



BY CHRISTIAN BURGER

# IT Trends in Construction

Contractors often invest available capital in heavy equipment, new personnel, office expansion, etc., while often viewing IT as an “expense” that needs to be managed. Meanwhile, customers are demanding more from contractors in the way of efficiency, project controls, schedule and budget management, overall visibility into projects, modeling, and prefabrication. Integrated Project Delivery (IPD), Public-Private Partnerships (P3s), and Lean methods are gaining momentum as well. This is all to say that the construction environment is under tremendous pressure to change.

Is technology dragging the industry forward reluctantly or are changes in construction shifting the demands for automation and better solutions (e.g., prefabrication)? This article reviews current and future technologies as well as their impact on construction organizations. It also provides important context for which IT managers and their executives can begin to plan around.

## The IT Staff

As available technology has progressed at a rapid rate, there have been several obstacles to consistent adoption. Historically, contractors have IT staff for maintenance and infrastructure, not for expansion, and most contractors have fewer IT staff than what they actually need. For example, a company that has an IT manager might really need an IT director, or a company with an IT director should have a CIO.

A common refrain from senior management (e.g., CEO, president) is that their IT staff lacks leadership and direction. Sometimes that is difficult to provide if the manager spends most days resetting passwords, ensuring servers are running, and managing updates. Senior management is also often unwilling to help enforce stricter IT governance (e.g., stronger password protocols, controls over website access, rules around bring-your-own-device), which means IT staff are consumed with problem-solving and less engaged with strategy.

## Trends

### Enterprise Resource Planning

An enterprise resource planning (ERP) solution used to be at the center of a company’s systems universe, and all other

applications orbited around or near it. However, the ERP solution has recently been under considerable pressure to divest some applications.

It is possible that the scope of ERP solutions will be reduced as more functions/applications are carved off and integrated into ERP (e.g., project management solutions, procure-to-pay, HR, equipment). Contractors are far more comfortable moving to Best in Class solutions than they used to be. Also, the number of viable ERP vendors has sharply diminished amid company acquisitions and sun-setted products.

Even if a legacy product is not officially retired, development may be substantially slowed in order to lower costs. Smaller contractors will continue to opt for all-in-one solutions as the fully integrated model continues to make more sense and integrations are too risky or costly. But larger contractors may embrace third-party solutions and integrate back to the ERP.

### Prefabrication

Another important trend is the increased demand for prefabrication. This requires a contractor to work more like a manufacturer with fabrication occurring within a fixed space and with limited equipment and manpower. However, current construction ERP solutions don’t have the same types of applications as those found in manufacturing (e.g., material requirements planning (MRP) and shop-floor planning). Construction ERP solutions may try to integrate with stand-alone manufacturing coordination applications, while some nonconstruction ERP solutions may try to break into the construction market. This is expected to be disruptive, to say the least.

Consider the schedule and dates. In traditional MRP systems, dates drive everything: ordering, receiving, demand, and logistics. But in a construction ERP solution, very little is date driven. Everything is planned and entered manually. This is a transition with which the industry could struggle.

### HR Solutions

Another substantial trend in IT has been the movement to third-party human resource information systems (HRIS).

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Many contractors now have professional-level managers in the HR department with larger and more contemporary technology expectations. Some of those managers have come from other industries where they have used more robust HR solutions than what is available in most legacy ERP solutions (e.g., self-service, performance management, training administration and recruiting, and onboarding). These third-party HR solutions are compelling; however, they require integration back to the payroll system *and* a level of commitment to HR best practices like performance reviews, compensation analysis, and benefit management.

There are two tiers of HR solutions available for the industry. The top level solutions tend to be more expensive, frequently require payroll to be performed within the application, and are time consuming to implement. The other tier frequently offers similar functions on a simpler scale and on a platform that may be more structured. In order to keep up with the demands of the HR staff, the organization, and external compliance, contractors should evaluate their HR options if they have not done so already.

### **Training**

A related and welcomed trend is the move to a learning management systems (LMS). An LMS is like a private portal or library that contains all of your organization's training materials (e.g., videos, documentation, links, and other content) that could easily be searched and viewed from the office or field. Topics could range from software and company policies to curing concrete in cold weather or staging techniques.

The industry has been slow to adopt these tools and platforms because of the commitment necessary to develop training content. Content libraries are now available for rent or purchase on topics like safety, but these may not be specific enough for the construction industry. Some tools also provide testing capabilities to monitor who has watched certain material and how well it is being understood. As companies continue to bring more technology into the organization, training material is more vital than ever to ensure proper adoption and use.

### **The Cloud**

Many large and mid-sized contractors have made the move to cloud applications and/or cloud storage. While no longer a radical idea, some have only made small steps like moving to Office 365 or cloud-based project management solutions. Others have pushed more of the processing and storage out to a hosting facility like Amazon Web Services (AWS).

