

THE KEY TO CONSTRUCTION PRODUCTIVITY

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INTRODUCTION

A group of architects, contractors, developers, and consultants find themselves once again huddled in a trailer office, passing around stacks of photocopied reports and pouring through them, highlighter in-hand as each searches for monthly project budgets, schedules, RFIs, and other critical information. For people who work in the built world, this scene has become all too familiar.

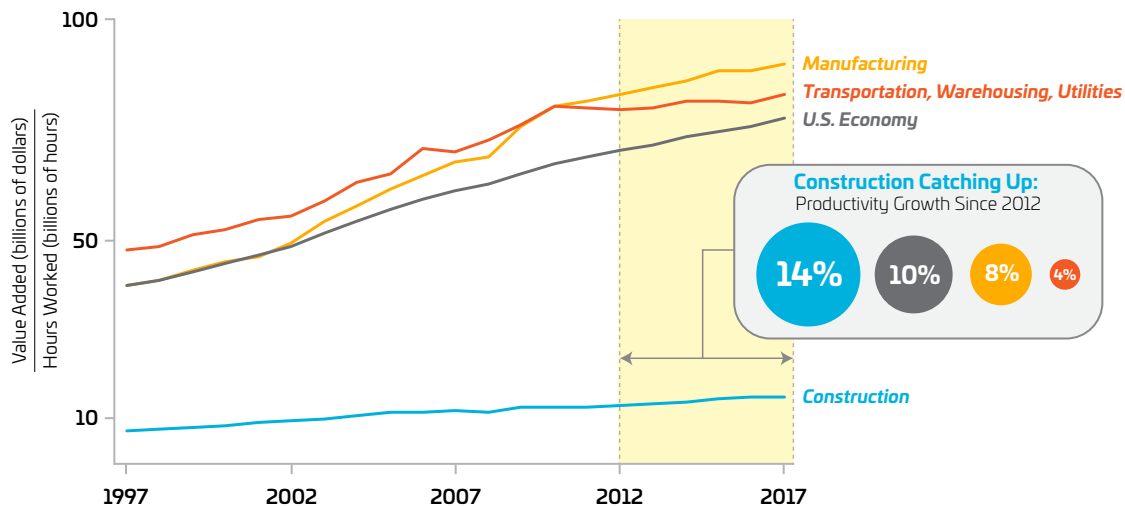
Much has been said and written about lagging productivity in the construction industry. **We've all heard the stats, and they paint a bleak picture:** over the past 3 years, just 25% of projects came within 10% of their original deadlines.^[1] Nearly 50% of construction professionals prepare daily reports manually.^[2] 40% of construction companies still use paper plans,^[3] and only 29% of them use mobile apps on all projects.^[4] In fact, the construction industry places second-to-last in McKinsey's industry digitization index, finishing above only the agricultural sector.^[5] In an industry built on near-constant collaboration across stakeholders, relying on outdated practices limits efficiency in process and communication and strains long-term growth in productivity.

“Construction companies are investing in mobile devices, but many teams are still relying on simple text and email rather than tapping more robust technology to collaborate and access project information.”

– Stuart Frederick-Smith,
VP of Product Marketing, PlanGrid

In other labor-intensive industries such as manufacturing or warehousing, emerging technology and software solutions have long since catalyzed productivity.^[6] With the implementation of accessible digital solutions and automated processes, these industries have made efficient and resourceful use of their hard-working labor forces and have even outpaced average productivity of total U.S. economic activity for the past several decades.^[7] Meanwhile, the construction industry's delayed response to the digital revolution has made it more difficult to upgrade its long-standing processes, stagnating the economic value of both labor and capital. The costs of poor productivity extend beyond the construction industry itself; the global economy in 2015 missed out on an estimated \$1.6 trillion in added value from construction activity due to inefficient use of resources and people.^[8]

Labor Productivity Trends 1997 - 2017



Source: Bureau of Economic Analysis: Value Added by Industry, 1997-2017;
Bureau of Labor Statistics: Hours Worked by Industry, 1997-2017

The good news? That trend is beginning to change. After decades of trailing, construction is now catching up. From 2012 to 2017, growth in U.S. construction productivity totaled 14%, outpacing not only highly productive industries like manufacturing, transportation, warehousing, and utilities, but also the broader U.S. economy.^[9] As the industry continues to grow, it has become more important than ever for construction companies to get more value out of each hour worked on any given job site. Driving this industry-wide shift: **the integration of increasingly flexible enterprise resource planning (ERP) software** throughout the construction lifecycle.

