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Manage projects like a symphony, not a competition

5 ways construction firms are mastering complexity and reducing risk

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Construction isn't for people who can't handle a little chaos. Schedules, prices, and labor and material availability change daily, if not hourly, leaving managers at the mercy of forces beyond their control.

In a 2022 survey by the Associated General Contractors of America, 82% of construction companies reported delays due to supply chain problems and 66% due to labor shortages. 58% said owners had canceled, postponed, or scaled back projects because of rising costs. Ever-more complex projects and shortened timeframes don't help either.

Facing such relentless change, construction leaders often feel like battlefield generals trying to marshal resources and command troops under a barrage of daily emergencies. Technology promised to help, but disconnected systems and siloed data add to the problem. As one senior project manager said, "Information is spread out, and that makes it harder to keep everyone on the same page and moving in the same direction."

US$13-$15 trillion

Estimated market value of global construction industry, representing more than 14% of global GDP

What owners and construction leaders need is to have broad visibility to determine priorities, understand progress, and predict problems before they occur, while there is time to react and mitigate. They need fine-grained control to orchestrate resources: capital, people, equipment, and supplies. They also need systems synchronized to deliver projects according to the

schedule and budget, while ensuring quality and safety. In other words, they need to work more like symphony conductors than embattled commanders.

> "A symphony conductor controls everything. The analogy in our industry is being able to orchestrate the work of the designer, the contractor, the hydraulic specialist, and so on. You need to see and synchronize what everyone is doing."
>
> **UK-based senior resident engineer for owner of large-scale construction projects**

The industry is addressing its problems by adopting new technologies. Owners and delivery teams spent an estimated $50 billion on architectural, engineering, and construction technology between 2020 and 2022—85% higher than in the previous three years, according to a 2023 McKinsey & Co. study. Specifically, firms are investing in digital workflows to more efficiently manage portfolios, schedules, risk, projects, and payments.

Firms are also adopting integrated, cloud-based applications to connect teams, increase mobility, and adhere to schedules. For example, as the industry focuses more on sustainable construction, both to be good citizens and win green-compliant business, the inability to access data from downstream partners makes it hard for companies to accurately track their carbon footprints.

But construction firms are making progress. Following are five key ways they're orchestrating performance to master complexity and reduce risk.

1 Connect teams, processes, and data to avoid overruns and delays

In a business where every job comes with many stakeholders—including project owners, general contractors, and architects, as well as myriad subcontractors and suppliers—improved collaboration remains a top priority.

Construction projects are fraught with risk for all of these players, and the stakes are high. Without finely tuned teamwork, projects are likely to suffer delays and cost overruns that can impact delivery timeframes, reputations, and margins.

Historically, the biggest obstacle to effective collaboration has been the lack of shared data across construction project teams resulting from disconnected communication and information management processes. Project delivery teams have long managed information independently even though they're interdependent. They rely on data from one another to plan and execute work, inform decision-making, mitigate risk—and manage near-constant change.

Connecting teams around centralized and accessible project data is essential to solving this problem, with the right approach offering several benefits.

- A single "source of truth" for the entire project can help teams make decisions confidently and more easily resolve problems. For example, when a request for information (RFI) is opened by a subcontractor, all ensuing communications (from start to finish) can be captured and tied together in the project record. When best practices are followed, this information can't be altered by any project organization, protecting the rights of all teams should a dispute arise.
- Project planning and jobsite construction teams can operate from a common data set that unifies the master project schedule and the day-to-day work plans.

