



Winning the Battle for Performance
Standardizing Best Practices within Technology

White Paper

Executive Summary

Today, almost \$5 trillion is being poured into construction projects of all types around the globe. And, with a Compound Annual Growth Rate (CAGR) of 6.5 percent projected to remain through 2009, the industry shows no signs of losing its momentum.

While market trends are strong in industrial and commercial construction, worldwide infrastructure is also growing steadily. Looking forward to 2012, annual growth is projected at four percent for the Asia Pacific, Eastern European and Middle Eastern regions and two percent for Western Europe. Growth is also projected to be about two percent in the U.S.¹ due in large part to the Safe, Accountable, Flexible and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), which guaranteed \$244.1 billion in funding for highways, highway safety and public transportation.²

But despite these favorable conditions, leaders in the construction industry are far from complacent. They know that its health is delicately balanced—and that it can be severely compromised by even the slightest shifts in economic, social, political and global factors. In fact, they are painfully aware of the impact that today's rising material costs, shrinking skilled labor pool and increasingly demanding clients are having on already thin profit margins. And, they see these and other factors—including increased regulatory demands and the rising cost of claims—as challenges to robust corporate growth in the near future.³

To gain solid footing and maintain a strong competitive position in this volatile market, executives must remain on the look out for new ways of increasing efficiency.

Forward-looking enterprises are adopting a progressive approach that calls for consistent, repeatable business processes and operating procedures supported by the adoption of uniform technology—standardization. According to a recent survey of more than 100 construction management executives, the percentage who say their firms are already “extremely homogeneous” in their information technology rose from 36 percent in 1999 to 45 percent today, with 58 percent saying they hope to move toward an even more standardized environment in the near future.⁴

This white paper highlights the most important elements and key benefits of standardizing business processes and operating procedures based upon uniform, organization-wide technology. It also serves as a guide for engineering and construction (E&C) firms in choosing the right technology to best promote standardization across their organizations.

Why Standardization?

In today's global marketplace, construction continues to be one of the most vulnerable industries to fluctuating market conditions. In fact, individual project profitability can be hindered by a wide range of external and internal factors, including rising material costs and contractor-caused delays. And, if a firm is not aware of problems *before* they impact projects, and equipped to respond accordingly, the results can be devastating.

Dillingham Construction, a \$350 million firm with 45 years of success, lost profitability for a full year because of problems encountered on a few projects. The company had to finance the projects to get them completed, and amassed a debt level so high that they simply couldn't stay afloat. And such a fate is not reserved for smaller firms only. J.A. Jones, one of the federal government's largest contractors with a number 14 ranking on Engineering News-Record's Top 400 Contractor list and more than \$2.2 billion in revenue, was literally wiped out by a couple of failed projects. In an interview shortly after the J.A. Jones Chapter 11 bankruptcy hearings, a former top executive said he had witnessed cascading fallout from a few unprofitable projects. That fallout led to lower bonding capacities. And those resulted in less work, which triggered a mass exodus from the firm and eventually led to its demise.

Project-driven organizations running tens and hundreds of increasingly complex projects face a clear problem in managing the business successfully, with each project proving a potential liability. Executives must guarantee corporate profitability. And, to do so, they must maintain clear visibility at the individual project and program levels, and into the cumulative effect of all projects and programs on the overall organization.

Traditionally, in the E&C business environment, a single project focus has driven project-level purchasing decisions. Therefore, technology solutions used to manage and execute projects vary greatly across an organization, making it very difficult to glean project information across multiple project-level application silos. For E&C firms, the one common system that all projects tie into is the financial system. However, this system captures invoices and payments as they happen, but not the actual project work as it happens. The one common financial system reports on events after they've occurred, when either no further action is possible or, at best, only reactive action or mitigation can be affected.

In order to enable proactive management of projects and programs, organizations must uniformly couple technology solutions with best business and project practices. Standardizing business processes *around* enterprise-wide technology provides a means for bringing order and visibility to an otherwise chaotic data and process environment.

