Building a Capable Technology Stack

By Jay Snyder

With the universal growth of platforms powering business functions, the importance of a technology stack is being recognized by companies of all sizes in the built environment.

In today's market, it's easy to get swept up in the buzz of new technologies that may or may not be fully developed, commercialized, staffed and ready for your engineering and construction (E&C) firm to use. There are also antiquated systems that haven't properly maintained or upgraded their back-end programming or ease of use by the field, but which may be showcasing a new release that is little more than a polished user interface.

The good news is that companies can avoid being distracted by this sort of technology by understanding their business requirements. They should also take time to translate that into systems requirements that ultimately act as a performance specification to guide the technology road map and selection process. The better news is that by using a capable technology stack—or the combination of all the technology services used to build and run a single application—companies can focus only on those solutions that actually help enable better business or project performance, or possibly actuate new or needed capabilities to succeed in today's competitive markets.

Starting at the Beginning

The term technology stack is misleading, as it suggests a physical pile of solutions; today fewer solutions are installed on premises and are now cloud-based, simplifying infrastructure and support. A company's suite of solutions is now often managed remotely by outsourced IT services companies, vendor technical support and customer success teams. Oftentimes systems and databases are hosted on dedicated virtual servers or a shared virtual server environment to allow for flexibility and scalability, all managed by a third-party provider.

This suite of solutions that we call a tech stack has become the backbone of contractors' business operations. Over the last 10-15 years, technology has shifted from being a budget line item to taking a larger position in strategic planning and execution of business services and operations. It has moved from being a consideration to being an enabler or even an actuator that allows firms to develop services and capabilities in their business that they otherwise couldn't create.

Because of this, companies in the built environment are now placing more importance on the overall configuration, support and ability of their technology stacks.

Exhibit 1. Example of a Tech Stack

Sources: Procore

Software Stacks Versus All-in-One

A real enabler for E&C firms, technology is playing an increasingly important role in today's built environment. Here's one analogy that all E&C firms can relate to: "When building a skyscraper, you don't start with the marble facade or the fountain in the lobby," time tracking software maker Hubstaff points out. "You start with a deep foundation and girders to hang everything else on." In this example, your tech stack is the core capabilities that ensure the company is enabled and supported.

To determine whether a tech stack or an all-in-one solution is the best bet for your situation, you can look at all-in-one enterprise resource planning (ERP) solutions such as Accumatica, HCSS, Plexxis, Viewpoint and Sage 300. With these solutions you will usually benefit from tighter integrations among various modules within the platform.

The problem is that these solutions aren't always as customizable as an E&C firm might like in terms of general workflow or automation. "And if you don't like one function," Capterra adds, "say, accounting—you have to throw the baby out with the bathwater and get a whole new all-in-one app," or in this instance, keep the rest of the platform but adopt an accounting system that doesn't integrate—an extremely inefficient situation.

Tech stacks built as a system of systems, on the other hand, take a bit more work to put together but offer a level of customization and flexibility that all-in-one solutions can't match. Here's a sample application stack:

- Accounting
- Project Management
- Estimating and Quantity Takeoff
- Invitation to Bid
- CRM
- Collaboration
- Time Tracking
- Fleet Management and Asset Tracking
- Email and Office Solutions

"These are all great applications with a lot of features for a small-business owner—and if you don't care for one [solution], you can swap it out for another app that works the way you'd like," Capterra notes.

Steps to Success

Building a capable technology stack requires solid buy-in from the E&C company's leadership team, a technology strategy that aligns well with the firm's overall vision and goals, and a solution that both fills in the gaps and eliminates redundancies. Here's why:

- **Align as a leadership team.** Experiences and sophistication with technology vary widely in the industry and even within a company. It shouldn't be surprising that a company's leadership team often feels differently about embracing technology in the business. Some see technology as a high-maintenance annoyance while others consider technology as valuable as the hand tools of their craftsmen.

- **Enable business objectives.** Once the leadership team agrees on what technology means to the business, it's important to consider overall business objectives and how current technologies are enabling or prohibiting those objectives. Enabling technologies should be supported, and those that create barriers must be assessed and potentially replaced. An assessment of these tech solutions will determine whether it is an issue with user adoption and leveraging all features, or whether the technology simply doesn't have the appropriate functionality (or perhaps that there is a gap in tech capabilities).