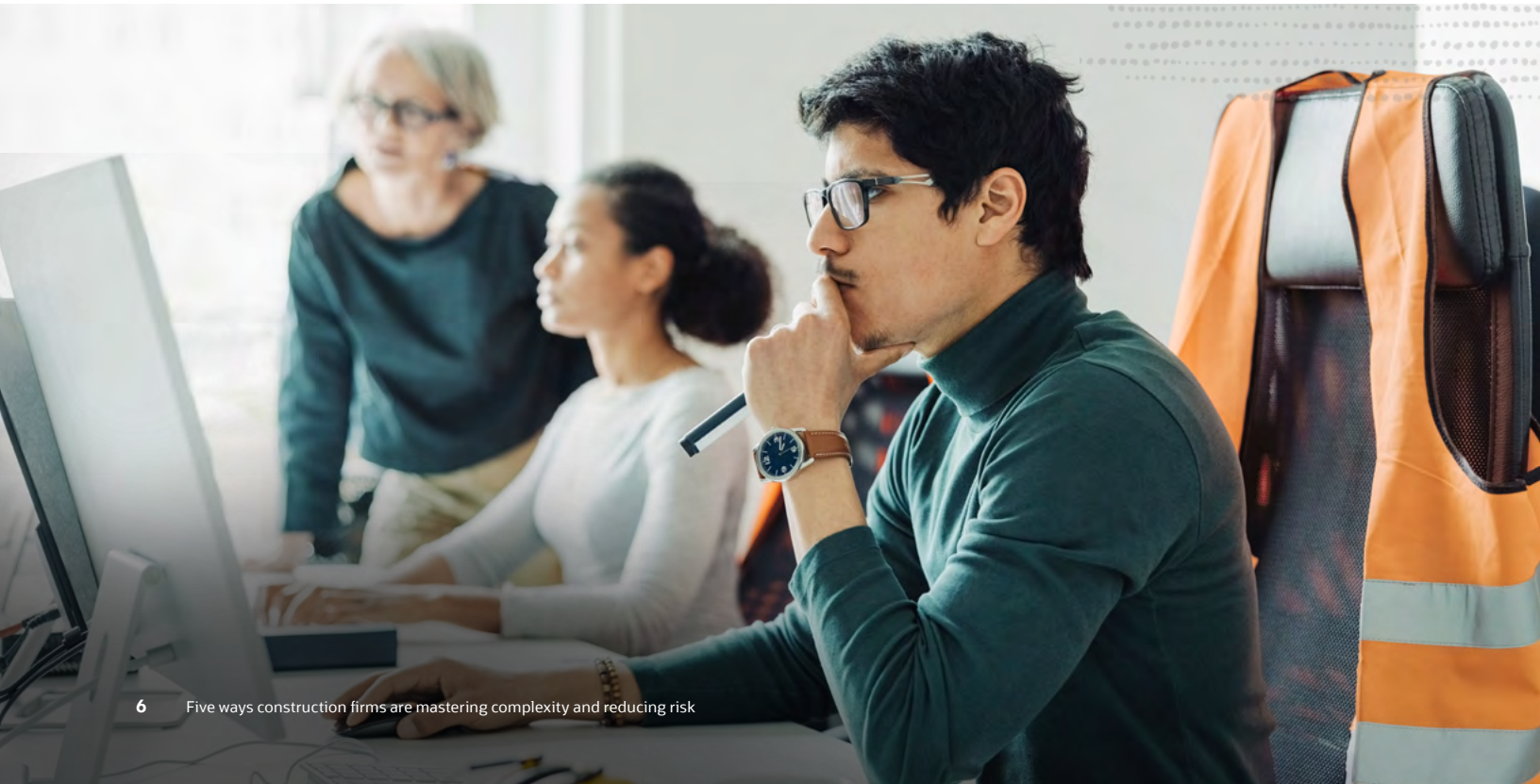
This enables project planning and execution teams to remain fully coordinated, driving the synchronization of work vital to keeping projects on track.

- Cross-team workflows unlock efficiencies by making critical information available in real time to previously disconnected teams. For example, project managers and field teams can gain visibility into schedule data to better manage work and changes across jobsite task planning and risk mitigation. These new connections, along with the unification of schedule and task management, are critical to orchestrating teamwork.