Industry Snapshot

Current Construction Projects in the United States

Total in Millions: \$1,217,250

Private Sector	\$944,709 (77.61% of total)
Residential	\$641,602 (52.71%)
Non-residential	\$303,107 (24.90%)
Public Sector	\$272,542 (22.39% of total)
State and Local	\$255,297 (20.97%)
Federal	\$17,245 (01.42%)

Source: U.S. Census Bureau Department of Commerce

Potential Roadblocks to Construction Market Growth

In a recent poll taken by the U.S.-based Construction Industry Roundtable, leading CEOs in the construction and engineering industry discussed the issues they felt would be key barriers to expanding, robust growth in the construction market. The results were as follows:

- 34.8% believed litigation impediments and costs would burden growth
- 30.4% found retaining sufficient skilled employees/laborers as the source of concern
- 56.5% thought regulatory delays and barriers would cause a problem
- 73.9% saw the lack of sufficient private funding sources and/or adequate reliable public funding as the most problematic
- 26.1% identified insurance and bonding limits as the problem
- 21.7% concluded environmental and other opponents as the culprit

Source: Construction Industry Roundtable

Standardization provides E&C firms with the multi-level visibility they need to recognize deviations and problems *before* they impact project performance and profitability. In a transparent environment, everyone from clients and executives to contractors and even outside parties knows exactly where a project stands at all times.

With standardization, an E&C firm defines its own workflows and enforces them at every level. This ensures accountability for every task and creates an audit trail for easy compliance with regulatory requirements and protection against claims at all levels. Plus, each member of the team can fulfill the responsibilities of a designated role more effectively and efficiently. Processes are streamlined and automated so users can spend more time on strategic, collaborative management and less time pushing paperwork and searching for the tools and information they need to do their jobs. Plus, all processes are based on a common set of data and operating procedures, so there is never an issue with accuracy or consistency.

Danny Scott, manager of project controls for BE&K Construction Company, says, “[Standardization] has made us more centralized and allowed us to share information easily. And because everyone sees the same information, they can collaborate across units and do quicker, more accurate analysis of schedule input.”⁵

Shawn Pressley, project engineer for Hill International, Inc., a construction management firm, says, “Since all the data is in one place, I can stop chasing team members for information and concentrate on managing project issues. The key to any project is the speed and accuracy of the information and the ability to deliver that information to the people who need it. With this level of access and visibility, I can now see the effects of contracts on schedules and costing without having to shuffle through different reports or log onto separate software applications.”

From the shrinking labor pool to the high rate of attrition, standardization allows organizations to better navigate the complicated staffing issues that are a routine element of the E&C industry. In a standardized environment, all staffing resources are optimized—new employees are up and running faster, intellectual capital is retained in the system after key employees leave and active staff is maximized through streamlined, automated processes. Scott says, “[Standardization provides] scheduling templates for activities and logic, reducing project start-up times and the risk of errors. Plus, it greatly reduces training time for new employees.”⁶

In a standardized environment, every party critical to completing a project on time and within budget is working with the same tools and the same information—ensuring maximum efficiency and profitability.

Success with Standardization

Following are examples of how standardization helped leading construction companies overcome business challenges.

Company: BE&K Construction Company

Challenge: Incredible growth through increased volume in existing industries and diversification into new areas, such as the public sector

Benefits of Standardization: “[Standardization] across the enterprise has made us more centralized so we can share information easily. That lets us continue what we were doing, but work more efficiently in this ever-changing business.”

– *Danny Scott, Manager of Engineering Project Controls, BE&K Construction Company*

Company: Kuwait National Petroleum Company (KNPC)

Challenge: Increase ongoing production without further capital investment and, through managed refinery operations, prevent or limit production losses while ensuring the safety of staff and the environment

Benefits of Standardization: “Having information about what has occurred, and having one system to manage the resolution of any problems, is vital. We have seen a great deal of tangible and intangible improvements in our business processes and performance. We now handle the entire life cycle of a contract from within the system, whereas before it was all done manually with a lot of paperwork.”

– *Sulaiman Sultan Ali Mohammad, PMP Team Leader, KNPC Integrated Management Systems Project*

Company: Hill International, Inc.

Challenge: Manage the on-time, within-budget completion of construction of Philadelphia’s \$185 million National Constitution Center

Benefits of Standardization: “Because of the complexity of the project, it would have been extremely difficult, if not impossible, to have managed such an undertaking and meet our deadlines without [standardization]. It allowed us to keep all of the balls up in the air and continue on the mark. No matter where you were, if you were connected to the project, complete access to the information you needed was available via the Internet. And, as we leave, it’s an operating museum and everything we’ve done has been archived, including agendas, meeting minutes, costs and tracking of issues. So, that information is always available if needed in the future.”

– *David Rupp, Project Director, Hill International, Inc.*

Benefits of Standardization

Standardization is a progressive approach to E&C management designed to increase the efficiency of operations—and thus the profitability of projects. A standardized approach enables the following key benefits:

Maximized and codified efficiency. Operating each project at maximum efficiency is the key to protecting profit margins in the competitive E&C industry. Standardization allows firms to implement standard processes and operating procedures and customized workflow based on tried and true best practices. Then easily enforce them throughout the firm. As such, in a standardized environment, it is ensured that each and every team member is completing specified jobs via only the most efficient and effective methods.

