

Managing the AEC industry

A survey of technology applied to the
management of projects, knowledge,
and resources

In summary

In this survey of 429 leading AEC industry professionals we look at how technology is impacting project management, knowledge management, and enterprise resource planning.

Project Management (pg. 4)

- Most medium to large sized firms are using project management software to organise and share documents both internally and with external clients and partners.
- These systems are perhaps better termed document management systems since most currently lack the integration necessary for true project management.
- Cloud based storage has seen new arrivals take significant marketshare from incumbents. Firms should look closely at the new range of provider options and be aware that the offerings are likely to change significantly in the coming years.

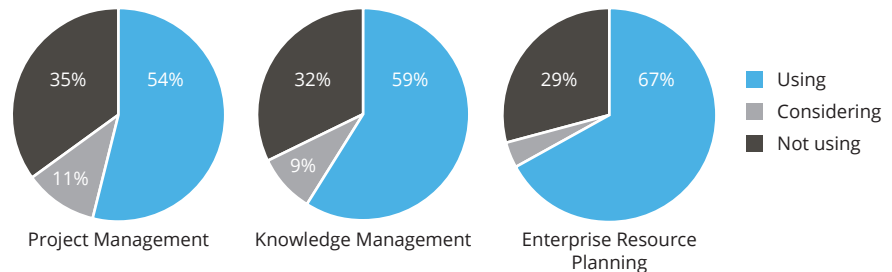
Knowledge Management (pg. 6)

- Most firms with more than 50 employees are using intranets and other tools to capture knowledge.
- Many firms are reporting that it is hard to get employees engaged and as a result the data often goes stale. Furthermore, the lack of specialised AEC integration means critical project data often isn't captured.
- Be cautious when investing in these systems, the technology that gets deployed is rarely used to the extent envisioned without proper executive support, implementation consulting, and training. This remains a major pain-point for the industry. KA Synthesis is the only AEC specific knowledge management system with any meaningful traction.

Enterprise Resource Planning (pg. 8)

- Primarily used for accounting and time tracking, they generally integrate poorly with other aspects of the AEC industry.
- Majority of firms use some form of Enterprise Resource Planning.
- While innovation is possible, there do not appear to be any firms taking the lead in this area. Firms should expect the status quo to remain in place for at least the next few years.

Software use at a glance



Introduction

Where computation resides

In recent years the AEC industry has been saturated by images of intricately curved geometry, demonstrations of robotic construction, and diagrams of data flowing between design, construction, and occupancy. Collectively this deluge forms a declaration: computation is here, and it is profoundly impacting the AEC industry. Yet discussions of technology tend to dwell on only the most readily apparent instances of computation. To a degree this makes sense, we are – after all – here to design, make, and manage buildings. We are interested in how computation provides new tools for design and construction, we are interested in

how it affords new opportunities for collaboration and new workflows. But this interest often overshadows how computation is impacting the less glamorous parts of the AEC industry; the back-of-house functions like project management, knowledge management, and enterprise resource planning.

In this report we investigate the computational technology powering AEC firms. There are no images of complicated geometry, robots, or data flows. We instead examine the technology used to manage projects, manage knowledge, and manage resources. We have asked 429 leading AEC industry professionals about the technology

they are using – what they are using it for, how they are using it, and the challenges they face with it. Our methodology is similar to the NBS *National BIM Report* and the Design Intelligence *2012 Technology & Innovation Survey* but, unlike these previous surveys, instead of focusing on design tools we have chosen to draw attention to the technological infrastructure that underlies leading AEC firms. In doing so this report taps into a growing awareness that the computation celebrated for transforming contemporary architecture is similarly transforming the management of AEC firms.

About CASE

CASE is a Building Information Modeling (BIM) consultancy based in New York City. They provide strategic advising to building design professionals, contractors and owners seeking to supplant traditional project delivery methods through technology-driven process innovation.

www.case-inc.com

CASE and HP share a mutual interest in how technology will shape the future of the architecture, engineering and construction industries. To gain further insight into this future, CASE, in association with HP, conducted the survey and subsequent analysis that forms the basis of this report.