- By bringing together historically siloed project data, that data can be correlated and analyzed in new ways to help organizations make better decisions, spot problem areas, and drive continuous improvement.

Email and instant messaging have made project communications easier and more immediate, but they have also increased the volume of correspondence. To collaborate effectively, teams need to work in a common platform that ensures all information is kept together, stays up to date, and is accessible to those who need it.

A UK-based construction firm adopted digital tools that it reports sped document review by 65%, reduced field inspection time by 45%, and gave owners more visibility into projects. “We’ve got our clients engaged, and that’s an absolute win for us,” says the firm’s head of digital construction.



2 Align teams to manage capital more efficiently

With construction projects larger and costlier than ever, owners' project teams have several main objectives: Align projects with organizational goals, manage their execution, and control expenses to optimize working capital. The stakes are high. In the mining industry, for instance, 64% of construction jobs run late or over budget, with an average cost overrun of 39%, according to international consultancy EY.

In the past, it was difficult to align capital planning and project execution. Today, planners bridge the two activities, gaining timely access to cash flow actuals and forecasts across their portfolios. For example, if planners can't access updated financials throughout their portfolio of projects, a company might budget a project at $10 million more than needed, contingency funds that tie up capital that might work harder elsewhere.

External forces can also pressure firms to rethink their capital plans. Since most construction projects are financed, rising interest rates mean higher project costs, which force firms to reevaluate approved projects and find ways to do more with less. Natural disasters and supply chain disruptions are other reasons to be nimble in allocating capital.

Increasingly, firms are using digital capital planning applications to collect and share capital data. Besides automating project approvals across the portfolio, these solutions prioritize investments, track project performance, compare current and past projects to identify investment gaps, and recommend any needed reallocation of capital.

"There's so much to consider when evaluating projects," says Janet Poses, a product marketing director in Oracle's Construction and Engineering group. "The engineering and design alone is a big piece of the puzzle. A hospital, for example, needs the infrastructure to support a growing array of medical technologies. A commercial building, on the other hand, might need a 'wow' design that lures tenants in a tough market."

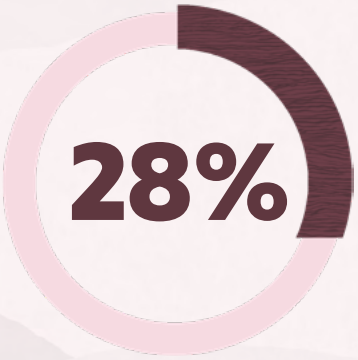
A public works authority in the Middle East uses its digital capital planning tools to manage all aspects of building national infrastructure, including roads, drainage networks, and new

schools and government centers. Over time, the authority expects to manage some 900 different projects, all on a single platform, to orchestrate projects end to end.

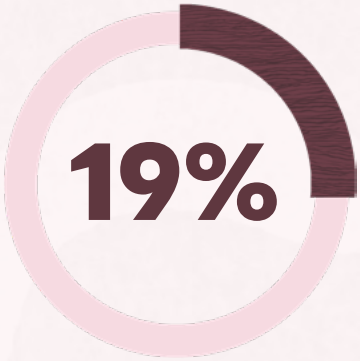
The key to success is connecting different stakeholders across a project's lifecycle. "Owners need to know how their many investments are doing," Poses says. "Ideally, their teams view the same project details, such as schedule-based cash flow status against plan, to see if projects are on track."

Facing Greater Project Scrutiny

Percentage of project owners and construction firms who say their large capital projects are being reviewed more intensively:



