

2015

THE 4TH ANNUAL CONSTRUCTION TECHNOLOGY REPORT



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TEXAS A&M UNIVERSITY

 **HCSS** INNOVATIVE
SOFTWARE
FOR THE
CONSTRUCTION INDUSTRY

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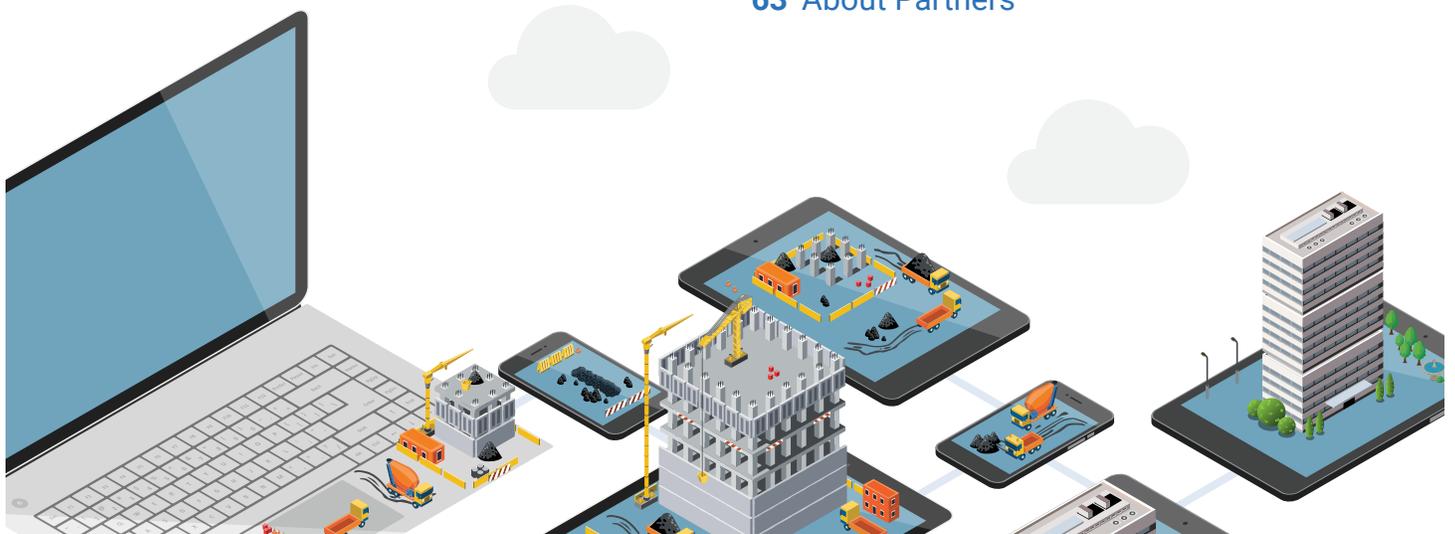
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About the Survey

JBKnowledge, Inc. conducted the first annual Construction Technology Survey in 2012. In providing technology consulting and solutions to firms across the U.S., Canada, Caribbean and Middle East, JBKnowledge found that there was a distinct need to learn more about technology adoption and usage within the construction industry.



Year after year, survey participants are contributing to valuable statistics on cloud adoption, data security, software integration, mobile policies, emerging technologies and ultimately the role of IT in construction companies.

This year, the fourth annual Construction Technology Survey was conducted by JBKnowledge in conjunction with the Construction Financial Management Association (CFMA), the Texas A&M University Department of Construction Science and HCSS construction software. Between June 17, 2015, and July 8, 2015, the survey received over 2,000 responses.

About the Survey

The survey was distributed via email, social media and online publications to over 30,000 construction industry professionals. It is important to note that a statistically relevant number of respondents are users of JBKnowledge and HCSS products, therefore statistics involving mobile apps and invitation to bid software may be skewed. JBKnowledge has made significant efforts to distribute this survey to as broad of an audience as possible to mitigate statistical bias.

On all questions with answer choices that were not simply “Yes/No” or a ranking system, survey respondents could select multiple answers. **For this reason, only percentages that are displayed in a pie chart will add up to 100%.**

Lastly, it is important to note that 2,044 total responses were logged for this survey. To ensure statistical relevance, however, 424 of those responses were removed for one of the following reasons: 1) The participant was a CPA, consultant, educator or services/technology provider who could not provide feedback on how the solutions and strategies mentioned are used in construction operations; or 2) The participant did not provide enough answers to hold statistical significance.

This report reveals the comprehensive results from the 45 question 2015 survey with commentary and analysis from the perspective of a construction technology solutions provider. As we develop the 2016 survey, we encourage readers to send feedback, recommendations or press inquiries to:

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Foreword

When we started this survey in 2012, we hoped to get at least 300 people to fill it out. To have over 2,000 participants in 2015 is pleasing to say the least. Each new participant gives us valuable insight into how a construction company operates with or without technology. It helps tremendously that we have partner organizations like the Construction Financial Management Association (CFMA), Texas A&M's world-renowned Construction Science Department, and HCSS Construction Software to add relevance and credibility to the distribution and publication of the report.

First let me say thank you to every participant who took a few minutes to complete this survey. We trust that the contents of this report will be well worth your time and hope you'll let us know if they are not.



In its fourth year, I would argue that this report has more relevance than ever, not only due to the number of survey respondents but also due to the historical data. Most of the analysis in this report compares at least 3 years of survey data.

As the owner of a technology company and lifelong technologist, every year I'm tempted to focus this survey on emerging technology, but the reality is that our industry still isn't doing enough with existing technology or with technology budgets. Anyone who has attended one of my speaking engagements knows about my mission to eradicate our industry of spreadsheets, create a culture of tech R&D and boost IT budgets to at least meet, if not exceed, the averages of other industries.

That being said, this year's survey did show some progressive companies looking into drones, virtual reality, 3D scanning and more. It also revealed that, although in a minority, some companies are actually investing in R&D departments and have turned their technology departments into revenue generators. I dream of how these numbers will look in a decade if we can pull together as an industry and reprioritize our investment.

Foreword

As you get into the report, I'll leave you with two questions to mull over. How are you contributing to your company's tech innovation? How can you as an individual create a culture of research, development and tinkering that proves tech advancement can create ROI and not just expenses?

We hope that this report gives you, not just your company, the data to make more progressive technology decisions.

Sincerely,



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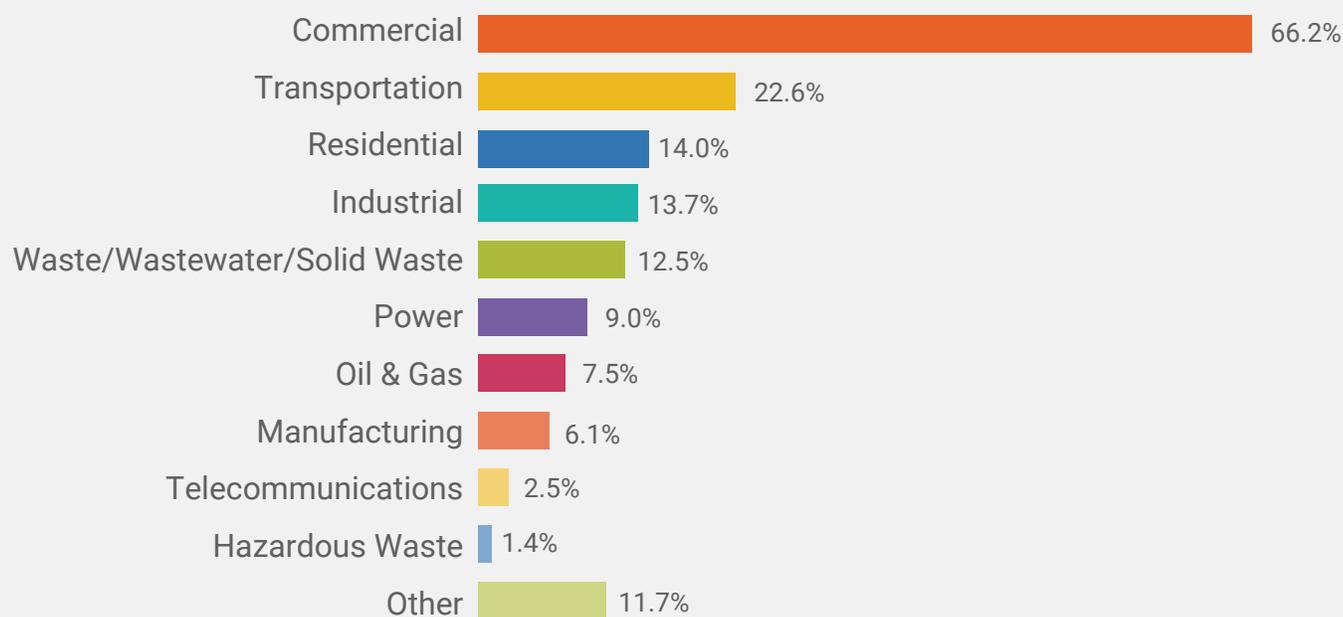
 [jbenham](https://www.linkedin.com/in/jbenham)

Survey Participants

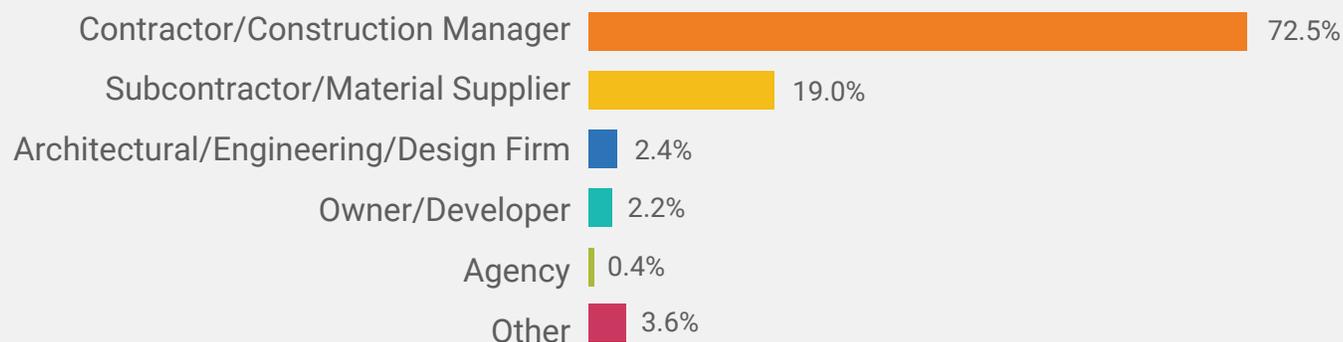
Learn about the companies and individuals who participated in the 2015 Construction Technology Survey.

Industry, Type & Role

INDUSTRY TYPE

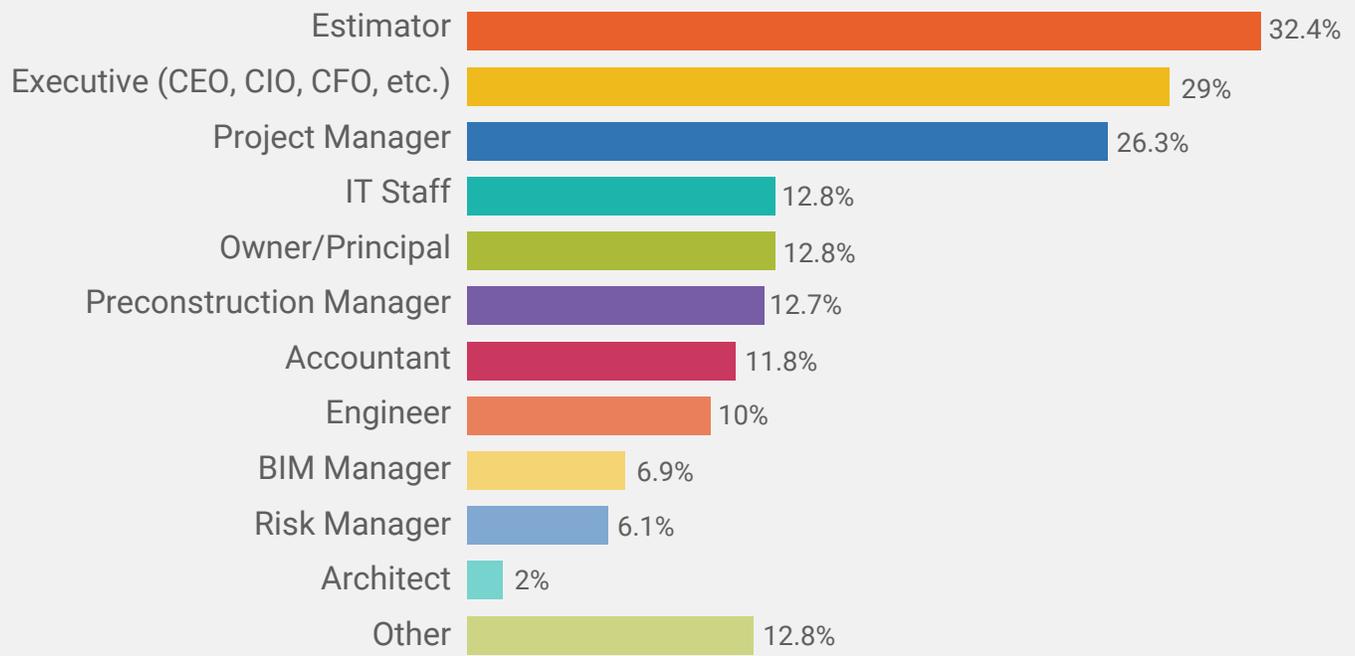


COMPANY TYPE



Survey Participants

ROLE



From Risk Managers to BIM Managers to Project Managers, professionals from a wide variety of roles completed this year's survey. **The breadth of roles filled by survey respondents illustrates the importance of, and interest in, technology across departments and processes.** The majority of respondents being Estimators, Executives and Project Managers should not be surprising. An estimator's role involves a large amount of data computing that technology can alleviate. Considering an estimator's data is integral to every step of the project after preconstruction, technology is a growing concern and focus for this role. Thanks to survey partner, CFMA, this survey reached a wide audience of decision-makers in a financial role. Executives, especially those in a CFO role, have final say on all technology purchases and the number of CFOs who took the time to complete the survey bodes well for the future of construction leadership. Top-level managers are either technologically savvy, curious or hoping to be in order to make the best technology decisions for their companies. As for project managers, they coordinate people, processes and data between so many stages of construction that forgoing technology is not an option.

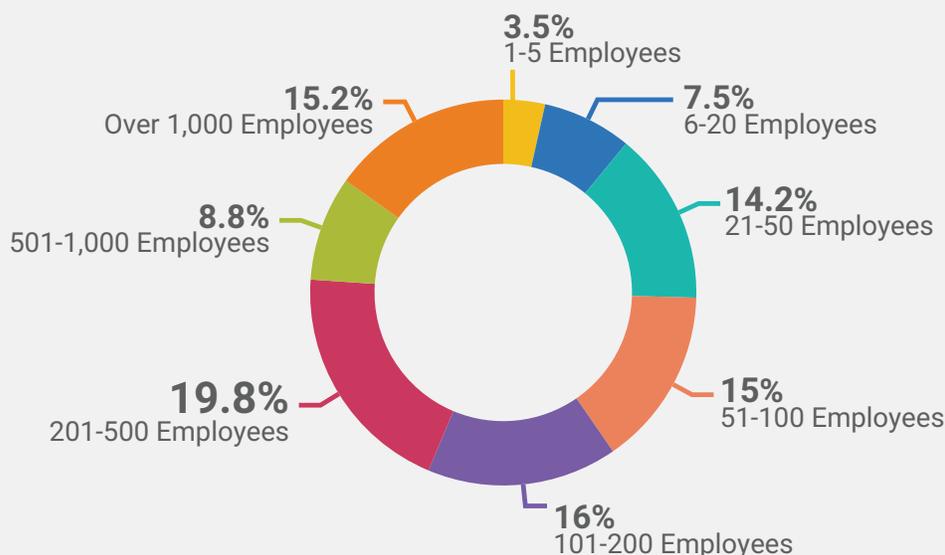
Survey Participants

These 2015 Construction Technology Survey results represent a variety of roles in companies of many sizes, but are heavily representative of prime contractor companies in commercial construction. Whether or not commercial builders have the most interest in technology or were simply the largest portion of the distribution list of the survey is hard to say. Commercial builders do have the widest breadth of project types, from skyscrapers to museums, and so may have more flexibility in terms of technology requirements, adoption and regulation. Prime contractors also manage more parts of the building process, needing more technology solutions than, for example, an electrical subcontractor or an architect who may use one or two software solutions at most.

