2019 New York Conference
December 5, 2019
New York, NY

Keeping up with the Techies: How construction technology is raising the bar for risk reduction and assignment of liability

Background and Purpose

Technological innovation is emerging in the construction industry through the integration of artificial intelligence, smart and predictive analytics, autonomous equipment, virtual and augmented reality, wearables, and more. The data collected and aggregated is providing unprecedented insight into construction operations, which is making jobsites safer, more efficient and more profitable every day. The next stop? The desks of underwriting, risk engineering, and insurance professionals everywhere. Construction technology is expected to capture data that allows for better risk assessment, management and mitigation, as well as provide valuable facts and support for expeditious claims adjustment on property and liability losses. While this all sounds new and exciting, there will likely be many hurdles to overcome as the insurance and legal industries fully comprehend how to navigate this integration. This session will provide well-rounded perspective on this complex discussion of new and emerging construction technologies and how they are expected to affect risk assessment and mitigation, underwriting, claims management and legal aspects.

I. Introduction to Construction Technology

Construction tech solutions and the data captured by them are proving useful on the front end of projects for increased operational efficiency and risk reduction, and on the back end of projects (i.e. post-loss) with more effective claims resolution and assignment of liability. Increasing interconnectivity of projects with devices and better utilization of data and analytics will help reduce risk and settle claims faster. For example, smart construction projects tout potentially fewer workplace accidents by separating the humans from the hazards with automation and robotics. Embedded sensors on a connected worksite create opportunities for collecting and managing data on safety, material performance, and operational workflow, just to name a few. Smart devices and wearable technology, as well as sensors and on-site cameras can be tied in to various systems aiding risk professionals in risk prevention efforts and liability professionals on the back end.

There are numerous categories of emerging technology that require brief backgrounds as to the purpose of their existence and how they will shape the future for claims professionals, attorneys, and experts:

- Environmental & Weather Sensors. Products such as Pillar can document conditions across a site with interconnected devices that track temperature, humidity, carbon monoxide, particulates, and more. Sensors can trigger alerts when a potentially hazardous condition exists, e.g. elevated CO levels. Athenium Analytics provides site-specific weather data and forecasting for better scheduling and weather protection.
- Wearables. Worker wearables are growing rapidly trackers, fatigue monitors, proximity warning devices, and ergonomics. These devices provide varying types of assistance to site workers to reduce construction site accidents and injuries.
    - Trackers. FC Construction, Triax, and GuardHat among the manufacturers and users of tracking devices that have many purposes, such as monitoring and/or limiting locations where workers visit, or documenting movements of workers.
    - Fatigue Monitors. The Caterpillar SmartBand detects fatigue by monitoring worker movement potentially mitigating fatigue-impaired accidents.
    - Proximity Warning. The ProxxiBand is a is a wristband that alerts the wearer of high voltage components prior to touching or engaging.
    - Ergonomics. Wearable devices by StrongArm Tech, SmartBelt by Modjoul, and SoterSpine are addressing these injuries with wearable, accessible, and adaptable systems that prompt the wearer to correct improper ergonomic behavior to avoid injury.
- Robotics. Innovation in this category is significant with autonomous construction equipment and advances in labor-intensive tasks at the forefront. TyBot is a rebar-tying robot for large bridge construction while Toggle created a handheld rebar-tying tool. Others include brick-laying machines, drywall-hanging robots, etc.
- Modular / Pre-Fab – Studies have indicated that use of modular and prefabricated elements can save cost (16%), schedule (45%) and improve overall project performance and safety.
- Photography/Photogrammetry/Drones. A picture is worth a thousand words; during construction, as a loss occurs, or documenting the loss, this technology is quickly evolving. Technology from SmartVid.io, EarthCam, OnSiteIQ, OpenSpace, and Matterport are revolutionizing an old task.
- Daily Documentation and Logs (Raxar)
- Quality Management (ProCore, BIM360, FieldLens, Plangrid)
- Leak Detection (LIKK, WINT)
- Embedded Sensors (ConcreteSensors)
- Equipment/Asset Tracking (Hyundai HiMate, CAT Connect)
- 3D/4D/5D Modeling / Digital Twins (Avvir, Capgemini, Bentley (iTwin))

Integration of all these systems provides a more holistic understanding of risk, incident facts, and adjudication of claims. The data allows us to know, rather than surmise or opine on, what actually happened in the event of a loss.

II. Case Studies

Technology in Action

To illustrate how construction technology comes into play in a claim and how it is likely to shape how we manage future construction claims and litigation, we explore two recent and relevant case studies:

Berkley Balcony Collapse (Berkley, California) Case Study

The loss occurred at the Library Gardens apartment complex in Berkley, California. Library Gardens was completed in 2007 and is a five-story complex with four residential floors above a retail level. In June of 2015, a balcony outside of a fourth-floor apartment broke away from the building and flipped over, landing on the balcony beneath it. There were 13 people on the balcony when it fell; six were killed and seven were severely injured. All six people killed were students who were 21 or 22 years old. Five of the deceased were Irish citizens and the other had dual citizenship in Ireland and the U.S. The loss occurred during a 21st birthday party for an Irish student who was visiting the Bay Area for the summer. The accident received a fair amount of attention from the national news media and led directly to changes in legislation (SB 721 and 1465).