project owners



engineering and construction firms

Source: KPMG, 2023 Global Construction Survey

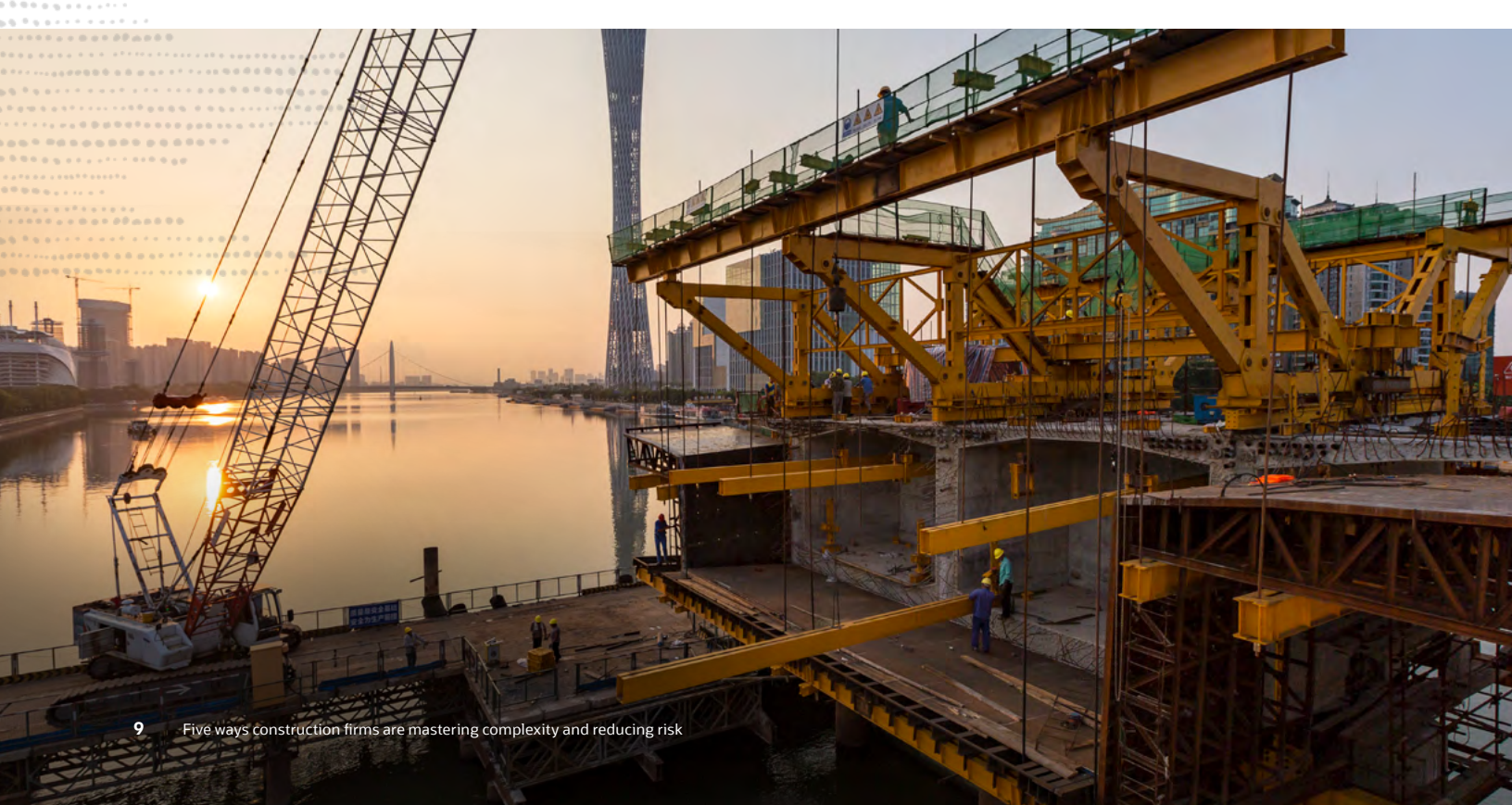
An Australian transit authority is using its digital planning tool to deliver $90 billion in infrastructure improvements over the next three decades, including 165 major roads and rail projects. The authority orchestrates the work of countless organizations, project delivery teams, and public-private partnerships. Moving to a centralized solution enabled it to tighten up contract management, improve visibility into supply chain risks, and deliver reports faster and more accurately.

