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The Capital Delivery Revolution and Technology: Connecting Capital Planning, Construction, and Everything in Between

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Executive Overview

In times of economic distress, it can be easy to lose sight of the problems that have plagued the architecture, engineering, and construction (AEC) industry. But the fact remains: this industry continues to face systemic challenges with capital project delivery inefficiencies and stagnant productivity that can further endanger already slim margins during a downturn—or consume profits and reinvestment capabilities during a boom.

To consistently deliver successful projects with appropriate value and return for all stakeholders, the AEC industry needs to review the personal and contractual processes, relationships, and dynamics at play among owners, contractors, designers, and the entire supply chain. Moreover, the industry must also review core enabling technology solutions and how they interact to help ensure a return on investment (ROI).

This white paper recognizes three principal solution areas in the capital project delivery lifecycle: project design, project execution, and organizational governance. In particular, it addresses the area of project execution and the means available today to drive successful project delivery on a consistent basis. Finding and developing delivery efficiencies and increasing project productivity through the use of technology facilitate

- Proactive project management
- Risk management
- The automation of key AEC business processes

Introduction

Unforeseen fluctuations in the economy can wreak havoc on project delivery and company performance. In addition, perpetual challenges facing the AEC industry—tight budgets, slim profit margins, and increasing costs—only intensify during an economic downturn. Regardless of market conditions, consistently successful capital project delivery can ensure an AEC organization’s financial stability and an owner’s ROI.

But all too often, a changing economy causes management to take its eyes off the ball. Over the past 40 years, productivity in capital project delivery has decreased. Although an aggregate of all other nonfarm industries has shown a rate that has more than doubled, AEC productivity has fallen at an average compound rate of 0.59 percent a year since 1964.¹

This measurable decline in productivity—and the inherent inefficiencies that hamper project deliveries—must be clearly identified and reversed. By doing this, the industry can not only survive a market contraction but also be prepared to capitalize on the projected global construction surge over the next 30 years.

¹ Paul Teicholz, “Labor Productivity Declines in the Construction Industry: Causes and Remedies.” April 2004 (accessed September 23, 2008); available from www.aecbytes.com/viewpoint/2004/issue_4.html.

A Technology-Enabled Project Delivery Lifecycle

Although there are some valid and important reasons for the AEC productivity decline (consider, for example, improved health and safety), the overall decrease speaks volumes to the industry's inability to streamline project drivers to provide greater value. One clear differentiator between AEC and industries that have seen productivity gains, such as manufacturing, is the ad hoc and niche approach it takes to supporting technologies during the project delivery lifecycle.

There is an opportunity to reverse this trend and help address industry challenges. At a high level, the project lifecycle requires technology solutions in three primary areas: design, execution, and operational governance. To illustrate the potential benefits, this paper focuses on the capital project execution component and describes the core requirements for an integrated program management solution to tie together all relevant business processes and data streams to support a capital project from inception to completion.

Barriers to AEC Productivity

In his article “Labor Productivity Declines in the Construction Industry: Causes and Remedies,”² Paul Teicholz examines the trend of AEC production regression, identifying four key problems:

- **Design-bid-build (DBB) business model:** The DBB business model divorces the design phase from the building process, which can lead to increased changes and conflicts during project execution that cause delays, claims, and extra cost. Regardless of which contracting methodology stakeholders employ, an integrated program management solution can help them overcome this barrier, by integrating the design and construction phases of a project. This integration enables managers to not only share the responsibilities of the work but also reap the rewards of a unified and organized value chain.

² Ibid.

- **IT interoperability:** Although new IT adoption has increased in AEC over the last 35 years, many applications continue to run independently of each other, preventing fluid communication. Disconnected technology environments are breeding grounds for wasteful paper production and inefficient manual processes. But a Web-based integrated program management enables a network of interoperability and automation that reduces the need for human intervention and increases opportunities for meaningful collaboration. It also aggregates data so that all stakeholders can track project status at any time.
- **IT leadership:** Because the construction industry is characterized by varying groups of small clients, vendors, designers, general contractors, and subcontractors, the responsibility for new IT adoption can get lost in the shuffle. By providing an easy-to-use integrated program management solution that minimizes concerns about costly infrastructure and training requirements, project managers can take the lead and inspire technology integration across the entire spectrum of partners.
- **Shallow labor pools:** Because of the perceived high costs and risks associated with research and development, the construction industry has moved to new technology at a slower rate than other industries. As a consequence, AEC has had trouble attracting the interest of students who want to engage with the latest and greatest. A cutting-edge, Web-based solution can help owners, contractors, and designers automate their operations and attract a new generation of tech-savvy workers.

