How to Harness Big Data to Drive Performance Across Your Project Portfolio

Why and How to Capitalize on This Emerging Movement: A Playbook for Project Portfolio & Executive Leaders

BRAND STUDIO

A CONSTRUCTION DIVE PLAYBOOK

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Big data is beginning to transform the engineering and construction (E&C) industry as more companies capitalize on its potential to drive project management performance. This playbook covers four important topics to help you understand and harness the power of big data:

Together, these topics will give you a comprehensive understanding of the role that big data can play in construction portfolio management, help you discover important reasons for embracing big data, and provide actionable steps you can use to get started.

1 **An Overview of Big Data in the E&C Industry**

2 **Why You Should Harness Big Data**

3 **How to Harness Big Data with Construction Management Software**

4 **The Top Five Things to Look for When Choosing Construction Management Software**

In the construction industry, as in other sectors, big data refers to the huge quantities of information that have been stored in the past and that continue to be acquired today. Big data can come from people, computers, machines, sensors, and any other data-generating device or agent.[1]

— RACHEL BURGER, construction management expert at Gartner Inc., a leading research company

AN OVERVIEW OF BIG DATA IN THE E&C INDUSTRY

While big data presents a vast array of unmined opportunities, the E&C industry has been slow to leverage it. With regard to portfolio management specifically, the power of big data analytics has yet to be fully embraced due to a combination of factors:

1. ***A lack of understanding.*** Data analytics are developing at a rapid pace, making it difficult to keep up with technology advancements and the benefits associated with them.

2. ***A lack of resources.*** Many E&C companies simply do not have the in-house IT infrastructure and expertise to successfully harness big data.

3. ***A lack of willingness to change.*** Having already invested heavily in legacy software systems, many E&C executives may be hesitant to invest in new software solutions.

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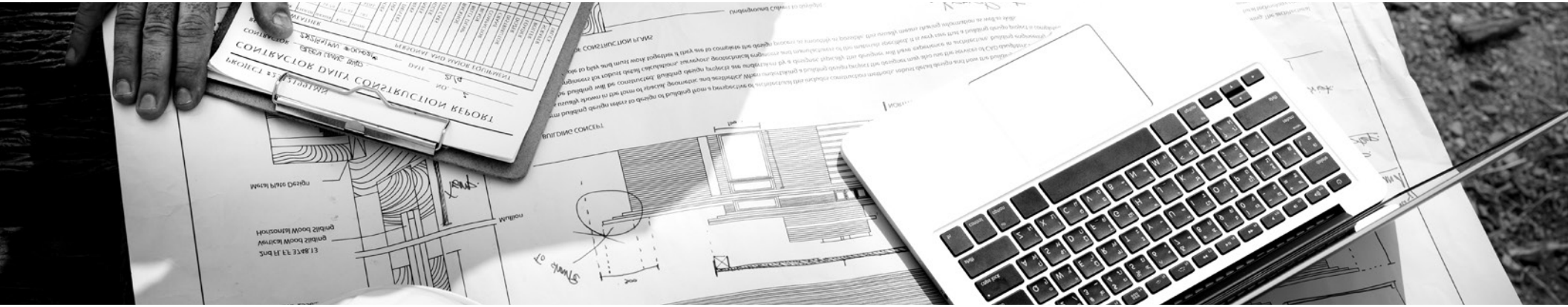
In fact, a 2016 global construction survey found that just 36 percent of engineering and construction companies–and only 21 percent of owners–were using advanced data analytics for project-related estimation and performance monitoring.[2] However, there are signs that the slow-adoption sentiment is changing. As new ways of collecting and using data have emerged, big data has begun to move to the forefront of E&C disciplines.

A February 2017 article published by Engineering News-Record (titled “Data Mining Gains More Cachet in Construction Sector”) reported, “Now, with vastly improved tools to collect and store enormous amounts of data collected from project stakeholders and the growing need to analyze and interpret it… construction-sector companies and software firms are embracing data science—and those who are good at it—in new ways.”[3]

Nevertheless, many project-portfolio and executive leaders are left wondering exactly why and how they should be harnessing big data.