WHAT IS ERP?

ERP refers to wide-reaching software platforms that facilitate nearly every aspect of a company's core business functions. From accounting to customer relations management (CRM) to supply chain management, ERP solutions are broad and diverse. *Why use software for these processes?* By hosting business practices on shared digital platforms, companies can **eliminate wasted time** by automating simple repeatable tasks, **facilitate collaboration** by making information readily accessible to all, **gain new insights** through the integrated collection and analysis of data, and **save money** by improving overall labor productivity.

What does ERP software actually do? The administrative functions of ERP look quite similar across industry lines; financial services, human resources, sales, and marketing are all universally requisite to successful business activity. On the operational side, ERP software touches inventory tracking, engineering and design, scheduling and production, resource management, asset management and maintenance, and more. These operational functionalities are less generalized than their administrative counterparts and are highly dependent on the businesses they serve. In this report, we'll be looking specifically at how ERP fits into the construction workflow—more on that later.

WHY USE SOFTWARE IN CONSTRUCTION?



**Eliminate
wasted time**



**Facilitate
collaboration**



**Gain
new insights**



**Save
money**

TRENDS IN THE ERP LANDSCAPE

At the turn of the millenium, ERP software had established itself as a mainstay of corporate IT infrastructure, especially in the manufacturing industry. Companies quickly saw the value of forging digital connections across business processes and turned to large-scale software providers to achieve just that. However, as ERP bled from manufacturing-based activity into other industries, its inflexibility was quickly noted. Larger firms with highly specialized operational workflows struggled to work within the rigid boundaries of early ERP suites, and smaller companies looking only for a few simple administrative services could not justify paying for the entire ERP platform. As a result, the market for business service software began its **search for a more customizable solution**.

Consequently, the ERP landscape shifted into its ‘postmodern’ phase roughly a decade ago, marked by the rise of the software-as-a-service (SaaS) model and therein **specialized point solutions** as a replacement for wide-reaching ERP mega-suites. With the adoption of point solutions for a specific business function, developers began selling individual, specialized services that perfectly matched the specific needs of their clients— for example, a solution that focused only on bid management or specific project management tools. This allowed firms to break free from the rigidity of traditional ERP, adopting a “best-in-breed” mentality specific to each business process. Client companies took this new postmodern model to the extreme, assembling their own ERP mini-suites made up of niche point solutions, each purchased from a different software developer. However, the cost savings and increased flexibility of the SaaS model have been offset by **2 new challenges** in particular:

1. Complexity and Integration

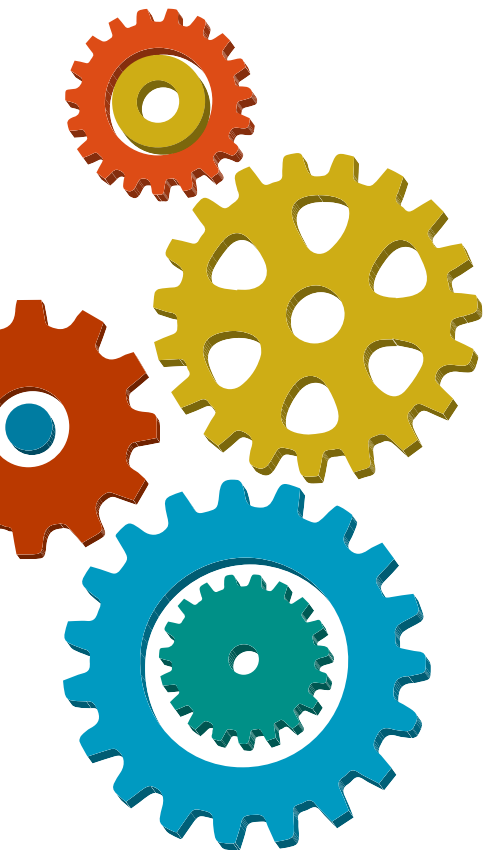
With software solutions developed by multiple vendors, adoption of postmodern ERP can be complex. It is often argued that the added time cost of training and onboarding employees to use multiple software interfaces can erode the added value of increased flexibility. Conversely, while the rigidity of the traditional ERP model may be somewhat restrictive it nevertheless provides a certain level of consistency and simplicity in integration.

