



# Construction Project Management

## ON THE CUTTING EDGE

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How innovative technologies and software are helping project managers streamline processes to build faster, smarter projects.

*by Andy Holtmann, Viewpoint*

# CONSTRUCTION PROJECT MANAGEMENT

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*The lifeblood of any construction company is the construction project itself. How those projects are managed can make or break the company. That makes project managers (or in some companies, project sponsors who oversee teams of project managers) arguably the most important role in an organization. Whereas others may be responsible for particular tasks or defined roles on the project, project managers have to be some—what of a “jack of all trades.” They must know the project plans inside and out as well as all of the players, tasks, goals, budgeting and more—not to mention representing the company’s mission statements and reputation by producing a finished product that meets or exceeds expectations.*

## **Project Management versus Construction Project Management**

To understand the challenges that a construction project manager faces, it’s important to understand what makes construction project management so different from other forms of project management. “Project management” is a loose business term. Projects in other industries can range from simple tasks taking a few hours to complex procedures with multiple steps and processes requiring input from many people or departments.

For instance, project management could mean facilitating a new way of collecting data for a financial firm to prepare annual reporting methods. It could also mean generating a marketing plan for a company. Anything deemed as a project within a company can be project managed. In many cases, these can be easily administered by a single person or a small team—with the bulk of work being done by that person or team. Projects can be tracked and managed efficiently using checklists, spreadsheets or simple off-the-shelf software.

In larger project management scenarios, say the development and manufacturing of a new product like a smartphone or a better-gripping car tire, the project management might include many people and processes. Still, these tend to be unique, one-of-a-kind projects.



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Project management in construction, however, can be entirely different. Construction project managers often have to govern multiple, ongoing projects—perhaps similar in scope, but each with its unique challenges and countless moving pieces. There are the dozens, if not hundreds of people to keep informed and working, often at several different locations. Some aspects of the projects could be handled in pre-fab facilities, while others occur on the jobsite. Project managers have to account for the physical building, bridge or highway work, as well as water lines, sewer lines, electricity, rights of way and easements, drainage, environmental compliance and more.



Project managers have to be, or at least should be, involved with everything from labor and payroll issues to accurate accounting and job costing, to inventory and materials, to safety and compliance issues. Then there's the project itself, which typically involves staying on top of multiple subcontractors, dealing with RFIs, change orders, submittals, transmittals and more, ensuring that ever-changing project plans remain up to date for everyone working on the project team.

To say that construction project managers have their work cut out for them is a definite understatement.

## Outdated Processes

Interestingly enough, despite all of the time-saving tools and advancements in software and technology that can help automate a lot of project managers' work, many today are still reliant on outdated processes and systems. An August 2015 study<sup>1</sup> conducted by Capterra, a service that connects buyers and sellers of software, noted that only 52 percent of project managers were using a software solution geared toward construction project management. Of the remaining 48 percent, the two most common tools used to manage projects were Excel [33 percent] and email [27 percent.] Nearly a quarter of respondents [22 percent] were using "other" methods, "which could range from text message communication, handwritten checklists, or forgoing a formal process altogether," the report read.

In the same survey, of the construction managers and project managers that were not using software, more than 37 percent said they were wasting two hours or more per day on project documentation alone.

Adopting new technologies, however, can often be one task that some project managers do not care to take on. Darin Bailey, project sponsor for Gilbert, Ariz.-based heavy highway contractor, Hunter Contracting, said the approach of "this is how we've always done it," is still, unfortunately, a common practice among project managers. His company, however, is one that has embraced leading-edge software to help streamline project managers' work.

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“Things are definitely better. Information, people—everything is more accessible, and available a lot quicker than it used to be,” Bailey said. “We are able to get up-to-the-minute information that helps us to be able to evaluate productions/cost. The trick is to know how to read the data and to know what to do with it so we can benefit from it.”

While it is true that some project managers resist change, many are ready for technology’s helping hand—they just don’t know where to start. The best place might be to step out of the box of a million tasks and details and think about project management in its most basic sense: getting the right people on the project the right tools and information and the right place and time.

## PEOPLE: Empowering the Project Team

While the lifeblood of the construction company is the construction project, the lifeblood of the project is the people working on it. Hire bad people to manage and build the project? The results will be poor. Hire smart,

talented folks with expertise and the results will be good. Hire forward-thinking, open-minded folks ready to try new things and take calculated risks? The results are likely to be even better.