Proactive Project Management

When owners, contractors, and designers initiate or take on a capital delivery project in any form, they do so in order to gain a return on their investment or satisfy their constituent needs at the lowest cost for value. Whether a retail chain wants to open stores in a new region or a local district needs to replace an aging school, the project owners create a capital plan predicated on the assumption that they will see ROI in monetary or other stakeholder benefits within a certain time period.

After a plan has been authored to capture the purpose and goals of a project, however, contractors traditionally use independent project management tools. They tend to develop a delivery plan that focuses on meeting contract obligations such as costs and time but does not reflect back on the original goals and intent.

In addition, when project participants work across disparate systems, information is submitted to all collaborators as separate files or paper documents. Therefore, anytime an update or modification occurs, stakeholders need to exchange phone calls, e-mails, faxes, and letters—and manually update their individual records.

Although this has been the status quo for some time, the lack of process and systems integration prevents project leads from quickly seeing the true impact different actions and modifications can have on the overall capital plan. Throughout the industry, project execution is commonly

almost entirely separated from the original intent, planning, and metrics for which the work is done.

Uniting Process and Technology to Create a Dynamic Forecast

To ensure that project execution consistently meets program needs, two tenets must be firmly established. First, project processes and requirements—such as handling requests for information (RFIs) or change orders—must be rigorously defined. Second, these processes must be integrated with technology solutions that not only capture and disseminate the information but also provide the means to analyze it within the appropriate context. With this data, stakeholders can drive the execution process with informed decision-making and push accountability for executing those decisions across the entire project team.

To facilitate informed decision-making, it is imperative that stakeholders leverage all up-to-date project information and status to gain transparency and employ a vigorous forecasting engine that simulates project performance and evaluates outcomes for all stages of delivery.

The Power of Forecasts

Capital delivery projects routinely encounter changes, whether due to differing conditions in the field, volatile weather, materials delays, errors, or all of the above. The traditional approach to dealing with these changes is through the use of project managers and planners that oversee myriad pieces of information and relationships and keep the process moving. More often than not, though, the ability to see the actual impact of every small change, trivial decision, or missing document on the project delivery lifecycle is more art than science.

The importance of easily accessible, up-to-date information for improved decision-making is very clear. But equally, if not more, important for the overall success of a project is the ability to forecast the outcome, based on decisions made today. Rigorous forecasting of performance—in terms of costs, time, resource usage, and scope changes—can help project managers make decisions with confidence.

With so many variables in play on any one project, the ability to leverage a forecasting solution to manage all the data—and to provide an accurate means of evaluating the feasibility of different scenarios—can greatly improve the quality and confidence of decision-making throughout the entire delivery lifecycle.

Supporting Technology

Today technology is readily available that provides real-time capabilities that incorporate large quantities of data into a robust forecasting engine, creating the necessary visibility into how adjustments will affect ROI goals while offering ease of implementation, maintenance, and—most importantly—use.

For example, an owner's capital plan forecasts that within five years of completing a construction project, a building or facility will pay for itself. Inevitably, when the project meets the execution realities on the ground, changes to initial assumptions and tactics occur, causing delays or cost increases that transform the amount and timeline of the initial return. If detailed planning and execution reveal the need for adjustments and changes, however, and these are iteratively accounted for to refine the original capital plan, stakeholders can leverage the provided information and tools to better meet the original intent, goals, and ROI of the project in real time.

Efficiencies Through Real-Time Insight

An integrated program management solution for the AEC industry can facilitate the means to this end. Providing all project stakeholders with preconfigured dashboards that present up-to-date status on all construction initiatives, tasks, activities, changes, risks, and costs creates efficiencies. The integrated program management solution effectively eliminates the need to sort through e-mail messages and faxes and manually update information. In one click, users can drill down from a high-level view into more detail, so they always have access to the data they need in real time—empowering them to make informed decisions and conduct proactive project management.

