Construction sector transformation

The productivity drivers: digital

Engaging with the fourth industrial revolution: part one
Engaging with digital, the fourth industrial revolution

A digital enterprise strategy is essential for digital to be transformational. Unfortunately, for most, this appears as yet elusive, with only 28% having a digital strategy and agenda in place even though 26% felt that competitors further along the digital readiness spectrum will have a significant impact on their business. Key drivers for digitization given were increasing customer expectations and needs, cost pressure, and competition.

In our “Engineering and Construction (E&C) sector transformation” series, we explore four significant drivers of productivity that will transform the sector. In this our first, we explore the impact of the digital revolution. The sector has lagged in digital adoption, but according to CB insights data, investment in construction technologies has grown 568%, from US$66 million to US$375 million in the five years to 2017 and investment is likely to continue.

While the critical KPIs for the E&C sector have been delivering projects to time, budget and agreed-upon quality, EY’s point of view is that the sector needs to transform itself by setting new benchmarks, producing better quality at a lower cost and in shorter time frames while achieving materially improved and more sustainable margins and safety records. Some of these new benchmarks are already achievable, and market-leading organizations are progressing toward them. Consequently, organizations that do not engage with sector transformation will struggle to compete with those that do.
The digitally transformed “future state” construction company. What does it look like?

Sally is a construction project manager. To start her day, she opens her tablet and taps on the pre-construction project.

The client and architect, using VR goggles, complete a full walk-through of the BIM model, experiencing the building and surrounding infrastructure.

The federated, cloud-based BIM is shared across value chain and the design changes uploaded immediately.

BIM is connected to an independent job costing engine, automating project re-pricing.

BIM is connected to the blockchain-enabled, digital ERP which the supply chain connect into, avoiding the need for purchase orders or invoicing.

Sally’s dashboard shows green dots against all the subcontractors and suppliers, confirming their agreement to the updated schedule of works and their ability to commit to the updated start date.

Sally swiped web based dashboard to her next project, midway through construction.

The dashboard shows green dots for each level, confirming:
1. The IoT connected self-drive trolleys which are digitally integrated with the hoists and loaded with pre-cut materials moved into position overnight, and,
2. Each of the trades were running to schedule.

3D Laser scanners and drones record each floor to confirm ‘As Built’ into BIM model. Analytics engine combines 3D Laser scans, 5D BIM and ERP data to determine exact project progress. Sally digitally schedules auto progress payments in accordance with cash flow parameters.

Combining current and past project data, the predictive analytics engine reviews project progress. Two flags (lead indicators) on potential scheduling/costing/quality issues are raised for Sally to investigate and take preventive action if required.

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The productivity drivers: digital

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Source: EY
What are the key steps to enabling your organization for a successful digital transformation?

There are five stages to a successful digital transformation:

1. Define your future state
2. Create a digital core
3. Drive operational efficiencies through automation
4. Resolve fragmentation; digitally integrate the supply/value chain
5. Improve performance through continuous, predictive analytics

1. Define your future state

In market-leading organizations, the CEO has a clear, defined picture of the future state of the organization and has a digital director on the team who defines and executes the digital transformation strategy. Defining your future state involves challenging your strategic direction, business models and how you create value as an organization. It is about taking your strategic drivers, including revenue and margin growth, how you win work and serve your clients; improving delivery and improving safety; and combining these with industry trends to create a technology-enabled future state for your organization — a process that involves organizational, sector and cross-sector learning.

Following the definition of your future state, your digital director designs and executes a clear set of initiatives prioritized by organizational and financial impact to realize the vision.

Organizations without a defined future state run the risk of starting the digital revolution at step three by aiming to reduce costs and error rates while overlooking the true potential of the digital revolution. These organizations implement ad hoc apps or digital tools to solve “random” challenges. Inevitably the automation will be suboptimal, not prioritized on impact or integrated into any whole of business strategy and mostly before processes and systems have been optimized. This will lead to small gains and, where taken to its conclusion, will lead these organizations to increased complexity and suboptimal effectiveness.

2. Create a digital core

“If you don’t have a digital core, everything becomes exponentially harder.”

— Stacy Scopano, Innovation, Development & Construction, Skanska USA

The current/historic state across much of the sector is one of delivering highly complex construction projects on fine margins, over-relying on people, with the persistent use of paper and under-supported by systems. With the technical and commercial viability of the cloud and mobility solutions, this is rapidly changing.

Paper is a tool of the 19th century and while it has its purpose, it is associated with higher costs, manual handling, data entry errors, version control issues and automation hindrance. Stage two could be characterized as “getting off paper.” A digital future state requires an organization to renovate its IT environment and create a digital core and a data strategy, enabling the transition toward end-to-end digital processes and taking advantage of digital opportunities.

