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LOOKING AHEAD:

10 Things E&C Leaders Must Consider in a Post-Pandemic World

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Jay Bowman

Pandemics force a mass reckoning, and 2020 left no one untouched. The events of the past year, from stop work and shelter-in-place orders to massive unemployment, half a million people dead from COVID-19, and a wave of natural disasters, catalyzed changes long at work in the construction industry nearly overnight.[1] The way we work has changed, and as we rebuild, the question is not only how to recover, but also how we want the future to look.

As I write, the nation's baseball stadiums have been turned into mass vaccination sites, trillion-dollar pieces of legislation are being pushed through Congress by a new administration, and a full reopening is finally in sight. It is time for contractors to focus on the years that come after the pandemic, an era in which 60% of baby boomers will reach retirement age, and labor shortages will attenuate at the same time as technology uptake accelerates, changing the very definition of our work.

Here, I present 10 of the most important trends for contractors to focus on as they plan ahead:

1. The Impact of Minimum Wage Increase
2. The Skilled Labor Shortage
3. Vaccination of Employees and Subcontractors
4. Succession Planning
5. Contractual Risk Shifting by Owners
6. Cryptocurrency and Blockchain
7. Autonomous Vehicles
8. Distributed Energy Resources
9. Stimulus and Other Infrastructure Spending
10. Diversity, Equity and Inclusion

NOW LET'S TAKE A DEEPER LOOK AT THESE TRENDS.

[1] Bowman, Jay. "The Last Normal Day: How Strategic Planning Can Address the Different Realities of the Post-COVID World." FMI Corporation, Jan. 2021.

1 THE IMPACT OF A MINIMUM WAGE INCREASE

The federal minimum wage was raised to $6.55 per hour in 2008 and again to $7.25 in 2009. Then, for over a decade, it stalled, over which time housing prices rose by about 25%. Income inequality is a drag on the economy,[2] and the widening compensation gap has created an environment in which the eventual correction will shudder through the industry, with positive and negative effects.

The Raise the Wage Act, which stalled in the Senate in early March, would raise the minimum wage to $15 and cost an estimated 1.4 million jobs over the next four years (according to the Congressional Budget Office), at the same time as it lifts 900,000 people out of poverty.[3] It is likely to impact the construction industry indirectly: Though higher wages would push up labor costs broadly, people employed in the construction industry already earn above the threshold,[4] per data from the Bureau of Labor Statistics on mean incomes by occupation. Still, a higher minimum wage would put a greater squeeze on the already tight skilled labor market (see **The Skilled Labor Shortage** below). While higher product costs are often cited as a consequence of wage hikes, modeling in the Review of Economic Dynamics found that increases are temporary, given the effect of inflation, and may in the short term incentivize firms to uptake productivity-enhancing tech.[5]

Effects to the wider economy are likely to ripple through the construction industry, with significant changes in demand. The Economic Policy Institute estimates that federal income tax revenue would rise from $7.0 billion to $13.9 billion among those who benefit from higher wages[6] at the same time as spending on social programs drops, raising the prospect of significant future public infrastructure spending.

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[2] Bivens, Josh. "Inequality is slowing U.S. economic growth." Economic Policy Institute, Dec. 12, 2017.

[3] "The Budgetary Effects of the Raise the Wage Act of 2021." Congressional Budget Office, Feb. 2021.

[4] "May 2019 National Occupational Employment and Wage Estimates United States: Construction and Extraction Occupations." Bureau of Labor Statistics, May 2019.

[5] Sorkin, Isaac. "Are There Long-Run Effects of the Minimum Wage?" Review of Economic Dynamics, Apr. 1, 2015.

[6] Zipperer, Ben; Cooper, David; Bivens, Josh. "A $15 minimum wage would have significant and direct effects on the federal budget." Economic Policy Institute, Feb. 2, 2021.

2 THE SKILLED LABOR SHORTAGE

Over the past few years, job openings in the construction industry have tended to float steadily at between a quarter and a third of a million positions, regardless of federal unemployment.[7] No matter how many open jobs there are in the industry, there are simply not enough skilled candidates to fill them.