Company Size and Sales Volume

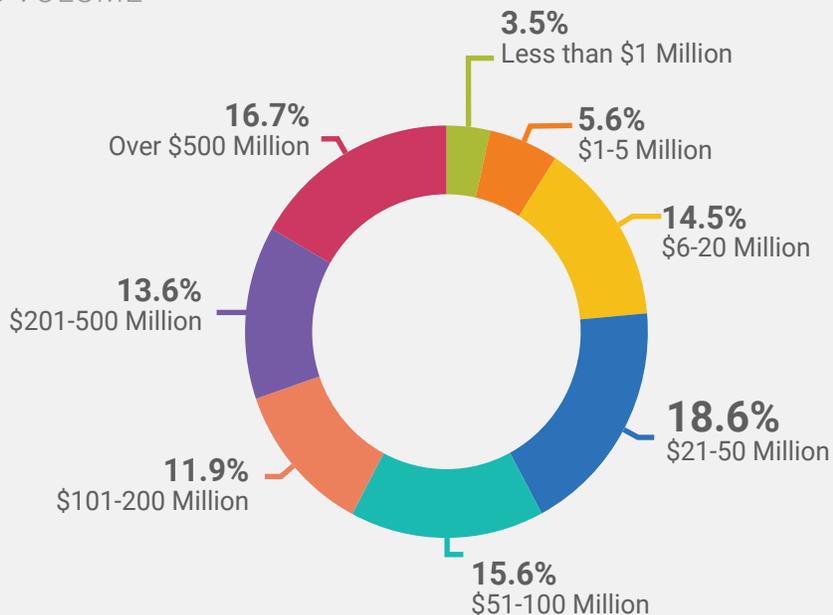
While the largest portion of survey participants came from companies with over 200 employees and over \$500 million in annual sales volume, the survey garnered participation from companies of all sizes. It is important to note that comments in the survey indicated that many builders were not sure how to define their company size, whether or not to include contractors, site workers, subsidiary offices, etc. The largest companies surveyed, by employee size and sales volume, build in the commercial and transportation industries.

SIZE OF COMPANIES



Survey Participants

ANNUAL SALES VOLUME

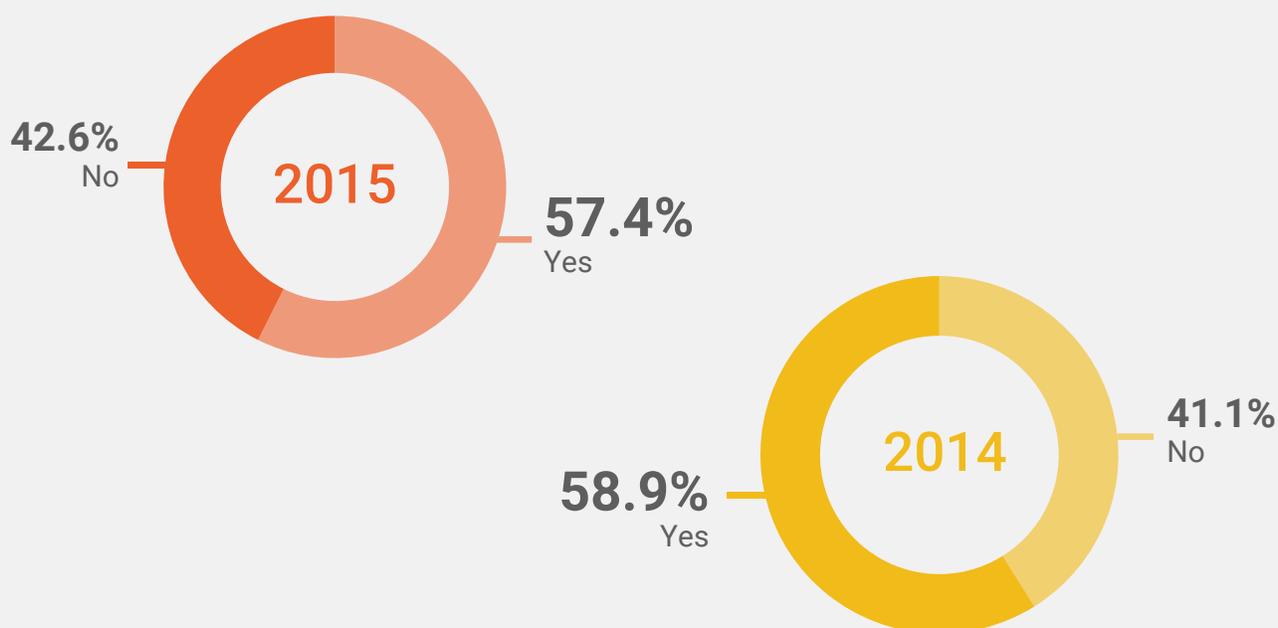


Throughout this report, statistics reveal how the construction industry is both succeeding and failing at keeping up with technology - but the good news is that the right people and the right companies are interested to know how they can improve.

IT Departments

Learn how construction companies are staffing, budgeting and researching technology resources.

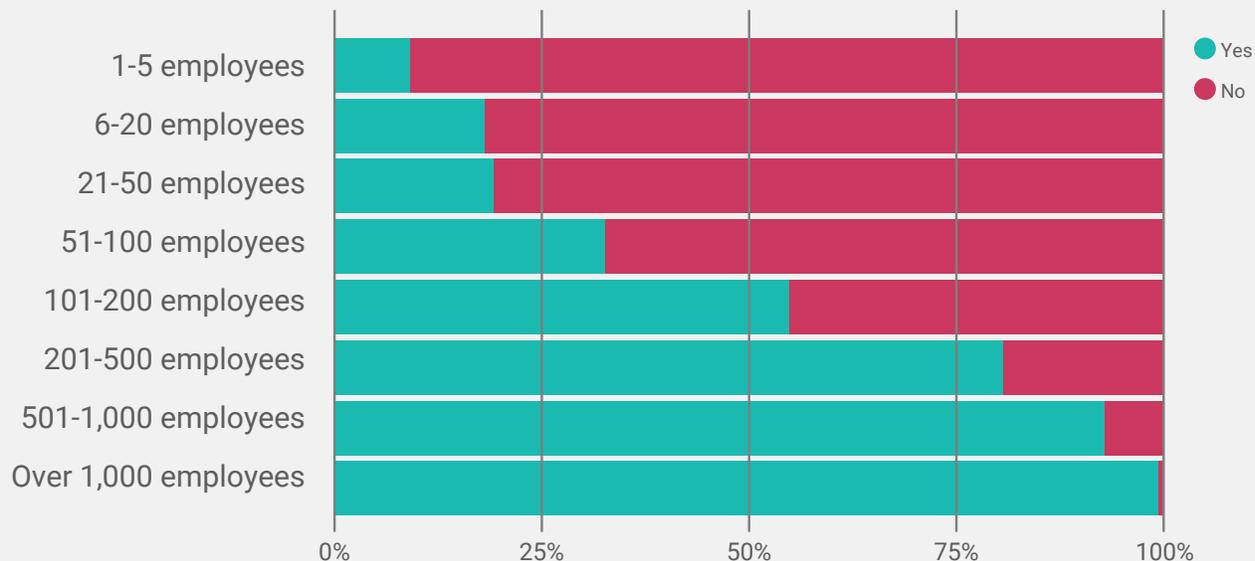
DEDICATED IT DEPARTMENT



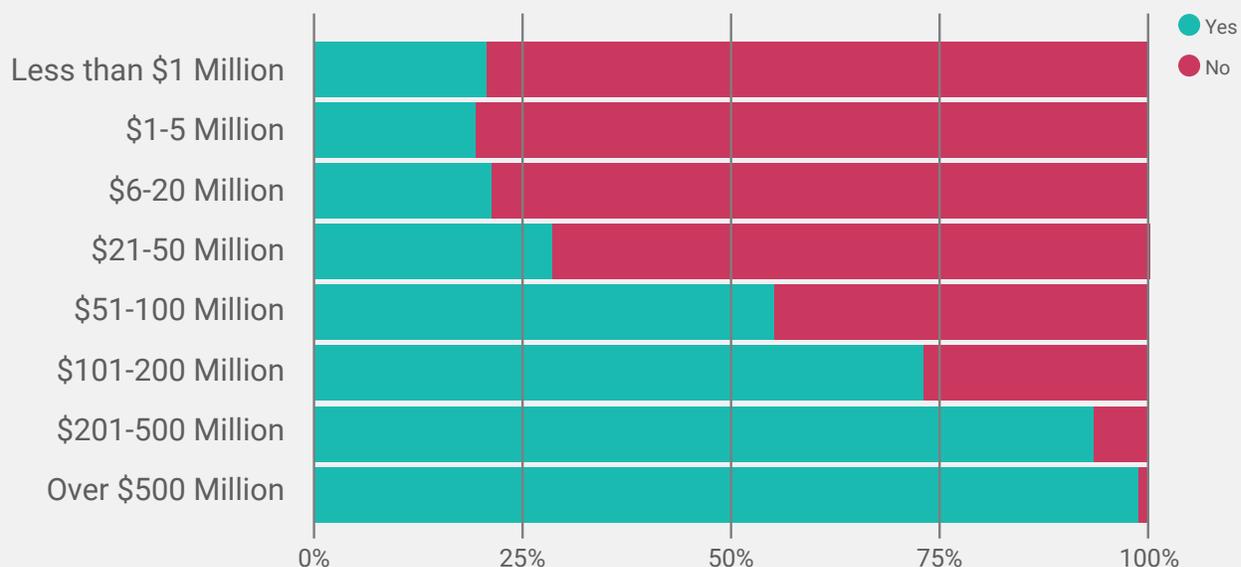
The number of surveyed companies with dedicated IT departments did not change significantly in the last year. Over 40% of survey respondents do not have a dedicated IT department at their companies. The likelihood of having an IT department increases the larger the company size and the more the sales volume (as shown on the next page). With more than 100 employees or \$51-100 million in annual sales, a company is more likely to have an IT department than not. 90% of companies with over 500 employees and \$200 million in sales have IT departments. Interestingly, between \$1-20 million in sales volume, the percentage of companies with IT departments remains consistent around 20%. According to the survey, construction companies in the power industry are the most likely to have IT departments.

IT Departments

PRESENCE OF IT DEPARTMENT VS. NUMBER OF EMPLOYEES



PRESENCE OF IT DEPARTMENT VS. ANNUAL SALES VOLUME



IT Departments

However, just because a company lacks an IT department doesn't necessarily mean no employees are dedicated to IT. Companies are outsourcing to third party companies with at least one staff member from those third parties available for on-site support. Companies are also assigning IT duties to technologically savvy employees or those heavily involved in a solution's usage or implementation.

Survey participants commented:



"We outsource to a third-party vendor, but they provide one person as an on-site help desk."



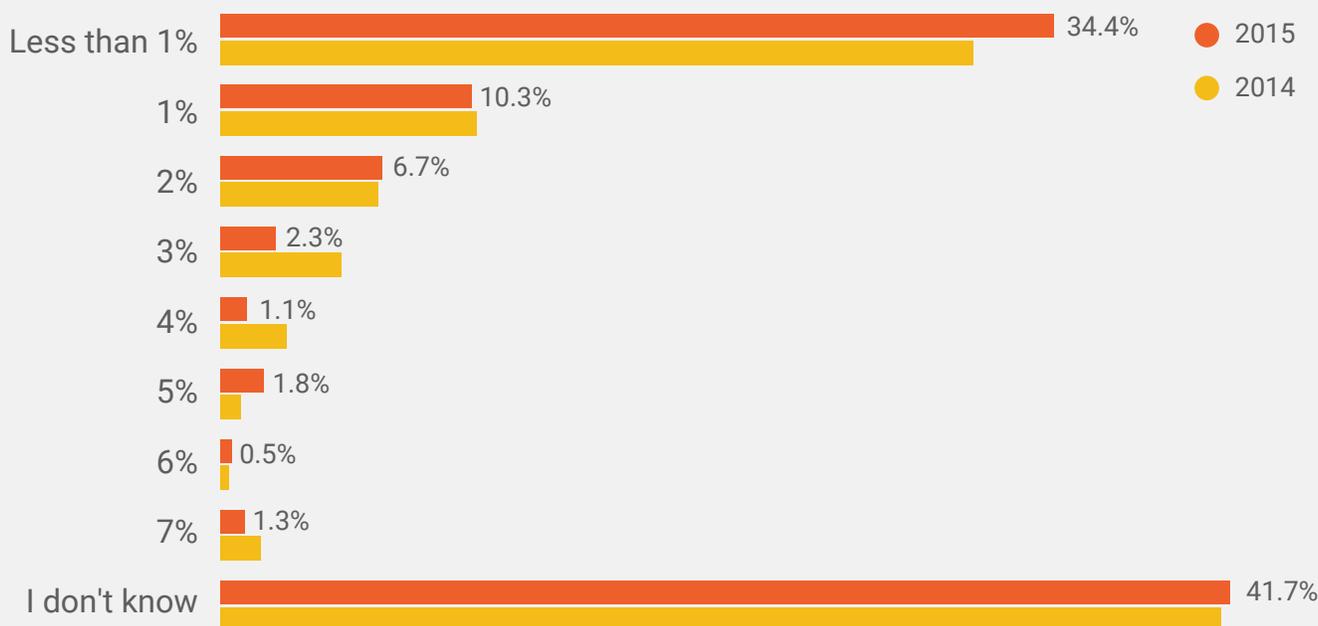
"Several people handle various aspects of our IT needs - one person handles the on-site server & all office machines, one person handles all field/operations technology & training, and one person (CEO) handles all social media and business development/marketing."



"No, we did in the past, but it was more trouble than it was worth... Well at least with the employee we hired. haha"

IT Budget

PERCENTAGE OF CORPORATE REVENUE SPENT ON IT



IT Departments

Corporate revenue is defined as the fees the corporation bills out on projects as either profit or overhead charges. Gross billings are not used to define corporate revenue because, for the purposes of this survey, the answers would be a fraction of a percent.

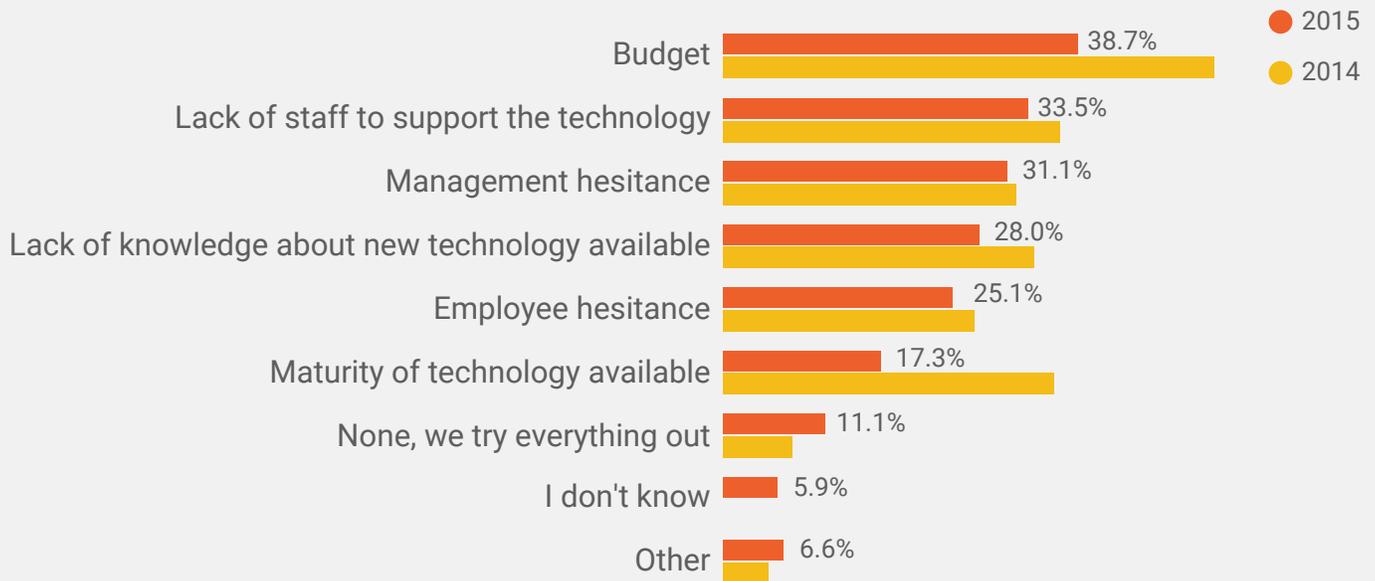
The largest number of those surveyed do not know their company's IT budget as a percentage of corporate revenue. Those who do, say it is less than 1%. Under 1% was the most frequent answer, no matter the revenue of the company, indicating that IT spend is a portion of profit, but not proportional to it. Digging deeper into the responses revealed that over 10% of accountants and executives surveyed responded "I don't know" for their company's IT spend as a percentage of revenue.

Computer Economics notes that across all industries, companies spend an average of 2.5% on IT as a percentage of revenue, while **other reports estimate** a cross-industry average of up to 5%. **Fortune asserts** that the most innovative companies are spending anywhere from 3.5-20% of revenue on research & development alone. **Out of 19 industries**, construction allocates the least amount of revenue (1%) for technology, according to Gartner. This was confirmed by the Construction Technology Survey results in 2014 and again this year. All of this means that the construction industry underspends cross-industry averages by 60% to 70% - a staggering number.

Who decides IT budget? How is it decided and communicated? Both of these questions were asked in survey comments and could be added to future surveys. According to Gartner, Construction is the 3rd most likely industry to outsource IT, **with 16% of IT spending being outsourced**. This suggests that many construction companies are running IT with a combination of "unofficial" staff and advising third-party vendors.

