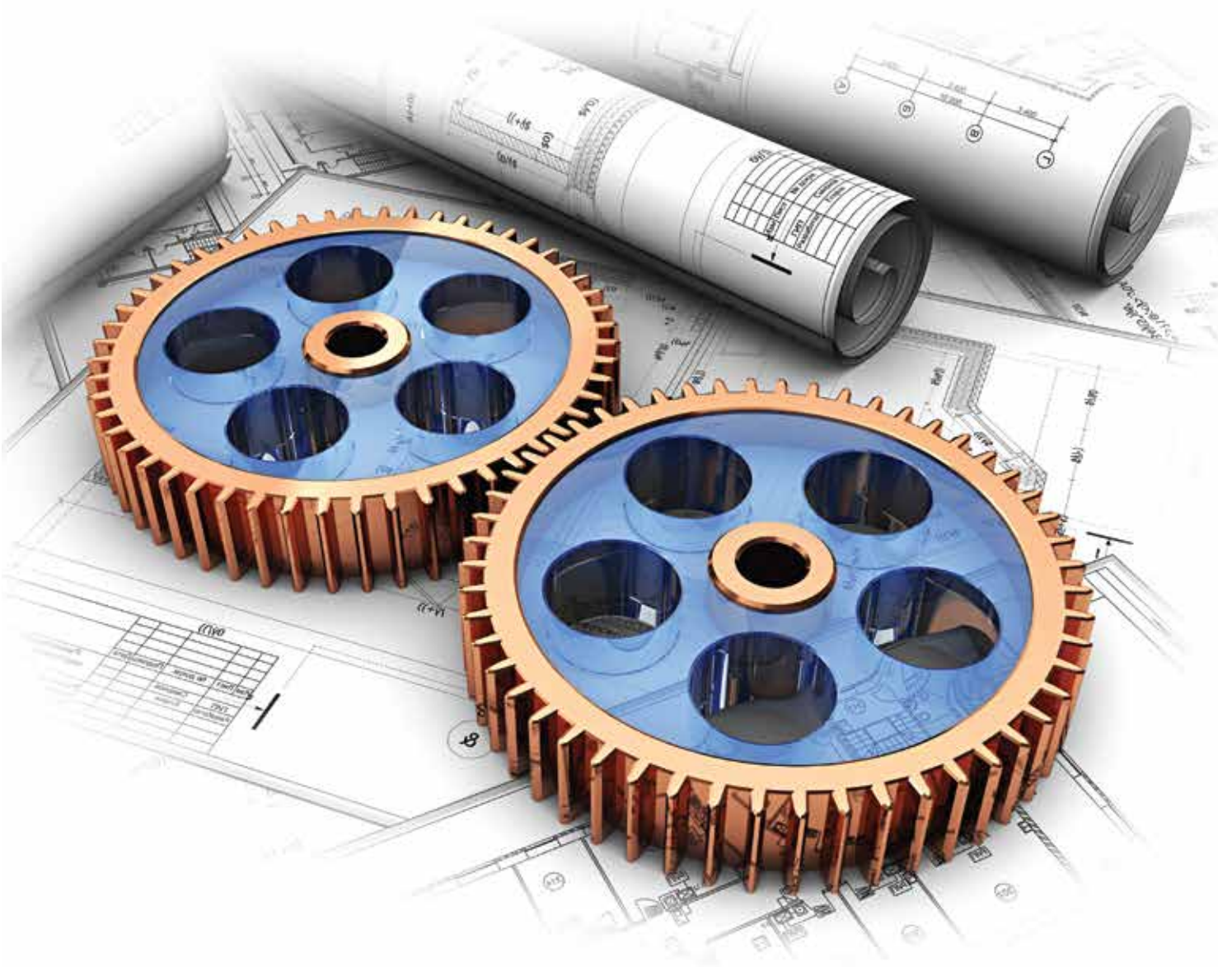
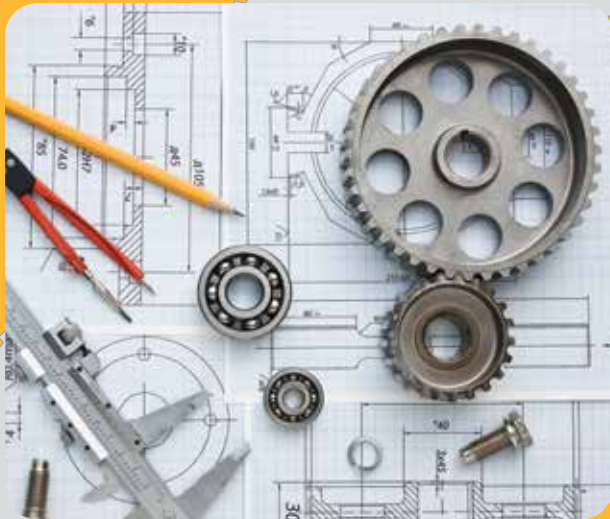

DIGITAL INTEGRATED PLATFORM: BRINGING RESILIENCE TO CONSTRUCTION ENTERPRISE



THE NEED FOR CHANGE - WHY DIGITAL INTEGRATED PLATFORM?

