

# Digital Disruption in Commercial Real Estate

SHIFTING PARADIGMS & A HEIGHTENED PACE OF  
OBSOLESCENCE

**How We Build**

By the Business Intelligence, Data and Analytics Department  
of First American Title's National Commercial Services



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This article is the third in a series discussing the disruptors that are remaking commercial real estate and will impact the way we live, build, work, play and invest.

Rather than thinking about technology as a defensive, isolated disruption of commercial real estate, we need to contemplate technology in the context of a disruptive framework and consider how technology and accelerated change will impact the built environment. Being strategic and applying research will prove key in evaluating the demand for real estate, the impact of technological change, and potential sources of disruption to how we build.

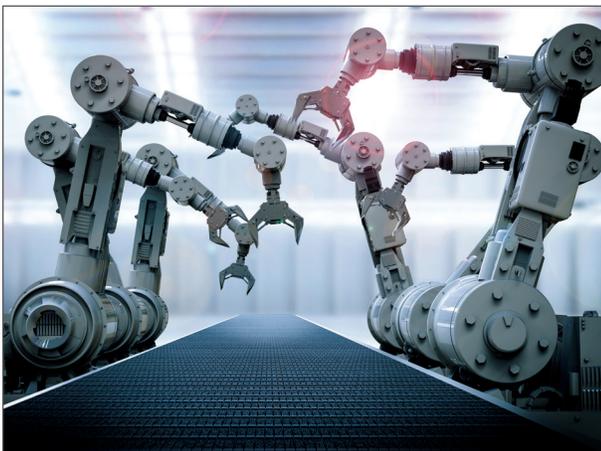
## An Industry Focused on Higher, Faster, Safer

Real estate architects, planners, engineers, developers and construction companies have always pushed boundaries. The world's first skyscraper, the 10-story Home Insurance Building in Chicago built in 1885, utilized the then-revolutionary system of sustainability and safety. Now real estate enterprises are using sophisticated technologies such as Sensing, Computing, Modeling, Artificial Intelligence (AI), Machine-Learning (ML) and other applications to design and construct today's buildings. The application of Robotics Automation and AI, known as RAAI, continues to accelerate and drive innovation. New tools, including Virtual Reality (VR), Augmented Reality (AR), AI, The Internet of Things (IoT), Digital Twin (DT) technology and still other innovations, are creating a more productive, cost-effective and safer construction experience.



## The Result

As technology becomes integral to businesses and their operations, ConTech (industry lingo for construction technology) has been on a fundraising tear. This year will set a record for the space, with ConTech funding already up 60% from 2017, and still another quarter left.<sup>1</sup> As of the end of June 2019, capital injection and investments totaled more than \$4 billion into the ConTech sector, which is greater than 2018's total for the entire year.<sup>2</sup> ConTech in the context of the built environment is the technology used to innovate the way we plan, design, build, manufacture and install structures and their components.



This article examines how new technologies and digital tools are disrupting the planning and construction experience now and into the future, as the prime growth drivers for how we build. Our future homes and structures are already building themselves with the touch of a button, and in some cases, they are doing so at breakneck speed, completing construction in just minutes. Instant access to construction sites down to the smallest details, via real-time digital representation of physical objects, also known as a Digital Twin, is a reality. With building components readily connected and stacked, portable and temporary, the Fourth Industrial Revolution (4IR) is upon us.<sup>3</sup>

1 CB Insights, Construction Tech Financing Continues Its Record Run, Despite Challenges At Kattera, <https://www.cbinsights.com/research/construction-tech-financing/> (August 30, 2018).

2 Konrad Putzier, "Momentum Builds for Automation in Construction," <https://www.wsj.com/articles/momentum-builds-for-automation-in-construction-11562073426> (July 2, 2019).

3 "The Fourth Industrial Revolution describes the exponential changes to the way we live, work and relate to one another due to the adoption of cyber-physical systems, the Internet of Things and the Internet of Systems." See Bernard Marr, "The 4th Industrial Revolution Is Here - Are You Ready," <https://www.forbes.com/sites/bernardmarr/2018/08/13/the-4th-industrial-revolution-is-here-are-you-ready/#a4945b4628b2> (August 13, 2018).