With construction booming again after the recent recession, there is plenty of work to be had. The talent pool for skilled construction professionals, however, is woefully shallow right now. A Bureau of Labor Statistics report in December of 2013 noted that the construction industry could face a shortage of 1.6 million skilled workers by 2022<sup>2</sup>.

The retirement of baby boomers, a dearth of technical schools and certificate programs training the next wave of skilled labor, and the fact that many former construction professionals took jobs in different industries to get by during the downturn have all contributed to the slim pickings today.



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“It’s changed how we choose our construction teams,” said Dallas Williams, vice president and general manager at Red Deer, Alberta-based general contractor Scott Builders. Williams, who has served as lead project manager on many of his company’s projects said decisions are being driven by money. “Right now, it’s based on price and it should be based on value, experience, reputation, etc.”

## Championing Collaboration

Another challenge is that project managers often don’t get to pick and choose every member of their project teams. In construction projects, the people involved are a constantly changing cast of characters. Most of those who wind up working on a project will not be under the direct employ of the primary contractor, but rather

### A Tech-Empowered Workforce

Technology is aiding the collaborative effort. Here is a brief look at five technology advancements that are having a positive impact on collaborative project management:

01

Talent Management Software

From recruiting and hiring, to onboarding and training, all the way through to assessments and retention, there are all-inclusive software packages to streamline human resources functionalities. This involves employees in the HR processes and allows contractors to focus on the work rather than sorting through mounds of employee paperwork. These solutions also ensure that top-notch, skilled employees that are the best fit for the companies are in place and brought up to speed quickly.



02

Online Plan Rooms

Technology has allowed contractors to avoid the hassle of taking plans and specs to reprographics providers and then dealing with keeping track of those paper plans—and any changes to them—during the project. Online plan rooms digitize the plans and spec process, while making them available—and usually easily changeable—to everyone on the project team that needs to see them. This increases collaborative decisions and ensures that project teams always have access to the latest information.



03

Construction Specific Software

Some software packages manage and track projects in ways that contractors relate to, while larger, enterprise resource planning (ERP) packages integrate all facets of the construction project. ERP systems can track project data on the jobsite and seamlessly integrate that data with accounting, inventory, equipment management and other areas of functionality. This one-platform approach reduces multiple data entry and allows everyone on the project to work from the same playbook at all times.



04

Cloud-based Mobile Solutions

Mobile and online tools allow project data, financial information, materials and equipment information, employee time, labor rates and more to be entered directly from the jobsite. For instance, one portal/kiosk could provide employees a place to check their pay stubs, view employee information or download W2s or other forms. Another might allow subcontractors to enter their project information, update compliance related documents and more.



05

Video Conferencing Programs

Thanks to video conferencing programs like Skype, GoToMeeting.com and others, entire project teams can now meet face to face multiple times a day. Teams can go over project updates, review plans and project phases, resolve conflicts and more—all without project managers or supervisors having to leave the jobsite to do so. Other advancements like FaceTime, allow face-to-face video chats via iPhones or iPads.



These technology advancements are empowering construction project teams to work smarter, more collaboratively. And it is not just the processes, but the quality and relevance of the shared construction data itself that is getting a boost from technology.



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—DARIN BAILEY, PROJECT SPONSOR, HUNTER CONTRACTING

different tiers of subcontractors. And these workers will undoubtedly change from project to project. In any given year, a project manager for a mid-sized company could be responsible for thousands of different workers touching the project in some way.

This means that project managers often don't know, or are not always familiar with, the workers on their projects—their skillsets, their personalities and work habits, their certifications and insurance documentation, etc. The onus is on the project manager to make sure everyone on the project team is capable and certified. Project managers also need to ensure the entire team understands the project—its end goals, deadlines and special circumstances.

“We start each activity with a pre-activity meeting that discusses all aspects of that scope of work, including budget,” Hunter Contracting's Bailey said. “We talk about crew size, productions, safety, and more, and we make sure the foreman or superintendent is on board with knowing what the expectations are. It makes it easier to follow up during the construction process to discuss how things are going. My most successful projects involve sharing as much information as possible.”

Bailey said he also involves many team members in the decision-making processes on the project, listening to feedback and new ideas. “I have to make the final call,

but I benefit greatly from everyone's input. It makes my job easier,” he said.

## TOOLS AND INFORMATION: Streamlining, Better Analyzing the Construction Data

All battle plans are perfect—until the battle begins. Construction project managers probably relate to that statement more than anyone. A construction project can be planned out down to the very last nail, but even in the best-planned project, something always goes awry.