About HP

HP creates new possibilities for technology to have a meaningful impact on people, businesses, governments and society. With the broadest technology portfolio spanning printing, personal systems, software, services and IT infrastructure, HP delivers solutions for customers' most complex challenges in every region of the world.

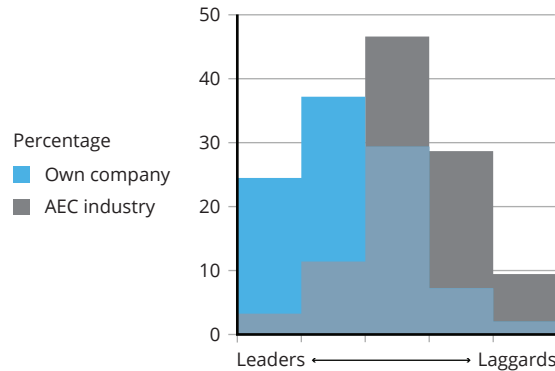
www.hp.com

Method & Limitations

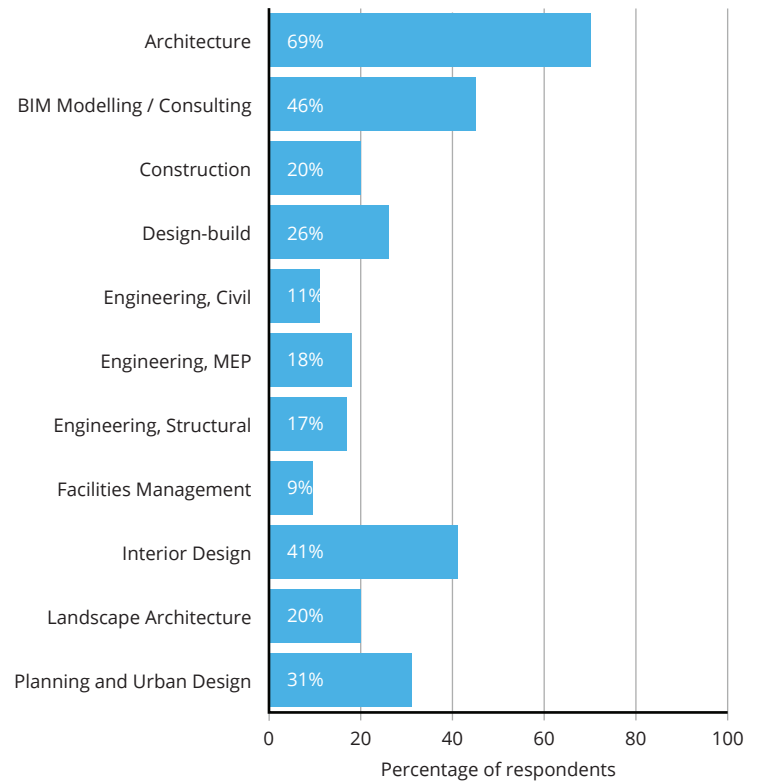
This report is based on a survey of 429 AEC industry professionals undertaken between June 3 and June 13, 2013. The survey was conducted online and respondents were primarily recruited through invitations in the CASE email newsletter, a post on the Archdaily website, and links in social media.

Considering that respondents were recruited through digital media, it is unsurprising that they tend to self-identify as technological market leaders. This report should therefore be read with the understanding that it is not a representative survey of the entire AEC industry, but rather a glimpse at how leading firms are using technology. While the survey was answered by respondents in thirty-seven countries, the majority (69%) were from the United States of America. Despite increasing globalization in the AEC industry, there are still regional preferences towards particular software. The most salient instances are highlighted in this report, but in general this report offers American perspective of the AEC industry.

In terms of technology adoption, how would you rate your company vs the AEC industry?



Which of the following services does your company offer?