3 Orchestrate labor, equipment, and materials to keep projects on schedule

On construction jobs, orchestrating the flow of labor, equipment, and material (LEM) has always been difficult. Events of the past few years—the pandemic, resulting supply disruptions, severe weather patterns, a shortage of workers, and the need to make supply chains more sustainable—have made the orchestration even harder. Without accurate, up-to-date data on project timelines, material costs, and labor expenses and availability, a firm's budgets, schedules, and bottom line can go off the rails.

"Whether you're an owner, a general contractor, or a sub, your corporate procurement needs visibility into project specs and schedule, so they can optimize procurement across their supply chains," says Frank Malangone, executive director, industry strategy and innovation, Oracle Construction and Engineering. "Orchestrating these activities is key."

Allianz Global Corporate & Specialty (AGCS) reports that depleted materials, severe weather including natural disasters, and labor shortages are the top risks to project schedules and budgets, resulting in higher equipment and materials costs, longer project lead times,



and cost overruns. For example, the costs of cement, timber, steel, and glass have all increased significantly over the past year, sometimes as much as 50%, according to AGCS. A Deloitte 2023 study noted rapidly rising hourly wages as well, up 17% since 2020.

The risks have a way of snowballing. A shortage of workers delays revenue because jobs can't start on time. Higher pay, one obvious way to attract skilled talent, adds to project costs. In the UK, construction demand will require an additional 225,000 workers by 2027, according to the nation's Construction Industry Training Board (CITB).

Digital construction platforms orchestrate LEM, other resources, and important processes in the project schedule. Field teams capture data via mobile apps, autonomous devices, cameras, and sensors throughout the jobsite. Progress or lack thereof is compared to virtual models of whatever's being built. If a team wishes, the platform can automatically update tasks as well as the schedule, making needed adjustments to LEM supplies, costs, and task timeframes. Ideally, teams can access documents, drawings, models, and changes in real time.

Say someone needs to install electrical rough-in on the first floor of an office building. The electrician needs the specs for that floor, the latest approved submittals, and the drawings of the floor layout, all stored in and accessible from a document management system. When that system is connected to the scheduling software, the electrician can snag the documents via links to the task and get down to work instead of running down information.

Like many firms today, one Canadian builder is saving time by embracing prefab construction, assembling modular components, such as wall panels, complete with insulation and electrical wiring. Because raw materials are delivered to the manufacturing site, not the jobsite, construction teams don't waste time waiting on late deliveries. In 2022, the builder finished a 28-unit residential building in only 13 months.

4 Take a comprehensive approach to employee health and safety

No two ways about it: Construction's a risky business. Think of the iconic 1930s photo "Lunch Atop a Skyscraper," showing 11 workers casually perched on a single beam 69 floors above the streets of New York, no safety harness in sight, and you begin to get the picture.

Although construction safety practices have come a long way since then, workers still face plenty of risks: getting struck by tools or materials, getting electrocuted, falling from heights, and being exposed to air contaminants, high temperatures, and ultrahigh noise levels, to cite several.

41% **of the 34 deadliest jobs in the US are in construction.**

Source: Business Insider analysis of Bureau of Labor Statistics data

To reduce worker injuries or exposure to hazardous materials and to avoid a job shutdown, construction firms are investing in digital solutions that identify, assess, and help mitigate safety risk. Today's tools provide the expertise to predict incidents the way weather reports forecast dangerous conditions before storms roar through a community. When the risk of a safety incident is heightened, project teams can take steps to alleviate the risk to prevent injuries and save lives.