Additionally, a Web-based integrated program management solution immediately updates information for all parties when changes are submitted. Armed with the most-up-to-date data, owners and contractors can account for delays and reallocate resources—all while keeping an eye on that ever-important bottom line.

Finally, only an integrated program management solution with a powerful forecasting engine can facilitate real-time construction modeling of costs, resources, time, scope, and risks. With this comprehensive visibility, the entire project team can evaluate multiple scenarios and alternatives—whether to accommodate necessary changes, reprioritize efforts, hit every milestone, or make every effort to achieve the goals of the original capital plan.

Risk Management

Many construction projects involve the coordination of multiple companies, various contingencies, and large budgets. As a result, risk mitigation is a key element for successful project delivery and meeting long-term business objectives.

In fact, common issues such as poorly defined scope, design creep, and rising costs practically demand development of a risk management strategy and integration with a company's capital plan. However, surprisingly few executives and project managers in the industry carry direct responsibility for developing and executing this essential function.

The Importance of Understanding Risk

How much does risk factor into the capital plan for a typical construction project? Surprisingly, according to “Embracing change? Global Construction Survey 2008,” by KPMG International, not as much as one would think. The survey, which polled CEOs and senior executives of leading construction contractors around the world, revealed a glaring disconnect between how well respondents felt they determined and identified exposure during a project and how often that data was integrated into the project management process.

According to the survey, 81 percent of the respondents felt they effectively identified and assessed business threats at an individual project level. Compared to the 42 percent who prepare matrices or the 38 percent who quantify risks in costs facing the execution of major capital projects, the disparity in the numbers “suggests a lack of clear processes for identifying and evaluating risks, which could leave companies exposed, jeopardizing the budgeted bid margins.”

Owners and contractors who do not carry direct responsibility for risk management strategy leave themselves open to cost overruns and delays—not to mention conflicts over emerging problems and disputes—that can tie up valuable resources. According to KPMG, “Ultimately a company’s entire reputation can be in jeopardy should it become involved in a difficult or failing project.”³

Improving Risk Visibility with Integrated Program Management

An integrated program management solution must, therefore, enable organizations to formulate and execute risk aversion strategies in the face of impending threats to project delivery. By capturing and maintaining project-specific risk registries and simulating delivery performance with “most likely” scenarios, organizations can prepare effective contingency plans to ensure the least-possible impact on overall project performance and ROI.

Through an integrated program management solution, executives from all types of owner and AEC organizations can attain visibility into risk factors at the individual project and program levels and gauge their cumulative effect on the project as a whole.

Understanding the potential hazards of a project and developing appropriate risk mitigation strategies can provide a value-add for contractors in particular. Especially during the bid stage, AEC organizations can leverage their risk mitigation experience and project risk evaluations to gain an important competitive advantage over lowest-bid competitors and develop lasting partnerships that will serve them well on future projects.

³ KPMG International. “Embracing change? Global Construction Survey 2008,” 2008.

Business Processes Automation (Reversing the Trends)

Insiders might argue over which AEC industry challenges are the most pressing, but everyone can agree that ample opportunities for improvement exist, especially in terms of streamlining communication, improving collaboration among stakeholders, and automating key business processes in project delivery.

With stakeholders still interacting largely via phone, e-mail, fax, and letters, technology offers the chance to loosen the grip and latency of paper documents. It brings information dissemination and decision-making online and into real time—replacing document-centric environments with data-centric networks.

Standardization for Seamless Collaboration

Standardization that calls for consistent, repeatable business processes and operating procedures supported by the adoption of interoperable technology is a critical first step. Although each AEC project is unique, numerous business initiatives remain the same across projects and stakeholders.

Consider change management, procurement, work packages, and more as rudimentary execution tasks that, if completed consistently and correctly, help bring projects to a successful conclusion. Standardizing these activities and subsequently automating them through a workflow- and collaboration-enabled integrated program management solution, are central to increasing project delivery efficiencies—and reversing the trend of declining productivity in the AEC industry.