The technology of project management

Expect shifts towards the cloud and away from pure file management

Project management software helps firms plan, organize, and manage projects. In the AEC industry, this software is primarily used to manage project deliverables, share files (both internally and externally), and to track issues pertaining to projects.

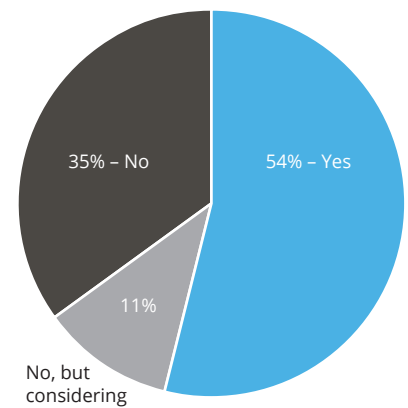
For the 46% of respondents who do not use dedicated project management software, projects are typically organized using some combination of file storage and emails. In the extreme case (13%) an individual will store files on their personal computer and use email to send colleagues and clients updates. The more typical situation (58%) is that project files are stored on what one respondent called “a disorganized project server” with coordination occurring through emails, phone calls, and excel spreadsheets. There is also a contingent (29% – but likely to grow fast) that use cloud-based storage instead of an on-site server. Dropbox is far and away the most popular cloud storage service, with only a handful of respondents using alternatives like box.net and Google Drive.

Managing project documents on file servers – whether cloud based or on-site – presents problems when multiple users access files. It can become difficult to track issues such as: who has permission to use particular files, who is using a file, which version of a file is the most recent, and what has been done on a project in relation to what needs to be done. These issues tend to be amplified by BIM since it encourages data sharing between project stakeholders.

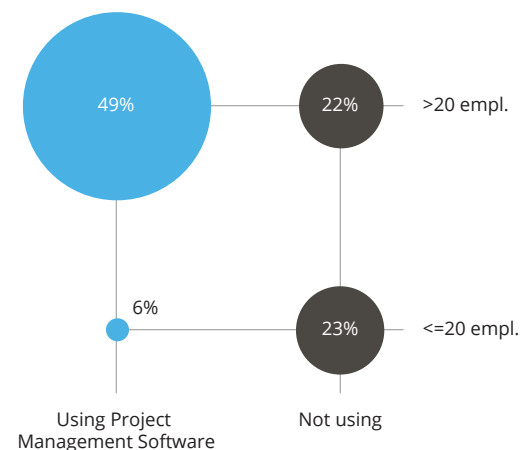
Most AEC project management software attempts to address the challenges associated with sharing data in a collaborative context. 54% of the respondents use project management software. This is correlated with firm size – firms typically begin considering project management software when they have roughly 10-30 employees, and most firms have adopted some form of project management software by the time they have 50-60 employees.

There are regional biases towards particular project management software. The survey’s Australian respondents were more likely to use Aconex, while those in the United Kingdom were more likely to use Asite, Conject, and 4Projects (the sample size was not large enough in other countries to identify

Does your company use Project Management software?



Project Management software use vs firm size



differences with any statistical significance). In general, the most commonly used project management software in the sample was Newforma (56%), followed by Autodesk360 (27%), and Projectwise (18%). Autodesk360 is a relative newcomer. Launched little over

“There isn’t one piece of software that does everything.”

“My biggest frustration is that actual project management software doesn’t thoughtfully integrate with BIM, at all.”

a year ago, its cloud based solution has picked up significant market share (largely through Autodesk’s vertical integration) where other new cloud based arrivals, like GTeam, have failed to do so (only 4% of firms were using