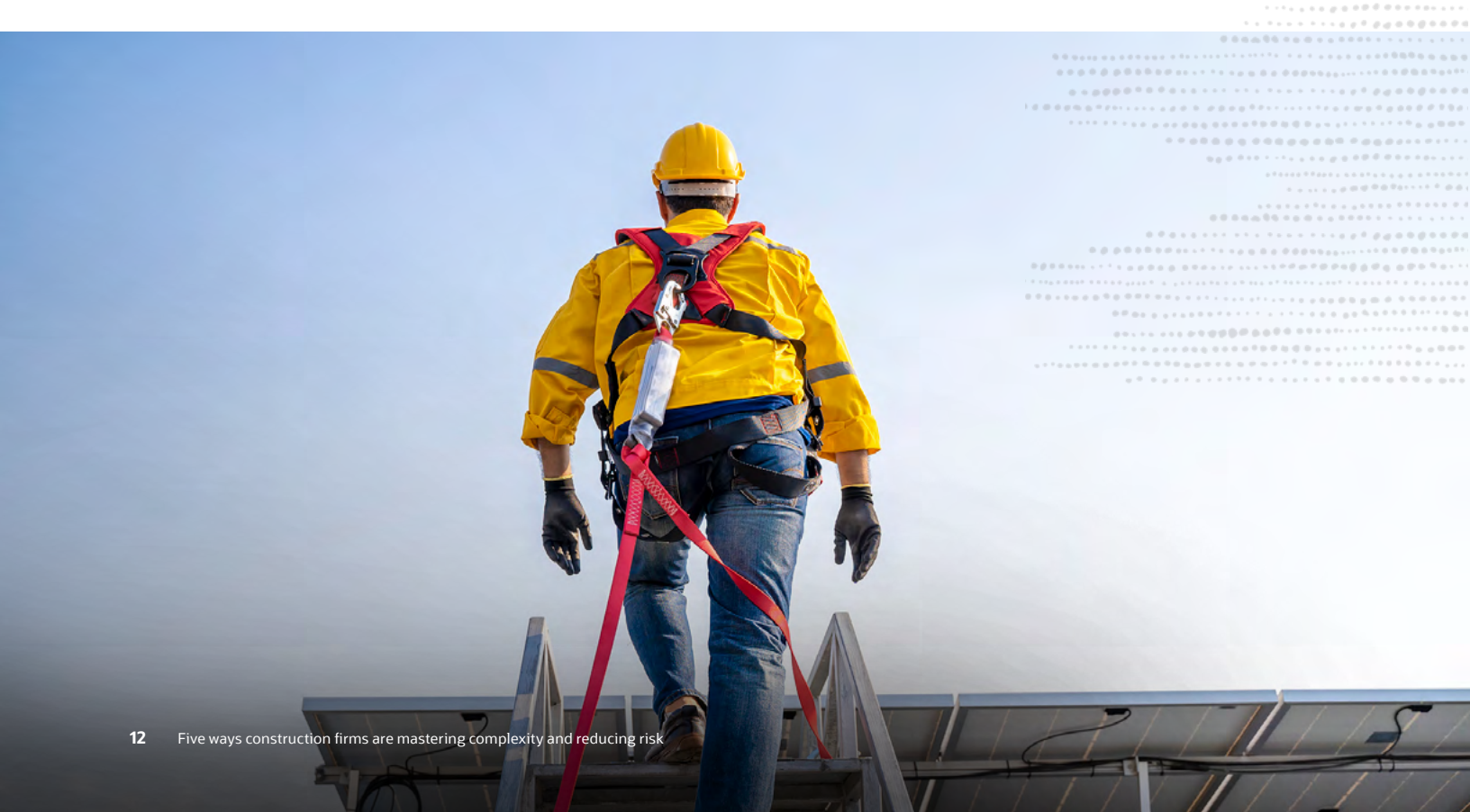
A “perfect storm” scenario of safety risks could include an insufficient number of workers, unpredictable weather patterns, and an upcoming long weekend. The firm’s solution connects the dots to predict and prioritize potential dangers.

Its experience isn’t unusual, according to Oracle customer research. Adopters of predictive-based safety programs have seen their recordable incident rates drop by an average of 30% over a 12-month period, with some seeing reductions of up to 50%.