In February 2020, labor was the top concern identified by respondents to a survey by the National Association of Home Builders (NAHB), with 85% of business owners expecting future issues around cost and availability, up from 13% in 2011.[8] This dynamic has worsened over the past decade as the field of noncollege-educated young workers shrank (college-educated white collar workers are in surplus), at the same time as baby boomers entered a phase of mass retirement delayed, but not curtailed, by the pandemic slowdown (see **Succession Planning** below).

LIMITED SUPPLY OF CRAFT LABOR LISTED AS A TOP RISK IN TODAY'S E&C ENVIRONMENT

"For 20 years, we haven't trained and spent money on educating, and at the same time a lot of the industry is retiring. So the skills gap is going to get worse before it gets better," Ed Brady, president and CEO of the Home Builders Institute, told Bloomberg.

This trend was also confirmed in the recent AGC/FMI Risk Survey, in which almost 50% of respondents listed limited supply of skilled craft labor as a top risk in today's E&C environment.

Some of the solutions are employer-directed: shortened recruitment timelines, reconsideration of the qualifications required for certain jobs, and use of technological solutions to target and recruit good candidates.[9] Mentoring and apprenticeship are also paths to developing in-house capabilities and productivity, while policies like employee-ownership models and competitive compensation can help recruitment and retention.

There is also a role the government could play in broadening the workforce by loosening immigration policy or pursuing a policy of decarceration for the more than 2.3 million people currently locked up.[10]

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[7] Cohen, Arianne. "Why Finding Workers Is Getting Harder for U.S. Homebuilders." Bloomberg, Jan.15, 2021.

[8] "Labor Shortages Remain Top Concern for Builders." National Association of Homebuilders, Feb. 20, 2020.

[9] "From Not Enough Jobs to Not Enough Workers: What Retiring Baby Boomers and the Coming Labor Shortage." The Conference Board, September 2014.

[10] Pettis-David, Carrie; Epperson, Matthew. "Smart Decarceration: Guiding Concepts for an Era of Criminal Justice Transformation." Florida State University, Sept. 2015.

3 VACCINATION OF EMPLOYEES AND SUBCONTRACTORS

Across the globe, reopening is premised on a degree of immunity. Vaccination passports date back to a 1935 convention passed by the Hague, amended in 1944, to protect against transmission of cholera, small pox, typhus fever and other epidemics, and are again being discussed on a public level. As vaccinations for COVID-19 gather steam, the prospect of mandated vaccinations is also being broached by businesses, with construction workers deemed essential workers eligible for vaccination since the rollout began.

The Equal Employment Opportunity Commission has offered guidance[11] that employers can mandate vaccination of their employees, though there is legal nuance around exceptions for people with medical or religious objections. The issue of whether employers can require subcontractors to get vaccinated is slightly grayer, premised on whether or not those who are not vaccinated likewise have a medical exemption, in which case, subcontractors or temporary employees would potentially be covered by states' human rights charters against "discrimination," as one employment attorney explains.[12]

Some states may yet carve out additional protections to prevent public entities or owners from denying entry to individuals who have refused vaccination. This kind of legislation could make it harder to mandate vaccination of employees as well as sub-subcontractors and other parties.[13]

If a failure to vaccinate or other pandemic-related complications were to affect contractors' ability to deliver on a job, the precise wording of force majeure clauses would likely become the focus of drawn-out litigation. Questions of whether or not a pandemic is "foreseeable," or whether it is an act of God or a failure of human response, will determine the responsibility for contract failures: "In order to provide an effective defense, the force majeure provision must generally include a triggering event that applies to the COVID-related basis for nonperformance," advises the National Law Review.[14] Typically, qualifying circumstances are defined quite narrowly, and contractors would need specific language offering protection due to a public health crisis or state of emergency.

Prior to the vaccine rollout, social distancing and mandated on-the-job mask-wearing allowed work to continue. Subsequent to vaccination, these remain viable accommodations for those unable or unwilling to be vaccinated, especially in a landscape where the public health emergency is no longer unforeseen, but something that must be engineered around.