Construction projects have so many people involved and so many moving pieces of data flowing at any given time that something is bound to get missed. Effective project management means controlling the data flow and staying on top of transmittals, submittals, RFIs, email communications, change orders, materials, inventory, job cost and WIP reports, labor hours and wages, union rules, safety regulations, insurance and bonding, compliance data and a whole lot more.

Still, that does not mean planning should go out the window just because even the best-laid plans will always change. Technology is helping project managers plan better, work smarter and be more adaptable during the project. It provides the ability to change on the fly without negatively impacting end goals or bringing projects to a halt.

“Because of the size of our industry, there is a momentum and a demand from our customers to innovate and provide more value, more cost-effective solutions, reduced timeframes, higher quality. Probably what's enabling that more than anything right now is

technology. Technology is quickly changing our industry in ways we haven't seen before," Dan Johnson, president of Minneapolis-based Mortenson Construction said in a recent interview with Construction Dive<sup>3</sup>. "Right now, the one that's having the most impact for us is building information modeling (BIM), virtual design and construction. When you combine that with the collaborative tools that are now available in the advent of mobile devices, we are literally collaborating real-time, anywhere, out on the job site with all the stakeholders. That's accelerating a lot of the innovation."

Here are just some of the modern technology tools leading construction companies are relying on to streamline and better analyze data and build better projects:

## **BIM/Virtual Design**

Building Information Modeling, or BIM, is the process of designing a building collaboratively using one coherent system of computer models instead of multiple sets of drawings. By using multi-dimensional computer modeling, BIM can save significant time and money and reduce errors. The process has been billed by many contractors as the future of construction, opening the door to new design and building ideas that might not have been realized before.

## **Complete ERP systems**

More and more, contractors are turning to full-service construction software that combines functions like accounting, job costing, project management, equipment management, human resources, inventory management, document management and more under one platform. By using one system, data can be shared instantly across all

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—DALLAS WILLIAMS, VP AND GENERAL MANAGER, SCOTT BUILDERS

facets of the project without having to do multiple data entry across multiple software programs—programs that might also present or manipulate data in different ways making it harder to analyze when needed.

## **Document Imaging**

It used to be that a contractor's office was a sea of filing cabinets, crammed with plans, specs, invoices, change orders, submittals, time cards and reams upon reams of other paper documentation and correspondence. With the advent of scanners and powerful document imaging and archiving solutions, contractors are digitizing their data. This makes it easier to store, easier to find, and, with some construction management software packages, easier to attach to other data, reports or collaborative communication tools.

## **Automated Workflow Tools**

As construction software advances, so do the opportunities to simplify and automate processes. Dedicated workflows being built directly into construction software packages are helping improve both collaboration and efficiency. Specific tasks or whole processes can be set up to occur automatically, and items that need approval can be routed to specific people, groups or even defined

roles within the organization. By creating an automated flow of data and alerts when tasks need attention, projects can move quicker—and smarter—while reducing workloads.

## **Intuitive Dashboards and Kiosks**

Another technology driver of efficiency has been the design of intuitive dashboards that provide not just a snapshot of construction project data, but a way to drill down into the data—right from the dashboard itself. This saves both time and confusion of navigating software menu systems. It also puts the most relevant data the project manager needs to see right at his or her fingertips every day. Special kiosks and portals built into software packages allow select groups to view and work with information relevant to them. For instance, subcontractor kiosks allow a single portal for them to see all project data related to their individual work and submit compliance documents.

## **Project Management Mobile Apps**

With the explosion of smartphones and devices, mobile apps are being created specifically to handle project management tasks. From mobile apps that provide bid management and communication alerts to apps that allow viewing of plans and specs on any device to markup tools and more, there are a multitude of choices where contractors can keep business moving with a few taps or swipes of their mobile device.

“Managing the information is one of the biggest challenges of project management today,” said Scott Builders’ Williams. “Modern technologies and construction software are really helping to control the information and disseminate it so it can be available and useful to our project teams.”

## **PLACE AND TIME: Accessing Real-time Data at the Jobsite and Beyond**

While having the best people in place, working together well and using the latest tools is critical, the construction project can still suffer if the data being tracked and reviewed is days or even weeks old. That outdated project information can make it hard to accurately gauge current job costs or work in progress.