One insurer has funded pilot deployments of such a system, using construction-trained AI algorithms with select clients. Using the data that’s generated, construction companies can offer strong evidence of lower risk to negotiate lower insurance rates.

Besides adopting digital tools to make jobsites safer, firms should double down on traditional best practices, according to a 2023 study by Associated Builders and Contractors, an industry trade association. ABC found that firms requiring exhaustive safety training have half the incident rates of companies that limit training to basic compliance topics. Companies investing more in substance abuse prevention report a 62% drop in days missed from work, restricted work, and job transfers.

A comprehensive approach to health and safety can help contractors reduce accident and fatality rates, with the aim of everyone going home safely every night.



5 Analyze performance to make continuous improvements

In the preceding chapters, we've seen how construction firms use data to orchestrate performance to lower costs and improve scheduling and safety. Now let's see how firms use analytics applied to data gathered on integrated systems across the organization to assess results, spot trends, and predict risk.

It's important to note that data analytics comes in different flavors. Predictive analytics, for instance, predicts the likelihood of a specific outcome. It answers the question, What's most likely to happen? Descriptive analytics looks back to reveal trends. Increasingly powered by AI, both types of analytics can find patterns across thousands of projects. What should be the average length of the preconstruction process? Which change requests are most likely to affect cost or schedule? What are the biggest risks to complying with sustainability regulations?

A Wisconsin-based construction firm reports that it cut its safety incident rate by 10% and its workers' compensation costs by 75% after deploying a health and safety application that uses predictive analytics. "In the past, people looked at safety as a series of unique events, but there are variables that influence it, and they are common from incident to incident," says the firm's insights and analytics manager. "Our investments in software are about broadening the search for those variables."

A West Coast transit authority that's building a driverless commuter rail system uses descriptive analytics to measure timely approval of contracts, payments, and change orders. Its analytics dashboard shows where process delays have occurred so that managers can make fixes. "The dashboard is a communication tool to encourage good behaviors," says one of the authority's quality management executives. "Most of our invoices are now signed off within thirty days."

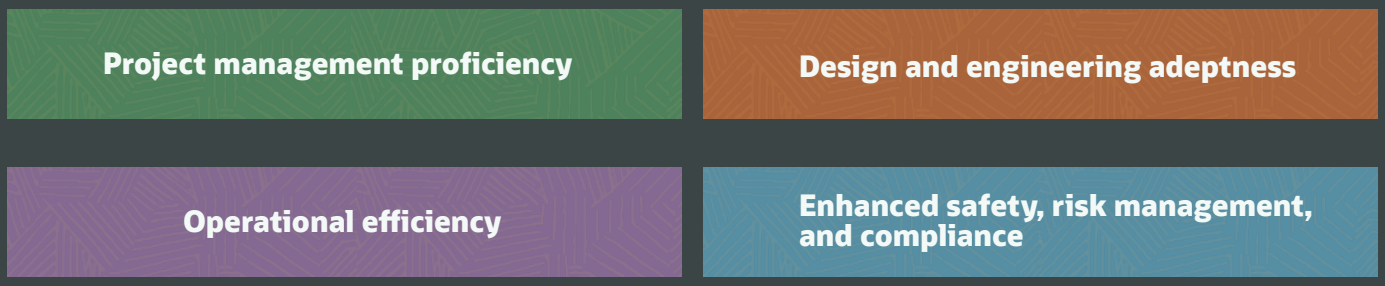
Firms also use analytics to predict risks for the week ahead such as disrupted materials deliveries, a shortage of onsite manpower, hours lost to bad weather, and the potential

for safety-related delays. They also typically analyze the previous week's performance, taking a snapshot that helps tweak timelines, labor needs, or material purchases.

Companies capture a lot of data in their ERP applications that they don't use to full advantage, such as procurement, budget forecasting, and supply chain data. In many cases, they simply don't have the time or the willingness to dig into it.