How technology Contributed to the investigation:

Because of a criminal investigation, typical destructive testing methodologies were not permitted as the criminal forensics team did not want any perceived tampering and/or destroying of evidence if the inspectors and experts retained for the civil litigation were granted full access. The balcony itself was placed in a warehouse and the accident site was carefully regulated as to what could or could not be done (original inspection was limited to photos from far inside the building or via a scissor lift). This created a huge issue for the civil litigation, particularly as to liability allocation as there was no ability for the experts to conduct destructive testing in the manner in which they were accustomed.

To assist, the various experts on all sides (plaintiff, defense and criminal) came up with a solution: 3D renderings based off the plan details, the construction notes, the criminal investigation and the civil investigation. They were able to “build” the balconies and recreate a likely scenario in which liability for the construction group could be allocated. The rendering allowed for “removal” of any portion of the balcony construction (the deck coating, the waterproofing membrane, the stucco, the drainage system, etc.) to get to the root core of what caused the obvious wood rot that had occurred. It also allowed for an accident reconstruction, similar to those used in auto accidents, for the BI portion of the claim. It also assisted in determining if there were design issues that were attributable to this accident.

III. Technology Meets the Law

The Law Lags Behind Innovation

Discuss how the data will play into legal process and procedures. Discuss if and how the data can, should and likely will be used by the various parties.

- Admissibility Concerns of evidence through data: With technology always changing, Courts are struggling to keep the discovery-net wide enough to encompass information stored on smart devices and wearables as the technological industry constantly evolves. Use a data analytics company to retrieve information from devices such as smartphones and wearables. To get a picture of information, reports, logs and trends, use a data analytics company as a witness to testify about obtaining the information from the device. As in the case of these devices, it will most likely be necessary to have the wearer of the device testify for purposes of authentication. Make sure the witness does not try to manipulate the findings.
- Use of Data in the Court room: Wearable data has unlimited potential in the legal context to help resolve some of the weaknesses that plague current forms of evidence. One of the most prevalent weaknesses stems from concerns about the reliability and credibility of witnesses. Using technological data from wearables as an additional source of evidence could help eliminate the concerns about the fallibility of human memory, biases, and intentional deceptions that undermine witness testimony reliability.
- The parties must prove that the information is reliable, and if it is not, may supplement the information with technological devices: Technology is on the verge of making lying much more difficult to get away with. In fact, the full scope of how our increasingly networked and documented lives can catch deceptions can be hard to fathom. With the accumulation of data from wearable devices comes a better way to determine the credibility of witness testimony. To utilize technology in this manner, courts would need to employ the use of technological data as supplemental evidence as a comparison to what someone is actually testifying. Of course, this is in circumstances limited to the type of data collected by the specific device worn by the witness — for instance, Fitbit/Apple Watch data would most likely not be able to disprove inaccurate eyewitness identification. However, Fitbit/Apple Watch data could be useful in proving that a witness lied about their location on the day of a construction accident.
- One question that remains is whether the plaintiff (and their experts) can prove their case through non-destructive evaluation; and whether the defense (and their experts) will agree to this method: Non-destructive methods with technology tend to be less understood as they continue to progress as emerging technologies in the construction field, e.g. uncertain advantages or limitations, lack of technician qualification criteria, or little to no industry codification. The issue continues to be whether both sides agree to the methodologies for non-destructive testing.

Determination of Liability with Technology

- The procedure to which liability is determined shouldn't be any different whether or not data from construction technology is considered on a construction accident, defect, or property loss claim. This is especially true for experts who are generally engaged post-loss and will be on the front lines providing consultation to the claims professional and attorney. The difference between the way this was done in the past versus where the industry is going directly correlates with technology.

Specifically, the availability and type of data produced, the reliability of the data itself, and the subsequent development of expert opinions.

- It is uncertain whether the claims and litigation community, on both the plaintiff and defense sides, may universally accept the data produced by technology. There is surely a universal cause for concern with perhaps rudimentary tasks performed. Examples:
- Destructive testing on defect claims. There are emerging technologies that may make destructive testing a task of the past, given new equipment and procedures that could prove the task to be unnecessary. Plaintiffs may be able to prove their allegation without cutting open a wall, however it's questionable whether the defense may accept an alternative to destructive testing by plaintiffs. It should also be considered whether the use of technology may provide a means of indemnification to owners/claimants.
- Under conditions of accident reconstruction on construction sites. Emerging technologies with photographs, videos, proximity sensors and more can virtually recreate accidents with little contention. It should be considered whether the re-creation includes all relevant context to accurately capture the entire picture in order to fairly and accurately assign liability and resolve the claim justly.
- In any scenario, the good comes with the bad, and vice versa. With a law that is lagging, it is unclear how the data will or can be used by the plaintiff and/or defense to make their case. And, how the opposition will react. Clearly the use of technology yields many pros, and conversely additional cons. Voluminous data will undoubtedly provide more details on cause and origin investigations and provide more accurate determinations of liability across the board; however, certain questions will undoubtedly arise through the claims and litigation process that test the rules of expert testimony and limits of the scientific method. The insurance and legal communities will be pressed to make policy interpretations and push the law forward, respectively, as emerging technologies evolve.