WHY YOU SHOULD HARNESS BIG DATA



RISK

Uncontrolled data = project delivery and company risk

Construction projects require thousands of people to collaborate on project processes like inspections, RFIs, and change orders. Without an efficient system, data can get trapped and risk can increase. Manual data entry, inefficient processes, and delayed visibility can lead to budget & schedule risk. Not having easy access to 'proof of what happened' can lead to compliance & litigation risk, and it can increase the time and resources spent on dispute resolution. And if project data isn't adequately protected, your corporate risk is higher.

PERFORMANCE

Don't get left behind - drive performance using big data insights

Karthik Venkatasubramanian, Senior Director, Data Strategy and Operations at Oracle Aconex, explains why the time is ripe for disruption in project management protocols: "First, big data is real, it's now. It is real in the sense that you can use it on your day-to-day job, and it's available now, so you can apply it to a current project," he says. "Second, you can actually make a difference by using big data to address four key parameters—time, cost, quality and safety. Third, other project-portfolio managers and executives in the industry are already doing this. Therefore, you risk getting left behind by not jumping on the big-data bandwagon."

When considering the impact of big data… it is not the amount of data that is important. It's what organizations do with the all of this data that matters. Data of any variety can be analyzed for insights that lead to better decisions and strategic business moves.

— TOM STEMM, "Moving Big Data Into the Cloud," Construction Executive, published June 20, 2017

Connect your project teams, processes, and data on a single cloud platform to share, analyze and harness big data at a more sophisticated level.

When data is effectively and efficiently captured, processed and analyzed, you can gain a more complete understanding of your entire portfolio. This leads to several advantages:

BENCHMARKING

A collaborative big-data platform allows you to set benchmarks around what success looks like in terms of timeframes, costs, productivity and ROI.

FASTER AND MORE THOROUGH REPORTING

You will be able to create reports on operations more frequently, in real time, to gain better insights into each project's progress. These insights can drive continuous improvement across your entire portfolio.

BETTER RISK PREDICTION AND AVOIDANCE

Having one platform for all project information helps avoid miscommunication, oversights and errors, all of which can lead to costly rework. By implementing data analytics, you also will be able to detect potential risks or problems early and take action faster.

MORE EFFECTIVE PROJECT CHANGE MANAGEMENT

The faster you can detect, monitor and manage challenges and changes, the more likely your projects are to stay on track from a budget perspective, from a scheduling perspective and from a safety perspective.

ENHANCED BUDGET ACCURACY

“From the pricing of personnel to the cost of materials and suppliers, big data helps to better budget in real time, create improved planning procedures and save money throughout the life of the project,” stated Anirban Basu, chief economist of Associated Builders and Contractors, in his association’s December 12, 2017, Newsline newsletter.

IMPROVED SAFETY

Insights gained from data analysis can help your company predict the future and make changes ahead of time to eliminate hazards and fine-tune safety training.

BETTER OUTCOMES

Construction projects that are well run, well planned and well managed produce higher-quality and more profitable outcomes.

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Experts expect collaborative approaches to become more commonly adopted for construction projects… Powered by "best of breed" integrated technology platforms to support all stakeholders, these approaches that will alter the face of the industry will gain ground in 2018."

— TYLER RIDDELL, "Major Events Affecting the Construction Industry," Construction Executive Tech Trends, published December 15, 2017

HOW TO HARNESS BIG DATA WITH CONSTRUCTION MANAGEMENT SOFTWARE

The best way to leverage big data across your entire portfolio is to standardize construction management with a single, proven software solution. You can achieve this objective by encouraging your organization's leaders to complete the five steps listed below.

1 ESTABLISH YOUR OBJECTIVES

"The best way for any E&C company (owner or contractor) to get started around big data is to really focus on what operational life-cycle area they wish to improve," says Chris Dobbyn, Executive Director, Construction & Engineering Solutions of Oracle Aconex. "If you are an owner, do you want to improve planning, building or operating? If you are a contractor, do you want to improve how you pursue, build or repeat things? Then the dialogue can shift toward more meaningful and insightful lines of questioning: 'What data would allow us to make swift, accurate and less risky business decisions? How and where would we need to capture it? Once we have it, what will we do with it?' Without objectives, big data is just 'stuff.' However, with objectives, big data can become a golden-ticket-generating machine."