2. Data Integrity

Connectivity and information lie at the heart of ERP functionality. The value of ERP software stems from the data it processes, providing businesses with actionable insights to continually improve their processes. In the postmodern landscape however, extra steps need to be taken to synthesize data collected across foreign point solutions, further undermining any productivity gained from using the software in the first place. Larger ERP suites, on the other hand, are designed with interoperability in mind and provide a centralized and consistent platform to collect and analyze operational data.

“When you connect a construction-specific ERP to an entire ecosystem of applications, it needs to be done in a way that ensures that the ERP is the single source of truth and a place where decision makers can get real-time updates on the health and profitability of their business.”

– Bill Wagner, VP of Product, Penta Technologies



The tradeoff between ERP approaches essentially boils down to **complexity versus flexibility**, where the value of simple integration and data integrity is weighed against the value of long-term agility and interoperability. For a productivity-starved and diverse industry like construction, the right choice has not always been clear, which has limited widespread adoption.

Conveniently, some ERP providers have taken note and now offer fully customizable suites of native-built point solutions. Acting as the next step in the evolution of ERP, this hybrid approach combines the consistency and integrity of the full suite model with the context-specificity of the postmodern point solutions model. Specifically, companies like [Penta Technologies](#) are working to offer the construction industry the choice from a wide variety of solutions and services without taking on the transactional costs of working with multiple different platforms. With the ability to **seamlessly integrate ERP software alongside a robust ecosystem of integration points** and funnel data into a centralized, native-built suite, construction companies are increasingly able to leverage technology for a much-needed productivity boost.

ERP AND THE CONSTRUCTION WORKFLOW

OK, enough context— let's take a closer look at how the newest wave of ERP solutions fits into construction activity and is contributing to the industry's emergent productivity catch-up. The range of activities performed as part of any given construction project are broad, diverse, and highly specialized. For this reason, the suite of ERP solutions used by a general contractor will look different than the suite used by a field services contractor. That being said, there are a few mainstays of construction ERP: inventory and asset tracking, payroll tracking, bidding and estimating, project management, progress tracking, inspection management, and more. On top of basic administrative services, these operational processes frame the four most important characteristics of effective construction ERP:

1. Collaboration

Construction operations are complex and involve a broad set of stakeholders. ERP needs to facilitate efficiency in communication and easy access to information.

2. Predictive Capability

Construction projects are dynamic and ever-changing, and being quick to adapt is an absolutely must. This is made possible by using real-time information generated by ERP software to solve problems as they happen, and often before they happen.

3. Interoperability

Seamless integration between different modules to ensure data integrity, minimize wasted time, and make ERP as easy as possible for the people who use it.

4. Mobility

Mobile technology has become an increasingly important on-site tool for the industry. With near-constant movement of people and materials, ERP needs to be fully mobile-enabled to give workers quick access to all the information they need.

“Integration between systems eliminates data validation and accuracy issues experienced in operational silos and data sharing is improved.”

– Mark Bishop,
Director of Managed Services,
United Rentals

With [Penta Technologies](#), [Sage](#), [Viewpoint](#), [Autodesk](#), and **Epicor** leading the way, the market for ERP software continues to grow and more solutions are now popping up for the construction industry. What specific services do these ERP suites provide construction companies? Check out our ERP Modules diagram to get a better idea of some common services that are helping to optimize the construction process and transform the industry.

CONSTRUCTION ERP MODULES

CREW-BASED FIELD REPORTING

With connections to on-site tracking and imaging devices, collect and analyze information about labor, task-level progress, equipment condition, and more. This helps companies better understand how their job sites operate from a labor perspective, and in turn allows them to improve how they operate.



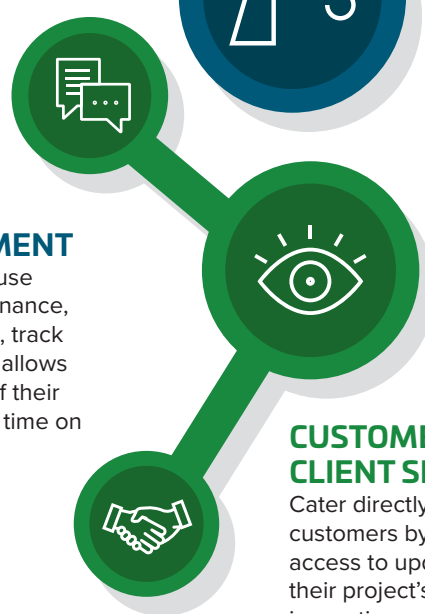
INSPECTION MANAGEMENT

Automate the inspection life-cycle by managing inspection work orders, identifying and recording deficiencies, facilitating inspection quoting and dispatching, and more.