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[11] "What You Should Know About COVID-19 and the ADA, the Rehabilitation Act, and Other EEO Laws." Equal Employment Opportunity Commission, Dec. 16, 2020.

[12] Hecker, A. "Employers' Mandating the COVID-19 Vaccine for Temporary Workers, and Other Issues for Employers' Consideration."

[13] Husch Blackwell LLP. "50-State Update On Pending Legislation Pertaining to Employer-Mandated Vaccinations." JDSupra, Mar. 5, 2021.

[14] Shargel, David; Nielsen, David; Benesh, W. "Revisiting Force Majeure and Other Contractual Considerations Amid COVID-19." National Law Review, Nov. 6, 2020.

4 SUCCESSION PLANNING

We are in the middle of a massive demographic shift. The last of the baby boomers will turn 65 — retirement age — in 2031. In September of 2020, 40% of boomers were retired according to Pew data,[15] boosted by an uptick through the pandemic of boomers leaving the workforce, with a huge exodus by the remaining 60% yet to take place over the next decade. For the construction industry, this can mean a leadership void if there isn't a solid succession plan in place, as well as costly delays in ownership transfers and merger and acquisition activity.[16]

75% OF ALL RESPONDENTS INDICATED COVID-19 HAD A NEGATIVE IMPACT ON THEIR COMPANY'S EARNINGS

The economic slowdown of 2020 has complicated plans further, making it harder for workers to bolster their retirement savings in their final years of earnings and sending some companies into a holding pattern. In fact, in our recent ownership transfer and succession management study (conducted in collaboration with the CFMA), 75% of all respondents indicated that COVID-19 had a negative impact on their company's earnings. This has had a demonstrated impact on those hoping to sell in the next five years. Prior to COVID-19, 43% of all respondents intended to have sold 100% of their equity within the next five years; as a result of COVID-19, only 29% expect they will have sold 100% of their equity within five years — these delays in succession will cost those companies.

[15] Fry, Richard. "The pace of boomer retirements has accelerated in the past year." Pew Research, Nov. 9, 2020.

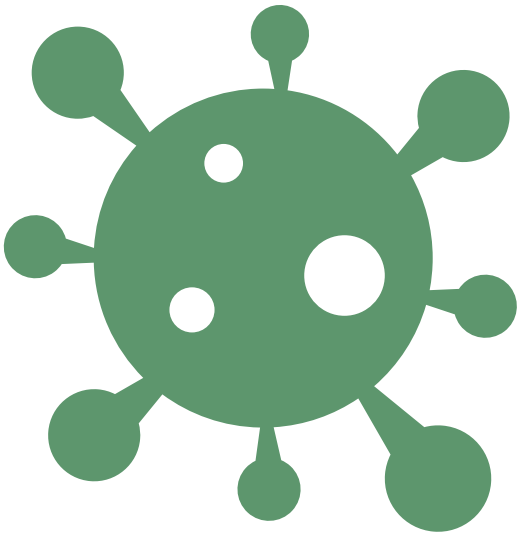
[16] Appelman, Jake; Miller, Alex. "Ownership Transfer and Succession Management in Construction: Top Four Questions in 2021." FMI Corporation and Construction Financial Management Association, Feb. 2021.

FIGURE 1.

IMPACT OF COVID-19 ON OWNERSHIP TRANSFER PLANS IN CONSTRUCTION

Prior to COVID-19, were you in the middle of an ownership transfer plan (external or internal), or did you expect to begin an ownership transfer plan in the next two years?

YES 51% | **NO 49%**



If "Yes," how will COVID-19 (and the economic implications) impact your ownership transfer plans?

17%	Delay the beginning of an ownership transfer
35%	Extend the duration of an ownership transfer
2%	Change the method of ownership transfer (e.g., M&A, ESOP, gift)
10%	Reduce total proceeds from ownership transfer
36%	Other

Source: FMI/CFMA

For companies struggling to execute an ownership transfer amid reduced earnings and heightened volatility, there are other options. Employee stock ownership programs (ESOPs) are a tax-friendly alternative that has become increasingly popular in recent years, in part due to the flexibility offered in deal timing and structure as well as the positive impacts to both the company's bottom line and employee earnings. Mergers and acquisitions are also proceeding apace, with valuations holding steady as strategic buyers look to diversify their geographic and specialist footprint.