2 START GATHERING KEY INFORMATION

Perform a data-sharing analysis and assimilate answers to exploratory questions such as:

1. What people, processes and systems do you already have in place?
2. With which partners do you share information the most?
3. Who are the individuals critical to project portfolio management?
4. Where is data sharing typically congested?

3 DETERMINE WHAT YOU WANT TO MEASURE

By establishing key performance indicators early, you will be able to determine if project performance is improving over time. Do you want to measure enrichment of BIM data over a project lifecycle? Do you want to measure certain improvements or costs or change-management control? Do you want to measure improvements around schedule management, or some other key indicator of performance?

4 STANDARDIZE CONSTRUCTION MANAGEMENT PROCESSES & SOFTWARE

"The big-data collection part is actually fairly easy now, because computing machines are far more powerful. So now it's a matter of how well we catalog, categorize and deal with data as it is coming in," Dobbyn states. "The most successful companies think of big data in a more enterprise way, because the aggregate of information is where the profit margin is. You need to have your project information going into a centralized, enterprise-wide, scalable cloud platform. And then the data set becomes very interesting because it is easier to mine. By first piloting software on one project, you can learn and work out the kinks before deploying company-wide."

Today, an increasing number of E&C companies are integrating data into a single cloud-based system to drive performance across their portfolios.

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5 BEGIN YOUR BIG DATA JOURNEY

“We see many E&C professionals who are struggling with how to implement a cloud-based solution,” Venkatasubramanian says. “What helps is knowing that there needs to be a path to action.”

“Essentially, you should think of harnessing big data as a journey,” he continues, referring to steps detailed in Figure 1 below. “You start at the Descriptive stage, which is looking at the past: determining what happened and what you learned. Here is where data accumulated in your legacy systems is quite valuable. Then you do something to manage your present, which is the Diagnostic stage.”

“But where it gets really interesting is from stage 3 and upward. Stage 3 is getting Predictive. That’s when you ask, ‘What would happen?’ Then stage 4 is Prescriptive, when you say, ‘What actions need to be taken to avoid what might happen?’ And the last stage is Adaptive, when we ask, ‘Could we build systems and processes that are adaptive, that are learning from interaction, so that we can change and tweak user behavior and system behavior to try to manage processes?”

FIGURE 1 The Big Data Journey

1

DESCRIPTIVE

What happened and what can we learn?

2

DIAGNOSTIC

What is happening now?

3

PREDICTIVE

What might happen and how do we manage it?

4

PRESCRIPTIVE

What actions can be taken proactively?

5

ADAPTIVE

What needs to change and be re-architected?

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CASE STUDY: HOW ONE EPC DRIVES PERFORMANCE WITH BIG DATA AND STANDARDIZATION

One of Engineering News-Record's Top 400 Contractors and Design Firms was struggling with inconsistencies in how they managed project information and processes across their business practices. Inconsistent and manual data collection exposed them to schedule and quality risk, while inhibiting insights and accountability.

INSIGHTS & CONTROL: Since standardizing multiple business units on Aconex construction management software, the company has improved visibility, control, and collaboration with external stakeholders.

SAFETY: By digitizing safety processes, they can see correlations between projects that completed safety forms and those that had incidents. Standardization gives them the ability to compare across business units. Change management has been easier because Aconex easily adapts to the way the company manages their processes; workers don't mind using the new digital forms because they look just like the previous paper forms.

PRODUCTIVITY: Because the software enables faster decision-making, project turnaround times have decreased since the company began standardizing in mid-2016. *Figure 2.*