- **Fill gaps and eliminate redundancy.** As a company assesses its tech stack, gaps and redundancies across the current technology solutions will start to surface quickly. A clear inventory of technology solutions and understanding of the capabilities needed to support the business will expose gaps quickly (e.g., a system to monitor and assign resources, track project pursuits, coordinate design changes, etc.). Gaps may not be readily apparent within major functions like accounting or project management, but a closer look may reveal specific capability gaps around how those systems integrate with one another. Redundancies will cause inefficiency with managing data and

sharing knowledge, with document management being the biggest redundancy culprit. Nearly all technology solutions have some form of document management capabilities, which means that there could be files saved in a dozen solutions, making retrieval cumbersome and inhibiting awareness/business intelligence.

- **Address the needs of employees (both field and office).** The tech stack should equally support the office and the field. For far too long, technology only improved business office processes and workflow. Now that project sites are more "connected" and devices prevalent in the field, technology solutions can more adequately address the needs of the field. The importance of gaining feedback from employees cannot be overstated. While companies don't necessarily want to encourage employees to provide limitless "wish lists," employees need to feel like they're being taken seriously. Companies should ask their employees to share which technology solutions work well and which ones don't or what may be lacking.

Capability Versus Compatibility

When developing their tech stacks, E&C companies can follow one of two philosophies. They can either commit to a core ERP that includes accounting, human resources, project management and document management capabilities, or they can opt for a "system of systems" approach, which usually centers around either an accounting or project management platform.

Each of these choices comes with its own benefits and tradeoffs. Going all in on an ERP can mean accepting a technology suite that is good at all things but isn't *really great* at any of them. A "system of systems" approach means managing multiple service agreements and system integrations (if they integrate). It's also important to note that ERPs are much more difficult to change out if a company determines that it has outgrown the platform (while a systems approach makes replacing point solutions theoretically easier).

Remember that even with an ERP, there will be additional solutions required to meet the needs of the office and the field. So, whether it is an ERP or system of systems, choosing a path that will maximize data integration is crucial to leveraging the tech stack. The key benefits that come from this process typically include reduced duplicative data entry, fewer data errors, and an enterprisewide ability to unlock insights in the form of visualizations and actionable business intelligence dashboards.

The Right Choice

During the technology selection process, E&C companies can avoid being drawn to shiny objects by understanding their business requirements and taking time to translate that intelligence into actual system requirements. By taking an iterative process of generating those requirements and then revisiting it while increasingly breaking the business need into technical requirements, even someone who lacks tech expertise can make good choices in this area. From this process, companies should come up with a "requirements traceability matrix" that will serve as the specification for the technology stack.

"Consider the benefits of a technology that is compatible with your company's industry partners and clients," IBS advises. "With the universal growth of platforms powering business functions, the importance of a technology stack is being recognized in all industries, old and new, small and large."

Key Capabilities for Today's Builders

- HRIS
- Accounting, including Payroll, AP, AR
- Time Tracking
- CRM
- Document/Plan Management
- Project Management (RFI, CO, Submittals, Job Costing)
- Prequalification/Invitation to Bid
- Quantity Takeoff/Estimating
- Scheduling
- Asset Tracking/Fleet Management

- Safety
- Resource Planning
- Procurement/Inventory Management
- Reality Capture/Site Data Collection
- BIM/Design Software
- Quality Control/Lessons Learned/ Knowledge Management
- Detailing/Fabrication
- Supply Chain Management/Inventory Control/Procurement
- BI Dashboard/Centralized Analytics

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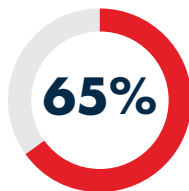
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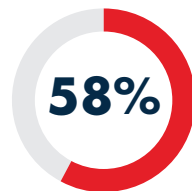## FMI Client Highlights
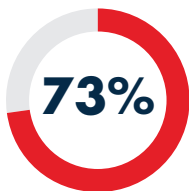
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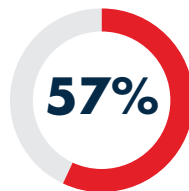
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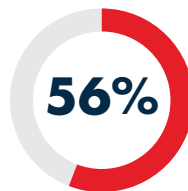
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