5 CONTRACTUAL RISK SHIFTING BY OWNERS

The COVID-19 pandemic didn't just impact projects that were underway; it had ramifications for projects already bid on, or under contract, and that are now subject to higher project costs, delays, labor shortages, uncertainty, changes in indemnity and so on.[17] The assumption of greater risk by contractors has been a point of contention, as subcontractors remain protected by mechanics liens; but governments have been able to mandate changes to contracts during the pandemic.

One way to address liabilities in the payment system is use of smart contracts at the outset, which automate payments between parties at agreed-upon points in the project, while documentation of risk ownership through blockchain can reduce ambiguity over who is responsible (see **Cryptocurrency and Blockchain** below).

Contractors should also give contracts a close pass, looking for indemnification and no damages for delay clauses, which typically favor owners.[18] To better share risk at a time of uncertainty, a mutual waiver of consequential damages clause or cap on liquidated damages can set up a positive and collaborative relationship at the outset.

Ultimately, risk tolerance in the industry is determined by the terms one contractor will accept over another. As a cohort, contractors have the power to establish a consensus view and push back against undue risk shifting by owners. Industry groups and knowledge-sharing missions can help establish reasonable risk allocation terms going forward.

[17] Barrett, Levi; Cohen, Nathan; Snyder, Mark. "How Will Today's Pandemic Impact Tomorrow's Construction Contracts?" Consensus Docs, Oct. 6, 2020.

[18] Bodde, Nathan. "Risk-Shifting Tactics for Construction Contracts." Construction Executive, Nov. 14, 2019.

6 CRYPTOCURRENCY AND BLOCKCHAIN

Widespread adoption of building information modeling (BIM) technology this century allowed different stakeholders on a project to execute a design-build-operate delivery model, sharing virtual information about the building, reducing the loss of construction data in handoff to the owner, and decreasing the project cost and timeline. There are, however, drawbacks to BIM. It is not designed to codify risk allocation, blended roles and responsibilities, confidentiality or changes to the design by different parties, nor to address conflicts around intellectual property, as a paper in Procedia Engineering notes.[19] But blockchain technology is.

Blockchain consists of a decentralized network, or set of "nodes," that allows users to conduct transactions that are tracked across the network, leaving not only the record of that transaction but also of all the data in that block prior. For a large-scale project, blockchain allows stakeholders to share open-source technology and codify exactly who owns the data, who gets paid when, and whose responsibilities extend to exactly which limit. Fintech and blockchain firms like California-based Briq have sprung up to optimize project documentation,[20] while smart contracts have the potential to address a key pain point: subcontractor payments.[21]

The use of cryptocurrencies like Bitcoin[22] can further smooth transactions between multiple parties and across the globe, eliminating latency issues and fraud as well as the conversion and transaction fees that would be baked in, were those transactions to take place through a bank. But beyond simply a new way to execute contracts and payment, the power of blockchain technology — a massive, decentralized platform for players to collaborate and invest in new products — is largely untapped.

"Pick any industry, and this technology holds huge potential to disrupt it, creating a more prosperous world where people get to participate in the value that they create," Don Tapscott stated in 2016.[23]

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[19] Turka, Žiga; Klinc, Robert. "Potentials of Blockchain Technology for Construction Management." Procedia Engineering, Volume 196, 2017.

[20] Tapscott, Don; Viana Vargas, Ricardo. "How Blockchain Will Change Construction." Harvard Business Review, Jul. 26, 2019.

[21] Mason, Jim; Escott, Hollie. "Smart contracts in construction: Views and perceptions of stakeholders." University of the West of England, May 1, 2018.

[22] Nakamoto, Satoshi. "Bitcoin: A Peer-to-Peer Electronic Cash System." White paper.

[23] Kirkland, Rick. "How blockchains could change the world." McKinsey, May 6, 2016.