Few industries are as high risk and fragmented as Engineering & Construction (E&C). There is good reason for this. Even simple construction projects require collaboration and coordination between vast arrays of stakeholders and specialists. Projects such as airports and hospitals, oil rigs and tunnels bring greater complexity and a higher level of fragmentation. The impact of a small change can ripple across teams, timelines, safety, productivity, materials and cost. Making it even more challenging and risk prone are unprecedented external pressures such as eroding profit margins, higher owner expectation, rapidly changing technology and a dwindling workforce.

It gets further complicated as go to market strategies of E&Cs involve tapping emerging sectors, aggressively augmenting services and inorganic growth through Mergers and Acquisitions (M&A). They need to follow owners and operators into uncharted territories to win new business. This is driving the need for E&C organizations to focus on operational streamlining at the back office and agility and value delivery to customers and leading them to question as to how they can standardize at the back and differentiate at the front to achieve better business predictability. With all these dynamics, substantiated by worrying decline in productivity, it is time to look at creating one unified, global, integrated Digital E&C platform connecting the front end to the back office. This can appear to be a Herculean task. But we believe that the upside is difficult to ignore.



Business and IT Challenges Faced by Project Owners

- ❖ Creating consistent margins across projects
- ❖ Lack of control and visibility of globally distributed projects (plan, cost, inventory, assets, labor, risk, utilization)
- ❖ Lack of project integration - site to back office and from bid to handover
- ❖ Lack of standardization to gain efficiencies from processes related to HR, Procurement, Finance & Accounts etc
- ❖ Lack of IT enablement for site operations
- ❖ No single source of truth, leading to inconsistent business decisions
- ❖ Growing complexity of projects with resource constraints
- ❖ Manual and inaccurate systems increasing cost
- ❖ Inability to prevent pilferage, leakage and material misuse
- ❖ No system control over reporting
- ❖ No control over health and safety measures



#1 Priority for Project Owners

Connecting disparate front end products to an industry centric ERP at the back end, with industry best practices to capture bid history, capacity and execution capabilities.

Outcome:

- ❖ Strong ability to win new businesses
- ❖ Realistic bid management
- ❖ Improved project selection guaranteed for success

Figure 1 - Business and IT Challenges Faced by Project Owners

Unified, Global, Integrated Digital E&C Platform: What is it?

Fundamentally, construction companies stand to lower risk by integrating their operations, data and management systems (see Figure 1, Business and IT Challenges Faced by Project Owners). To understand the implications of integration, it helps to get to the bottom of the two key constituents of this platform:

The Front Office:

Managing project risks is a function of both project selection and project execution. Bid, business development and project execution are managed by different teams within a construction enterprise, and each has its own incentives. Currently bidding, project portfolio

management and backend ERP applications exist; however they are not easily integrated. Thus stakeholders cannot effectively leverage knowledge from past bids and completed projects to manage risks both from project selection as well as from project execution. This needs a tightly coupled 'Integrated Bid to Project Delivery Solution' that will allow Engineering, Procurement & Construction (EPCs) to transform their businesses with an integrated process to capture and optimize margins as well as manage the most strategic and profitable projects in their markets.

It is essential to support this solution with best in class Critical Path Method (CPM) schedule development, resource planning, forecasting, utilization and efficiency analysis and an innovative approach to cost engineering. This will ensure accurate budget cost planning and

performance monitoring through analytical techniques and risk assessment beginning with Engineering, continuing through to Construction, and concluding with Project Closeout. The growing complexity of project controls software and customer's need for

- 1) They operate as standalone systems without integrating with the front office environment which is the true source of data from site and project systems.



integrated approaches requires a very specialized skill-set to implement. However, this integrated solution is incomplete without a Digital site solution that automates the data capturing of the 3Ms (Man, Material & Machine) related to daily operational data from project sites. This capture should also include site project updates, documentation, safety and security automation by leveraging the next generation technologies such as Mobility, RFID and Cloud.

This we believe will be a true Front Office transformation of a traditional single project management practice into an enterprise portfolio approach creating business value by enabling visibility, predictability and control.

The Back Office:

While the Construction Enterprises have been leveraging business applications like ERP, Supply Chain and Asset Management systems their back office has lacked in three critical aspects.

- 2) These backend systems lack standardization and are usually not tailored to meet construction centric business processes. They also miss out on incorporating key learning of past projects and are unable to adapt to the needs of projects being executed in new geographies.
- 3) They are not tuned to the dynamically changing needs of the construction industry, the demands of the owner operator community and lack adoption of new technology interventions.