IT Departments

THE MOST LIMITING FACTOR IN ADOPTING NEW TECHNOLOGY



Other included:

- Time Data security
- Integration with other systems
- Off-the-shelf products do not meet our external customer requirements
- Difficulty identifying an owner/champion for the solution

Survey respondents were asked to identify the most limiting factors in their companies adopting new technology. Budget was the most common answer, followed closely by lack of staff to support the technology. Maturity of technology available was less of a factor to builders in 2015 than in 2014 when adopting new technology. Only 11.1% of companies claim to “try everything” and have no limitations to technology adoption.

IT Departments

It's interesting to note that the companies that do "try everything" were the smallest companies surveyed, building \$1-5 million in sales volume annually. Smaller companies may allow more flexibility, even if the budget is smaller, in R&D than larger companies. For companies this size, "management hesitation" and "maturity of technology" were also least likely to be factors in technology decisions. Perhaps this is due to an agile startup mentality, smaller, more controlled R&D efforts, or more direct communications between all parties needing tech at a small company.

The fact that "maturity of technology" is no longer a leading concern could be attributed to the mergers and acquisitions across tech firms in the construction industry over the last year. These partnerships have brought cash flow and brand recognition into the industry's emerging technology, with trusted records of technology deployment. Whether industry tech is truly maturing or just appearing to have matured, it will continue to drive innovation and adoption forward, if IT budgets can keep up.

Survey participants commented:



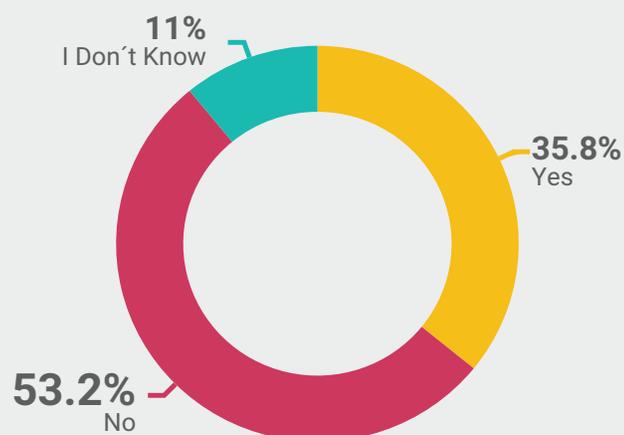
"Technology needs to solve a problem I have - not be a solution in search of a problem."



"We have set up a Technology Committee to explore all new technology to see if it will work for our business model."

IT Departments

BILLING IT EXPENDITURES TO PROJECTS



This year the survey included a new question on whether contractors are billing IT expenditures to their projects. The comments from survey participants clarified both Yes's and No's as "it depends on the expense." Most companies are hesitant to calculate and separate out the expense of enterprise technology used for specific projects, at the risk of having to justify the expense to clients. Hardware used on the job site and BIM costs are more likely to be billed to the project because the expense is much more transparent and measurable by project.

At the end of the day, companies should explore all possible ways to turn their IT departments into revenue generators, instead of just revenue spenders, or at the least recapture IT expenses wherever possible.

Survey participants commented:



"Only if it is being used on site, like cell phones and phone circuits. We don't allocate corporate IT costs to the job, we keep it in overhead."

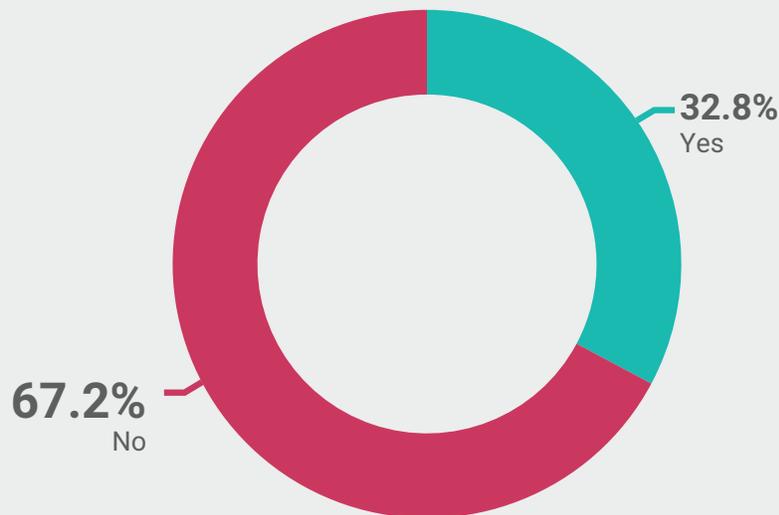


"Depends on the IT expense. Project specific (project management, scheduling, BIM software) are typically charged, as well as computing for project management staff."

IT Departments

R&D Department

DOES YOUR COMPANY HAVE A R&D DEPARTMENT?



The majority of companies surveyed, no matter their size, do not have research and development departments for technology. The likelihood of having a department dedicated to R&D increased as the size of the company increased. A company with more than 1,000 employees or \$500 million in revenue is more likely than not to have R&D. According to the survey, builders in the oil and gas industry are the most likely to have R&D departments.

Many companies tend to have "a person" who experiments with new technology or processes, but usually that person has three or more other roles. This is not the same as having a dedicated department, or at least one dedicated person, whose sole responsibility is exploring new technologies and processes from which the company could benefit.

Survey participants commented:



"I believe this is a huge mistake in my industry. No company that I know has any R&D budget of any kind."



"We have money budgeted, but not a dedicated department."

IT Departments

IT Roles

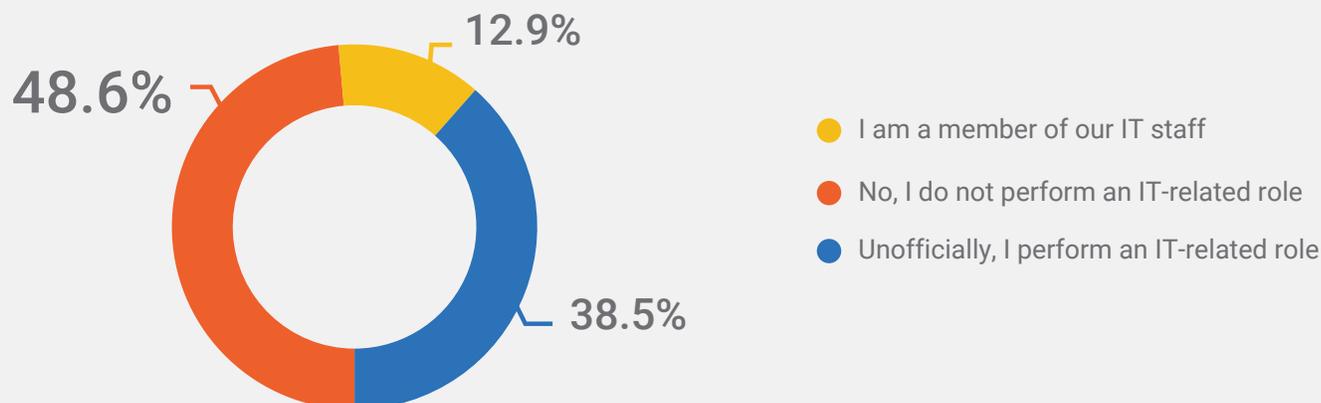
When asked their title as an IT staff member, participants' answers included:

- Application Development Manager
- BIM Manager
- Business Applications Analyst
- CAD Support Specialist
- Chief Analytics Officer
- Chief Estimator
- Chief Executive Officer
- Chief Financial Officer
- Chief Information Officer
- Chief Operating Officer
- Chief Technology Officer
- Computer Technician
- Construction Technology Lead
- Controller
- Designer
- Developer
- Director of Marketing
- Director of Virtual Construction
- Director, Architecture & Application Services
- Director, Construction Technology
- Director, Engineering Information Systems
- ERP Manager
- Estimating Manager
- Executive Manager of Information Technology
- Executive Vice President
- Facilitator to 3rd Party Vendor
- Field Solutions Manager
- Financial Manager
- General Accounting Manager
- General Manager
- IT Administrator
- IT Consultant
- IT Coordinator
- IT Manager
- IT Specialist
- IT Support
- Office Manager
- Operations Director
- Owner
- President
- Project Manager
- Senior Business Analyst
- Solutions Architect
- Systems Analyst
- Systems Manager
- Technology Advisor
- Technology Committee Member
- Technology Team Leader
- VDC Director
- VP of Information Technology
- VP of Operations

IT Departments

IT Staff

DO YOU PERFORM AN IT ROLE FOR YOUR COMPANY?



More than one third of survey participants indicated they perform IT roles, although unofficially. The numbers in this graph correlate with the size of IT budgets and staff detailed in this report. Only 12.9% of the over 2,000 construction professionals who took the survey perform an official IT role.

Survey participants commented:



"Ask Travis" is the title.



"IT Guy by default."



"Unofficial fixer of all problems."

Employees, especially the tech savvy millennials, are absorbing IT functions by default, by performing support, maintenance and training to help out understaffed IT departments. The role of the IT professional needs to be redefined in today's construction companies. The majority of those who perform an "unofficial" IT role work for companies with 21-500 employees. For other companies, the IT functions are more appropriately confined to dedicated IT staff. Survey participants cited the total number of employees as the most influential variable in determining the size of IT staff - however the IT staff to company size ratios mentioned previously in this report do not support this reasoning.

IT Departments

Survey participants commented:



"I lead the technology committee. In addition, as someone up-to-speed on technology, I am often asked to perform IT tasks/troubleshooting by co-workers."



"We outsource our IT dept. Even though they are very responsive, my staff and CFO come to me first with their IT problems in case I know the solution."

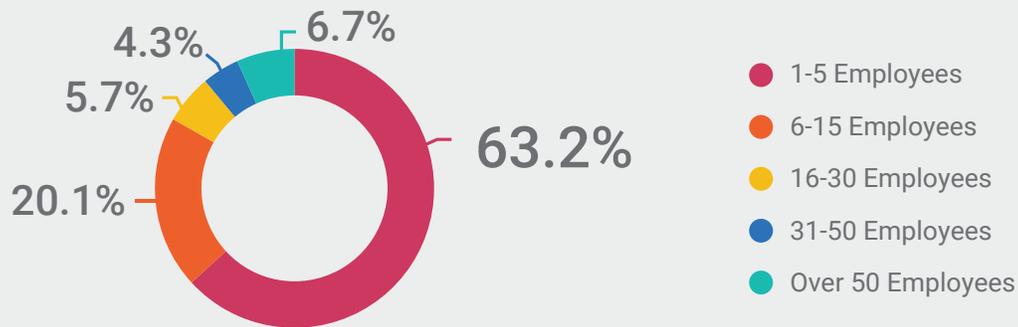


"IT at my company is strictly nuts and bolts. In no way do they help with software implementation of any kind."

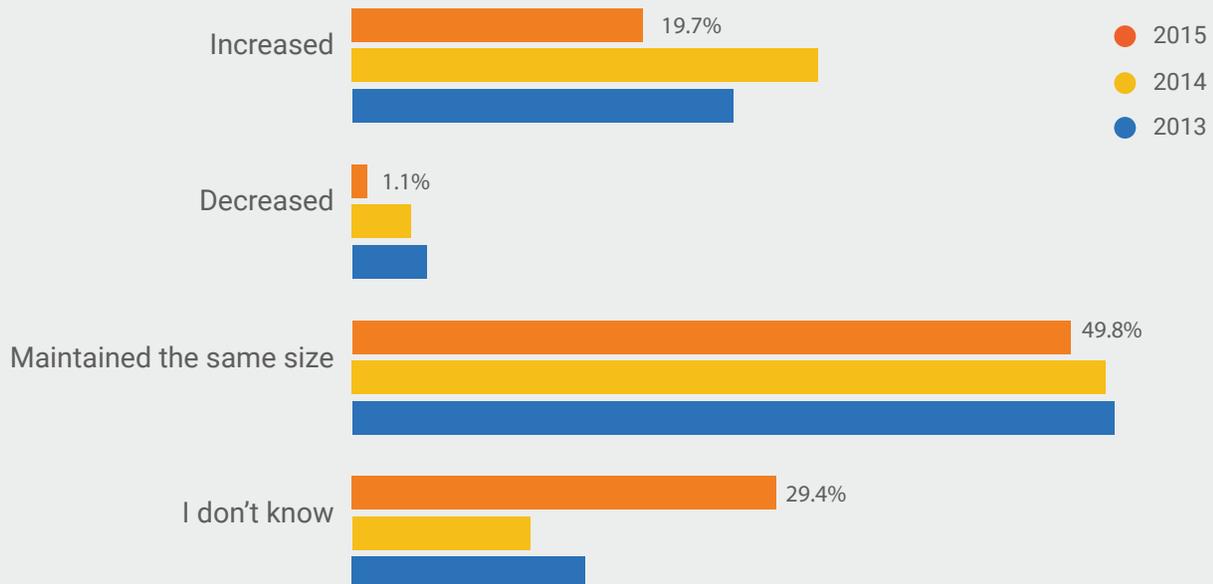


"As a millennial and senior project manager, I've been in an unofficial role of IT/Ops coordinator."

NUMBER OF EMPLOYEES DEDICATED TO IT



SIZE OF IT STAFF

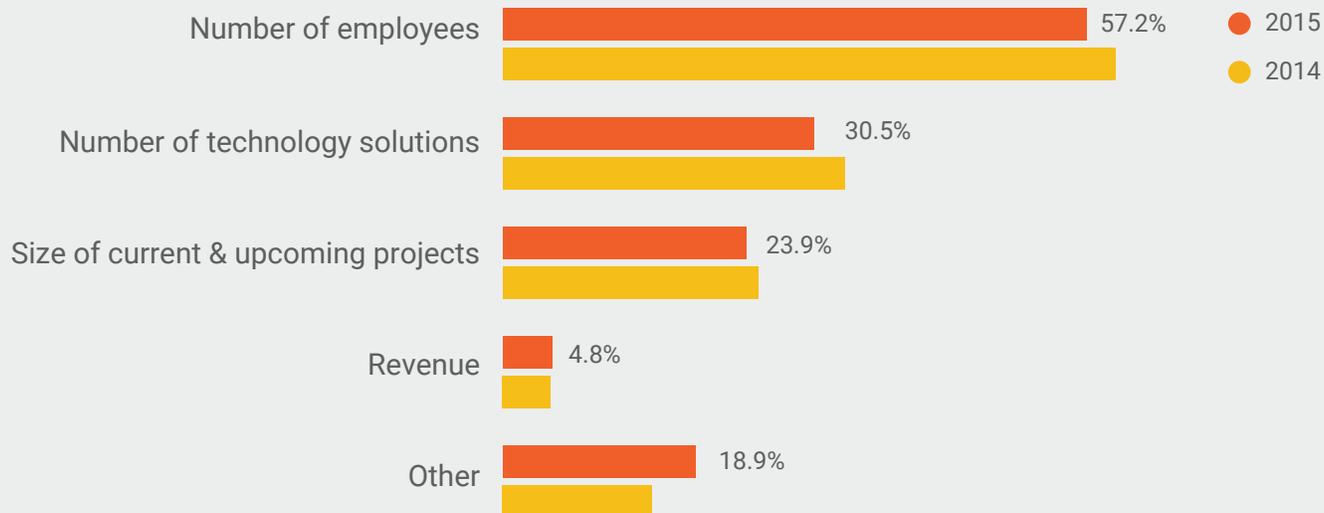


IT Departments

Regardless of size, 63% of construction companies have IT staffs of 5 employees or fewer. Only with more than 1,000 employees and over \$500 million in sales volume are companies likely to have more than 5 employees dedicated to IT, and the IT staff size for those large companies is only likely to jump to 6-15 employees. In 2015, less companies plan to decrease their IT staff size than in 2013 and 2014.

Though it is recommended to have dedicated IT staff in-house for at least hardware and infrastructure management, technology strategy and leadership are important as well. Companies can take a hybrid approach, hiring critical staff in-house and using consultants for strategy and leadership decisions until they are large enough as a company to hire a properly staffed department.

SIZE OF IT DEPARTMENT DEPENDS ON



IT Departments

The factors that influence the size of IT departments have not changed significantly since the 2014 survey was conducted. Survey participants cited the number of employees as the most influential variable and budget as the least influential variable in determining the size of IT staff.

The number one “Other” answer was “Workload” meaning that almost 20% of survey respondents base the size of their IT staff on how stressed out the IT staff is. Companies need to take a more proactive, strategy-based budgeting approach, setting budgets based on what tools, processes and people are necessary to fulfill the company’s core strategic objectives.

One survey participant commented:



“No measure stick available. It’s how much work is on the plate. If it gets crazy I will augment the staff with contractors.”

These statistics show that construction companies are lacking in structure, staff and budget for information technology - and most of them are aware of it. Employees filling unofficial roles in IT are band-aids on resource gaps, but not fully trained and equipped IT professionals. This becomes even more evident in the next section of this report on cloud security measures.

In general, these statistics and comments from participants indicate that companies do not have a clear and communicated strategy when budgeting for IT, therefore needs and allocated resources do not align. Most builders have a set mission and objectives within their space, as far as the projects, clients and employees they seek and maintain. For most companies, technology is not given a detailed role within that mission.

Cloud Security

Learn how construction companies are using and securing data in the cloud.

Software Allowed in the Cloud



Due to comments from survey participants that show a misunderstanding of what “cloud” means, every year we start this report’s cloud security section with a definition of “cloud computing” as defined by The National Institute of Standards and Technology (NIST):



“Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or service provider interaction.”