7 AUTONOMOUS VEHICLES

In November 2018, Caterpillar hit the milestone of 2 billion metric tons of hauled material using the autonomous Cat MineStar Command vehicle.[24] Watch a video of these driverless trucks piloting their way down into the vast, open-cut mines of Western Australia to retrieve load after load for years on end, and you begin to see the way this singular technological advance has the potential to reshape the industry.

Autonomous vehicles (AV) can help mitigate labor shortages, boost productivity through longer hours and optimized operation of vehicles, and increase workplace safety by avoiding injury and deaths resulting from human error, but there are some barriers to adoption. Public and consumer trust in intelligent technology design needs to be improved;[25] testing of AVs has met with resistance from state governments; and some vehicles need improvement to satisfy regulatory requirements for on-road use.

Contracts and insurance requirements will also need to be adapted to address use of AVs. But as The Brookings Institution notes, product liability law is a "time-tested framework" for addressing tech-related malfunctions.[26] Manufacturers are held responsible for strict liability, misrepresentation, failure to warn about defects and damage under warranty, with human responsibility for operation of the vehicle contingent on the level of automation.

The human operator of a vehicle can still be held responsible, but this is going to be dependent on data about his or her actions immediately prior to the crash; and increased automation will of course reduce the amount of human error. A study by the Highway Loss Data Institute of adoption of the Volvo XC60 and S60 found significant reductions in claims frequency. In the longer term, it is possible insurers will actually incentivize use of AVs over manually operated vehicles.

Worldwide, fully autonomous vehicles represent less than 1% of construction equipment sales worldwide, according to market research by Foundamental,[27] but sales are expected to double in the next two years.

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[24] "Caterpillar Achieves 2 Billion Tonnes Hauled With Autonomous Trucks System." Press release, April 2020.

[25] Morra, Lia, et al. "Building Trust in Autonomous Vehicles: Role of Virtual Reality Driving Simulators in HMI Design." IEEE Transactions on Vehicular Technology, July 2020.

[26] Villasenor, John. "Products Liability and Driverless Cars: Issues and Guiding Principles for Legislation." The Brookings Institute, Apr. 24, 2014.

[27] Brown, Jeremy. "Want a Glimpse Into the Future World Dominated by Autonomous Vehicles? Look No Further Than Off-Highway Construction Sites." Medium, Feb. 3, 2020.

8 DISTRIBUTED ENERGY RESOURCES

The power outages caused by Texas' February snowstorm and the even tempo of black- and brownouts in California in recent years during heat waves and forest fires have raised awareness of vulnerabilities in the U.S. power grid. Renewables and decentralized energy generation — think solar cells and smart grids — have been gaining market share in recent years as companies, General Motors among them, strategize beyond fossil fuels.

The transition to clean energy continues to pick up pace: In 2020, investment hit a record $500 billion globally, a 9% rise from 2019, with the U.S. representing almost 20% of investment.[28] Customers have been a huge part of the push into a new industrial age, with a growing number of corporations using power purchase agreements, green tariffs and other methods to fund renewable energy projects to provide independent power generation.[29]

INVESTMENTS HIT A RECORD **$500 BILLION GLOBALLY**, A 9% RISE FROM 2019, WITH THE **U.S. REPRESENTING ALMOST 20%** OF INVESTMENT.

While the economic slowdown of 2020 was a drag on the expansion of distributed energy resources (DER), delaying installation and impacting short-term budgets, Wood Mackenzie Power & Renewables anticipates the market will begin to gain on its pre-pandemic peak in 2023 and expand widely by 2025.[30] Investment in storage capacity and smart home tech that optimizes energy use will continue to grow, giving consumers and owners greater resiliency and efficiency in the face of a changing climate.

Even smaller players have the potential to take advantage of this market shift, with the Federal Energy Regulatory Commission's Order 841[31] prioritizing aggregation of energy from storage sources as small as 100 kilowatts.

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[28] "Clean Energy Growth Proves Resilient Through a Turbulent 2020." BloombergNEF, 2021.

[29] "Designing the 21st Century Electricity System: How Electricity Buyers Can Accelerate Change." REBA Institute, March 2021.