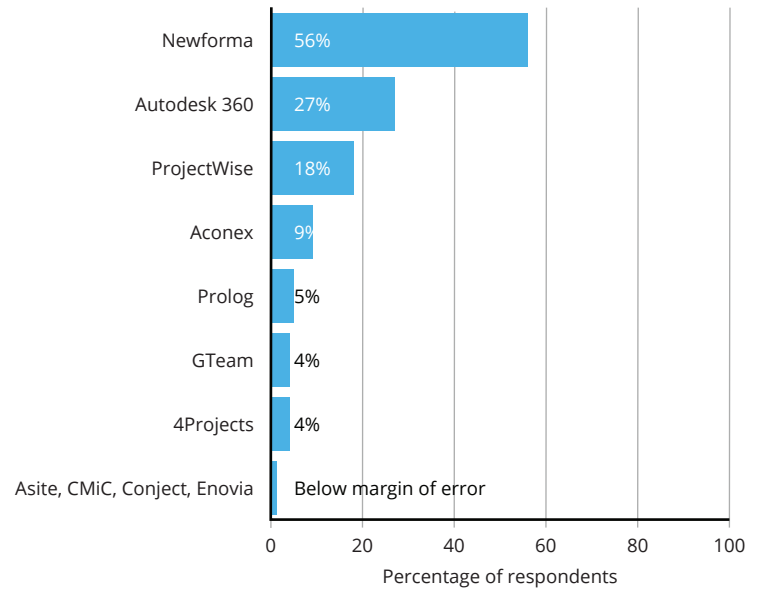
GTeam, however 19% of those looking to begin using project management software were considering GTeam, which makes it the third most considered [behind Newforma and Autodesk360] and perhaps signaling a change of fortune for GTeam).

Newforma, Autodesk360, and Projectwise, all have a strong focus on organizing files and models. Some of the survey respondents noted that “document management is not the same as project management” and felt hindered by the lack of integration to dedicated management software. Other common challenges brought up included:

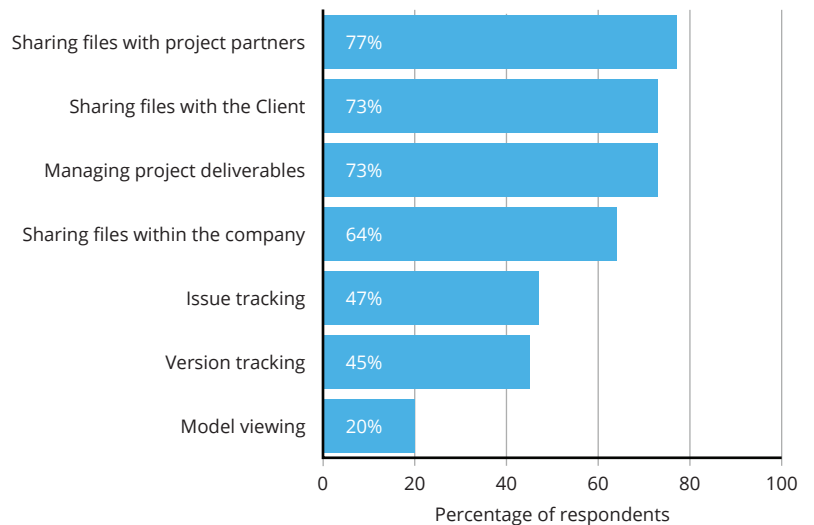
- The training required for individuals to use the software.
- Software using a file based paradigm when models are more appropriate.
- Internet connection speeds.
- Interoperability, fragmentation, and compatibility with certain design software.
- The chunkiness of Newforma’s interface.

These challenges signal that while project organization is generally becoming more sophisticated than simply files on servers, the industry has a ways to go in the management of projects. There have been a number of new companies who have arisen to take significant market share in only couple of years, and we anticipate that there will continue to be heated innovation in this space over the next few years.

Which of the following project management software does your company use?



Which of the following does your company use project management software for?



The technology of knowledge management

With limited AEC specific options, knowledge management systems often go stale once deployed

Knowledge management concerns how knowledge is created, captured, and disseminated within an organization.