To simplify this statement, ‘the cloud’ is computing, storage and data transmission that is available anywhere, anytime, on any device, in any capacity or location desired.

Cloud Security

Every year, the type of software allowed in the cloud stays fairly consistent; however this year it appears companies are allowing less data in the cloud in 2015, no matter what the data is. Invitation to bid and plan room software remains the most likely solution in the cloud, due to file sharing and collaboration necessities. Accounting remains the least likely department to have data stored in the cloud, due to the sensitivity of financial data and an irrational fear of cloud-based solutions. Companies are not truly recognizing that digital data is equally at risk whether it is on premise or in the cloud.

One of the biggest security threats to companies in 2014 was CryptoLocker, a ransomware trojan that infects on-premise solutions and encrypts hard drives until the user pays a ransom to get it unencrypted. This illustrates that companies need to take ALL data security seriously. Whether on-premise or in the cloud, companies should focus on the most secure solutions for scalability, portability and ease of use.

Cloud Security Policies & Procedures

METHODS OF SECURING CLOUD DATA



Other included:

- Active Directory
- Periodic Virus and Phishing Alerts
- Virtual Computing (no local data/computing)

Cloud Security

Survey participants using cloud solutions were asked how their companies are securing those solutions. **The results show a severe lack in cloud security methods, with employee training being the most widely used method, but at less than 50% of cloud-employing companies.** Over 20% of construction employees surveyed do not know if their companies have cloud security policies or procedures.

No matter the number of cloud solutions employed, the policies and procedures to secure those solutions are not in place at construction companies. **The lack of cloud security policies and procedures can most likely be attributed to understaffed IT departments.** Most employees are stretched to unofficially perform IT functions outside of their primary roles and to add policy development and enforcement to their “extra duties” would not be welcome. In addition, employees performing IT functions “by default” are not fully trained and equipped IT managers. They often specialize in deployment and use of software, without a thorough understanding of the more technical details and consequences of the solutions. From comments on this survey, it is apparent that IT staff is comprised of either the hardware manager making sure the network wires are intact or the estimator showing everyone how to use the latest software. There is a major void between these two roles, where a data security or risk manager would operate.

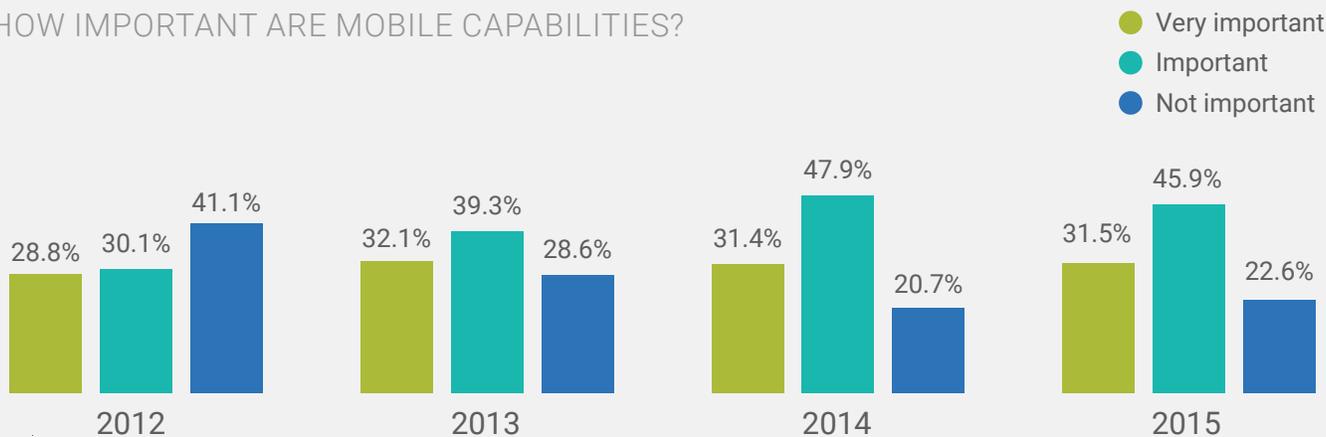
The only encouraging news from this survey section is that the number of construction professionals who say their company has no cloud security policies or procedures has dropped by almost 50% since 2014.

Mobile Technology

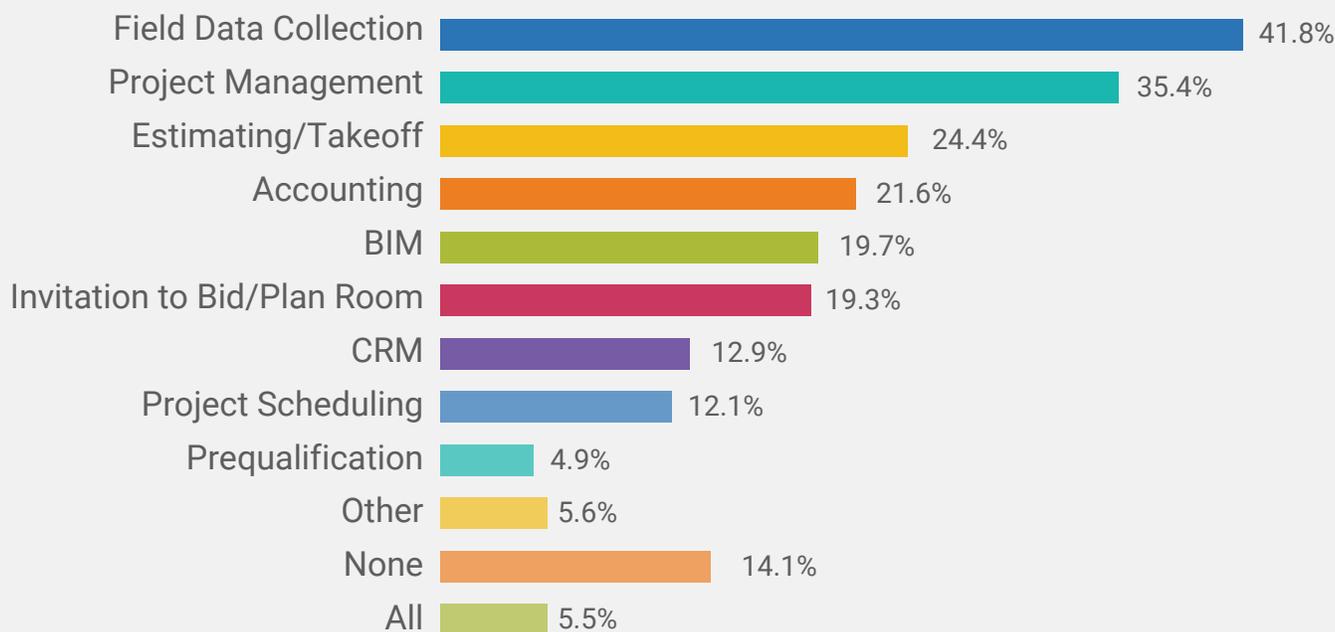
Learn how mobile strategy, applications, hardware and policies are impacting project data accessibility.

Is Mobile a Priority?

HOW IMPORTANT ARE MOBILE CAPABILITIES?



SOFTWARE PROVIDERS THAT OFFER MOBILE APPS



Mobile Technology

Most construction professionals in 2015 consider mobile capabilities important, but not very important, when purchasing software. **Field data collection and project management solutions are the most likely to have full mobile capabilities, while project scheduling and prequalification are the least likely.** The number of builders using an invitation to bid or plan room software that provides mobile capabilities dropped to nearly half of 2014's numbers.

Between 2013 and 2014 this report saw a big shift in the importance of mobile capabilities that did not occur again between 2014 and 2015. Would survey participants' responses change if asked the importance of mobile for each category of software? If builders' expectations of their software's mobile capabilities are not high, it's because technology providers are setting them too low. In consumer technology today, consumers expect every new technology they adopt to come with a mobile component - most often, an app. The same expectation has not made its way into all business technology, especially not construction.

It's surprising to see accounting software more likely to offer mobile apps than BIM, invitation to bid and CRM software - but this could be attributed to most accounting software's integration with project management suites. CRM solutions have a major opportunity to step up offerings in both cloud software and mobile applications and put client relationship details at the fingertips of those charged with managing them.

Survey participants commented:



"It depends on the software. If we expect it to be used in the field, it must have mobile capabilities. If it is for back-office staff, it doesn't require mobile capabilities."



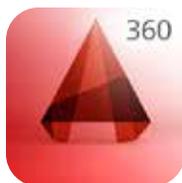
"Our ERP vendor would say they have mobile tools, but I disagree. A few slices of the application can be available if it would ever work... which it doesn't."

Mobile Technology

Top Mobile Apps



About Time



AutoCAD 360®

Bentley
Navigator®

BIM 360™ FIELD



BIM 360™ GLUE



BIMx™



BlueBeam®

Construction
Master 5DeWALT
Mobile Pro™

Explorer Software



HCSS



iAuditor™



Multivista



NoteVault



PlanGrid



Procore™



Prolog Mobile



Sage Construction



SmartBidNet®



SmartReality®

The top 20 construction mobile apps currently in use by survey participants range from augmented reality to time tracking to document management solutions. For the second year in a row, **Autodesk®** led the pack with three apps in the top 20.

Mobile Technology

Mobile Devices & Operating Systems

DAILY DEVICE USAGE



LAPTOP



TABLET



SMARTPHONE



WEARABLE

2015

Total
Personal
Company

85.6%
23.3%
91%

69.4%
38.9%
74.5%

97.6%
35.9%
81.1%

9.2%
71.4%
33.3%

2014

Total
Personal
Company

63.9%
27.4%
86.3%

50.1%
48.8%
60.1%

72%
41.6%
72.3%

2013

Total
Personal
Company

83.3%
40.6%
79.2%

53.1%
62.7%
52.2%

91.4%
48.6%
71.5%

Device usage has increased since 2014 across the board for laptops, tablets and smartphones. Wearables were added to the 2015 survey and 71.4% of those in use are personal wearable devices. (For more details on the types of wearables in use, see the Emerging Technology section of this report.) Over 80% of companies are providing both laptops and smartphones to employees. The number of companies providing tablets increased by over 20% since 2013.

Survey participants commented:



"BYOD - We pay a monthly stipend for tablets and smartphones."

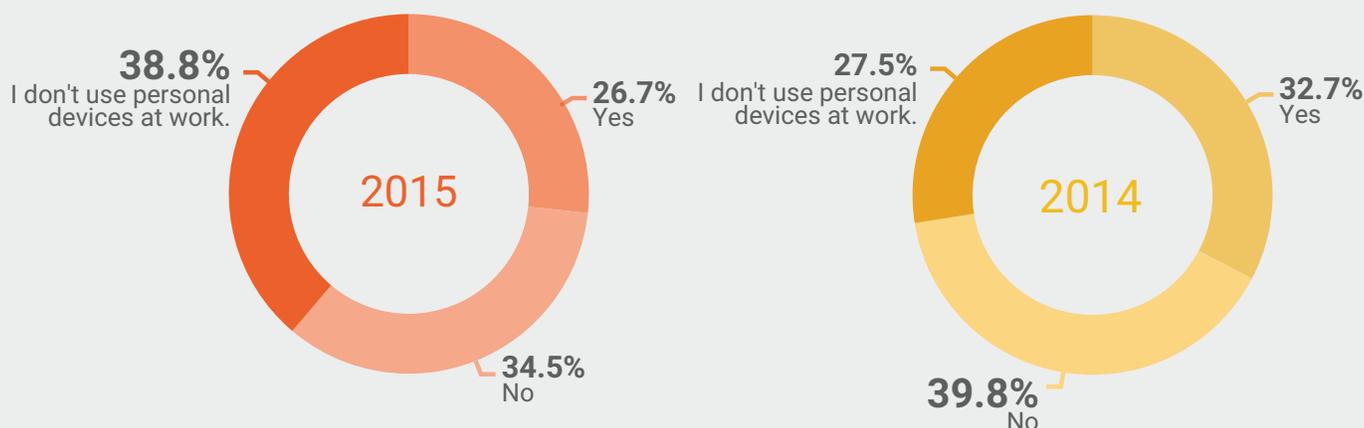


"I wouldn't call it a "smart" phone."

Mobile Technology

As for hardware, construction companies are supplying more devices to employees than ever before, most likely as a way to curb data security threats and transparently bill hardware to projects. The downside is that, as noted in the Cloud Security section, companies are not detailing the policies and procedures employees should follow while using that hardware.

DO COMPANIES SECURE PERSONAL DEVICES?



Because more companies are supplying devices, fewer builders are using personal devices at work in 2015 than 2014. However, over 30% of respondents are using personal devices at work that their companies neither secure nor have policies in place for data stored on them. When asked if devices are allowed on the construction site, 98% of builders who took the survey said yes. Those who said no cited safety hazards or client restrictions.

Survey participants commented:



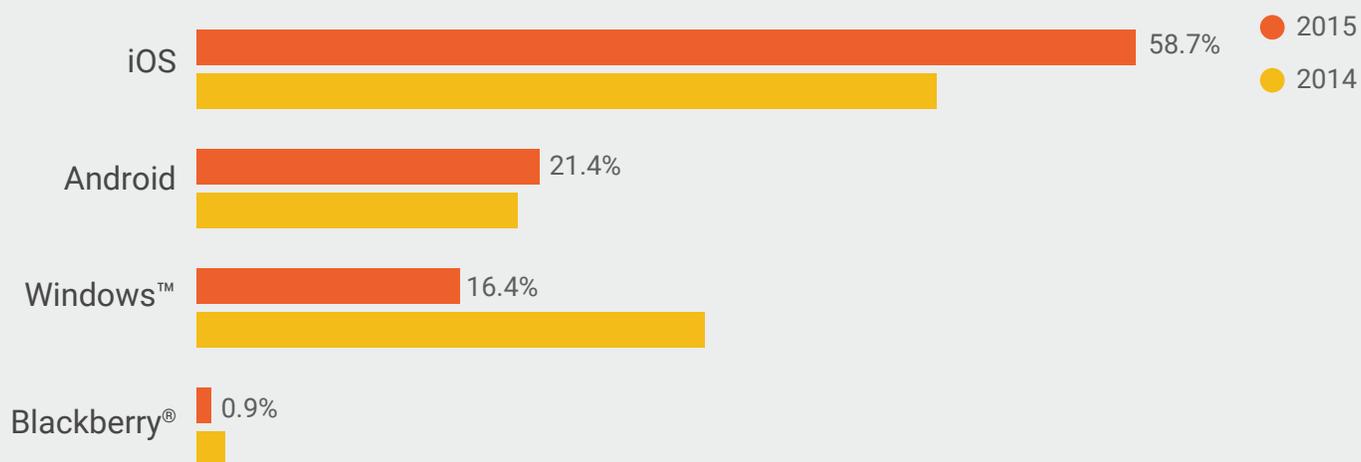
"Users must sign an agreement to have the device "bricked" by the company upon termination of employment."



"My smartphone isn't secured by my company but I only use it for making phone calls, not active work-related items."

Mobile Technology

MOBILE OPERATING SYSTEMS IN USE



When it comes to mobile operating systems in use for construction, iOS continues to lead the way and is used on nearly 60% of mobile devices, up 15% from 2014. Android maintains a market share on roughly 20% of builders' devices and Windows™ dropped 50% in usage from 2014 to 2015.

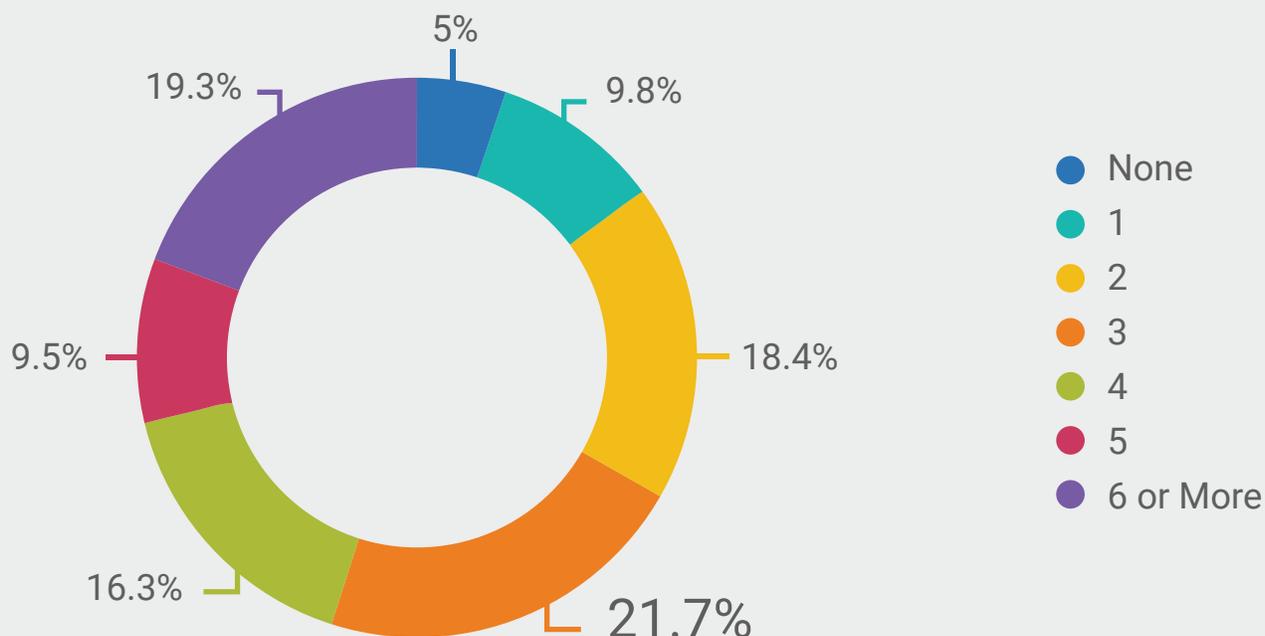
Where have all the Windows devices gone? 15 of the top 20 construction apps listed in this report offer both an iOS and Android version of their application, yet nothing for Windows. **iOS continues to lead the way because iOS is the preferred consumer operating system and the more easily people can translate their work technology by referencing their personal technology, the better.** Despite this, don't rule out Windows. Devices like the new Surface Pro 4, running Windows 10, are powerful mobile solutions. It easily performs both the features of a tablet and a laptop while providing the ability to run legacy Windows applications like Excel - an application that many builders in this survey are dependent on.