FIGURE 2 Standardization in mid-2016 reduces project turnaround times

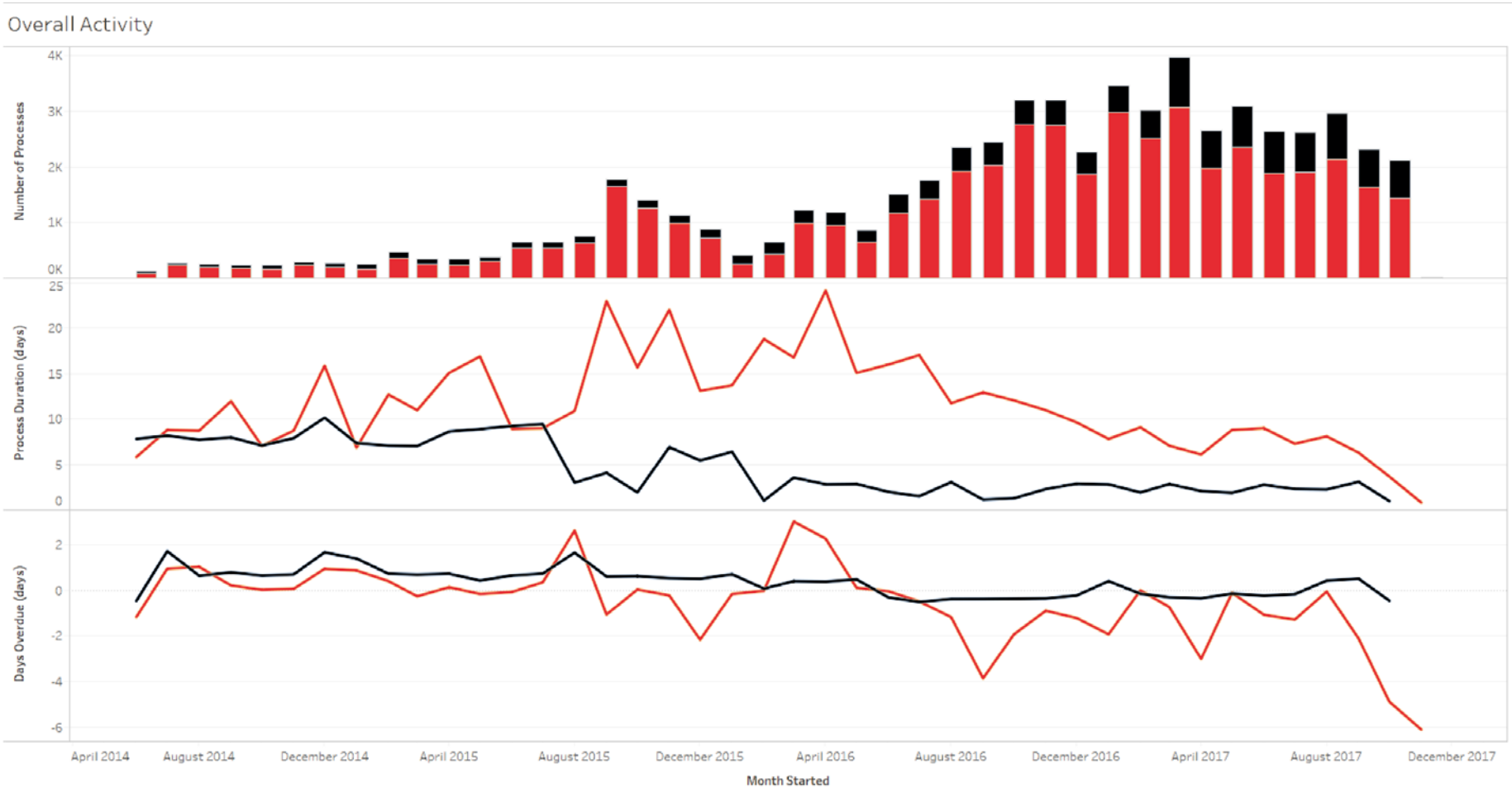
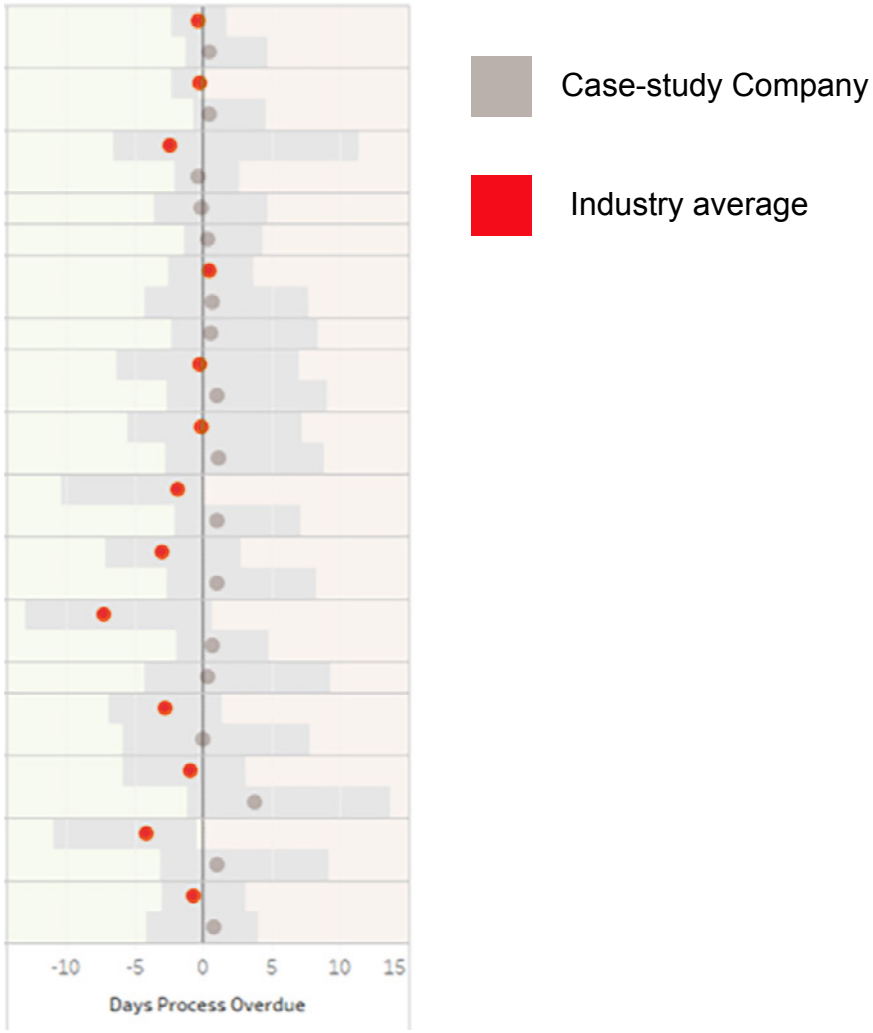