Often, project managers work with information culled together in reports generated in software systems that cannot pull data until it is fully processed or individual phases of the project are completed. Lacking workflows or alerts that expedite approvals and processing, these software packages put the onus back on the people to remember to manipulate the data. Furthermore, having to wait until reaching the office, a connected workstation or even relying on limited VPN connections to manually enter data into the system means additional delays. Thankfully these processes are on the way out.

## **A Walk in the Cloud**

Enter cloud computing. A buzzword in the industry just a few years ago, more and more technologies are embracing cloud computing as a way to deliver data in real time. Cloud-based software is breaking project managers free of the chains to the office, allowing them to work almost exclusively in the field where the action is.

The data processed in the cloud-based software is stored directly on a server and can be hosted internally by the company or externally through hosted services. In either case, the data is secure and encrypted, ensuring that those without the proper authority or permissions cannot access the software.



As one contractor recently put it, “I reviewed draw requests from 35,000 feet in the air over Siberia using WiFi on a flight to China.”

Cloud computing affords unprecedented access to powerful applications. These applications are more user-friendly and easier to navigate with automated tools to get to better, more relevant data quicker. With more and more technologies moving to a true cloud platform it makes it much easier to integrate between software programs.

Because “cloud” has become a buzzword, however, software and technology buyers need to beware. Some software providers claim their products work in the cloud, but those services might not be designed to take advantages of browser interfaces and mobile access. Or, they rely on connectivity software that still requires back-office support and limits the user to specific types of devices. Some features and functionality may also be restricted in their scalability. For software to work well in the cloud, it has to be designed for the cloud. Make no mistake; this is the future of where almost all software is ultimately headed.

## Web Worth

So how exactly are cloud computing and web-based construction solutions providing such a leg up for project managers? Here are four key reasons:

### Accessibility Virtually Anywhere

By working in the cloud, project managers no longer have to travel back and forth between the field and the

office to process data to keep work moving. Web-based software lets the data— and the jobsite—flow in real time. In an area without an Internet connection? Not to worry, as leading cloud-based software solutions allow users to work online or offline, synching when the solution is re-connected to the Internet. This means that work could be done in the mountains or deep underground, with the latest data always close by. Or as one contractor recently put it, “I reviewed draw requests from 35,000 feet in the air on WiFi on a flight to China over Siberia.”<sup>4</sup>

### Real-Time Project Decisions

With live access to the very latest data, contractors no longer have to rely on data that is days, weeks or even months old. The older the data, the harder it is to gauge a real sense of how the project is going. Accuracy, especially with the data used to generate WIP reports, true job costing projections, change order status and the like, is key to projects’ ultimate success.

Working with data in real time not only reduces unnecessary costs and avoids delays, but gives project managers the insight to know where problems on the project might exist and address them quicker. Having real-time data also keeps the owners and financiers of the project up to date and ultimately happier.

### Conflict Resolution

As earlier noted, digitizing documentation and having it accessible when needed is critical for project managers. Why is that important? Even though conflicts are significantly reduced when everyone is collaboratively working together, conflicts can still occur. Having the ability to show evidence that a task was not completed

or that a particular document was indeed signed off on, will resolve these conflicts. However, instead of waiting for hours or even days for the project manager to track down the paper trail, imagine being able to pull that proof up in real time—right from a laptop or tablet device in the field. This will help resolve conflicts when and where they occur rather than the project stalling while the project manager adds “detective” to his or her job titles.

### Ability to Change on the Fly

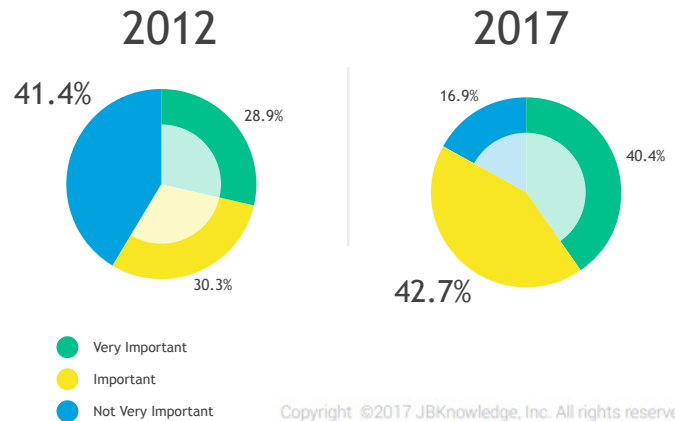
Changes happen in construction projects. They’re a key part of construction’s ebb and flow—so much so that the change orders are one of the most critical things a project manager has to manage. In addition to ensuring the project is carried out correctly and to the latest specifications, changes are where contractors have opportunities to make more money. However, changes can also waste a lot of time and productivity waiting for them to be approved. Cloud-based software and modern workflow technologies can route change requests and change orders the moment they are needed and expedite the approval process.