Many legacy systems communicate through a bespoke integration process that is costly to implement and increasingly difficult and expensive to maintain over time or often operate as stand-alone systems with other processes unable to access the data:

- **Digital core** — This is a combination of different, often cloud-based systems with open application programming interfaces (APIs) that are configured to exchange data across systems and processes. Industry-specific applications and digital tools can be plugged in at a fraction of the cost, relative to integrating these into legacy systems. Data from legacy systems that may need to be maintained for a period can be brought into the digital core through cost-effective robotic process automation.

- **Data strategy** — A digitally transformed organization will generate significantly more data. To manage this data successfully, the organization will need a data lake and a data strategy, defining how the organization creates, stores, governs and ultimately archives and destroys its data.

“It’s 2018! How are you going to retain or track your workers when you’re mailing boxes of paper around? How are you going to retain your customers? Even foundationally, from a human perspective, no one wants to work for that company!”

— Stacy Scopano, Innovation, Development & Construction, Skanska USA
3. Drive operational efficiencies through automation

With a future state execution strategy and necessary infrastructure in place, the organization can drive transformation in its operations automating internal processes and placing live data in the field, resolving version conflicts.

Transformation leaders are using the “process” approach so the user can manage construction processes in visually aligned, intuitive dashboards. These dashboards overlay the systems operating in the background. This approach promotes adoption and avoids the frustration of having to log into multiple applications under one process. Any change in underlying technology will be less apparent to the user.

At this point, any new technology can be implemented with relative ease and leveraged to maximum efficiency. Digital tools, including safety solutions, site access automation, drones, scheduling tools, Internet of Things and geographic information systems, are examples of digital evolutions that can be plugged into the organization’s digital transformation.

“You actually get staff retention based on using technology – it makes people’s lives better.”

— Menno de Jonge, Director Digital Construction, Royal BAM Group

4. Resolve fragmentation; digitally integrate the supply/value chain

Construction is a fragmented process, with the general contractor, individual trades and multiple suppliers each operating as separate functions on a project. This fragmented nature of the construction supply chain drives inefficiencies; it regularly affects time, quality and cost. Stage four digitally integrates the end-to-end value chain.

While stage two could be summarized as “getting off paper,” external integration could be characterized as “getting off the phone,” with the value chain connecting to a single source of truth to enhance collaboration and value transfer.

This stage moves supply chain interaction away from time-consuming and costly activities, such as manual status checks, telephone and paper-based information requests, rectification activities and version conflict resolution, that frequently plague projects. Instead, interactions can be focused on sharing learnings, improving productivity and delivering results.

Leaders in this space are creating “value chain-accessible platforms” which allow all participants to access a centralized store of information to plan and deliver projects.

“We’re probably at the 30%-40% range of digitally integrating with suppliers.”

— David Wilson, Chief Innovation Officer, Bechtel

“Most problems happen at the intersection points of the fragmented value chain.”

— Sheldon Morris, VP Commercial & Risk, EI Seif Engineering and Contracting, Saudi Arabia
5. Improve performance through continuous, predictive analytics

At this stage, your organization is able to leverage its data asset to improve project performance. This is achievable through developing lead indicators using predictive data analytics, AI and cognitive applications to inform and enable better decision-making.

These capabilities can:

- Create lead indicators on project performance and take corrective and preventive measures heading off serious challenges and avoiding terminal projects; one of the sector’s challenges is that of discovering that projects are failing after it is too late to take preventive measures.
- Use cross-project data analytics to continuously improve estimations, operations, efficiency and productivity across the value chain.

“Data analytics is going to benefit us from two points of view – from a technical point of view and from the manager’s point of view – and help us develop algorithms that better predict outcomes.”

— Juan Elízaga Corrales, Innovation and Media Director, Ferrovial

EY point of view

The road to digital transformation starts with defining your future state to inform your execution strategy and necessary infrastructure choices.

Your future state definition will be specific to your organization. While several are well on the way, at this stage, there appears to be no E&C organization that could rightfully claim to have achieved digital transformation.

Execution strategies showing promise and good results include setting up separate subsidiaries to drive digital developments, externally located innovation laboratories, acquiring a startup to capture and build on the organization’s capability, hiring digital leadership from a digitally mature sector, engaging agencies or consultants, and for most organizations, a combination of several of these strategies.

In order to achieve leading performance, the digital transformation strategy needs to form part of the overall sector transformation strategy. And as with each transformation regardless of organization or industry, the overriding findings suggest that both executive commitment and a bottom-up implementation are essential. Finally, you are committing to a new way of thinking and a new way of working – this is culture change, and it will take investment and time. There are no shortcuts; forming a strategy and pilot project is a good place to start.

The crux of transformation is that regardless of sector or century, the choice is to either engage and thrive or ignore and expire.
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