FIXED ASSET AND EQUIPMENT MANAGEMENT

Track asset location and usage, use data to enable predictive maintenance, manage maintenance schedules, track depreciation over time, etc. This allows companies to get the most out of their equipment and save money and time on repairs and replacements.



CUSTOMER AND CLIENT SERVICES

Cater directly to the needs of customers by providing self-service access to updated information about their project's work orders, billing, inspections, maintenance contracts, and progress. This level of accessibility and transparency not only benefits the customer, but also reduces the cost of customer support staff.



PROJECT MANAGEMENT

Making it easy for project managers to track costs, manage submittals and RFIs, generate detailed LEM reports, monitor KPIs and productivity, and more.



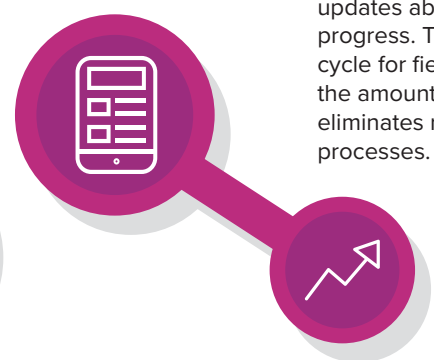
ENTERPRISE CONTENT MANAGEMENT (ECM)

The software that captures, manages, stores, and delivers documents and other content that are related to a company's internal and organizational process. The benefits of ECM include reducing the costs of storage, making information more readily-accessible for anyone who needs it, and eliminating paper from the office and job site.



FIELD SERVICE MANAGEMENT

Retrieve information about work orders, manage service technician dispatch, gain access to real-time updates about project status and progress. This shortens the billing cycle for field services, reduces the amount of paper used, and eliminates redundant manual processes.



BUSINESS INTELLIGENCE AND ANALYTICS

Centralized dashboards that provide easily interpreted analytics and actionable insights based on data collected across the production lifecycle. Save money, reduce waste, improve process, and most of all: catalyze productivity.



Combining cutting-edge software with decades of experience in the construction industry, [Penta Technologies](#) has played a prominent role in the construction productivity revival. With a focus on integration and flexibility, Penta Technologies works closely with its customers to carefully craft unique, targeted solutions that fit seamlessly into their existing workflows and allow for continual growth. The collaborative attention they bring to each partnership is perhaps best exemplified in their partnership with [Lithko Contracting](#).

A leading full-service concrete contractor, ranked #28 on the ENR Top 600 Specialty Contractor list for 2017, Lithko Contracting is a newer partner with Penta Technologies after going through an evaluation in 2016. Based out of Cincinnati, Ohio and with 17+ locations in approximately 35 states, they continue to expand their service offerings and the reach of their contracting business. Before partnering with Penta Technologies, Lithko utilized a system that greatly limited their ability to easily access information when and where they needed it. They were looking for a system that would help manage their labor work force and that had a comprehensive forecasting solution to measure productivity.

Penta Technologies' configurable ERP solution, PENTA, addresses three primary areas of Lithko's operations: comprehensive job forecasting, financial reporting, construction job costing and profitability tracking, and automation of manual workflows. On the forecasting side, Lithko's project managers use PENTA's Forecast Entry process to project cost, hours, units to complete on approximately 300 active jobs each month. Project managers are able to review the output in real-time and can make adjustments as needed. On the financial side, PENTA facilitates the production and circulation of various weekly, monthly, and annual reports, reducing the amount of time and resources required to report on customer profitability. For construction operations, PENTA gives Lithko project managers the ability to quickly and easily track job cost versus budgeted cost, allowing them to identify and solve problems in real-time. Lastly, the utilization of PENTA Workbenches allows more than 250 end users to access information specific to their roles in the organization. Users have hands-on access to current information with the ability to easily customize reporting to meet their needs.