## Planning

Building design is being disrupted both virtually and physically. Increasingly, construction documents are being stored in the cloud while virtual disruption actually begins much earlier, during the site selection process. For example, industry players are using technologies such as MapYourProperty, a digital interface, to access property data including zoning bylaws and proposals.<sup>4</sup> A digital app uncovers potential risks as developers assess parcels. Once the site is selected, digital Building Information Modeling (BIM), especially if integrated with Virtual Reality, can now create 4D modeling. This adds an additional dimension to 3D physical characteristics and mockups of structures, increases collaboration and improves efficiencies, reducing the time that would otherwise be lost when revisions cause multiple plan changes. BIM integrates various tools that facilitate sustainable management and enable building and system designs that streamline operations and increase property values.

For example, The Edge, Deloitte's Amsterdam headquarters completed in 2015, and considered one of the most "intelligent" buildings in the world, utilized innovative design that included orienting the building to the north, while creating an energy-efficient floor plan that brings in southern light to reduce heating and cooling costs. Using data collected from an array of sensors, an app organizes the interior digitally to enable just 1,000 desks to accommodate 3,000 employees. Approximately only 25 percent of the workers are at their desks simultaneously. The app also can adjust temperature and light settings depending on the number of people and their movements within the building at any given time.<sup>5</sup> "The newest connected buildings like Amsterdam's app-enabled Edge are attuned to our behavior, providing data-rich patterns that machines use to make better-informed decisions. Even now your thermostat, smartphone, lights and security system are starting to communicate, and soon they'll be limited only by how well they can play together."<sup>6</sup>

## Construction

New tools, applications and materials are enabling more cost-efficient, sustainable and safe construction. From the most basic tools to materials and communications to autonomous robots, technology implementation is trending toward Lean Construction, optimizing activity flow and cutting costs. Perhaps the greatest benefit these tools offer to the early construction process is accuracy. Laser scanners confirm that buildings meet specifications, and digital tape measures, including an app from Apple, render accurate measurements.<sup>7</sup> VR goggles provide fully immersive walkthroughs, allowing all those involved in construction including designers, engineers, builders and developers to spot errors and conflicts early.<sup>8</sup> AI and machine learning enable quick aggregation and analysis of data, thus creating a quicker, clearer picture of a jobsite. The outcome is greater insight into safety, scheduling and budgeting issues.<sup>9</sup>

Material production is also experiencing a unique combination of newness and tradition. A new process is now capable of turning knitted textiles into complex molds for concrete buildings. This innovation allows for faster production and construction, less waste and reduced carbon emissions.<sup>10</sup> Robotic plants, with items connected to the BIM via the internet, can prefabricate materials, as can 3D printers. The worldwide 3D printing industry may reach \$33 billion by 2023, according to Markets and Markets research, as systems and software improve.<sup>11</sup> "Self-healing" concrete will save costly repairs. Yet one material is a throwback to the past, timber. With sustainability a growing consideration, smaller skyscrapers are being built from timber, which is a better insulator in cold climates, and counterintuitively actually reduces fire risk by charring rather than burning.

4 Karen Graham, "Proptech Set to Disrupt Real Estate in 2019," Digital Journal, <http://www.digitaljournal.com/tech-and-science/technology/proptech-disruption-in-real-estate-industry-seen-in-2019/article/540387> (January 7, 2019).

5 Eleanor Peake, "The world's most sustainable building is also the smartest," <https://www.wired.co.uk/article/this-is-the-worlds-smartest-building> (Wired November 1, 2017).

6 Wired, "Building Connections: Inside the Tech Powering the Next Industrial Revolution," <https://www.wired.com/brandlab/2016/09/building-connections-inside-the-tech-powering-the-next-industrial-revolution/> (2016).

7 "5 Innovations in Construction Tech to Watch in 2019," <http://www.sbc.com/5-innovations-in-construction-tech-to-watch-in-2019/> (South Bay Construction November 7, 2018).

8 Building the Future: Virtual Reality in the Construction Industry," <https://www.vrfocus.com/2017/10/virtual-reality-in-the-construction-industry/> (VR Focus October 10, 2017).

9 Adam Higgins, "5 Major Construction Technology Trends to Watch in 2019," <https://connect.bim360.autodesk.com/construction-technology-innovation-2019> (Connect&Construct February 15, 2019).

10 Id.

11 "5 Innovations in Construction Tech to Watch in 2019," <http://www.sbc.com/5-innovations-in-construction-tech-to-watch-in-2019/> (South Bay Construction November 7, 2018).