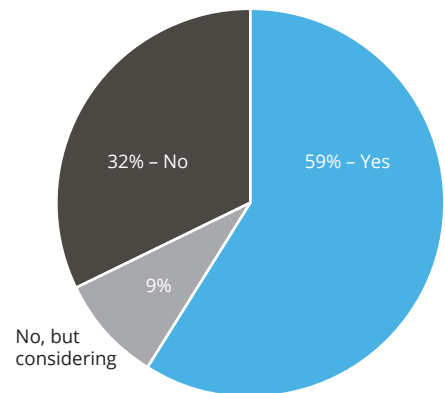
The capturing and dissemination of knowledge often occurs simply through emails, informal chats, and meetings. For respondents at small firms, this relatively informal, personal communication was the primary way knowledge was shared. For larger firms, there comes a point where it is prudent to deliberately set out to capture aspects of the organization’s knowledge. This point is clear in the survey data: most firms with 10 or fewer employees do not use knowledge management software, while almost every firm has begun considering using knowledge management software by the time they have approximately 20-30 employees, and virtually every firm with more than 50 employees is using knowledge management software.

“No one wants to read it. Everybody wants information but when it’s convenient for them.”

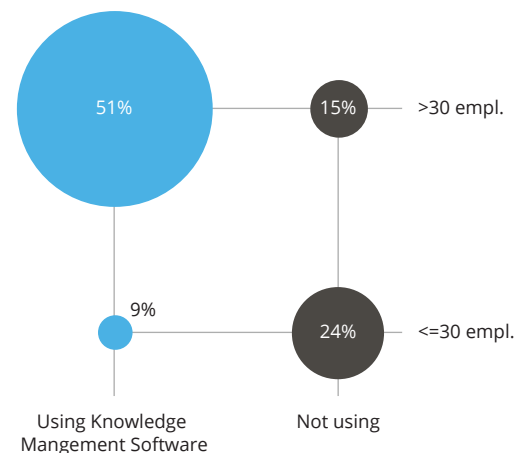
“The biggest challenge is getting people to contribute and then to actually use/read it.”

In total, 59% of respondents were using some form of knowledge management software, 9% were considering it, while the remaining 32% were not. For those using knowledge management software, 65% are using SharePoint. This is a dominant portion considering that the next most commonly used knowledge management software is some form of intranet developed in-house (19%). The prevalence of custom solutions is attributable, in the words of one respondent, to the “lack of AEC vertical solutions in the ecosystem or half-baked solutions, which forces

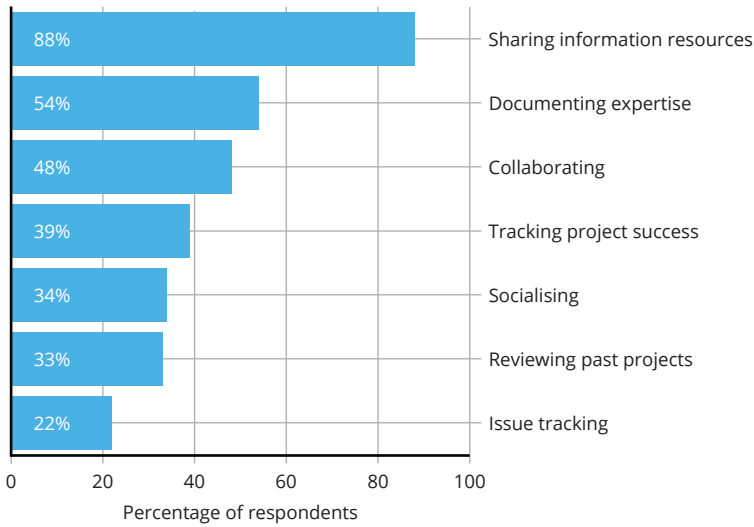
Does your company use Knowledge Management software?