FIGURE 3

Case-study Company's Performance vs. Industry Performance



The company is overperforming the industry across the board in process executions by achieving shorter durations and fewer days overdue. *Figure 3.*

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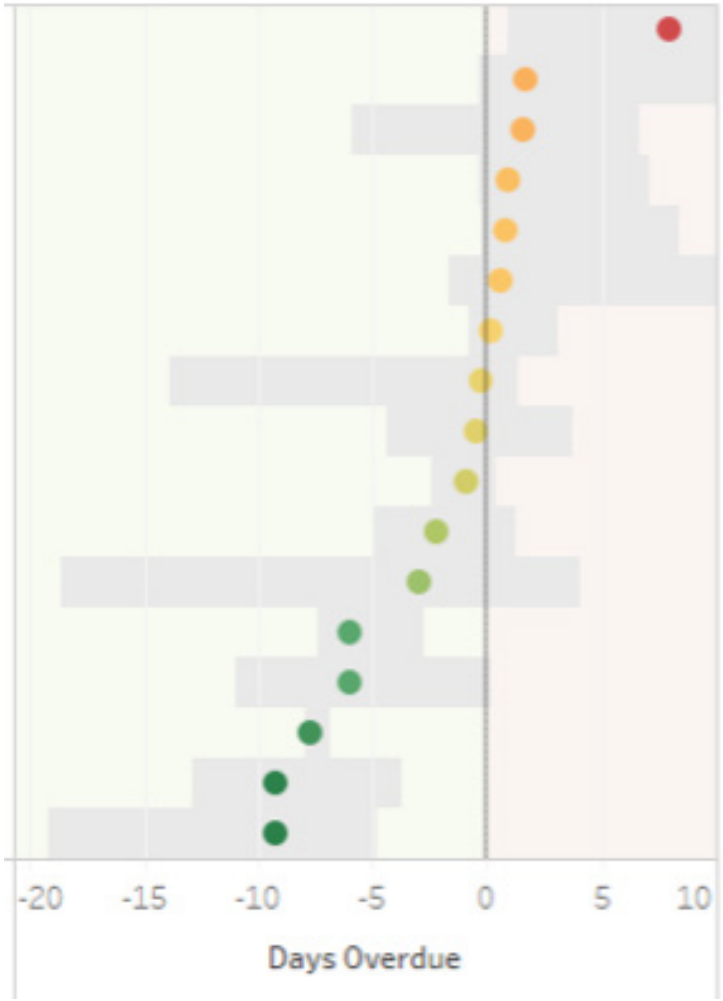
CONTINUOUS LEARNING: Standardization with Aconex will allow them to identify and share best practices learned from high-performing projects. For example, the company can identify clear patterns in partner performance. In Figure 4, each dot represents a supply chain partner, and you can see which partners are consistently overdue on process turnaround times. This data could be used for partner selection and contract negotiation.