Expert Witness Testimony

Expert witness testimony is dependent on the requirements of Rule 702 (Testimony by Expert Witnesses). Rule 702 requires reads as follows (Pub. L. 93–595, §1, Jan. 2, 1975, 88 Stat. 1937; Apr. 17, 2000, eff. Dec. 1, 2000; Apr. 26, 2011, eff. Dec. 1, 2011):

"*A witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise if:*

a) the expert's scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue;
b) the testimony is based on sufficient facts or data;
c) the testimony is the product of reliable principles and methods; and
d) *the expert has reliably applied the principles and methods to the facts of the case*"

As technology becomes more prevalent, the data becomes abundant and so does our dependence on same as an industry and a culture. E.g. When was the last time you gave someone directions to your house? Technology is empowering but its abundance and prevalence can easily render old methods obsolete. We must explore how this affects our typical process and procedures during claims and litigation. Rule 702 specifies that experts must

have “scientific, technical, or other specialized knowledge” on a subject and that their testimony is based on “sufficient facts or data.”

As technology evolves, experts everywhere will be pressed to continue learning and development in order to ensure they can review, assess, and evaluate new technologies. If the data produced and reviewed is misunderstood or overlooked, the implementation of technology will go to waste. Lastly, the most pressing and perhaps most exposed topic for rebuttal will relate to whether an “testimony is the product of reliable principles and methods.” There is no doubt that innovators everywhere are finding better mousetraps to improve safety on construction sites and efficiency in homes; however, the use of data produced by such technology must be exhaustively researched and accepted by the scientific and expert community. If not, the risk of opinions rendered from such data could be labeled unfounded; such could lead to unfavorable case law and hinder the use of technology by experts in determining cause and extent of damage, and more importantly, liability.

The Scientific Method

Experts rely upon the principles of the scientific method as a systematic way of solving a problem; hypotheses are formed and then systematic tests are performed to determine the conclusion (i.e. cause, liability, etc.). Understanding the scientific method as it relates to emerging technology is critical; including the following six steps:

- Purpose/Question – Ask a question. Example: What caused the Notre Dame fire?
- Research – Conduct background research. Example: Inspect the fire damage. Interview interested parties. Etc.
- Formulate Hypothesis – State an opinion that must be tested; generally, in a cause and effect format. Example: The fire was caused by sparks produced by welding crew working in the attic of the building.
- Conduct Experiment – Test the hypothesis. Example: Bodycam video from the welding crew depicted sparks landing on the framing and attic insulation. Sensors in the attic pinpointed the time and occurrence of the fire.
- Data/Analysis – Record observations and analyze what the data means. Example: Review industry standards. Review data. Etc.
- Conclusion – Conclude to accept or reject the hypothesis.

The previous exercise is basic and arbitrary; considering the data discovered through the use of technology (i.e. bodycam, sensors), there is potentially less contention with the expert opinion and subsequent assignment of liability in a scenario like this.

Accepting Technology – Plaintiffs & Defense

A more contentious foreshadowing of the future will occur when experts use technology as a tool in the rendering of an opinion (i.e. presenting their case and proving their hypotheses with the use of emerging technologies in lieu of typical (current) methods). One foreseeable way both plaintiffs and defense (attorneys and experts) will agree upon emerging technologies will be the acceptance of their reliability in the scientific community. Absent of this acceptance, experts will label the oppositions opinion as “junk science” or “unfounded.” This would apply in either direction – if the plaintiff alleges defects to a property, extrapolates across a property,

and presents such opinions following the completion of destructive testing, the defense may have difficulty rebutting their opinion through the use of non-destructive testing. Similar to any skeptic, one there is a universal acceptance or acknowledgement of something new or unknown, the opposition is going to have a hard time.

IV. Conclusions & Takeaways

Risk Reduction, Claims Resolution, and Assignment of Liability

Innovation will never slow down. The new and emerging technologies that were once just concepts are here and being implemented on construction sites and inside homes increasingly every day. How can this aggregated "big data" help us reduce overall risk in the construction industry? The answer is simple – by turning technology into insights and having foresight. Additionally, claims resolution can benefit from technology through cost efficiency making determinations quicker and finding solutions prior to performing comprehensive testing. Lastly, claims professionals, attorneys, and experts can utilize technology to more quickly and definitively assign liability. The takeaway: contractors, claims professionals and attorneys alike can benefit on all levels by understanding, embracing and leveraging the technology of tomorrow.