This calls for a periodic relook into business imperatives and technology enablers, and it is critical that the back office solution incorporate the above three aspects and are timely refreshed.

How does this help? When a change occurs at one of the nodes – it could be design, construction, procurement, finance, asset or labor availability it has a pervasive impact. Fresh questions need to be answered such as:

- ✿ Who reviews and approves the changes? How does it change procurement?
- ✿ How can labor efficiency be maintained? How can we have the right talent/skill show up at the right time?
- ✿ How is cash flow being impacted?
- ✿ When will new materials/fabrication be required or how will those becoming redundant be managed? How can waste be minimized?
- ✿ How is quality affected and how can I build it into the front end rather than inspect it later?

One Global Digital Construction Platform – Enabling Predictability

When unified, these two critical ecosystems of a construction enterprise i.e. the front and the back office will enable a strong, centralized decision making environment leveraging analytics. This will allow E&C companies to keep current projects on track and improve collaboration. But most importantly it will guide enterprise to invest in profit making projects and the right clients, while executing projects globally.



- ✿ How does it impact local compliance requirements? What are the risk mitigation steps to be taken?
- ✿ What is the impact of the delay on various agencies, stakeholders and project KPIs?

The unified system can be imagined as a Central Cockpit Analytics Center for the Construction Enterprise (see Figure 2, Project Analytics Cockpit).

A well integrated, industry-centric back office ERP system can respond to these questions accurately and quickly based on hard data and evidence from the front end.



Figure 2 - Project Analytics Cockpit

Its advantages are diverse. The data being shared across the system can be analyzed to help identify new cost optimization and control opportunities. These include supplier consolidation, contract management, product standardization and inventory reduction. Predictive models incorporated in the system can estimate optimal purchase decisions which are especially beneficial in long-term projects where price fluctuations are debilitating. Linking these systems end-to-end guarantees three ways to minimize the impact of change:

1. The change can be understood across the project
2. The impact of the change can be quickly estimated and controlled
3. Rules engines in the system can help shape appropriate business models that improve project selection and project resilience

It is rather easy to see that integration can be beneficial at an enterprise level, a portfolio level and a project level. The difference is in how the complete chain works in perfect harmony and in a highly responsive and transparent manner, improving business agility. A good way to imagine the impact of end-to-end IT integration is to picture architects who sit in remote locations across the world, procurement teams that are typically off site, engineers who are on-site and finance teams who are centralized. It is practically impossible to have control over such modern construction projects being executed globally without effective integration.



The Future: It is here – Extending the Construction Enterprise

The future of unified integrated platform is extending the construction enterprise leveraging next generation technology to create a truly Digital Platform. The invention of advanced sensing devices combined with the connectivity technologies, smart systems and machine to machine integration is building the “Internet of Things”. The Internet of Things is generating vast amounts of data – called Big Data – which can be used for the benefit of the consumer or enterprise. Big Data can play an important role in identifying key factors from the cycle of learning on the backs of projects, spot patterns, or address things like how spot-pricing could be used to procure materials and services. Building Information Modeling (BIM), which is related to Big Data, could be used to improve collaboration and drive more productive, predictable and profitable projects.

Over years of working with global E&C enterprises, Wipro has come to the conclusion that it is not easy to ignore the idea of an IT platform that integrates the front office to the back extended by next generation technology, delivering an effective decision making environment. We have been creating such unified end-to-end E&C platforms using our expertise gleaned from our customers, partners and industry experts. We are convinced that the current lack of standards and integration of products offers early adopters a significant competitive advantage.

Construction leaders are waking up to this opportunity. They are working with IT partners such as Wipro to get ahead of the curve. E&C businesses are keen to improve the success metrics for their projects. Clearly, integrating IT platforms are going to be a leading way to do it. It's about how E&C Enterprise can bring the desired *'Standardization at their back office and Deliver Differentiation at the front'*.

James Caston, (PMP) Global Director – E&C Wipro Ltd

James has 22+ years of E&C project management and controls experience globally and has held key management positions for projects spanning water, nuclear, government, infrastructure, technology, industrial, mining, refining, electrical, information technology, and military markets.

As a Global E&C Director, James leads technology and project management systems consulting companies for implementing and integrating project management systems and establishing business processes.

Manish Kumar, Practice Head – Civil Construction Wipro Ltd

Manish is a seasoned professional with 16 years of diverse experience in the verticals of Engineering Construction, Civil Infrastructures Projects, Integrated Support Service and Smart Townships as Project Manager and Head IT.

As Global Practice Head for Civil Construction, Manish has evangelized and delivered successful EC&O specific IT value propositions across the globe enabling E&Cs become more agile and productive.

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