These are all good, viable moves, but should be done with an overall direction and intent in mind. The move itself can be complicated and expensive depending on what is being attempted to avoid data and applications to be spread out over multiple service providers with differing conditions, security protocols, integration capabilities, and disaster recovery provisions. If most of your computing infrastructure is still in-house, consider evaluating your options and developing a cloud migration strategy, even if incremental.

### **Cybersecurity**

Cybersecurity is at the top of most companies' priority lists because of the ever-increasing threats from malware and ransomware. Senior management must support IT by authorizing stricter policies and procedures around passwords, website access, and mobile device protection. But the primary threat is not from hackers breaking in, but rather from various e-mail threats that the average user is not able to identify until it is too late.<sup>1</sup>

There are several solutions that can help train your user-community on recognizing phishing e-mails, malware, and other cyber threats. These solutions will test the organization with fake malware, develop a baseline (e.g., 30% of your personnel clicked on a bad e-mail), and then begin sharing videos and training material on how to recognize signs of malicious e-mail or website content. Larger contractors have also obtained cyber insurance. Just make sure to read the provisions in the underwriting agreements as they tend to be very strict around ensuring protections are in place in order to be covered in case of an event.

### **Business Analyst**

As companies move more computing infrastructure to the cloud, they are also changing the demands of the IT department and the nature of the resources required. One position that is new to construction and being met with great success is the business analyst.

The business analyst takes on the responsibility of working with various departments on process improvement and solution implementation. They might work with the estimating department on rolling out a new software solution, with project managers (PMs) on deploying a project management application for the field, or with purchasing on a procure-to-pay process change. The role does not take over the implementation, but instead supports the process as a liaison with IT, the vendor, the team, and management as needed. Good project management skills, solid



communication skills, an understanding of technology, patience, and an ability to delegate are all important and helpful skills. If your organization struggles with deployment, adoption, or getting value from new solutions, then consider transitioning someone from within the company into the position of a business analyst.

## Middleware & Content Management

Both middleware and content management are part of a larger movement toward enterprise architecture within many organizations.

*Middleware* sits in the middle of the system's landscape and is used to broker or exchange data from one system to another. This has several advantages over batch uploading or manually loading data from one system to another, which has little process automation.

Today's systems are more dependent on data that comes from or needs to push data to another system. Middleware facilitates that process efficiently with audit trails and error trapping, which is often beyond the awareness of most users. Also, the software vendor community is finally publishing application program interfaces (APIs) that can be used by middleware to facilitate automated and efficient integrations.

*Content management systems* (CMS) have been used in construction since the 1990s, but seemingly never at a scale commensurate with the value they can provide. A CMS can intelligently capture, store, and retrieve all of your digital content (e.g., files, photos, videos, plans) without dependence on users and folders. In addition, the technology automatically applies metadata tags to the files so they can be retrieved using search capabilities rather than having to know in what folder the file is located. These systems also allow for retention rules to be applied by document type to better implement a record retention policy. And, they frequently come with adapters that work with your applications, so the digital content is moved in and stored automatically.

A CMS also allows you to gain control over your sprawling digital content. This technology often pays for itself the first time you must retrieve documents for a claim or discovery request. Traditionally, a solution like this would exist in a company's architecture and connect to most of the primary systems that produce digital content. Enterprise content management (ECM) solutions have specialized technology for the capture function, which makes it reliable and transparent to the user.

## Other Applications

As you evaluate new applications, you will notice that most (or all) vendors are moving toward software as a service (SaaS) licensing models and away from software licensing plus maintenance fee structures. The new SaaS licensing models have some advantages and drawbacks. For instance, the SaaS fee is paid regularly and is a fixed amount; however, if you add more users or another triggering event occurs, fees may increase. If you need fewer users, this often leads to a decrease in the payment amount. But for solutions that don't often see changes in the number of users, the SaaS approach tends to be more expensive over the traditional model after the third or fourth year due to how vendors are pricing SaaS solutions.

Most marketing and business development departments are now using some form of customer relationship management (CRM) solution. Marketing departments are now embracing better tools and implementing solutions that help with lead tracking, proposal development, and pipeline reporting. Many companies are integrating their CRM solution with ERP, so jobs are automatically created from the CRM once awarded.

## Conclusion

IT-related issues and opportunities in construction continue to increase. Construction companies should have a cohesive two- or three-year strategic IT plan that includes ERP, BIM, IT staffing, movement to cloud, cybersecurity, IT management and governance, CRM, estimating, project management, and other primary solutions.

Supporting technologies like ECM and strategies like hiring a business analyst should be included. Risk mitigation should also be present in the plan with techniques around business continuity and disaster recovery, as well as accounting for education and cyber protection. ■

## Endnote

1. [resources.infosecinstitute.com/insider-vs-outsider-threats-identify-and-prevent/#gref](https://resources.infosecinstitute.com/insider-vs-outsider-threats-identify-and-prevent/#gref).

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