improve quality control and promote safety by analyzing and identifying risks. Its capabilities include, but aren't limited to, visual documentation and analytics, cognitive services and cameras, risk analysis and prediction, and data analytics. Implementing AI is not an inexpensive proposition, but it has shown a robust return on investment, notes a recent McKinsey & Company report.[5]

3. **Drones:** Unmanned aircraft systems (UASs), or drones, come equipped with software applications and cameras that can capture progress photos and videos and perform quality inspections, often in hazardous or hard-to-reach spaces. Consider that falls account for 37% of work-related deaths suffered by construction workers.[6]

   Drones can also capture data that can overlay information to business information modeling (BIM) and let engineers and contractors quickly see envisioned (versus actual) conditions. They can also be used to monitor quality control, safety and work site security. The JBKnowledge survey reports that construction workflows dependent on drones are expanding in areas including earth movement, site documentation, structural inspections and percent complete calculations. One interesting way they're saving companies money is by allowing key stakeholders to view progress reports without incurring travel expenses to visit sites.[7]

4. **Predictive analytics for medical/health management:** The use of predictive analytics can help manage workers' compensation costs and keep employees healthier and productive. Our Claims and Predictive Analytics teams have collaborated to create digital models that interact with a claim from the moment it's filed to when it's closed. Are employees going to the right doctors? Are the correct prescription drugs being used, in the right doses? We also use predictive analytics to flag claims that may benefit from early nurse case management. For these flagged cases, assigning a nurse early in the treatment can produce significant benefits, including $6,000 to $26,000 in terms of cost mitigation, according to our claims monitoring. There is also the possibility of a faster, fuller recovery for the worker.[8]

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[5] Blanco, Jose Luis, et al. "Artificial Intelligence: Construction Technology's Next Frontier." McKinsey & Company. April 2018.

[6] Centers for Disease Control and Prevention. "5th year – National Stand Down to Prevent Falls in Construction." 26 March 2018.

[7] Madigan, Nick. "Drone Soars as a Construction Tool Able to Leap Tall Buildings and Save Money and Lives." The New York Times. 15 August 2018.

[8] McIlree, Nina, M.D. "Predictive Analytics Delivers on Workers' Compensation Claims." Zurich North America. 14 June 2018.

5. **Robotics:** A recent survey conducted by Autodesk and the Associated General Contractors of America found that 80% of contractors reported difficulty finding qualified craft workers.[9] Machines that can perform or assist with construction tasks are especially welcome, either to supplement a lack of workers or maintain the health of existing employees. Robotics can be divided into two types. Autonomous robotics refers to machines that perform semi-complex tasks with minimum oversight, such as laying bricks or tying rebar. Assistive robotics devices are worn by workers to enhance lifting and carrying capabilities to reduce fatigue and injuries, and boost productivity.

6. **Monitoring and tracking equipment/autonomous vehicles:** The National Equipment Register and National Insurance Crime Bureau estimate that each year an average of $400 million of heavy construction equipment is stolen. In 2016, the latest year data was available, just 21% of stolen equipment was recovered.[10] Using tracking technology to prevent theft and increase the odds of recovery can help mitigate these losses. These systems also offer cost savings by tracking many areas of vehicle usage, including fuel and mileage.

   Autonomous and semiautonomous vehicles (e.g., driverless excavators and bulldozers) allow employees to operate the vehicles from a distance. This can help reduce the industry's "Fatal Four" events as identified by the Occupational Safety and Health Administration, which include being struck by an object or caught between equipment. A variety of monitoring systems are also available to protect construction sites from security breaches, vandalism and water damage.

Success Starts at the Top

There are many iterations of all these innovations, and even more advancements are forthcoming. It bears repeating, though, that simply adding technology isn't a cure-all. Achieving success in innovation starts with leadership commitment and must work its way down through an organization.

Furthermore, implementing any new technological process takes time and patience. You must allocate appropriate investments and have a plan for rolling out the new initiative, following up and making people accountable at every level. Without a focus on continuous improvement, the implementation won't succeed. When you do follow these steps, however, your company and its customers can both reap substantial benefits.

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[9] "80% of Contractors Report Difficulty Finding Qualified Craft Workers to Hire." The Associated General Contractors of America. 14 September 2018.

[10] "2016 Equipment Theft Report." National Equipment Register, National Insurance Crime Bureau and Verisk Insurance Solutions. 2017.

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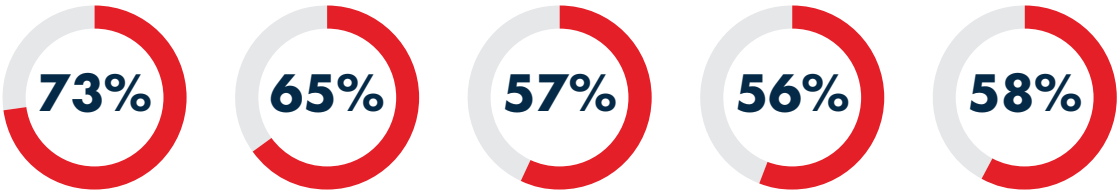

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