Software Integrations

See how well builders are integrating data across construction software.

Number of Software Applications

NUMBER OF APPLICATIONS USED DAILY



In 2012 and 2013, this report revealed that most builders were using over six software applications in their construction roles. **In 2014 and 2015, that number dropped to an average of 3 software applications used daily.**

Survey participants commented:



"One ERP system with 6 out of 10 modules being used effectively."

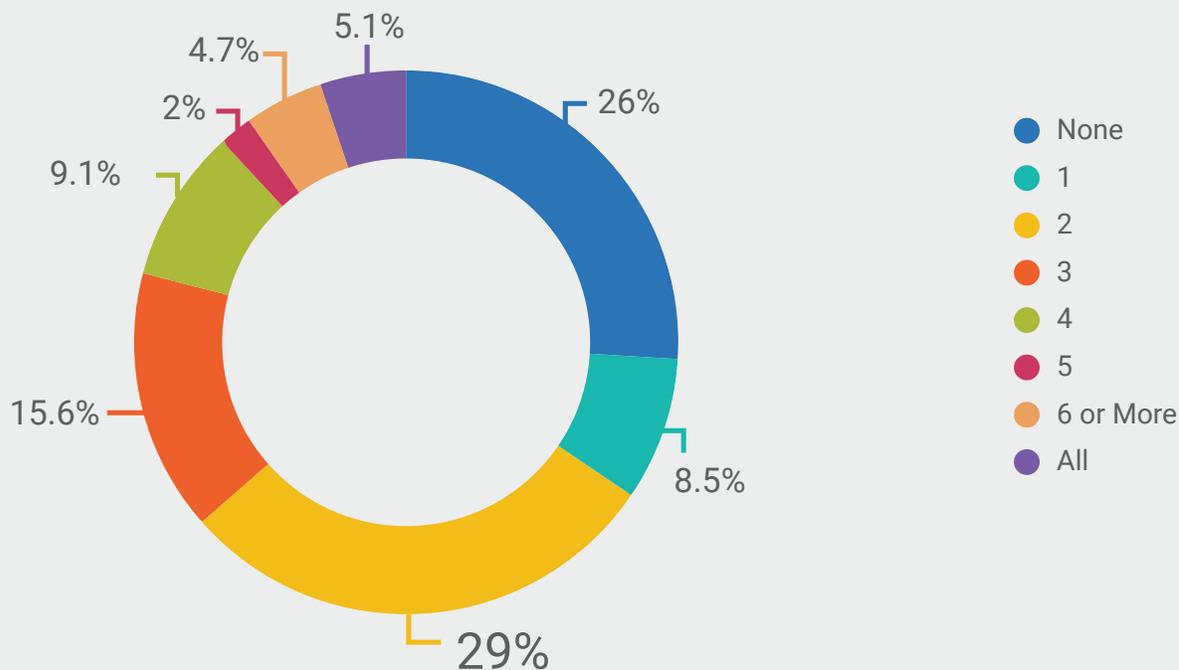


"Does Excel count?"

Software Integrations

Integrating Data

NUMBER OF SOFTWARE APPLICATIONS THAT INTEGRATE



The number of builders using software that do not integrate is down 13.4% from 2012, with most builders having two or three solutions that integrate in 2015. The number of integrated software has not changed significantly from 2014 to 2015. The number of builders using applications that fully integrate has not gone above 5.1% since this survey was first conducted in 2012.

Survey participant commented:



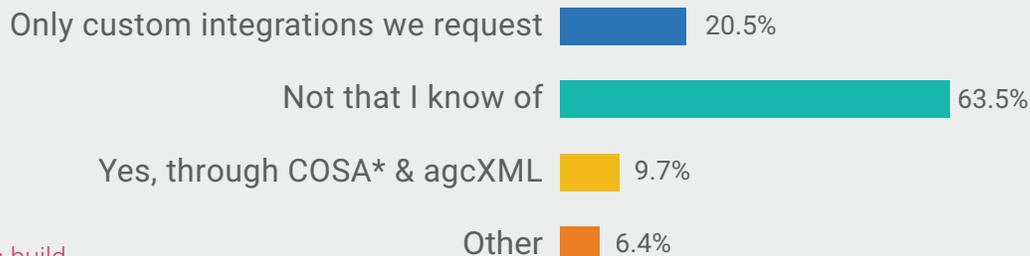
"Is this a trick question? They all claim to, but don't effectively."



"Some 'integrate' but it is through a CSV excel import and export that still requires a lot of formatting in order to import properly."

Software Integrations

DO SOFTWARE PROVIDERS OFFER INTEGRATION?



* visit: cosa.build

Survey participants commented:

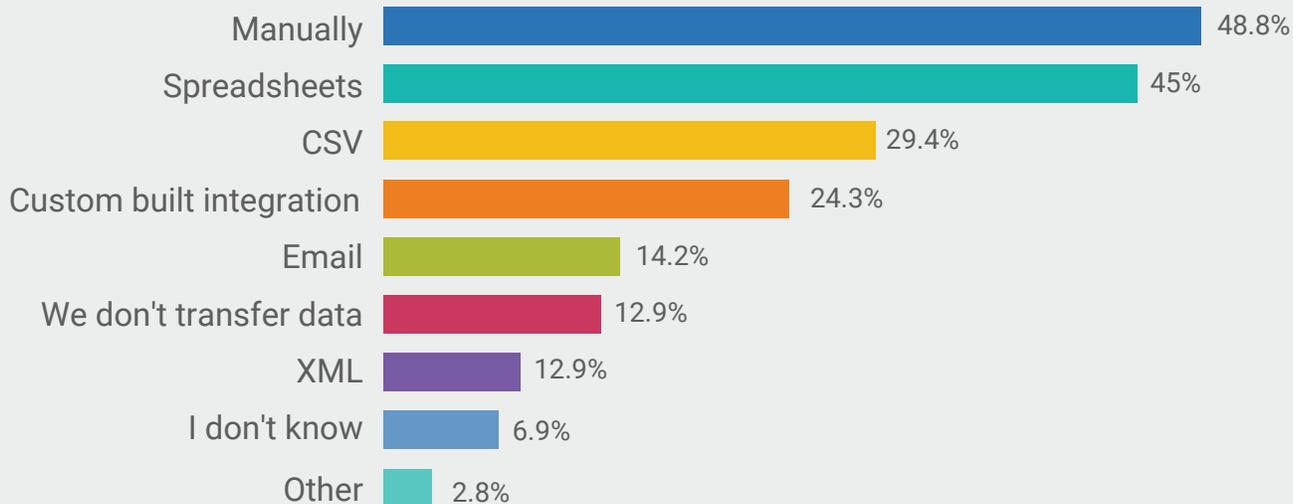


"Software providers are always 'working' on it."



"I say yes they are, but I have not seen any more integration outside of the logos on the sign saying they are for COSA."

HOW DO THEY TRANSFER DATA IF APPLICATIONS DON'T INTEGRATE?



One survey participant commented:



"API is our integration preference, opening up the data for us to access how we want."

Software Integrations

Year after year, the integration section of this survey elicits the snarkiest comments from survey participants. While entertaining to read, the comments reinforce the fact that technology providers are neither meeting expectations nor promises in data integrations. For that reason, builders insist that spreadsheets and manual processes serve as valid “integration” methods because they are the only methods available.

In 2015, as in 2013 and 2014, no significant increase in software integration availability occurred.

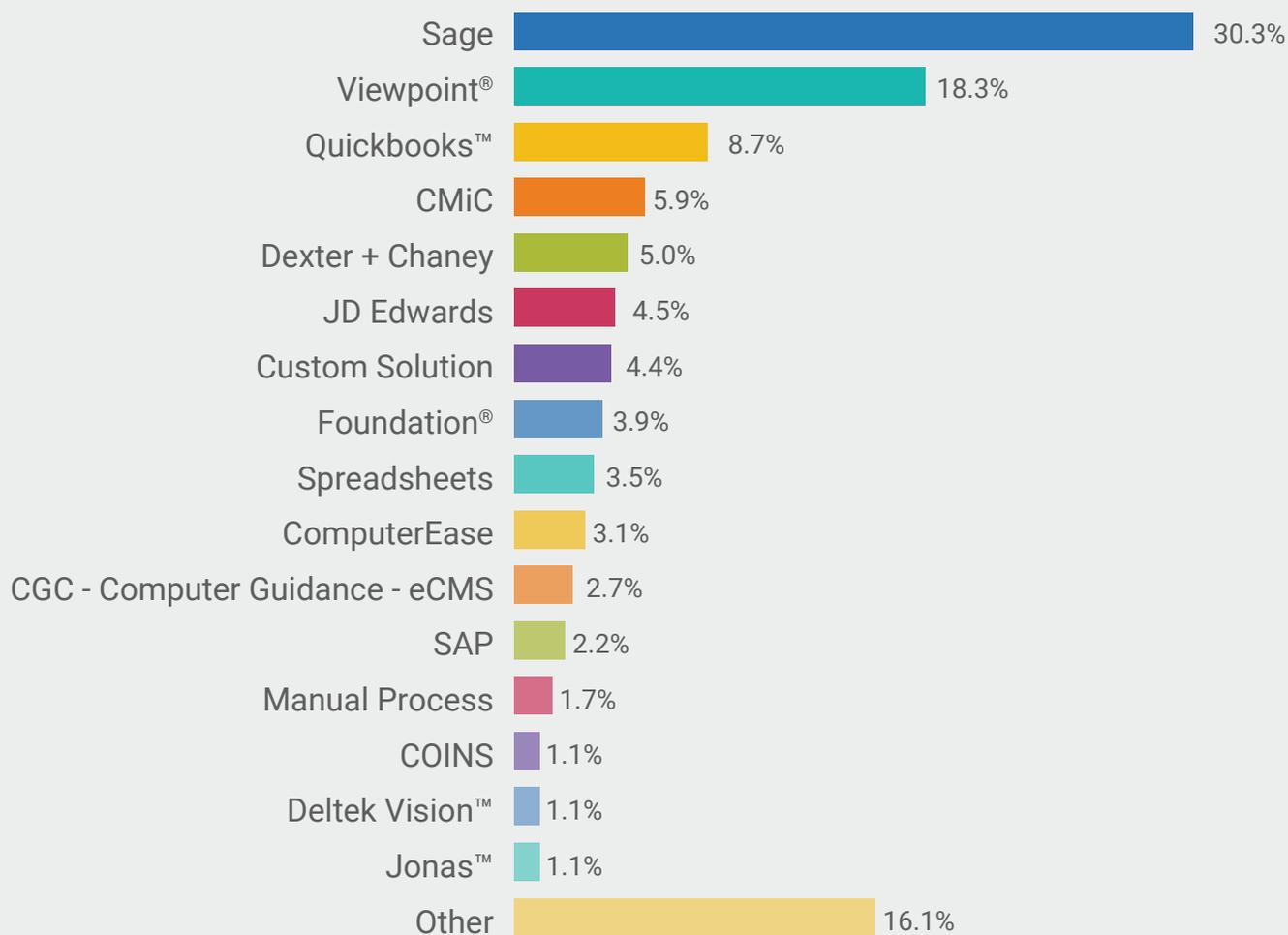
With low IT budgets, custom integrations are not an option for most construction companies, and with spreadsheets in heavy use, technology providers have no pressing incentive to develop integrations. It’s up to builders to demand integration development and partner with organizations like the Construction Open Standards Alliance (<http://cosa.build>) who develop open integration standards that are available to all software providers to adopt for the benefit of their end-users.

Software In Use

Learn the software products used most often on construction projects.

Accounting

ACCOUNTING SOFTWARE



Other included: Maxwell®

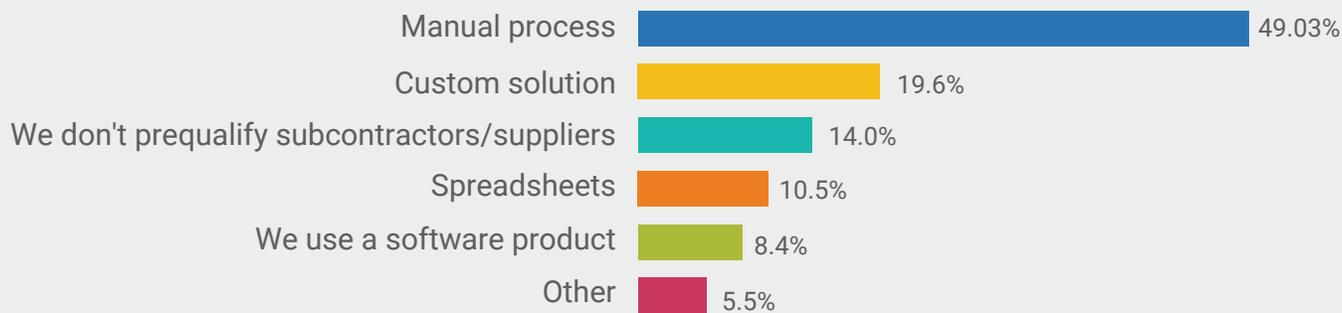
Even though this year's "Software in Use" section does not show any big newcomers or leavers in the construction software provider space, there are several statistics to review further.

Software In Use

While only 5.2% of builders are still using spreadsheets or a manual process for accounting, anything over 0% is too many. Any accountant should be terrified of company financials stored in a static, non-encrypted spreadsheet.

Prequalification

PREQUALIFICATION SOFTWARE



Top Prequalification Software Products in Use:



For subcontractor prequalification, the number of builders using manual (some form of email and PDF process) increased in 2015, as fewer survey respondents are using custom solutions, spreadsheets and prequal software to filter out subcontractors that meet project requirements.

Prequalifying subcontractors is like buying renter's insurance - you don't see its importance until you need it.

Software In Use

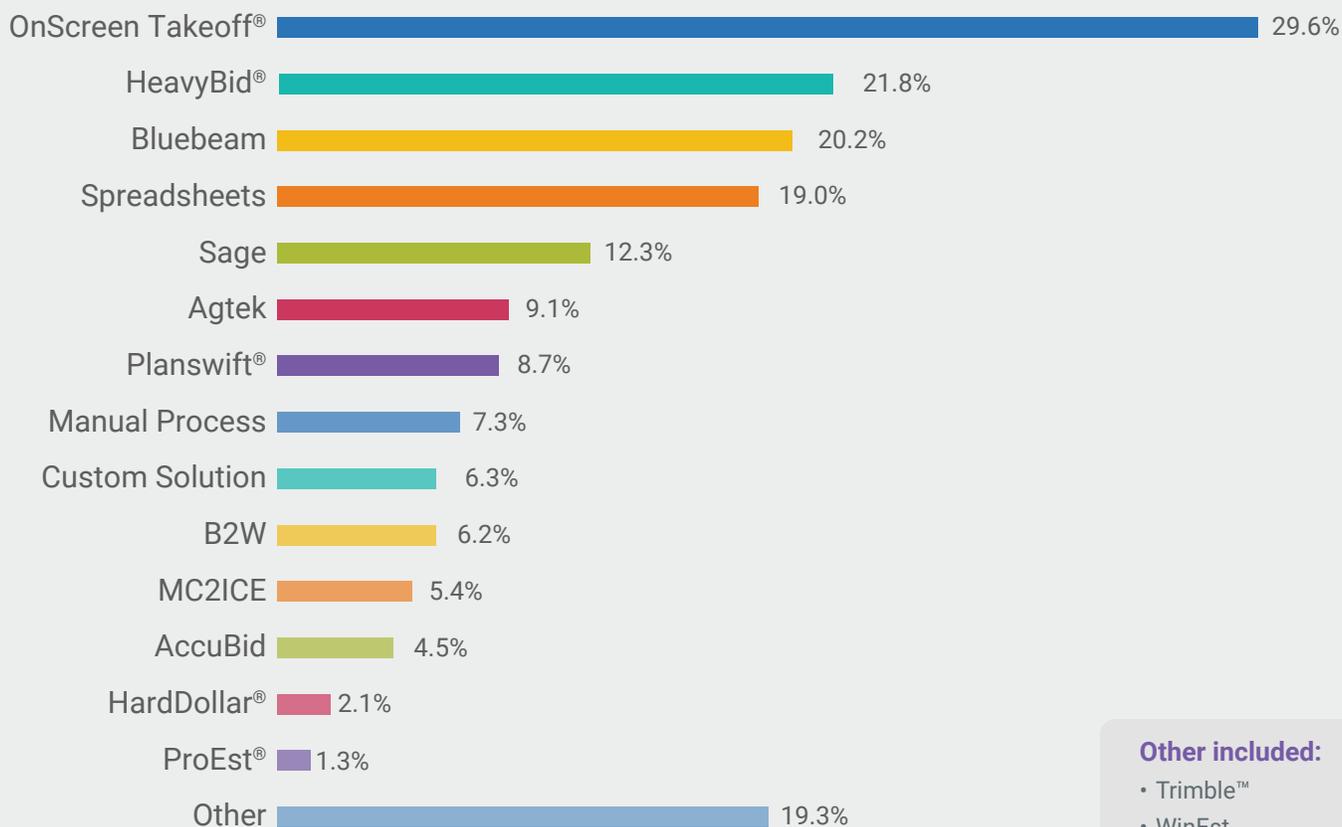
As owners, developers, agencies, banks and insurance firms are increasing the requirements for prequalification, many prime contractors are now struggling to provide documented processes for prequalification practices. However, builders are struggling to identify integrated solutions that will streamline the process while ensuring constancy and accuracy. As one participant commented: "Prequalification is not pre-disqualification and it's not post-qualification. Prequalification is about understanding potential risks and understanding how you can best work with someone."

