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The Age of With… AI in construction and infrastructure:

Creating value through data

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An industry in need of profitability and risk mitigation

Global demand for infrastructure is expected to continue growing over the next 30 years (only 25% of the infrastructure required for 2050 exists today). However, the Construction and Infrastructure (C&I) industry is facing major structural issues that have eroded margins (the EBIT-to-sales ratio stands at just 3% at European companies) and increased project risks.

C&I companies have made inroads into the digital world, but very few have been able to scale beyond certain pilot projects, facing three roadblocks: i) non-digitized processes jeopardize the ability to access consistent and ready-to-use data (paper-based documentation); ii) project execution is decentralized and deployment depends on the project managers; and iii) each project is perceived as unique.

Artificial Intelligence and Advanced Analytics at scale in C&I

The last five years have seen Artificial Intelligence (AI) and Advanced Analytics (AA) rapidly gain traction in the industry. Investment in data analytics has the potential to realize value throughout the project lifecycle: i) design, bidding and financing; ii) procurement and construction; iii) operations and asset management; and iv) business model reinvention/transformation.

Design, biding and financing

Historical construction issues typically stem from the design and bidding phase- inaccurate cost estimates, overly optimistic timelines and lack of risk and constructive alternatives analyses.

AI and AA can assist in the design review process (e.g. layout optimization), bidding process (e.g. predictive models of evolution of raw material prices) and post-mortem analysis (e.g. natural language processing to identify comparable work consignments) by analyzing vast amounts of internal unstructured data (such as bidding documents) and external data (such as commodity prices) to provide insights from previous projects. In doing so, C&I teams can generate more accurate estimates, reducing budgets and timeline deviations by an estimated 10-20% and engineering hours by 10-30%.

Procurement and construction

During the construction phase, the project manager must ensure the efficient use of resources (human and material), anticipate potential risks (safety, quality, etc.) and adjust costs with subcontractors and suppliers, with the ultimate goal of minimizing costs while meeting timelines and quality and security requirements.

AI and AA provide real-time insights that help when negotiating with suppliers (e.g. image recognition algorithms to provide on-site measurements), organizing tasks (e.g. input optimization algorithms) and predicting risks (e.g. real-time models for unforeseeable events such as localized storms).

AI may be used during the construction phase for security purposes (e.g. predictive analytics based on real-time data generated by construction work wearables) and to help reduce and automate administrative processes (e.g. handwriting recognition algorithms and natural language processing to "read" work orders).

Potential savings from data analytics and related technologies may amount to as much as 10-15% of total construction costs.

Operations and asset management

AI and AA can be used in a number of ways in the operations and asset management phases – from analyzing worker productivity to building efficient predictive maintenance systems, enhancing asset revenue and forecasting customer demand. Each asset has its own set of AI and AA applications, through which toll road operators forecast demand and customer elasticity to improve pricing strategies, railroad operators use track measurements to deploy predictive maintenance strategies and airport operators forecast traffic based on macroeconomic and social global trends. Collectively, analytics-enabled initiatives may generate a 10-20% saving in operating costs during this phase and a three to seven percent increase in ROI due to the extended useful life of the assets.

Business model reinvention/transformation

All of the above allow for better decisions and/or improved performance, but how could C&I players extract value from their data through new business models? C&I companies heavily rely on subcontractors and, as the digitization of the sector continues to grow, so does the opportunity for a disruptor. In this context, C&I companies may aim to become a platform business to integrate different services from different suppliers and capture their operational data, and then provide services demonstrating how to become more efficient, pool resources across suppliers or improve the operation of the asset. All in all, data is not only a way to improve decision-making but a business itself.

Capturing the untapped value of Artificial Intelligence and Advanced Analytics in the C&I business

Moving from pilot projects to impact at scale requires C&I companies to reflect strategically on their business context and needs. We are in "the Age of With": this is not about AI replacing humans at construction sites, but combining human work with the new possibilities offered by AI. In this context, we have identified five key success factors:

- **Develop a comprehensive data strategy:** C&I companies need to develop an overall data strategy - a strategy based on value generation for the company that helps support the choice of applications, infrastructure and tools.

- **Identify pockets of relevant data:** instead of endless IT deployments to create data lakes with all sorts of unstructured data, C&I should target relevant and actionable data to improve specific decisions and process performance.

- **Involve the organization through the bottom-up approach:** the selection and development of new technology should be driven not by top-level discussions, but by the real needs of the company's workforce, leveraging the expertise of its construction managers whose insights can help identify the key areas of opportunity.

- **Create a balanced and scalable portfolio:** companies should use a portfolio approach to their data analytics investments, rather than a project-by-project mindset. Pilots are fine, but only as a first step for deployment across company projects .

- **Ensure management buy-in and push initiatives top-down:** from the outset, organizations must develop a strong business case to help secure funding and organizational buy-in.

While investments in data analytics can generate value, success is not about simply acquiring and integrating new technology; it's about developing an organizational strategy and culture that integrate an insights-driven approach to key decisions, processes and business models in a way that enables the company to make investments at the right time and for the right reasons.

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