Changes on the job aren’t always necessarily related to the materials used or scope of the plans. With the real-time access to data that cloud-based solutions provide, project managers can see if there is a particular area of the project that is lagging behind or if bills and invoices need attention. This allows the project managers to do their jobs better and be proactive rather than reactive on the jobsite.

### What To Consider When Considering Project Management Software

While many project managers today are still utilizing manual processes or working with significantly outdated

### HOW IMPORTANT ARE MOBILE CAPABILITIES?

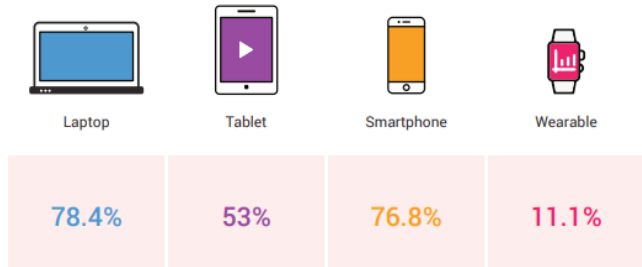


software, it is becoming clear that this is less of a matter of choice. According to a 2017 Construction Technology Report<sup>4</sup> by JBKnowledge in conjunction with the Construction Financial Management Association and others, 83.1 percent of respondents considered mobile computing capabilities on the project jobsite to be either “important” or “very important.”

More than three quarters of contractors surveyed in the JB Knowledge report said they were using either laptops or smartphones, while more than half were using tablet devices. That’s actually a decline from previous years, though the report notes that respondents are “eschewing the use of multiple devices in favor of a single device for multiple purposes.”

One area that has decreased is the number of programs or packages used. According to the JBKnowledge report: “The largest group of respondents in 2012 reported using six or more software solutions. The largest group of respondents in 2017 reported using only two software

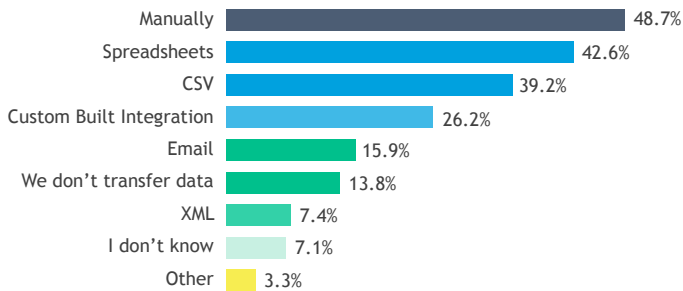
## 2017 DAILY MOBILE DEVICE USAGE



solutions. Popular software in 2017 may integrate more features rendering additional software superfluous, or respondents may have simplified and trimmed down their technology tools due to cost or implementation issues.”

One of the reasons contractors are using fewer software programs is that leading-edge software providers are better integrating functionalities together in single-system ERP platforms. This integration makes it easier to work from one source of data and create workflows throughout the program to streamline work.

## HOW DO YOU TRANSFER DATA WHEN APPLICATIONS DON'T INTEGRATE?



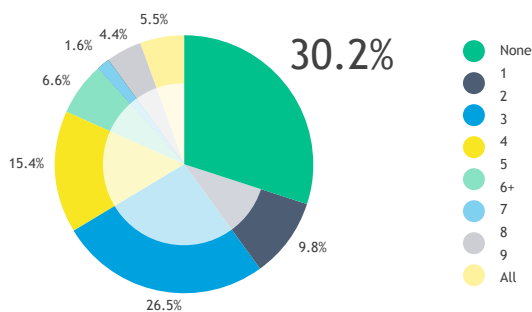
However, more than 30 percent of respondents noted that still none of their applications integrate. That means moving data via manual efforts or not at all.

## Return On Investment?

As these software packages improve features and functionality, doesn't that make them more expensive? The short answer is yes, but in terms of return on investment, most contractors are quick to point out that the perks are well worth the price.

## NUMBER OF APPLICATIONS THAT INTEGRATE

2017



“Technology, when used correctly, makes everyone on site and in the office more efficient,” said Scott Builders’ Williams. “If a \$1,000 software solution saves a 10 person steel crew an hour on site, it has already paid for itself.”