(Note: As many respondents wanted to understand prequalification trends beyond software offerings, JBKnowledge conducted a focused survey on prequalification in construction. The report highlights current practices, requirements and industry trends in the upcoming **Construction Prequalification Report** and will be published at jbknowledge.com.)

Software In Use

Estimating Takeoff

ESTIMATING/TAKEOFF SOFTWARE



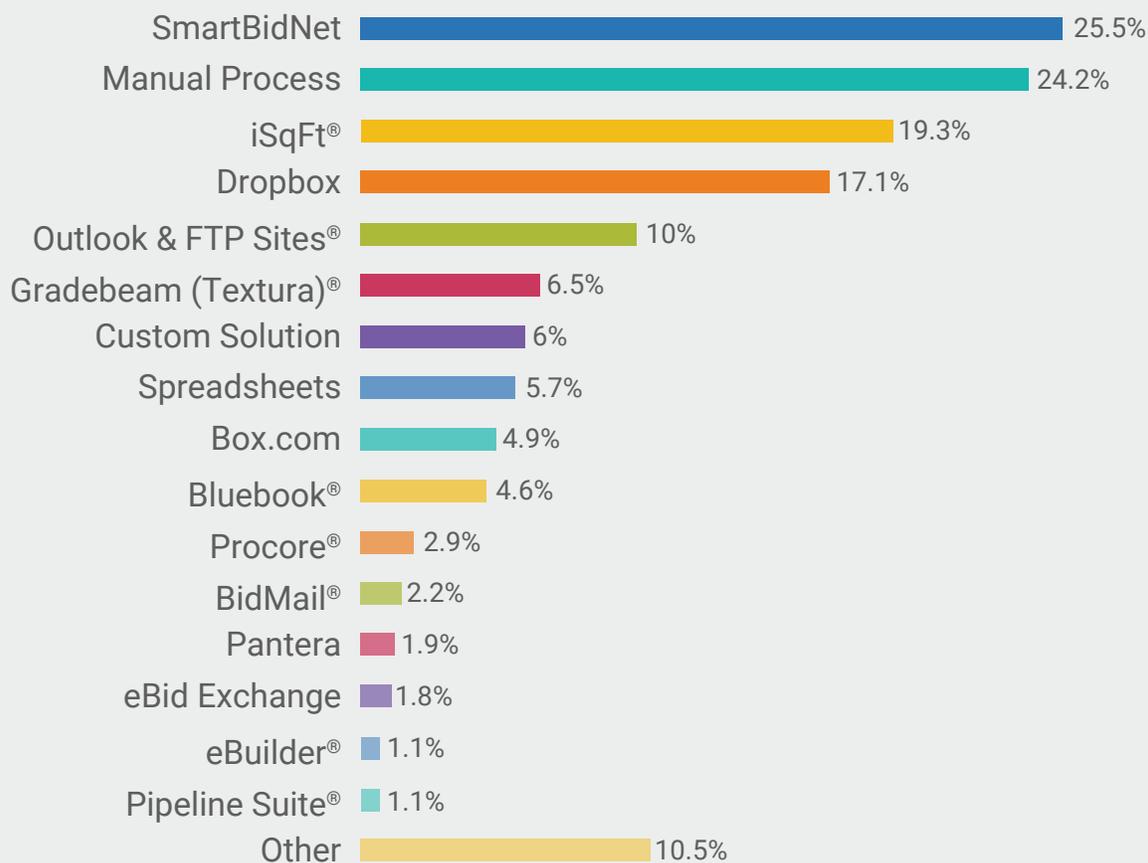
Estimating and takeoff software still has the most offerings of any category and the highest number of write-ins next to accounting. The estimating department also follows accounting in its dependence on spreadsheets at nearly 20% of companies. The only thing worse than company financials in a static, unencrypted spreadsheet are the quantities and costs of every estimated detail of your project.

Software In Use

Estimating is still poised for fundamental change, with companies who have fully adopted BIM saying that estimators have gone from spending 75% of their time counting and measuring plans to spending 10% of their time doing so. This leaves them with time to really focus on value added functions like value engineering, problem solving, customer relations and, of course, bidding on more work.

Invitation to Bid (ITB)/Plan Room

INVITATION TO BID SOFTWARE

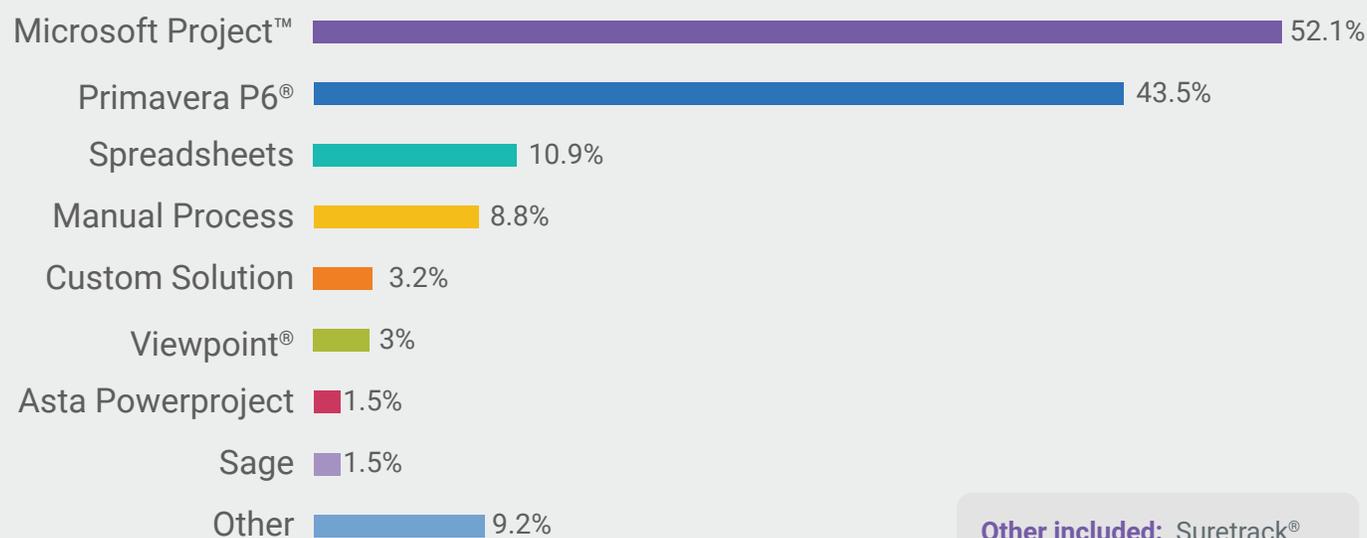


Software In Use

Surprisingly, the number of construction professionals using a manual process for invitation to bid grew since 2014 - most likely due to the proliferation of file storage solutions like Dropbox, which builders use in combination with email and FTP. Like spreadsheets, this still provides a very static view of the bid process compared to the software solutions available. Luckily, this trend has pushed dedicated ITB software like SmartBidNet to integrate with cloud storage solutions like Box and ShareFile to show builders that ITB should be an integrated, not manual, process.

Project Scheduling & Management

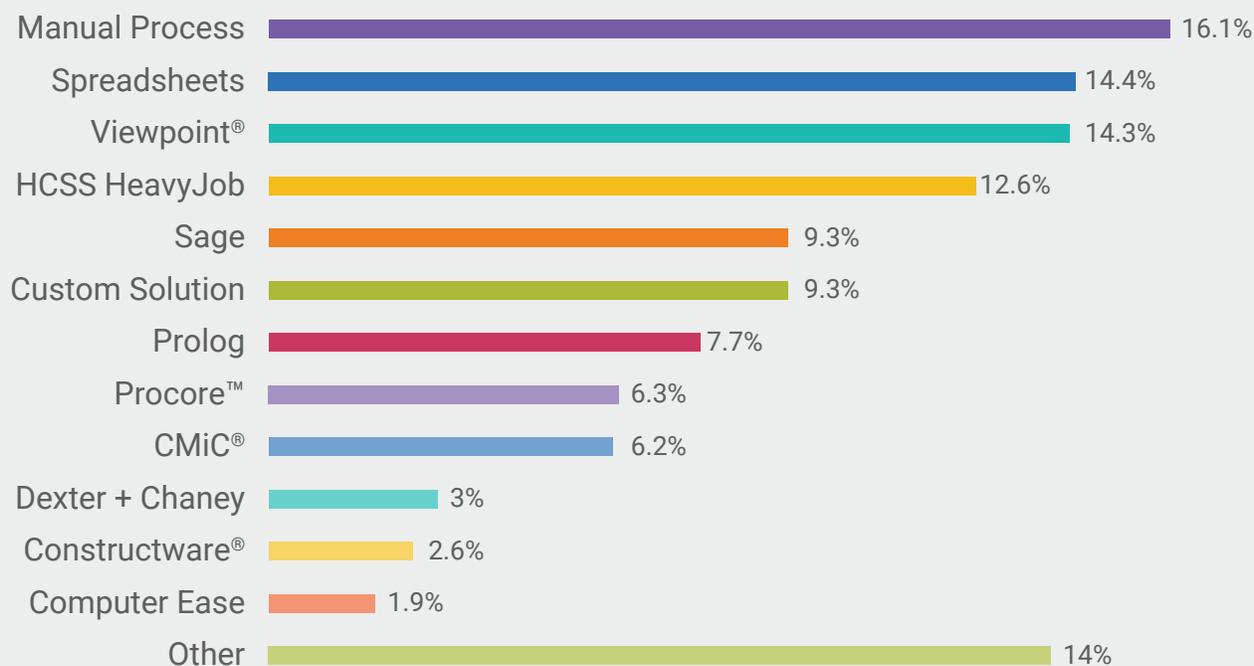
PROJECT SCHEDULING



Other included: Suretrack®

Software In Use

PROJECT MANAGEMENT



Other included: Newforma®

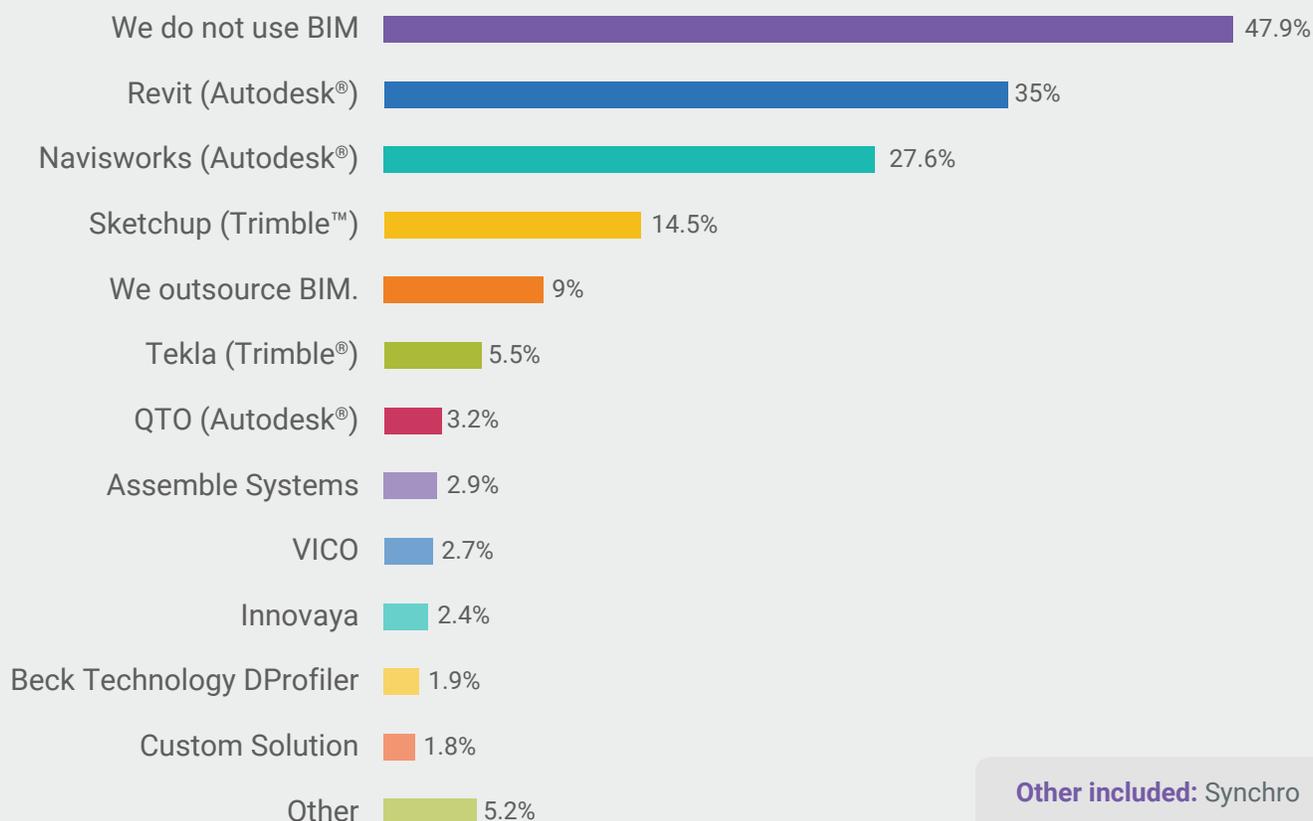
For this year's survey, the project management and project scheduling categories were separated to provide a more accurate view of the software available. For scheduling, Microsoft® Projects and Primavera P6 strongly lead usage, and builders have much fewer alternatives than in other software categories. It is interesting to note that Microsoft® has not made headway in any other categories, nor have other tech providers made headway into project scheduling. This may be due to the number of internal and external parties that must tie into a project schedule - making an industry-neutral software a better solution.

Project management is a heavily manual and spreadsheet ridden process, with Viewpoint and HCSS HeavyJob leading the way for those using a software solution. No solution seems to dominate in this space, which is interesting considering it tends to be one of the first software solutions companies buy.

Software In Use

Building Information Modeling (BIM)

BIM SOFTWARE

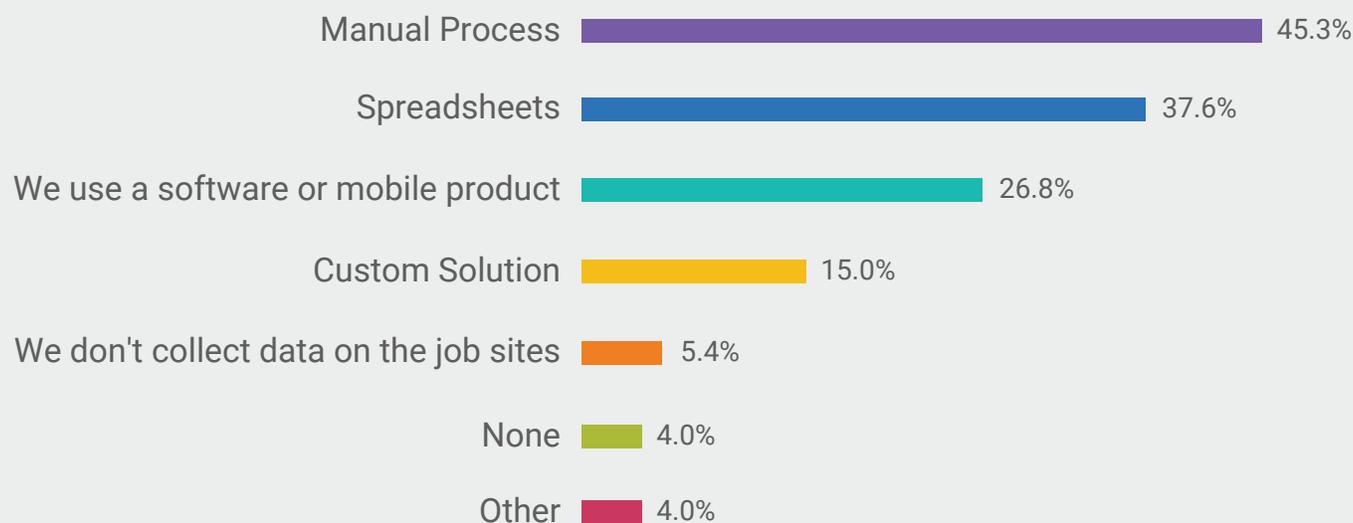


With nearly 50% of builders still not using BIM, it's hard to see where the next generation of 4D, 5D and 6D solutions will fall into place within the industry. Do the largest builders consume enough BIM to continue innovation and drive the cost down among technology providers? Will smaller companies take advantage of BIM once they learn cloud-based BIM makes it as accessible and intuitive as an estimating software? BIM, combined with estimating, has the potential to bring live, dynamic costing to project plans - if construction companies can just look out from behind their spreadsheets to see it.