Enhanced visibility. Standardization creates a highly transparent environment in which all parties have the visibility they require to know exactly where a project stands at all times. This transparency enables proactive management, making it possible to spot potential issues *before* they impact project performance and profitability. In a standardized environment, all project information is accurate, up-to-date and complete because it is combined from all systems and applications. Plus, with Web-based technology, it can be easily accessed by all project contributors around the clock from any location.

Advanced collaboration and communication. Standardization provides all construction stakeholders with the tools and resources they need to collaborate more effectively than ever on projects of all sizes and types, across geographic boundaries. With a common set of codified processes and operating procedures, and a defined workflow with which to carry them out, firms can expedite project communications, reviews and approvals; reduce errors and mitigate risk; improve work practices; and accelerate project processes from start to finish—with every activity recorded in a single system. And for E&C firms, this means increased accountability, reduced claims and better utilization of human resources.

The Benefits of Standardization

Process Benefit	Business Benefit
Maximized and codified efficiency	Better protected profit margins
Visibility	Proactive project management
Collaboration and communication	Improved services and quality across geographic boundaries, and increased accountability
Improved compliance	Reduced regulatory burden
Retained intellectual capital	Optimized staff resources

Compliance support. Sarbanes-Oxley and other complex regulatory requirements have increased the reporting burden and the demand for an audit trail and clear documentation tracking. Standardization helps organizations meet this demand, and subsequently lower operational costs, by streamlining the way documents are managed and stored and enforcing uniform processes that facilitate control, monitoring and continuous improvement.

Retained intellectual capital. With an unusually high rate of attrition and a shortage of skilled labor, E&C firms must optimize staff resources to protect profitability and remain competitive. In a standardized environment, it is easy to do this by integrating the intellectual capital of past and present staff into standard operating procedures. Plus, with staff operating as efficiently as possible according to the established workflow, their time and efforts are maximized.

Smart Technology Choices: The First Step Toward Standardization

Due to the fragmented character of the business, the construction industry has been historically slow in adopting software technology. In fact, as the rest of the industrial economy regularly achieves annual productivity gains of 1.7 percent, construction productivity levels have been virtually flat-lining since the mid-1960's, according to the U.S. Department of Labor. And experts have warned that one of the principal reasons for this stagnation is the failure of construction to quickly and/or effectively adopt technology.⁷

In recent years, however, the evolution of communications and field data technology has given way to solutions that can help E&C firms track, analyze, adjust and improve operations in response to real-time information—spiking the interest of otherwise skeptical executives. And the slow and sure technology adoption rate is creating a wide chasm between the early adopters and the rest of the field—and concern among the latter that their companies will not be able to stay competitive unless they adopt technologies more quickly.⁸

But in today's highly competitive construction market, it is not only the company that adopts technology *quickly* that will come out on top—it is the company that adopts technology *intelligently and strategically*, with the future in mind. And even companies that are starting from square one can pull ahead of the competition by choosing a system that promotes organization-wide efficiency and collaboration to increase profit margins and make a bottom-line difference.

As mentioned before, E&C firms have been adopting project-level technology on a project-by-project basis, requiring that they re-examine their solutions for each new project, and creating a vast, ever-changing collection of systems spread out among various entities. At the same time, business-level technology, such as financial systems, is adopted across the board. This disconnect and lack of technological standardization is ineffective not only from a cost and efficiency standpoint, but from a productivity perspective, as well. It renders organizations unable to define standard processes, operating procedures and workflows, let alone enforce them across the organization.

Standardization is an intelligent, forward-thinking approach, and it must extend to an organization's technology choices in order to be effective. A standardized technology environment is built around systems that can operate on a single platform and communicate openly with one another. A standardized construction management solution provides a complete system to manage scope, schedule, job cost, changes, risk, stakeholders, performance and more on every project and program from concept to delivery.

Choosing the Right Technology to Support Standardization Efforts

The following are characteristics critical for a solution around which to standardize your business processes:

Role-based Functionality. To promote use efficiency and ease-of-use overall, a solution system must weed out irrelevant data and features and provide users focused access to the information and tools they individually need to effectively carry out their responsibilities. As such, the solution must offer customized dashboards that incorporate relevant data and functionality from different applications and sources—and make it highly accessible in a single, easy-to-read window.