VR and AR technologies are being used to help train construction workers, improving safety, and software such as Spot-r, Fieldwire (management software for construction teams) and Kattera (which optimizes design and materials supply) are ensuring that all participating in construction are literally on the same page.<sup>12</sup> “Smart devices and wearable construction technology, as well as sensors and on-site cameras, can be tied into construction management software, and give a much clearer picture of building progress and real-time status reporting.<sup>13</sup> New tools are providing additional information to project managers, and are removing human workers from dangerous conditions. Drones are now being used to inspect construction sites, reducing worker safety issues, and even creating 3D models that are cutting the time to calculate volumes of dirt and evaluate other critical issues. Coming in 2020, Stanley’s Wireless Remote Operated Control System will permit vehicle operators to leave their vehicles in dangerous conditions, while Trimble’s Groundworks machine will control software facilitating remote drilling and piling.<sup>14</sup>



Robotics are already reducing busywork and synchronizing communications between machine and man.<sup>15</sup> Construction Robotics’ SAM 100, a mobile robotic arm, works with a human mason to automate the bricklaying process. MULE, also from Construction Robotics, lifts and places blocks and other items on a site.<sup>16</sup> Equally important, robots are now learning to work in a new way. MIT engineers have developed a robot that can assess visual information from its camera and tactile feedback from its gripper and wrist cuff to learn and predict how best to carry out tasks.<sup>17</sup> While the learning system has been tested via playing a game of Jenga, future applications can include assembling products.<sup>18</sup> Construction of large structures by smaller, autonomous robots coordinating with each other is “rapidly gaining momentum” in the field of robotics research,” according to a new study from [Science Robotics](#), and can address a “critical societal need for safe, inexpensive, sustainable and automated construction.”<sup>19</sup>

## Conclusion

With technology, manufacturing and industrial automation remaking nearly every aspect of life and business, it is not surprising that the construction industry will follow suit at scale. As labor shortages and soaring construction costs show no signs of easing, how we build will become even more critical. The accelerated pace of disruption in ConTech will become more explosive with the impact of 5G, which is expected to unleash a vast IoT ecosystem, and connect billions of devices. “... Robotics, Automation and AI continues to mobilize for the future. All expectations point to an even bigger, faster and more innovative year than the last. Indeed, 2019 will be the year that business historians will view as the pivotal moment in time.”<sup>20</sup> Companies that deploy technologies, keep pace with change and actively engage with innovation will be well positioned to achieve unimagined success in an RAAI-driven future.<sup>21</sup> Investors in ConTech will be among the leaders in a digital and physical technological revolution.

12 Adam Higgins, “5 Major Construction Technology Trends to Watch in 2019,” <https://connect.bim360.autodesk.com/construction-technology-innovation-2019> (Connect&Construct February 15, 2019).

13 Id.

14 Joe Beeton, “Tech Toys: The latest revolutions in remote control,” <https://www.constructiondive.com/news/tech-toys-the-latest-revolutions-in-remote-control/550932/> (ConstructionDive March 20, 2019).

15 Kayla Matthews, “5 Ways Robotics Will Disrupt the Construction Industry in 2019,” *Robotics Business Review*, <https://www.roboticsbusinessreview.com/news/5-ways-robotics-will-disrupt-construction-industry-in-2019/> (January 23, 2019).

16 Kirstin H. Petersen, Nils Napp, Robert Stuart-Smith, Daniela Rus & Mirko Kovac, “A Review of Collective Robotic Construction,” *Science Robotics*, Vol. 4, Issue 28, <https://robotics.sciencemag.org/content/4/28/eaau8479.full> (March 13, 2019).

17 Kayla Matthews, “5 Ways Robotics Will Disrupt the Construction Industry in 2019,” *Robotics Business Review*, <https://www.roboticsbusinessreview.com/news/5-ways-robotics-will-disrupt-construction-industry-in-2019/> (January 23, 2019).

18 Jennifer Chu, “MIT Robot Combines Vision and Touch to Learn the Game of Jenga,” *MIT News* <http://news.mit.edu/2019/robot-jenga-0130> (January 30, 2019).

19 Kathleen Brown, “Study: Autonomous Robots Working Together Are Industry’s Next Big Thing,” <https://www.constructiondive.com/news/study-autonomous-robots-working-together-are-industrys-next-big-thing/550931/> (ConstructionDive, March 20, 2019).

20 Roboglobal, “2019 Trends in Robotics & AI,” *Investing in the Robotics and AI Revolution, A Robo Report* (2019).

21 See id.

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