With all these applications and products being built and developed by Penta Technologies, this ecosystem provides seamless live data availability between the office and field, which empowers Lithko employees to proactively and efficiently manage their work. Additionally, the partnership approach that Penta Technologies brings to its customers allows them to be the key solution provider helping drive and build innovative products that create an unbeatable competitive advantage for their customers. This flexible approach to ERP is transforming how built world professionals view construction software. No longer contained to the back office, ERP has become the central command center of the entire construction lifecycle. In doing so, Penta Technologies aims to provide support to the full scope of construction stakeholders, from project managers to foreman, workers, call-takers, dispatchers, mobile field service technicians, and everyone in between.



TRANSFORMING THE JOB SITE AND THE OFFICE

Recent success stories of flexible and integrated ERP in the construction industry are not hard to find, and easier still to explain; as connectivity continues to become a valued characteristic of hardware on the job site, it only makes sense that the software it talks to should follow suit. Given the momentum that construction software has built in recent years, the nascent upward trend in construction productivity comes as no surprise.

In Georgia, design-build service provider **Primus Builders Inc.** witnessed that connection firsthand as they ditched their inconsistent mix of apps and programs in favor of the [Viewpoint](#) construction ERP suite.^[10] This allowed them to streamline communication, eliminate arduous manual reporting processes, gain better visibility over the field, and achieve consistency and standardization of process both in the field and the office.

Similarly, construction company **Lamp Inc.** has made productive use of [Sage's Construction](#) and Real Estate ERP suite.^[11] In particular, the bid management module has proven highly successful in decreasing the amount of time spent managing submittals from their long list of suppliers. By saving even a small amount of time on heavily-repeated tasks, industry players like Primus and Lamp are uncovering the savings that have long remained hidden in plain sight, allowing them to dedicate more energy and resources to growth and expansion of their businesses. For the construction industry, ERP is unlocking a level of productivity that had seemed unattainable for far too long.

PRODUCTIVITY DISRUPTION: A RISING TIDE

The notion that technology can act as a market disruptor and an agent of fundamental and wide-sweeping change has been proven time and time again. We see it all around us in our daily lives: online shopping has changed the way we experience retail, ride-sharing services have transformed how we get around, and streaming platforms have altered how we consume media. Regardless of the industry, the pace of technological development has forced us to adapt our behavior to keep up, and that process of adaptation is often uncomfortable.

In construction— an industry that relies on acute responsiveness and fool-proof, detailed planning— **the transition into the digital age has proven especially difficult**. For many construction firms, the idea of letting technology take over processes that have been performed by hand for decades, even centuries, can seem infeasible and costly in the short-term. Thankfully, the progress of development in construction technology is changing that perception, and the industry’s leading individuals and companies have begun to see the value, and most importantly the excitement, of investing in long-term market disruption.

At its core, the newest wave of ERP software has offered the built industry a critical piece of its disruption puzzle. The combination of agility and consistency that is offered by ERP providers like [Penta Technologies](#) and [Sage](#) have made integration simple, and the results are promising. As more and more contractors rush to adopt best practices and the industry begins to reap the rewards of quick, efficient, paperless, and waste-free operations, the acceptable benchmark for productivity will continue to rise. The top-down push toward fully-integrated ERP will in turn make it easier for software vendors to provide solutions that scale effectively and can reach larger segments of the market. While the integration of new technology has come slowly, the construction industry as a whole continues to evolve from the disruptive actions of those who push its boundaries.

“Advances in technology are reshaping the industry landscape at an accelerating pace.”

– Mike Sicilia,
Senior VP and General Manager,
Oracle Construction and Engineering

If you’re interested in learning more about some of the software companies referenced within this report and others, take a look at the [BuiltWorlds Three Waves of Project Software Top List](#).

CITATIONS: [1] [KPMG Global Construction Survey](#) [2] [JP Knowledge Construction Technology Report](#) [3] [JP Knowledge Construction Technology Report](#) [4] [KPMG Global Construction Survey](#) [5] [McKinsey Industry Digitization Index](#) [6] [McKinsey, Reinventing Construction Through a Productivity Revolution](#) [7] Bureau of Economic Analysis: Value Added by Industry, 1997-2017; Bureau of Labor Statistics: Hours Worked by Industry, 1997-2017 [8] [McKinsey, Reinventing Construction: A Route to Higher Productivity](#) [9] Bureau of Economic Analysis: Value Added by Industry, 1997-2017; Bureau of Labor Statistics: Hours Worked by Industry, 1997-2017 [10] [Viewpoint Case Study: How Primus Builders is Integrating the Field and Office](#) [11] [Sage Case Study: Lamp Inc.](#)



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