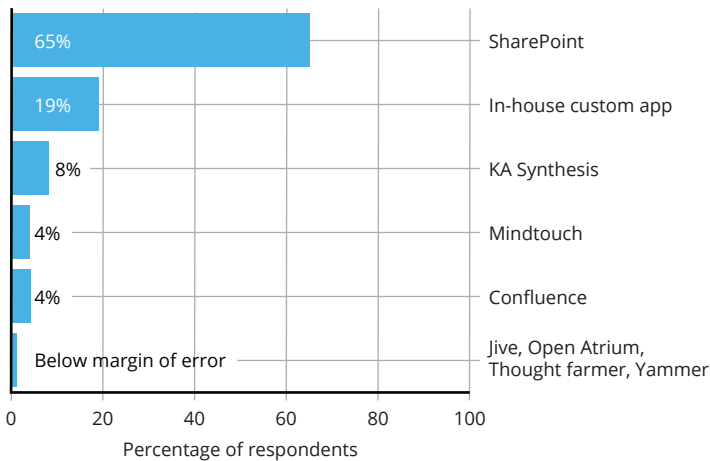
Knowledge Management software use vs firm size



Which of the following does your company use knowledge management software for?



Which of the following knowledge management software does your company use?



extensive self-customized solutions.” Based on the survey, firms that do implement a knowledge management system are primarily choosing between SharePoint, an in-house solution, or KA Synthesis. For the first two it is a somewhat dire choice; SharePoint isn’t targeted at the AEC industry and requires significant customization, meanwhile, an in-house solution is, according to one respondent, “slow to evolve and takes enormous resources to create and manage.” KA Synthesis is the only AEC specific knowledge management system with any sort of meaningful use, with 8% of respondents using it. This is due primarily with their market focus and integration with other AEC-specific enterprise technologies: Deltek Vision (enterprise resource planning, pg 8), Newforma (project management, pg 4) and Axomic OpenAsset (digital asset management).

Those adopting knowledge management systems are primarily doing so to share information resources (75%), collaborate (72%), document expertise (72%), and to review past projects (56%). But those using knowledge management systems report that they can be difficult to navigate, and that it is hard to get staff to participate. As a result, the knowledge often goes stale, which further dissuades users by reducing the utility of the knowledge management system. The tone of many respondents was quite negative, the consensus seeming to be that while knowledge management software was a good idea in theory, in practice people “get frustrated and don’t use it.”

Knowledge produced on projects often either gets forgotten or simply ‘walks out the door’. While there is a clear benefit to capturing project knowledge and sharing it within an organization, very few AEC firms appear to be doing this successfully. The range of knowledge management technology is limited, and the technology that gets deployed is rarely used to the extent envisioned without proper executive support, implementation consulting, and training.

The technology of enterprise resource planning

Widely used, although rarely for anything other than time tracking and accounting

ERP is TLA (Three Letter Acronym) for Enterprise Resource Planning. Simply put, this is how firms budget for projects, manage their accounting, pay employees, bill clients, and manage their relationships with clients.

29% of respondents do not use dedicated ERP software. Of these, the majority (25%) do not in any way formally plan or budget for projects. A typical respondent told us, “we just don’t do that and that’s bad, very bad”. Another common solution (22%) was to use Excel spreadsheets for planning, creating time-sheets, and tracking costs. For the remaining 53% of respondents not using dedicated ERP software, they were using a scattershot mix of whiteboards, Microsoft Project, bespoke solutions, and “the honor system”.

The majority of respondents (67%) use some form of dedicated ERP software. Most use Deltek Vision (49%) while 17% use Quickbooks. There is no clear pattern to what remainder use, other than that in aggregate they use a large range of software.

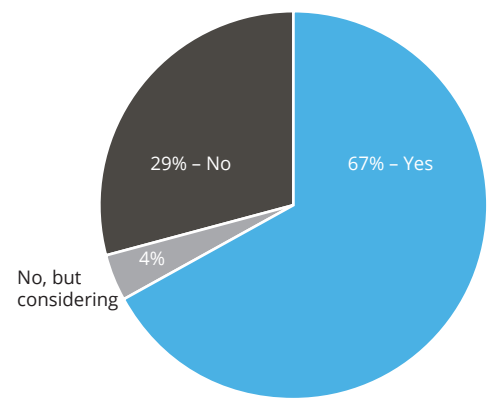
“We keep data modes separated: one for real time spent, other for billing times, other for client database”

“Users do not understand the benefit and so they are not motivated to use; they want to be architects, not managers.”