Making the decision to seek out software boils down to commitment. Eventually, all contractors are going to have to use modern software and tools to compete in the marketplace, so it is more of a matter of when management pulls the trigger. For software to have a positive impact, it needs to be embraced—and utilized appropriately—company-wide.

“It has been worth the investment for our company,” said Hunter Contracting’s Bailey. “We are still learning ways to be more efficient with it, but it has already dramatically improved our operations. And there is help readily available to guide us through everything.”

## The Software Checklist

### The Top 10 Questions to Ask

Once the decision is made to embrace new software, the next step is to determine what exactly project managers want it to do. Functionality (31 percent) was the number one answer in the 2015 Captterra survey<sup>1</sup> when respondents were asked the most important consideration in selecting software. Ease of use and price were second and third respectively at 21 percent and 15 percent.

With that in mind, here is a look at 10 key feature and functionality questions project managers should be asking when selecting new software:

1. Is the software easy to use? To get complete buy-in from users; software needs to be simple to use and present data relevant to each user. Is the interface clean? Is navigation intuitive? Do dashboards, grids, charts and other features make analyzing data easier?
2. How straightforward is setting up a new project? Can the software easily import estimates and jobs created with ease, allowing teams to get right to work?
3. Will it significantly reduce work and save time? Does the software reduce double or triple entry of data, does it automate processes and streamline work?
4. Does it integrate well with accounting? Is there a two-way street that lets data easily flow between and influence both the managing of the physical project and accounting processes? Can it easily navigate data behind purchase orders and subcontracts; handle AIA and time and material billing; facilitate real-time job costing, WIP, and more?
5. Will the software help create consistent structure across the company? In addition to integrating with accounting, will it provide a consistent platform where data from all departments (materials, HR, inventory, etc.) is uniform, allowing everyone on the project team and company to work with the same data?
6. Are forms and other requests easily generated? When change requests, change orders, RFIs, submittals and more are needed, can they be created quickly and simply?
7. If specific tasks are needed, are there workflows or alerts to address these and keep work moving? Is it easy to view and/or enter data from the field? Will being able to access data on the jobsite via mobile apps, kiosks or the full software package itself running on a laptop or tablet device allow project managers to operate fully wherever the jobs are?
8. Does the software enhance collaboration? Is it a single vehicle to disseminate information to everyone on the project team in real time? Will the software ensure that everyone on the team is instantly clued in to changes in the project, schedules, updates and more and reduced chances for errors or conflicts?

**9.** Can it effectively manage construction documents?

Are there powerful document imaging and archiving functionalities that allow the attaching of documentation to different pieces of data and processes in the software?

**10.** Will it be supported and scalable for the future? Will there be consistent maintenance and support of the software and how well is it designed to adapt to future technologies?

And here's a final bonus question that most project managers will likely have at the forefront of their lists—what will the return on investment be? The answer is that if embraced and used correctly, most software will ultimately pay for itself. Leading-edge software that is simple to use, easy to access and automates or streamlines processes further increases efficiency while saving time and minimizing costly mistakes and delays. The result is a quicker, easier project that turns project owners into repeat customers.

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**Sources**

<sup>1</sup>Capterra project management software survey conducted with Procore Technologies in August, 2015: <http://www.capterra.com/construction-management-software/software-research-with-procore>

<sup>2</sup>Bureau of Labor Statistics Monthly Labor Review, "Industry Employment and Output Projections to 2022," December 2013: <http://www.bls.gov/opub/mlr/2013/article/industry-employment-and-output-projections-to-2022.htm>

<sup>3</sup>Interview in Construction Dive, June 2016: <http://www.constructiondive.com/news/mortenson-president-construction-industry-is-a-prisoner-to-bids-but-ch/421141/>

<sup>4</sup>Press release on Alberta-based All Type Electric selecting Spectrum Construction Software for its multi-company, web-based capabilities: <http://www.dexterchaney.com/news/press-releases/203-all-type-electric-selects-dexter-chaney-s-spectrum-construction-software-for-its-multi-company-enterprise-business-solution>

<sup>5</sup>2017 Construction Technology Report by JBKnowledge in conjunction with the Construction Financial Management Association, Texas A&M University's Construction Sciences Department and The Mechanical Contractors Association of America. <https://jbknowledge.com/2017-construction-technology-report-survey>