Software In Use

Collecting Data on the Job Site

COLLECTING DATA IN THE FIELD



Top Field Data Collection Software Products in Use:



Only 26.8% of construction professionals are using a field data collection solution, even less than those using BIM. Most are using manual processes and spreadsheets. The mobile applications are out there, but maybe the budget for devices and connectivity is not. The technology learning curve and resources needed to train all workers on site may also be an obstacle.

One survey participant commented:

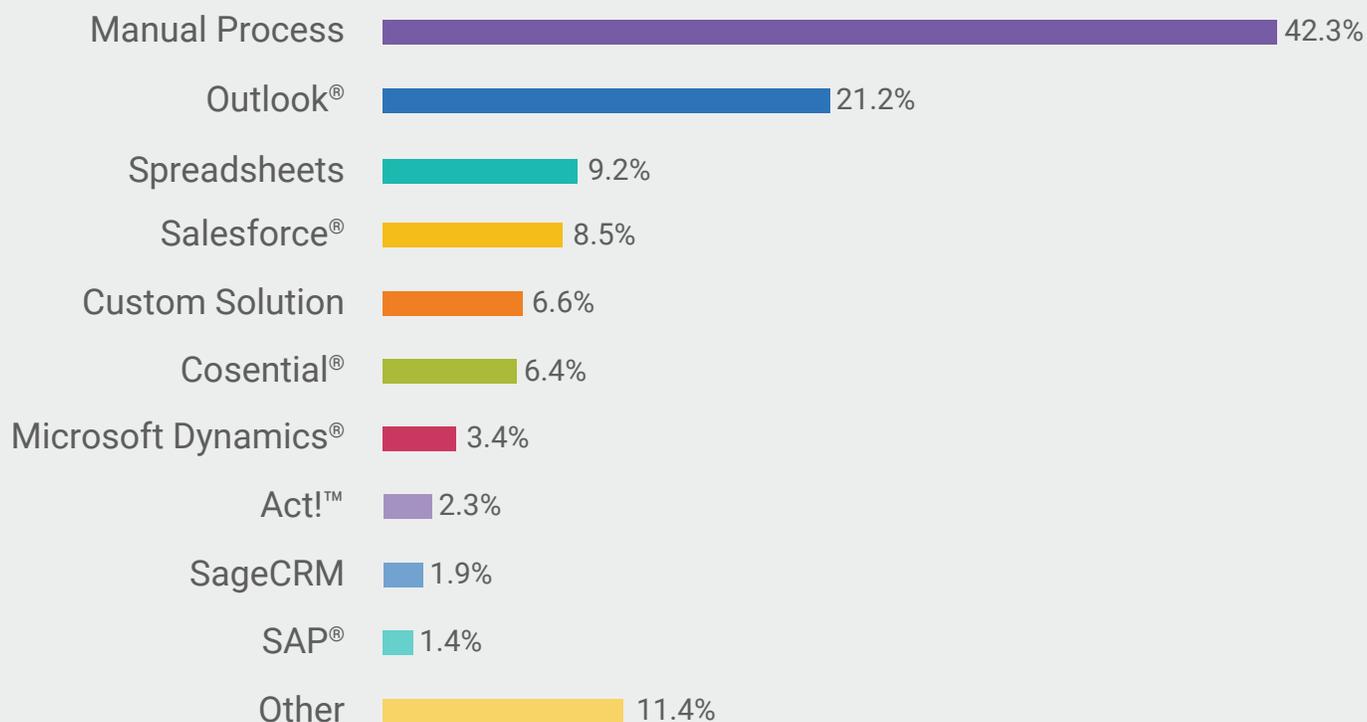


"We are struggling to find the right solution here."

Software In Use

Client Relationship Management (CRM)

CRM SOFTWARE



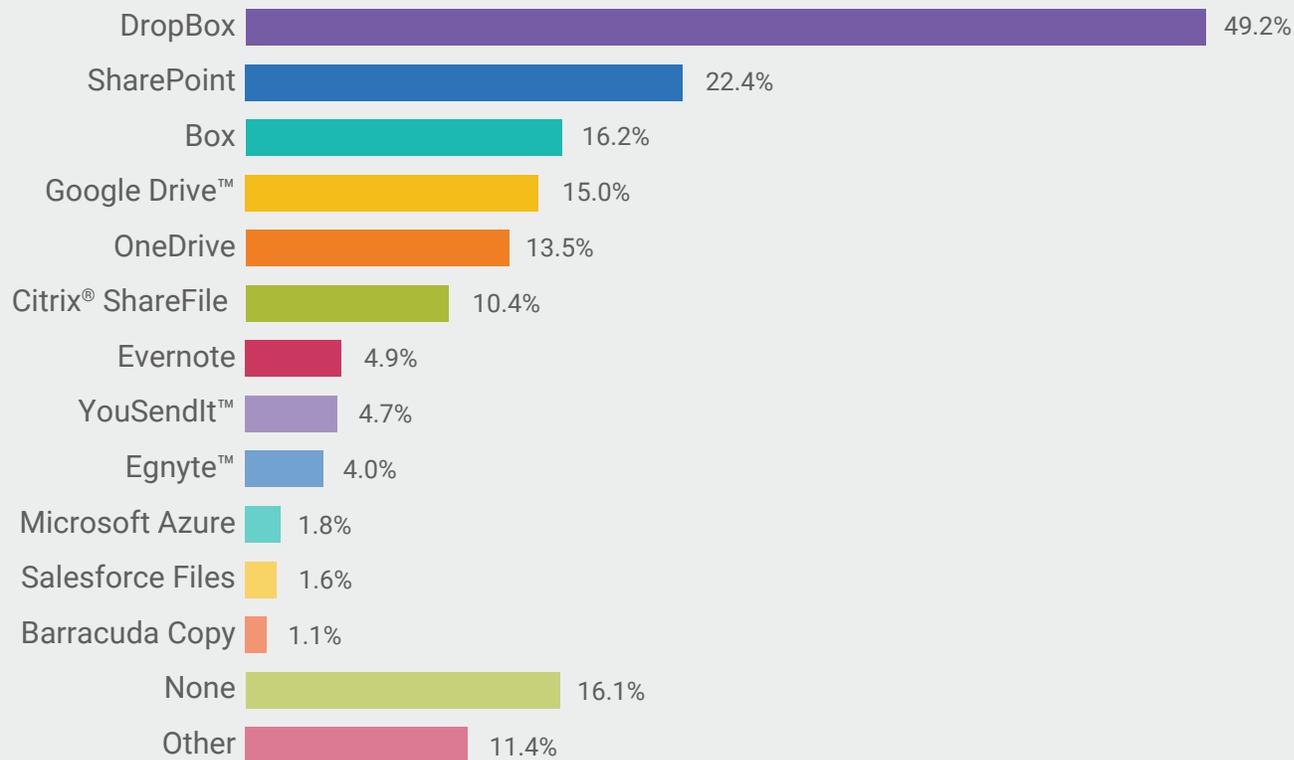
Client relationship management software is still not a focus for construction companies. This may be because there are few construction-specific solutions available, or perhaps because companies consider invitation to bid and project management software their contact database management. But are companies missing a major opportunity to prospect, nurture, close and maintain client relationships?

Business development is critical to any company, but especially to project-driven companies always looking for their next job. CRM software like Salesforce and Cosential allow for companies to accurately measure and manage their inbound pipeline of work.

Software In Use

File Storage & Collaboration

FILE STORAGE & COLLABORATION SOFTWARE



One survey participant commented:

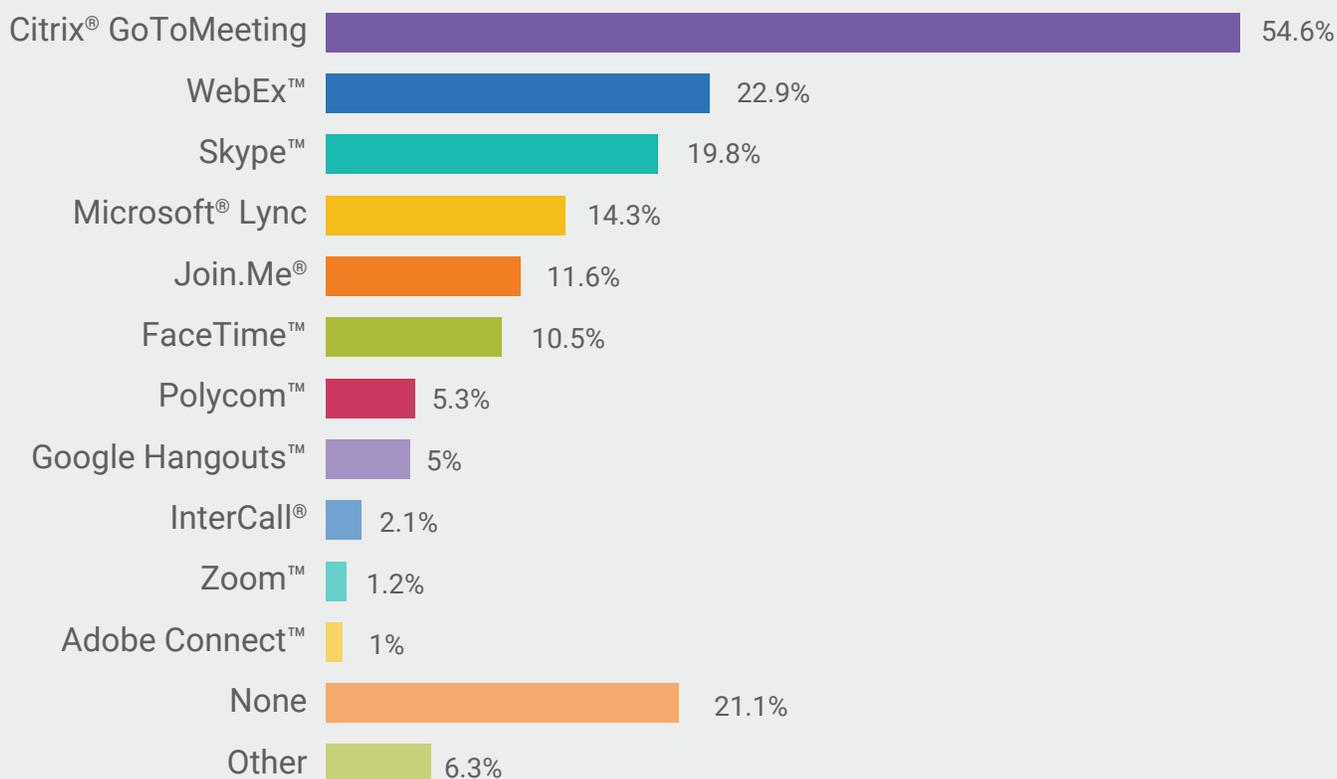


The "company" does not have an adequate sharing solution. I use DropBox.

Software In Use

Conferencing & Communications

CONFERENCING & COMMUNICATIONS SOFTWARE



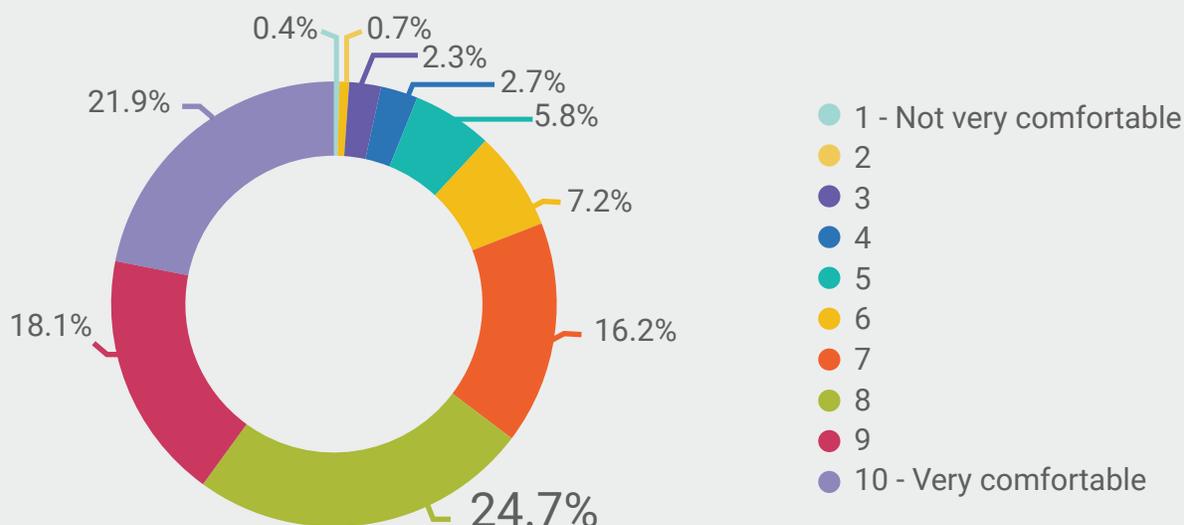
The 2015 survey included two new categories of software after many participants wrote them into the 2014 survey comments. The first category, file storage and collaboration solutions, showed Dropbox as a clear favorite. Many builders commented that they also use it for personal reasons, and sometimes use their personal Dropbox at work if their company does not have an account. (Anyone else's cloud security alarm going off?) The second category, conferencing and communications software, revealed that over half of construction professionals surveyed find this category of software important enough to pay for the Citrix® GoToMeeting product.

Emerging Technology - What's Next?

Learn what's coming in construction technology and how companies are employing emerging technologies.

Research & Development

HOW COMFORTABLE ARE BUILDERS WITH NEW TECH?



Nearly 65% of builders say on a scale of 1-10, 10 being “Very Comfortable” with new technology, that they are at least an 8. While this is a self-diagnosis, it is still encouraging. The average comfort level of builders, no matter their role, is 7.8. That average drops to 7.4 for builders who do not perform an IT role, while those who do perform an IT role claim an 8.4 average comfort level.

Emerging Technology - What's Next?

If you could get any technology approved to start using tomorrow, what would it be?



The overwhelmed...

"I don't need anything else to implement this year."

"Currently our people are still catching up to the technologies we have recently implemented."

"Something Simple! 3D scanner, drones..."



The unsure...

"I don't know. I don't take part in any of these decisions."

"Do not have one in mind."



The dreamers...

"Google® Project Tango."

"Automatic "smart" drone - operates on its own and inputs own data."

"Baxter the robot."

"Skycatch."

"GoPro® for execs to monitor job sites."



The practical...

"Emerging technology has much less value-add than simply adopting existing technology solutions. Doing a better job with basic project and document management would be most valuable."

"Integration of sensors located in the field with PM software and construction management mobile apps (e.g., indoor positioning/wayfinding, issue tracking/punchlist, safety, etc.)."

"Seamless remote access with full functionality and zero connectivity/speed issues."

"Easier to use Project Management that works with field & accounting."

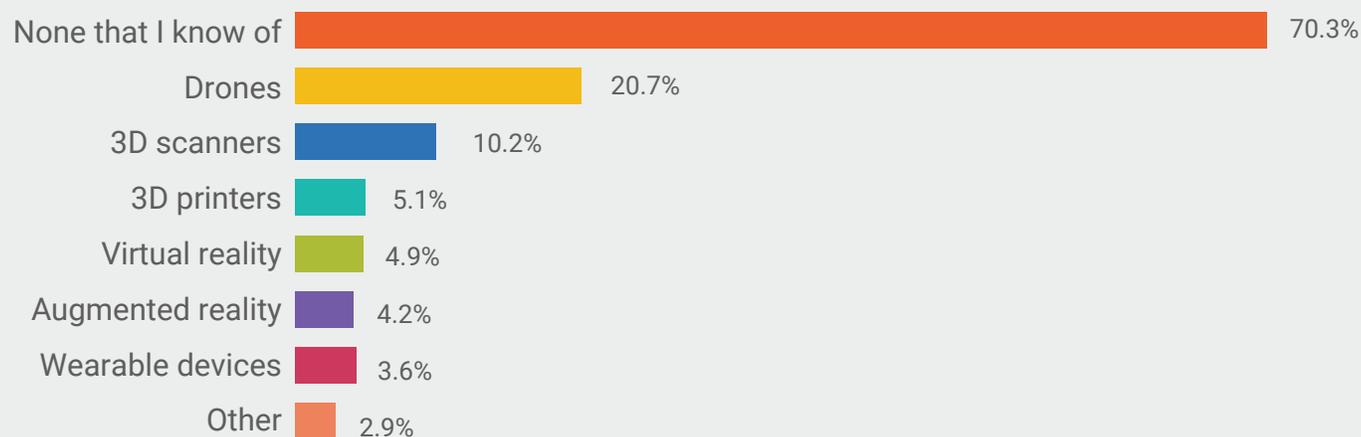
"Any 2D/3D/5D takeoff software that is integrated (and is proven to work) with an estimating software."