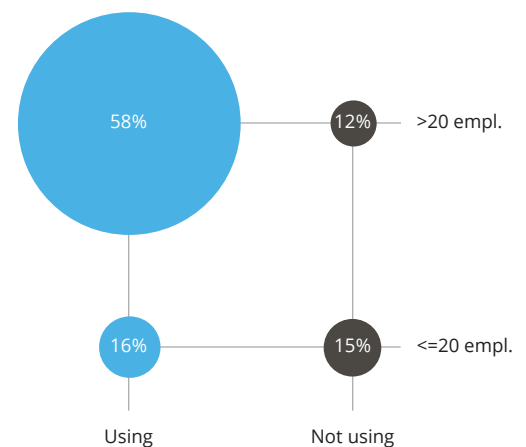
“I don’t see the benefits of using it to control project time/cost. Maybe upper management uses it that way, but I just enter my time and get no value out of the software.”

There were over twenty ERP solutions mentioned during the survey, most of them only used by a couple of firms. This reflects the diversity of ERP software available to AECO firms who do not require industry specific software to do basic tasks like paying employees and billing clients. While ERP software often needs to be localised for each

Does your company use Enterprise Resource Planning software?



Enterprise Resource Planning software use vs firm size



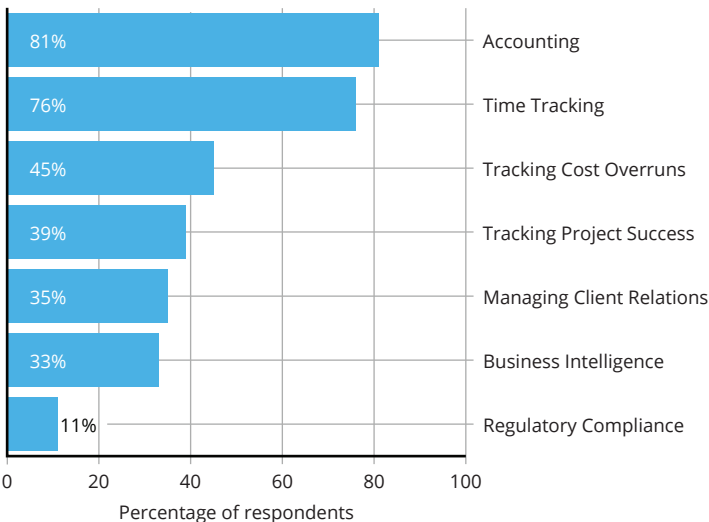
country (sometimes geographically limiting its availability), in our data the only discernible pattern based on location was that Deltek is more popular inside the US than outside. It was also difficult to find associations between firm size and ERP use. Virtually every firm with more than 50 employees uses ERP software, but there seems to be no pattern to the use in small to medium sized firms – a sole practitioner might use it, a firm with a dozen employees may not.

Most firms are using ERP systems for accounting (81%) and time tracking (76%), with only a third

mining the data for business intelligence. The most interesting example of this was a firm that had developed a custom application to track how sleeping and exercise impacted employee productivity. Considering the richness of the data entered into these ERP systems, very few firms are deriving value from the data outside of accounting and time tracking. Most respondents reported that due to the sensitivity of the data, they were unable to access it. Often employees only use ERP systems to enter data, with the aggregate statistics available solely to those in upper management and accounting.

While the majority of AEC firms appear to be using some form of ERP system, most have failed to leverage this data for anything other than simple accounting and time tracking. Integration remains a challenge due the wide variety of software firms are using, and due to the sensitivity of the data. There did not appear to be any firms taking the lead in this area, and it therefore seems likely that the status quo will remain in place, at least for the near future.

Which of the following does your company use enterprise resource planning software for?



Which of the following enterprise resource planning software does your company use?

