Improving construction project performance: A conversation with Amit Varma

Has the construction industry been thinking about capital project delivery in the wrong way?

Amit Varma

Co-founder of VEERUM

with Amit Varma, a co-founder of VEERUM—a provider of industrial IoT technology—about how technology can inspire fundamental changes in the way the industry develops and delivers projects.

VOICES: As technology solutions proliferate in the construction industry, what are the most important pain points that technology can help address? How do you expect these solutions to improve project performance—in terms of cost and schedule?

Amit Varma: For the average industrial capital project team, things move so fast that what was true yesterday may not be true today. One significant pain point is that project teams currently don't have a window into a single source of truth. This is, at least in part, due to the fact that teams are so large. For a typical major project construction in Canada, there might be several thousand people, and a hundred vendors across multiple locations that form the project team.

Critical project information is often dispersed among dozens of contractors and hundreds of team members. Without the right information at your fingertips, chances are you won't find it fast enough to make effective project decisions. Compounding this is the fact that project activities happen in parallel; so when information is incorrect or simply misinterpreted, it contaminates the entire project. Mistrust is cultivated and project stakeholders waste time verifying data and information.

Technology platforms can help create this single source of truth. Cloud-based platforms are accessible and elastic in the sense that software applications can expand and contract as project teams expand and contract. The applications offer this flexibility while enabling geographically diverse teams to plan, execute, and monitor projects based on centralized data. Digital twin technology—which is used to create a virtual replica of a physical object or environment that can be used to simulate, operate, and analyze—contributes to the single source of truth by generating trustworthy, actionable information to base project decisions upon.

Another pain point for projects is that they are dynamic, complex systems, sometimes with a global footprint—and their moving parts, design, fabrication, and logistics must come together just in time for construction to be on cost and schedule. Technology can help solve this problem by bringing these moving parts together in a holistic approach. Rather than focusing on improving one part, solutions can offer connected insights throughout the design, fabrication, shipping, and construction lifecycle. It can identify mismatches that could cause construction rework, such as matching fabricated parts to design and virtually fitting them at the site. In this example, defects that could cause rework are detected before shipping parts. Defects can be corrected, or the site can be adjusted to accommodate them. Project teams can vastly improve cost and schedule performance by finding these potential mismatches and taking proactive steps to fix them before anything goes wrong.

The ability to evaluate data in real time, and make better decisions as a result, will likely spawn the biggest changes in how projects are developed and delivered in the future. While many technology providers serving the industry are working toward this vision, we are realistic about the current state of data management and don't expect the industry to become a utopia of freely accessible, shared data overnight. Rather than trying to solve the problem of fragmented data, we recommend that capital project owners focus on how to connect those fragments to bring more certainty.

VOICES: What has to change to unlock the potential of digital solutions on construction projects—what are the biggest blocking points?

AV: First, owners must start making strategic decisions about data upfront—what data will be collected to inform daily project decisions, who will access it, and how.

Once you're in the thick of a project, it's too late to think about what data you need. Construction projects contain massive amounts of data, but at the moment those data are trapped in systems that don't interact with each other, practically rendering them useless. In crafting their project plans, owners must incorporate digital strategies and prioritize interoperability so every byte of data collected at the day-to-day level is effectively applied to solve a problem.

Of course construction industry leaders are seeking answers to these problems. But they are often skeptical of digital solutions because they cannot quantify their value or return on investment. We believe there is value in risk mitigation for both owners and contractors. For example, you pay insurance on your house every year and hope that you don't use it; a digital twin platform for capital projects can similarly act like an insurance policy by helping preserve plans and managing risk.

Often, one decision maker may not have visibility of all the value as it extends beyond their scope of responsibility. So key decision makers should work to analyze and understand how a digital solution can provide benefits across the supply chain.

Furthermore, some owner companies are slow to develop the internal policies needed to safely adopt new technology on-site. Understanding the evolving regulations, particularly for on-site technology such as unmanned vehicles, also impacts the timeliness of adoption. Technology providers may find that they become key to providing input to the development of regulations. Regulation ideally will accommodate the unprecedented rate of change and be informed by facts, training, and experimentation.

On the broadest level, to unlock the potential of technology, industry leaders need to accept that the future is nothing like the past. The industry cannot seek to control change in a linear way, especially at the disruptive pace at which it happens. We should accept this is the new norm and seek out opportunities to experiment, learn, and adopt.

VOICES: *In an ideal world, how do you see the roles of the owner, contractor, and solutions provider evolving to mainstream digital solutions in the industry?*

AV: In an ideal world, the owner, contractor, and the solutions provider would work together and in each other's best interests so the project outcomes are achieved. Technology can enable this level of collaboration.

Artificial intelligence offers a chance to completely reimagine how we deliver projects. In the next few years, project teams will be able to make decisions guided by a system capable of calculating more optimization options than humanly possible. We need to keep our minds open to the fact we may have been thinking about capital project delivery the wrong way all along. It will be exciting to see how the industry evolves.

The roles of the owner, contractor, and solutions provider may evolve in terms of contractual frameworks. Each player has a wealth of data but they treat it as a proprietary competitive advantage in project bids. If owners and contractors combined their data to compute best outcomes, they would be much more effective together.

Imagine if a major project team was an orchestra, in which a large number of musicians in separate sections were playing a diverse range of instruments. Today, their song sheets are continuously changing between sections and out of sync with each other. Now imagine those musicians reading from the same song sheet, and the song sheet updating automatically based on changes in others' sections and tunes. The instruments are the finely-tuned digital solutions the industry so desperately needs; and the music created together would be a true piece of art that all the musicians would be benefit from, and broader audiences would be proud of.

VOICES: *What are the most exciting developments in engineering and construction digital solutions that we can expect to see unfolding over the next few years*?

AV: The most exciting developments are projects managed from start to finish with data that's centralized, interoperable, and practical for people to consume. For instance, a large Canadian energy player is monitoring earthworks at a construction site where, instead of traditional surveyors, a robotic drone and software calculates progress. Digital measurements lower costs and eliminate volume reconciliation issues. Earth movement is optimized by decreasing double handling. Removing people from working around moving heavy machinery reduces safety hazard.

Digitization will also impact schedules, as it did in the case of a global industrial fabricator where equipment sizing and orientation mismatches were digitally identified before the equipment left the fabrication facility. This prevented expensive and hazardous rework on site. The project was delivered two months ahead of schedule.

Enhanced environmental management is another exciting development. For example, we are in the early stages of working with a client who is building a 2,000 kilometre transmission line through a dense forest. A digital twin suggested the optimal path of the power line, minimizing the number of trees felled, while balancing cost and environmental regulations.

Of the many exciting developments in our field, the prospect of autonomous, safe, and sustainable construction of the world's infrastructure is the most exhilarating. We believe that this can be achieved in the near future and we are proud to play a part.

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