Top AI Use Cases

Construction and engineering firms believe these four AI use cases can generate value



Source: Deloitte, 2024 Engineering and Construction Industry Outlook

The reality is that in construction, it's still early days for analyzing data to help orchestrate processes and improve performance. "It really is a journey, especially with emerging tech like AI," says Nathan Stump, Oracle product marketing director and an expert on construction analytics. "You don't buy a product off the shelf, flip a switch, and start getting amazing insights into every aspect of your projects. But it's smart to start the journey so you're not left behind."

Indeed, the industry is exploring wide-ranging AI use cases, such as drones and autonomous guided vehicles that improve inspections and worksite monitoring. Generative AI, which can generate text, images, video, code, and other data, has the potential to help construction firms improve efficiency by automating schedules, site plans, and other processes.

How can Oracle help?

Office and field teams trust Oracle Construction and Engineering solutions

Oracle Smart Construction Platform is an integrated suite of project collaboration, scheduling, payment, data analytics, and other industry-oriented applications—built on a common data environment and incorporating a growing partner ecosystem—to help owners and delivery teams work together and succeed. Applications in that suite include:

- **Oracle Aconex** connects teams across the entire project lifecycle and captures a complete record to keep everyone informed, minimize rework, and resolve disputes.
- **Oracle Primavera Cloud** connects owners and delivery teams to shared scheduling, resource management, capital planning, and portfolio management to help keep projects funded and on track.
- **Oracle Primavera Unifier** automates, standardizes, and connects construction processes across portfolio planning and project execution to help optimize capital spending.
- **Oracle Construction Intelligent Cloud Service** uses predictive intelligence to help improve decision-making and reduce risk when it comes to managing schedules, workflow, and safety.

Learn more about how **Oracle Construction and Engineering** applications connect teams and enable insights to achieve more with less.

Construction and Engineering firms trust Oracle Cloud Applications

- **Oracle Fusion Cloud HCM** helps firms recruit, onboard, develop, engage, and retain highly skilled workforces.
- **Oracle Fusion Cloud EPM** supports firms in strategically planning, tracking, and reporting on financial and operational processes that are vital to achieving their business goals. And the software is increasingly used by construction and engineering firms to plan and track their sustainability initiatives.
- **Oracle Fusion Cloud ERP** gives construction firms fast and secure access to financial data, including procurement, project financials, and core accounting, and empowers them with AI-driven reporting functions.
- **Oracle Fusion Cloud SCM** is increasingly being adopted by construction and engineering firms looking to build resilient supply chains and better manage their procurement and sourcing processes.
- **Oracle Customer Experience** connect all your business data across marketing, sales, commerce, and service to nurture lasting customer relationships.

Learn more about how **Oracle Cloud Applications** help construction and engineering teams manage their key HR, planning, financial, and supply chain processes.

Construction and engineering firms trust Oracle Cloud Infrastructure

- **Oracle Cloud Infrastructure** (OCI) is the underlying infrastructure for all of Oracle's construction and engineering applications. Firms rely on OCI to improve the performance of applications that boost efficiency, save money, reduce risk, and enhance quality. Embedded AI/machine learning algorithms help make it easier to build, automate, and scale new applications and data platforms. Key services include:
- **Oracle Autonomous Database** is a fully automated service that makes it easy for firms to develop and deploy application workloads, regardless of complexity and scale.
- **Oracle Analytics platform** uses machine learning and natural language processing to help increase productivity without compromising security or regulatory compliance. The platform powers **Oracle Construction Intelligence Cloud Service**, an industry solution that leverages predictive analytics.
- **Oracle Integration Cloud** connects any application and data source to help construction firms automate end-to-end processes and centralize project management.

Learn more about how **OCI** powers the success of data-driven construction teams.

Helping Construction Firms Work Smarter

Oracle Cloud solutions help construction and engineering firms and project owners alike efficiently manage jobs across their portfolios, with an emphasis on connecting teams to save time and money.

Learn more