[30] "United States distributed energy resources outlook: DER installations and forecasts 2016-2025E." Wood Mackenzie Power & Renewables, June 18, 2020.

[31] "Order No. 841." United States of America Federal Energy Regulatory Commission, Dec. 16, 2020.

9 STIMULUS AND OTHER INFRASTRUCTURE SPENDING

The Biden administration's coming infrastructure bill is likely to be worth around $3 trillion over the next 10 years, packaged as an investment in American competitiveness and in jobs. The administration has signaled that a major package would focus on clean energy deployment to address climate change and weatherize the U.S. economy.

AROUND $1 TRILLION IS EARMARKED FOR IMPROVEMENTS

Around $1 trillion is earmarked for improvements to decaying roads, bridges, rail lines, airports and other pieces of transportation as well as renewable projects, including electric vehicle charging stations and updates to the grid. Biden has said that investments are intended to make the U.S. competitive in the 21st century, both in terms of onshore manufacturing and the tech sector.

I expect a bill to pass, likely late summer or fall, and become a major driver of the industry for years to come.[32]

[32] Freking, Kevin; Yen, Hope; Boak, Josh. "Biden team readies wider economic package after virus relief." Associated Press. Feb. 28, 2021.

10 DIVERSITY, EQUITY AND INCLUSION

The themes of skilled labor shortages, an exodus of C-level executives, and the need to specialize in new and evolving service offerings overlap in the need to diversify the construction industry.

Women comprise 47% of the entire workforce, but only a little over 10% of total construction workers, per the BLS' Current Population Survey,[33] and 7.5% of construction managers — far from representative. Of the top 100 construction firms, 44% employ women in executive roles,[34] and research indicates that this has a payoff: McKinsey found a 25% higher likelihood of above-average profitability among gender-diverse companies than companies with less diversity.[35] At the same time, women are discouraged by a persistent wage gap and instances of bias.

The industry also remains relatively homogenous — 88.6% of workers are white — a problem that is more pronounced when it comes to management positions: In 2019, 91% of construction managers were white, as were 88% of architectural and engineering managers and 98% of operating engineers.

Recruiting and training qualified female and minority candidates is not just a solution to a skills shortage. Diverse teams arguably perform better work, creating intercultural competence, identifying blind spots and delivering designs that serve the communities they are created for.

Small and minority-owned businesses have been hit harder by COVID-related economic slowdown,[36] and I expect stimulus to be earmarked for these enterprises, as with the 2009 American Reinvestment and Recovery Act.

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[33] "Labor Force Statistics From the Current Population Survey." Bureau of Labor Statistics, 2020.

[34] "Women in Construction." Randstad, 2018.

[35] "Diversity wins: How inclusion matters." McKinsey & Company, May 19, 2020.

[36] "Small Business Owners Still Feel Pain of Pandemic and Fear More to Come." U.S. Chamber of Commerce, Dec. 15, 2020.

What we might have called a “recovery” 10 years ago is something different now: a transformation. There have been real casualties of the past year, but many of the biggest challenges facing the industry have solutions in areas not yet leveraged. Skilled labor shortages and the aging of leadership meet an underutilized field of female and minority candidates. Contractual risk precedes widespread adoption of blockchain technology. A reimagining of the very electric grid undergirding society into microgrid and collaborative smart housing infrastructure could soon be incentivized by an administration bent on bringing the United States up to and beyond its developed peers through massive stimulus expenditure.

Those in the engineering and construction industry who approached this year as a logistical and imaginative challenge have found that solutions are often within their capabilities. Data-sharing protocols and in-house security apparatus have allowed builders to forge ahead, while those who have invested in the next generation of leadership found themselves adaptable in a landscape that seemed to shift from day to day. The period of change is far from over, and the question for those bidding projects is, now you’ve survived, how will you adapt?

Jay Bowman is a principal with FMI. Jay Bowman assists a broad range of stakeholders in the construction industry, from program managers and general contractors to specialty trades and materials producers, with the identification and assessment of the risks influencing the strategic and tactical decisions they face. He can be reached at ***jbowman@fminet.com***.

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