An integrated program management solution offers an environment in which all critical parties are working with the same tools and information, ensuring seamless collaboration as they grapple with keeping the project on time and within budget. According to PricewaterhouseCoopers, integrated program management solutions “have the potential to reinvent the way the construction industry operates and may contribute to a reduction in mistakes and disputes, the biggest causes of waste and inefficiency in construction.”⁴

Increasing AEC Productivity with Primavera Solutions

Oracle can help owners and AEC organizations improve productivity by integrating all of the disparate elements of a construction project. Its Primavera solutions deliver a level of transparency all stakeholders can use to mitigate risk and adapt to economic pressures while accurately forecasting—and delivering—successful projects.

⁴ PricewaterhouseCoopers. “11th Annual Global CEO Survey,” 2008.

With technology that can easily scale for projects and programs of any size, the Primavera integrated program management solutions provides functionality that improves integration and collaboration, including portfolio management, resource and capacity management, budgeting and cost analysis, planning and scheduling, change and risk management, time capture, business process automation, and more.

These solutions enable organizations to

- Govern portfolios in real time
- Meet strategic objectives by optimizing the portfolio mix
- Provide stakeholders with complete financial transparency
- Control execution
- Plan and forecast resources more accurately
- Improve management of unplanned changes and shifting priorities
- Match resources with the right projects
- Quickly assess and eliminate exposure to risk

Owners, contractors, and designers who leverage the solution today are already reporting qualitative and quantitative benefits, including

- Better alignment of projects with business goals
- Increased project profitability
- Shorter time to market
- Standardized management processes
- Reduced administrative time and costs
- Limited exposure to risk
- Improved productivity in reporting and scheduling
- Streamlined internal and external compliance initiatives

Customer Success: Satterfield & Pontikes

In November 2005, Satterfield & Pontikes Construction, Inc., a general contractor with offices in Texas and Louisiana, began managing the construction of its new corporate facility in Houston. Eleven months later, employees moved into a three-story, 60,000-square-foot, Gold LEED-certified building that ultimately earned the company the Inspirational Pilot Projects Demonstrating New Ways Forward award at the 2006 American Institute of Architects National Technology in Architectural Practice meeting.

Facing challenges such as poor project visibility, reporting difficulties, profitability goals, and team management, Satterfield & Pontikes used an all-virtual process made possible through Primavera technology to successfully complete the building of its new corporate headquarters on time and within budget.

The only paper documents created during the project were those necessary for permitting or building inspections—all other records were created via a scan or native file and transmitted through the Primavera solution. As a result, the company was able to reduce clerical staff and decrease response times on requests for information (RFIs) and submittals from days to hours and—in some cases—from hours to minutes.

Prior to implementing the Primavera integrated program management solution, Satterfield & Pontikes had relied on an in-house project management system that lacked the ability to view an entire project, including documentation and cost and schedule data, in one information portal. Now it employs a solution that decreases project duration, increases overall productivity, and enables communication and collaboration among all team members—and it has the numbers to prove it.

Substantial Savings from Virtual Processes

Since implementing its Primavera solution, Satterfield & Pontikes has saved

- More than US\$200,000 in payroll and affiliated expenses
- US\$80,000 a year in costs associated with its legacy accounting system
- US\$108,000 a year in total support costs
- US\$330,000 in administrative expenses during the corporate headquarters project

The company has also received the following awards for its Houston facility:

- 2008 APEX Award—Best of the Best Associated General Contractors of America
- 2007 Excellence in Construction—Commercial Associated Builders and Contractors, Inc.
- 2007 Design Award Texas Society of Architects
- 2007 Landmark Awards—Best Green Project, *Houston Business Journal*
- 2007 Architecture Honor Award AIA Houston

Conclusion

Despite a struggling economy and an ongoing battle with productivity and efficiency concerns, the AEC industry stands poised to reinvigorate itself through accelerating growth and increasing technological innovation. Through proactive project management, improved risk management,

and increased process automation, AEC organizations can streamline operations and improve execution.

Oracle's Primavera integrated program management solutions enable owners, contractors, and designers to align the many facets of the building process with strategic business objectives, providing visibility into—and control over—schedules, costs, resources, risks, and more. With a common platform for communication among all partners, collaboration and execution improve significantly, facilitating consistent milestone achievements and capture of ROI.



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