Rebuilding The Construction Industry With AI

By **Josephine Bahn and Jeffery Mullen** (October 24, 2023)

Everything, everywhere, all at once.

As with every industry today, artificial intelligence is the topic of focus in the legal profession and a hyperfixation in the construction industry. How can we do more with less, be more efficient, build better and faster? These questions are all at the top of every C-suite's wish list.

In recent months, the construction industry has joined the chorus, looking for ways to utilize AI to increase project efficiency and decrease costs — but at what ultimate cost?

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Traditional Industry Gets Transformed

The construction industry, often associated with tradition and manual labor, is undergoing a profound transformation with the integration of AI.

AI aggregates how a machine can mimic the human cognitive functions such as problem-solving, pattern recognition and learning. In recent years, AI has emerged as a potential game-changer, revolutionizing multiple aspects of construction, from project

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management to safety and efficiency. In an industry that spends over $10 trillion per year, construction entities are clearly looking to increase their spend on technologic advancements.

Industry Disrupted by Technology

In June 2020, McKinsey & Co. Inc. issued a landmark report[1] outlining how AI would disrupt and affect the construction industry. The particularly prescient report identified seven sources of disruption.

Rising Customer Sophistication and Total Cost of Ownership

Customers have changed their expectations — needing faster delivery times, on lower budgets, with more engagement from their construction companies.

Scarcity of Skilled Labor and Changes in Logistics

Though the report was issued during the height of the COVID-19 pandemic, the construction industry is still looking at a labor fall off, with nearly 41% of the current U.S. construction workforce to be retired by 2031.

Updated Regulations for Safety, Sustainability and Building Code Standardization

Sustainable construction materials and processes are becoming stricter over time — with more customers wanting sustainable materials and more government officials seeking safety and building code standardizations.

Widespread Industrialization

Prefabrication of materials offsite is here to stay — this is directly tied to automation, machine learning and robotic imaging technologies.

Development of New Materials

With the advancement of technology, construction materials have gotten lighter. Light-gauge steel frames, cross-laminated timber and ethylene tetrafluoroethylene, a glass alternative, are affecting costs and logistics related to transportation of materials to work sites.

Digitization of Products and Processes

Digital design, processes and products are significantly reducing the operational and maintenance costs of construction projects.

New Entrants Into the Construction Industry

Disruption in the construction industry is changing the economics of project funding and who the players in the industry are.

AI Impacts on Construction Going Forward

The potential for machine learning in the construction industry is pervasive — from streamlining requests for information and change orders to synthesizing a large and sophisticated amount of data. Here are some areas in construction where AI will continue to drive improvements.

Predictive Analytics for Project Management

One of the primary areas where AI is making a significant impact in construction is predictive analytics. AI algorithms can analyze historical project data, weather conditions, and other variables to make accurate predictions about project timelines and potential setbacks.

Project managers are directly affected each day using this data to streamline their day-to-day management activities and proactively address issues, reduce delays and allocate resources more efficiently.

This proactive management decreases the need for legal interference and contributes to the reduction of cost overruns and potential disputes on construction projects.

Development of Additional Construction Site Safety Requirements

Safety is a top priority in construction, and AI is being employed to enhance safety measures on projects of all sizes. AI-powered cameras and sensors detect potential hazards in real time, such as workers not wearing appropriate safety gear or unauthorized personnel in restricted areas. This technology can help prevent accidents and save lives.

By increasing the detection of potential hazards, project managers are able to more effectively manage a project site — and also decrease the exposure for potential injury on a

project.

AI Assisting in Design Optimization

AI-driven design optimization tools are empowering architects and engineers to create more efficient and cost-effective structures. Through the use of AI algorithms, architects and engineers are able to analyze thousands of design possibilities.

In using these algorithms, architects can identify the most sustainable and structurally sound options, resulting in buildings that are not only safer but also more environmentally friendly. This design optimization narrows the potential for error on a project, while increasing the efficiency.

Increasing Drones and Robotics for Assistance With Logistics on Project Sites

Drones equipped with AI are revolutionizing construction site inspections. Drones are capturing high-resolution images and video, allowing project managers to assess progress and identify issues from a bird's-eye view.

Through the use of this technology, project managers are able to track development and schedules on a more precise basis leveraging the additional data to resequence project activities as necessary in real time.

Robots and automated machinery are being used to improve physically burdensome tasks like bricklaying, which in turn helps reduce labor costs and improve precision.

Materials Management Streamlined Through AI

Managing construction materials efficiently is essential for cost control and environmental sustainability. AI systems are now being utilized to track material usage, monitor inventory and provide real-time information on supply chain logistics. This use of AI helps the construction industry reduce waste, minimize costs and ensure that projects stay on track.

Project Cost Estimation Efficiencies

AI-powered cost estimation tools use historical data and project specifics to provide highly accurate cost projections. This helps construction companies bid on projects more competitively and manage budgets more effectively. Through the use of AI-powered cost estimation tools, construction companies are able to streamline and more precisely estimate their bidding going forward.

Virtual Reality and Augmented Reality On-Site for Project Visualization

Virtual reality and augmented reality technologies are enabling architects, clients and construction teams to visualize projects in three dimensions. The use of VR and AR also helps lawyers during the claims process as legal teams develop strategy for potential sequencing, delay and cost-overrun claims.

In addition to the positives of post project visualization for claims, the use of AR and VR helps make design decisions, identify potential issues and improve collaboration throughout the construction process.

Building Information Modeling Usage to Streamline Infrastructure Projects

Building information modeling is a technology that uses AI and 3D modeling to create a digital representation of a building or infrastructure project. This allows all stakeholders to collaborate and make informed decisions from the initial design phase to maintenance and renovation.

Building information modeling creates an environment where contractors and subcontractors can evaluate the entire project on a granular level before breaking ground — and is also used to support real-time decisions affecting the project once it gets underway.

Remaining AI Challenges and Future Prospects in the Construction Industry

Despite the numerous benefits, AI implementation in the construction industry also faces challenges. While AI will continue to create streamlined outputs, increase productivity and change the scope of projects, there are clear blind spots that must be considered.

The industry needs to address concerns related to data security, workforce training and the potential job displacement caused by automation — all while dealing with the potential that 41% of the construction industry is set to retire in the next eight years. However, with proper planning and a focus on responsible AI integration, these challenges can be mitigated.

As AI technologies continue to advance, it is clear that there will be even greater innovations, including the potential for autonomous construction vehicles, AI-driven project management platforms and advanced robotics for on-site construction.

With each new advancement, there will be legal implications and adjustment periods for the changes. Moreover, the downstream impacts of each change, including the legal implications of each, will be as important to evaluate and assess as the immediate impacts.

AI is ushering in a new era of innovation and efficiency in the construction industry. From predictive analytics to safety enhancements and sustainable design, AI is proving to be a valuable tool in all phases of construction projects.

As the construction industry adapts and embraces AI, it will undoubtedly lead to more cost-effective, safer and environmentally conscious building practices, ultimately benefiting both construction companies and the communities they serve. The legal community will need to stay equally nimble and well-versed to continue to offer insights and counsel to their construction industry clientele.

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[1] McKinsey's 2020 landmark report.
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