Construction sector transformation

The productivity drivers: BIM

Engaging with the fourth industrial revolution: part two
The productivity drivers: building information modeling (BIM)

EY sector transformation series covers each of the four quadrants where the industry leaders are focusing their time and resources – digital, building information modeling (BIM), Lean and off-site construction. While they overlap and are interrelated, each quadrant also has important stand-alone features.

BIM, an intelligent digital modeling process, is increasingly used by architecture, engineering construction professionals and owners to more efficiently plan, design, construct and manage buildings and infrastructure. However, organizational maturity with BIM varies greatly and ranges from limited use to BIM integrated into the digital core and being the default standard on every project, regardless of size or complexity.

Why is BIM transformational?

Benefits of BIM include:

- Single source of truth from which all parties with access can act, removing multiple version risks
- De-risks projects, as construction takes place in the digital sphere before any physical build and allows for issue resolution and design adjustments
- Time value, as detailed digital modeling and resolution can materially reduce overall time to construct a project
- Life cycle focus that acknowledges the end use of the building and supports more efficient operation and usage and preventive maintenance

“Before going on site, the project teams go through the 5D digital model, which is our minimum, in full detail. We construct everything in the digital realm. Then we join the site crews and repeat what we have already done. It isn’t about the cost saving – that hasn’t been our focus, though I expect it saves us on re-work and false starts. We believe we have already had our return on investment because we have taken the risk out of the job. And we know that with our level of investment in digital modeling, we can respond to the RFP for a three-year civil construction program and finish it in approximately two years.”

~ Andrew Harris, Director, Technical Futures and Engineering Excellence, Laing O’Rourke
Progress of BIM

While acceptance of the value of BIM is close to universal, its use varies by market and even more by organization. The three types of BIM users are:

- **Converts.** BIM is used on every single project regardless of its size or complexity. BIM is connected to the operational processes and systems, and transformational leaders elect to only work with subcontractors who engage accordingly (although allowances are made for immature markets). BIM is a “given” in their world, and working without it constitutes greater complexity than working with BIM. While some regard BIM as a “cost,” converts regard it as an essential risk management tool and a way to compress project construction duration.

  “We have a huge appetite in our team for BIM everywhere in the world. Even for contracts of €1 million, of course we use BIM. This is our way of working today. It’s not a question of size of the building or the project.”

  — Major European construction company

- **Drivers.** These are operators who are clearly committed to BIM and employ it wherever feasible. The use of BIM often varies with size and complexity of the project, but the belief in its value and potential role in the future of the sector is accepted. There is, however, still a project view of construction rather than a process view.

- **Strivers.** These are organizations where the proponents of BIM continue to struggle and BIM is often spoken of in terms of “cost to the project.” The cause is mostly attributed to the lack of commitment from the organization’s leadership to sector transformation.

  “There are many, including some large projects, where we don’t use BIM because the clients don’t value it and it just adds cost.”

  — Residential high-rise construction specialist
Leveraging the digital core

Construction consists of a series of key intersections between stages (design to build, for example) and stakeholders (such as architects, developers, clients, general contractors and subcontractors). At each intersection, a lack of digital integration means information is transferred on paper or with limited underlying data, and value is lost.

Digitally connecting BIM incrementally increases its value.

- **Federated BIM**, where project stakeholders access and develop a single cloud-based model, mitigating repetitive value loss. The risk associated with the physical management, version control and transfer of documentation could be eliminated.

  "Most problems happen at the intersection of various systems. In a federated model, you're taking responsibility for your model, managed by us. But what currently happens is that you maintain two information sources to support what is legally needed versus what is needed to manage and integrate the project. All the legal stuff is still on paper. The future will be a federated BIM that lives in the cloud, with supporting systems that can use that information. That's what we hope to implement in the not too distant future."

  — Atul Khanzode, Ph.D, Technology and Innovation, DPR Construction

- **Digital integration** with geographic information systems (GIS), virtual reality (VR), drones and other tools: digitally integrating BIM with complementary technology creates even greater efficiencies than stand-alone BIM models.

  "Complex projects on complex sites can be built without technology. But using BIM integrated with other technologies including GIS and satellites, it can be done in shorter time than if done in 2D; mistakes are corrected in digital rather than physical reality and it is much more efficient. It would be a massive mistake not to use BIM and new technologies."

  — Jean-Baptiste Valette, Director BIM Engineering and Transformation, VINCI

- **VR**: digitally integrating VR supports design and community consultation.

  "BIM with integrated VR allows our client to better understand their building before we construct it."

  — Major European construction company

  "With AR/VR integrated BIM, the Digital Twin, we expect to reduce errors and rework during construction to practically zero."

  — Menno de Jonge, Director Digital Construction, Royal BAM Group
The productivity drivers: BIM

Buildings and cities are getting smarter as digital drives changes in the built environment and how we work, live and transport ourselves. Increasing sophistication of BIM platforms and standards, and a clearer value proposition, will make BIM an essential and undisputable part of construction.

Toward the future state of BIM

The world is going digital, which is impacting the built environment and how we work, live and transport ourselves. While there is some way to go toward global standards and definitions, the direction is clear: BIM, or digital construction, will be an essential and undisputable part of construction. Increasingly, governments and clients are mandating BIM, and its greater use will stimulate investment and development of the platforms.

BIM currently adds a measure of time to the front end of a project. When done well, it reduces risk, rework, overall cost and duration of the project. It is only a matter of time before BIM will be cloud-based, available as a service and able to be integrated into your digital core and operational procedures. BIM will be part of automating your supply chain, progress payments and other back-office functions. Connecting to an independent pricing agent will automate accurate (re)pricing.

As BIM moves into the cloud, federated access control will allow efficient sharing of one BIM model across the value chain, and it is highly likely that over time the client will involve construction and engineering organizations earlier in the project’s development to achieve further reductions in time and cost.

Recommendations:

- Step one is moving the organization toward acceptance of BIM; build it digitally first, then build it a second time reducing rework and risk.
- With a three- to five-year future state strategy, the organization can leverage BIM into the other three quadrants and gain significant incremental efficiencies across the organization, the supply chain and ultimately the entire value chain.
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