Executive Dashboard. In order to catch problems before they impact profitability and productivity, executives need clear visibility into what is going on with every project and with the general health of the company. As such, upper management needs access to different information and analysis tools than anyone else in the organization. A solution around which to standardize must provide an executive dashboard displaying standard KPIs, such as time-to-completion, by which users can easily monitor profitability, efficiency, performance and other factors. Also, dashboard and analysis customization should enable executives to create additional KPIs based on critical metrics to track results at the corporate, project, team and individual levels. The executive dashboard must also facilitate accurate, productivity-based forecasting with up-to-the-minute project health reports and easy-to-read graphical trends and forecasts for all projects.

Integrated Data Repository. This is a by-product of the integration of all systems and applications. And it is critical to cost- and time-efficient operations, as well as effective, accurate reporting, stakeholder communication, claims resolution and KPIs, such as cost-to-completion. Without an integrated data repository, current and historical operational data is stored in various system-specific silos, leading to an exponentially increasing amount of replicated data with no correlation upon which to carry out business-critical functions and/or make executive-level, strategic decisions. An integrated data repository ensures a “single version of the truth.” So, everyone is working around the same up-to-date, accurate and consistent information.

Workflow Engine. Project-driven organizations differentiate themselves in how they adopt, develop and execute best practices and standard operating procedures (SOP) across projects. A solution environment for standardization must provide and/or enable a chosen workflow engine to establish and codify existing best practices and SOPs without changing established procedures to accommodate the limitations of implemented technology. Any workflow engine must be customizable in order to adapt itself to the organization’s expertise—now and in the future, as this expertise develops. Also, document versioning and audit trail capabilities are critical to maintaining accountability and clear record-keeping throughout any workflow.

Conclusion

Change is the only constant in the E&C industry. From fluctuating market conditions to schedule and scope changes, any small shift can throw off the profitability of a project, program or company.

Standardization makes it possible to create a technology environment in which companies can consistently drive profitable completion of projects through proactive project management. By standardizing business processes and operating procedures around technology, E&C firms can create a highly efficient and transparent environment in which resources can be allocated more efficiently and all critical project stakeholders are aware of exactly where their projects stand.

However, in choosing the right technology upon which to standardize its environment, an E&C firm must be careful to evaluate all of the capabilities to determine whether it can support a truly standardized environment.

Author

Richard Sappe
Construction & Engineering Market Manager
Primavera Systems, Inc.

About Primavera

Primavera is a software company whose clients depend on its project, resource and portfolio management solutions to identify which projects are most important and to make it easy for people to work collaboratively, productively and successfully. As the industry standard in construction and engineering for more than 20 years, Primavera solutions are used by general contractors and subcontractors, as well as public and private owners to improve scheduling and planning, negotiate change and increase collaboration to ensure projects are delivered on time and on budget.

Primavera solutions have ensured the success of projects with a collective worth of more than \$5.5 trillion, including the management of the Pentagon reconstruction, construction of China's Three Gorges Dam and the infrastructure development of the London Underground transit system. For more information, visit www.primavera.com.

References

1. "June 2006 Construction at \$1,217.3 Billion Annual Rate." Construction Industry Roundtable. 1 Aug. 2006. Construction Industry Roundtable. 16 Aug. 2006 <<http://www.cirt.org/public/pages/headlinedetails.cfm?id=326>>.
2. Global Construction Outlook. Global Insight. Global Insight, 2005.
3. United States. Office of Legislation and Intergovernmental Affairs, Program Analysis Team. Federal Highway Administration. A Summary of Highway Provisions in SAFETEA-LU. 25 Aug. 2005. 16 Aug. 2006 <<http://www.fhwa.dot.gov/safetealu/summary.htm>>.
4. "CIRT Opinion Poll Results." Construction Industry Roundtable. Mar. 2005. 16 Aug. 2006 <<http://www.cirt.org/public/pages/index.cfm?pageid=21>>.
5. "Shift to Standard Technology Shown." Engineering News-Record. 2 June 2003. 16 Aug. 2006 <http://enr.ecnext.com/free-scripts/comsite2.pl?page=enr_document&article=neinar030602c>.
6. Brooks, Roseann M. "Enterprise Solution: Collaborative Engineering." Primavera Magazine: 16-18.
7. Brooks, Roseann M. "Enterprise Solution: Collaborative Engineering." Primavera Magazine: 16-18.
8. Sawyer, Tom. "Construction Technology: All Shook Up." Engineering News-Record (2005). 16 Aug. 2006 <<http://enr.construction.com/news/currentEvents/archives/050119a.asp>>.
9. Sawyer, Tom. "Construction Technology: All Shook Up." Engineering News-Record (2005). 16 Aug. 2006 <<http://enr.construction.com/news/currentEvents/archives/050119a.asp>>.