"Two Factor Authentication."

Emerging Technology - What's Next?

Next they were asked, if they could have any technology to implement tomorrow, what would they choose? The answers above ranged from indifferent to overzealous. Showing that no matter how comfortable builders claim they feel about new technology, the prospect of taking on another technology solution tomorrow doesn't inspire innovation and excitement for all. Some builders would implement very practical solutions tomorrow if they could, or push change in current solutions. **Most builders are still sorting through all of the software they use today that doesn't integrate - and are not yet thinking about Baxter the Robot.**

WHICH TECHNOLOGIES ARE COMPANIES EXPERIMENTING WITH?



Along with the technologies that builders have on their wish lists, are emerging technologies they are actually experimenting with today.

Emerging technologies, for the purposes of this survey, are defined as innovative solutions with the capability to impact and improve the construction process. Most of these technologies are either still in the research and development stage for construction use, have upcoming or recent Beta releases, or have just started marketing commercial products.

Emerging Technology - What's Next?

Companies with a R&D department are almost 50% more likely to be experimenting with emerging technologies. Among those experimenting, drones and 3D scanners are most likely to be seen on job sites today, and wearables are the least likely, but let's look more closely at the specific solutions in use.

Survey participants commented:



"This stuff is impractical compared to existing technology that we need to utilize better."



"I am open to any technology that will enhance our operations and add immediate value."

Augmented & Virtual Reality

Survey participants are using or planning to use the following augmented and virtual reality solutions in the next year.

Augmented Reality Solutions:



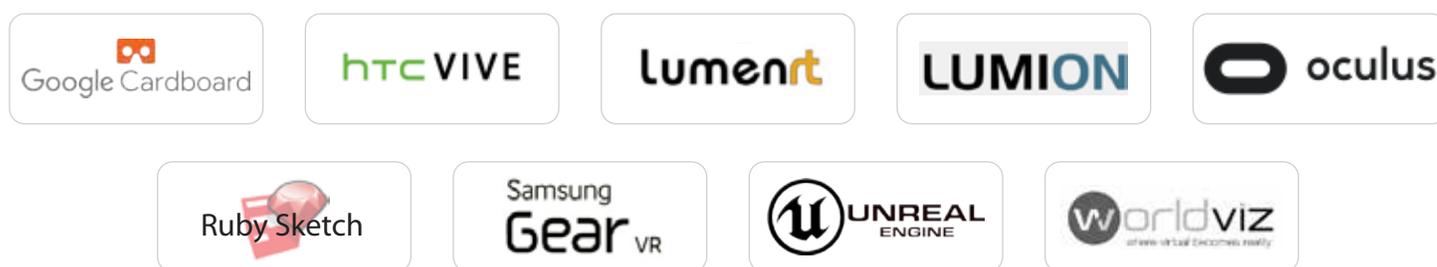
Augmented reality (AR) can be defined as the real-time enhancement of visual reality with data or models from computer sensory input. Except for SmartReality®, all AR solutions used on construction projects this year, according to the survey, are non-industry specific solutions. All are compatible with either mobile or wearable devices and use visual targets and data, such as a project blueprint or job site billboard, to overlay project data like BIM models. SmartReality and HoloLens (running specialized software for construction through their partnership with Trimble) can also be used with manual gesture tracking to manipulate visualizations and have virtual reality components.

HoloLens stands to make the biggest impact in 2016 (with a pending developer unit release in Q1), and will hopefully see an increase in usage by next year's construction technology survey. Their technology, which they dub as Holograms, combines augmented reality with motion tracking, 3D scanning and more to allow extremely advanced manipulation of augmented reality visuals with hand gestures,

Emerging Technology - What's Next?

Traditional computer mouse control and more. It combines the best of augmented reality with the interactive elements most solutions are currently lacking.

Virtual Reality Solutions:



Virtual reality (VR) can be defined as an immersive, computer generated reality, manipulated through sensory input that mimics physical presence. Oculus has stated that their objective is to achieve true “presence”, thus making someone forget that they’re not in reality, but rather ‘inside’ of a building model. Virtual reality solutions in use by builders start at the very cost effective Google™ Cardboard, a VR headset made of cardboard that utilizes your smartphone to produce visualizations. Some builders have then graduated to the Samsung Gear VR™ that is more durable, yet lightweight and portable, but requires a Galaxy Note or S5/S6 smartphone. However, Oculus has started to close off developer access to this platform, making it much more difficult to deploy applications on the Gear VR hardware. Other builders are investing in advanced hardware, such as the Oculus Rift headsets. These are bulky and require attachment to a computer and a 3rd party controller like Leap Motion or an XBOX controller, but the experience is far more advanced and realistic than most VR solutions available.

Emerging Technology - What's Next?

Drones & Wearables

Survey participants are using or planning to use the following drone and wearable solutions in the next year.

Drone Technology in Use:

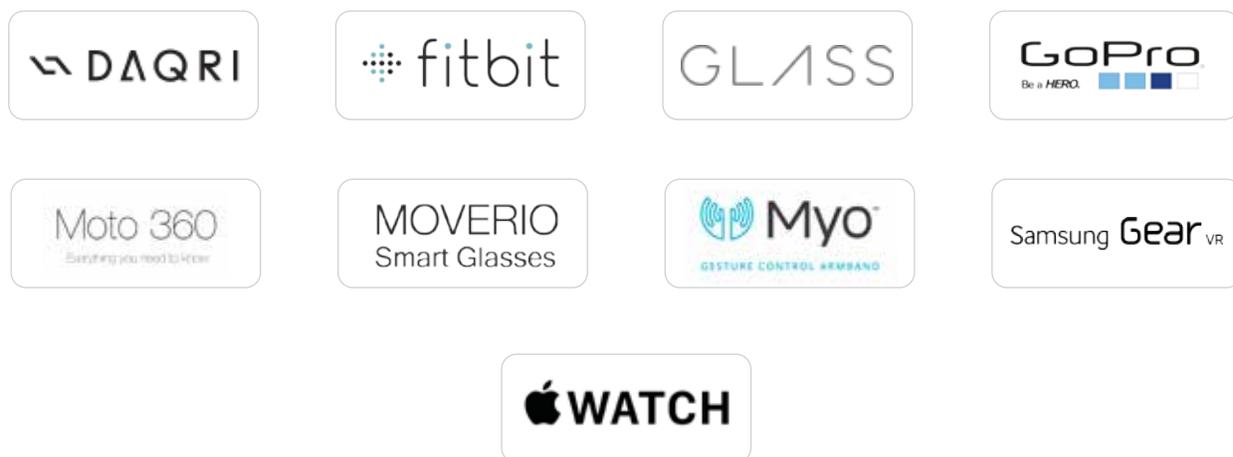


As the most widely used emerging technology, companies are employing a variety of drones to capture data for aerial imaging, topographical mapping, video recording and much more. The DJI Phantom's latest drone has ground sensing technology to allow for use indoors, where GPS cannot be referenced, and Kespry commercial drones allow users to measure perimeter, volume, cut and fill sizes of stockpiles. Parrot drones are one of the most affordable options because they capture less dynamic data but still produce HD photo and video for jobsite progress tracking and surveillance. One survey participant wasn't sure the exact brand of drones his company plans to use, only that they are "cool big ones."

Emerging Technology - What's Next?

Next year, companies will be using more sustainable drone systems like Skycatch, that don't need pilots and can even change out their batteries autonomously. Developing technology will also allow drones to connect with workers and machinery to power and monitor the jobsite through monitoring stockpiles, directing earthmovers, tracking productivity and much more. Drones will also become tools for more than just data capture and transmission, with load bearing capacity to haul equipment, move materials and transport tools. The real question isn't if drones will continue to grow in use, but rather how will they be regulated. Builders should bookmark knowbeforeyoufly.org and keep a close eye on FAA regulations that will impact drone adoption and usage, especially since commercial drone use must be licensed by the FAA.

Wearable Technology in Use:



Emerging Technology - What's Next?

As far as wearable technology goes, companies are using a range of devices including helmets, headsets, glasses, arm bands, watches and even exoskeletons. The draw to these technologies lies in the hands-free usage, real-time environmental data capture and integration with human input and sensory data. Many of the devices, such as Epson® Moverio and Apple Watch, also require an additional device such as a smartphone to operate. The Daqri smart helmet and exoskeletons are the two least mature solutions on this list and many of the devices, especially smart watches, FitBit® and Google Glass, are not industry specific and are consumer devices still making headway into the commercial market.

One of the biggest problems on construction sites is getting accurate documentation of events, progress and existing conditions. Wearables such as the Daqri helmet promise to change this entirely, by documenting everything a worker sees, through visual and sensory input, in real-time without them having to lift a finger. Combined with input from integrated drones, scanners, positioning beacons and other technology listed in this section, the data will essentially create an "Internet of Buildings."

3D Printing & Scanning

Survey participants are using or planning to use the following 3D printing and scanning solutions in the next year.

3D Scanning Solutions in Use:



Emerging Technology - What's Next?

3D laser scanning is the second most widely used emerging technology among builders this year. This is not surprising, considering this technology produces as-built models of a structure within minutes, without the need for blueprints or measuring tape. High-end solutions in use start with the high priced FARO® system that scans a room within two millimeters of accuracy in four minutes. On the other end of the spectrum is the Structure Sensor, a \$500 camera accessory that turns an iPad into a 3D scanner, though not with as high a degree of accuracy.

Scanners are also being combined with many of the drone and wearable technologies mentioned earlier in this report, creating intuitive, integrated solutions that will redefine risk management and facilities maintenance with real-time, accurate as-built models.

3D Printers in Use:








3D printing technologies in use are mostly consumer-grade printers, like the MakerBot® and Ultimaker, that can fit next to the regular printer in the office but can process 3D files and print using a variety of synthetic materials. Some companies are using 3D printing services, like Sculpteo, to order printed items for delivery.

3D printing on a larger scale, like the concrete houses that take 2.5 hours to print in China, is not yet in use among survey participants, due to cost and maturity of solutions. But large 3D printing research and development initiatives are expected to partner with builders over the next year for pilot programs to combine modular construction and on-site materials printing. This section of the survey could have some exciting advancements in the next two years.

Conclusion

This report is only a snapshot of technology's role in the construction industry. While the numbers, percentages and quantity comparisons are critical for ROI decisions, the underlying reasoning and motivation behind technology decisions are even more critical. It's not only important which technologies builders are using, but why they chose those technologies and why others didn't. Only through further analysis within their own organizations, can construction companies put the statistics in this report into context with their projects. For now, let's put these numbers in the context of the construction industry as a whole and analyze the overarching conclusions that can be drawn.

Budgeting

The construction industry continues to underspend on technology compared to other industries. Lack of budget reverberates throughout the industry and shows itself in several sections of this report. The most notable of which are: the number of "unofficial" IT staff, minimal technology R&D, nonexistent cloud security policies or enforcement, and flat technology adoption rates. Survey comments on budgeting questions indicated that many builders do not know the budget or the motivations behind setting a budget at their companies. While not knowing the budget makes sense, not understanding the company's general IT strategy can frustrate and limit employees. If they don't understand the range their roles have in using and adopting technology, they certainly won't think proactively about technology. This creates room for expensive software that doesn't get used and outdated software that doesn't get replaced.

Lacking the staff and the budget, IT departments could be missing out on many opportunities to be a billable department as opposed to an overhead department. Builders have not yet figured out reliable formulas for billing enterprise or integrated IT expenses to individual projects. Whether this means technology providers need to provide more transparency and pricing options by usage/project or builders need to better track their usage for projects, it's important that companies explore how to make technology generate revenue instead of just increasing expenses.

Conclusion

Most companies still take a reactionary approach to budgeting by assessing “How stressed is the IT guy?” or “How many employees did we hire last year?” Industries leading in IT return on investment are basing IT budgets, departments and staffing on a strategic plan.

Research & Development

The lack of research and development among the construction companies surveyed highlights the industry’s reactive approach to technology. With minimal budget and allocated staff, companies don’t have much bandwidth for tinkering with potential technology solutions. As a result, the construction industry is notoriously behind on implementing innovative solutions. Companies are mostly relying on technology providers to test and implement solutions, lengthening the time to production and use for both parties. As solutions like 4D, 5D and 6D BIM arrive, implementation is a lengthy process since most companies start with new solutions from scratch, without any lead-in time. In Europe, as-built BIM models are soon to be required in all construction projects. If this were to become a requirement in the U.S. next week, less than half of companies, according to this survey, would be able to comply. Companies would have a hard time turning spreadsheet data into BIM.

Cloud Security

Much like budget, lack of cloud security has been a consistent theme in this annual technology report. The only good news is that as of 2015, adoption of new software has leveled off, but while builders aren’t adding more solutions, they still have not secured their current ones. IT support and policy enforcement are two very important roles of IT staff - both of which require trained professionals and not just the employee who chose the software and then was tasked with implementing it. With the interconnectedness of personal and corporate devices, companies should be obsessive about data security both onsite and in the cloud. Relying on the technology provider to manage data security is not enough. If data is digital, it’s at risk - whether it’s in the cloud or local. Threats abound for local data as well, including, but not limited to, hardware malfunctions, disgruntled employees, network outages and more. Private or public cloud, security policies must be a priority for all construction companies in the next year.

Conclusion

Despite technology woes, total construction spending has risen 13.7 percent over the last 12 months. Business is good, but technology could make it better. Where to begin? You already did by reading this report. Take all of your “aha” moments from reading these statistics and discuss them with your colleagues. Action starts by identifying the problems and drafting solutions.

We look forward to revealing big budgets, secured cloud data, and R&D galore to you in next year’s report.

Special Thanks

Thank you to every construction professional who has completed one of our annual Construction Technology Surveys since 2012. We sincerely appreciate you taking the time to help us build this resource for our industry.

Thank you to our partners, the Construction Financial Management Association, Texas A&M University's Construction Science program, and HCSS Construction Software. Your guidance and input on the production, distribution and analysis of the survey results were invaluable. We hope this report helps you continue to educate, inform and serve the next generation of leaders in our construction industry.

Thank you also to the many media publications, organizations, companies and other online mediums who distributed and shared the survey. We are happy to provide excerpts and graphs for re-print upon request. Please send all re-print requests to our Editor-in-Chief, Liz Welsh, at liz@jbknowledge.com. Any re-print of the text and/or graphics in this report without permission from JBKnowledge is a copyright violation.

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JBKnowledge, Inc. develops cloud, mobile and wearable technology solutions for construction and insurance. JBKnowledge is also the maker of the SmartBidNet construction bid software, SmartCompliance vendor compliance software, SmartInsight online construction network and the SmartReality augmented reality mobile app for construction. JBKnowledge specializes in enterprise application and software development; strategic consulting; staff augmentation and outsourcing; electronic data interchange; infrastructure, application and data hosting; user interface and experience design; and database design and development for companies across North America, the Caribbean and the Middle East.

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About the Construction Financial Management Association (CFMA)

Founded in 1981, the Construction Financial Management Association (CFMA) is the only organization dedicated to providing construction financial professionals in North America with unparalleled career development and networking opportunities. Along with publishing the award-winning CFMA Building Profits, CFMA offers educational, professional, and connection programs through its 92 chapters, Annual Conference, and online learning to its more than 7,000 members. CFMA members are CFOs, controllers, and treasurers working at major commercial construction contractors in general, subspecialty trades, and heavy highway sectors, as well as those professionals who service these industry financial professionals, such as accountants, surety agents, bankers and IT specialists. For more information about CFMA, visit www.cfma.org. Follow CFMA on [Facebook](#), [Twitter](#) and [LinkedIn](#).



About the Texas A&M University Construction Science Department

The construction education program at Texas A&M University was established in 1946, and now enrolls approximately 1,050 undergraduate students pursuing a [Bachelor of Science in Construction Science](#) and 75 graduate students pursuing a [Master of Science in Construction Management](#). Both the undergraduate and graduate programs were among the first programs in the nation to obtain [American Council for Construction Education \(ACCE\)](#) accreditation. The program is serviced by approximately 34 full and part time [faculty members](#), 20 of which hold Ph.D. or equivalent degrees, many of which have extensive construction industry experience. The program integrates principles of architecture,

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technology, engineering, business and project management, in order to prepare students to effectively manage the total construction process. Specialized course work in building systems, materials and methods of construction, scheduling, cost estimating, structures, construction management, law and business/labor relations are also taught. This interdisciplinary approach provides the student with the best possible exposure to the various tools needed to become a construction industry leader.

Visit <http://cosc.arch.tamu.edu> to learn more.



About HCSS Construction Software

Founded in 1986, HCSS sets the standard for infrastructure construction software. HCSS combines award-winning estimating, job management, dispatching, equipment management, fuel management, safety, and GPS products for the construction industry with true 24/7 technical support, on-site training by veteran contractors and annual user group meetings attended by hundreds of contractors each year. Thousands of estimators bidding more than \$100 billion per year rely on their desktop products and mobile applications for their ease of use, speed, and precision in performing estimating, job management, and equipment management activities. HCSS has won “Best Place to Work in Texas” for eight consecutive years and was named one of Wall Street Journal’s “Top Small Workplaces” in 2009. For more information, visit www.hcss.com or call 800-683-3196.

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