QUESTIONS TO ASK WITH THIS DATA:

- Is this data used when contracts are let out?
- What causes such variability between partner performance?
- How much of this can be factored into the schedule?
- Can this be factored into the next project?

FIGURE 4

Partner Process Management Performance



THE TOP FIVE THINGS TO LOOK FOR WHEN CHOOSING CONSTRUCTION MANAGEMENT SOFTWARE

1 IT'S COLLABORATIVE AND PROVIDES A COMMON DATA ENVIRONMENT (CDE)

Software should provide project teams an environment where they can collaborate on processes. A CDE, also known as a Common Data Environment, is a single source of truth that makes it easy for project teams to work faster without errors and rework. But teams will only trust using the software if it's fair. This requires that every company has their own private workspace, so they feel comfortable entering information that won't be seen by other organizations (unless it's proactively shared). An unalterable audit trail between organizations is critical for gaining adoption; no single organization should be able to change or delete project history.

2 IT'S INTEGRATED ACROSS THE PROJECT LIFECYCLE

The right software will support critical processes across the entire project lifecycle and connect to other key systems. This ensures that you have control and visibility at every project phase—from feasibility through handover to O&M. Connected processes ensure insights at every step and an automatic "digital twin" of the project at handover, so you have fast access to project history.

3 IT'S FAST TO DEPLOY AND USE

The software you choose should take days or weeks to deploy, not months or years. And it must be easy to use. You should be able to access portfolio, project and process data within seconds to make better-informed decisions, as well as produce detailed, and timely, spreadsheets and reports.

4 IT'S FLEXIBLE, ENABLING PORTFOLIO-WIDE STANDARDIZATION

Flexible software allows you to manage processes the way you want, and it will work for your diverse project portfolio. One system for all projects lets you standardize processes and set benchmarks, enabling continuous learning and improvement. An easily configurable platform is key.

5 IT'S TESTED: SECURE SOFTWARE & EXPERIENCED TEAM

Secure data is critical. You want to make sure the software you select meets the highest international security standards, including capabilities like: ISO 27001 certification, single sign-on (SSO), and two-factor authentication. Your software provider should also have a strong track record and industry-specific expertise.

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ABOUT ORACLE CONSTRUCTION AND ENGINEERING

Oracle Construction and Engineering delivers best-in-class project management solutions that empower organizations to proactively manage projects, gain complete visibility, improve collaboration, and manage change. Its cloud-based solutions for global project planning and execution help improve strategy execution, operations, and financial performance.

To find our more about how Oracle Construction and Engineering can help you harness big data, Visit **www.oracle.com/construction-and-engineering** or call one of our industry consultants at 1-800-423-0245

SOURCES

1 Rachel Burger, “How the Construction Industry is Using Big Data,” TheBalance.com, updated November 1, 2017

2 KPMG, Building a Technology Advantage, Global Construction Survey 2016, Armstrong, Gilge

3 Debra K. Rubin and Mary B. Powers, “Data Mining Gains More Cachet in Construction Sector,” Engineering News-Record, published February 15, 2017