

2018 Industry Report

CONSTRUCTION DISCONNECTED

Rethinking the management
of project data and mobile
collaboration to reduce
costs and improve schedules



About The Report

In April 2018, PlanGrid partnered with FMI to survey nearly 600 construction leaders from around the world to discover:

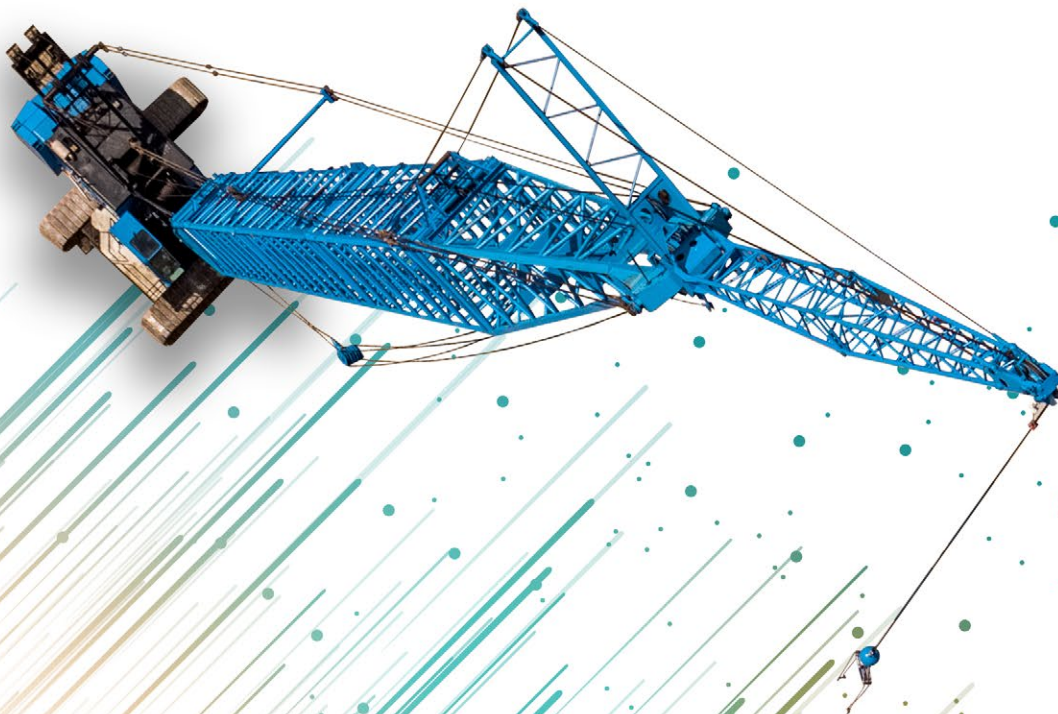
- What activities require the most time during their week and the costs associated with each activity.
- The causes of poor data and communication on projects and the costs to the industry.
- The top reasons for investing in construction-specific technology and what factors influence decision making.
- If the deployment and usage of technology align with how technology investment decisions are made.

In this report, we define construction-specific technology and/or software as products built explicitly for engineering and construction firms for field collaboration, reporting, project management, estimating, safety and more. Survey respondents were asked not to consider their experience with email clients (e.g., Microsoft Outlook), CRM software (e.g., Salesforce, Microsoft Dynamics), ERP systems (e.g., Oracle, Vista) or other similar platforms.



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Survey Demographics

Participants in the study included 599 construction industry leaders. This sample was composed of 500 respondents from the United States and 99 from Australia, New Zealand, United Kingdom and Canada. Of those surveyed, 49% work for general contractor firms, 36% came from specialty trades and 15% were owners. Over 300 respondents came from the commercial sector and the other respondents represent industrial and manufacturing, heavy civil, healthcare, power (oil and gas, and energy), education and government.



599 Total participants

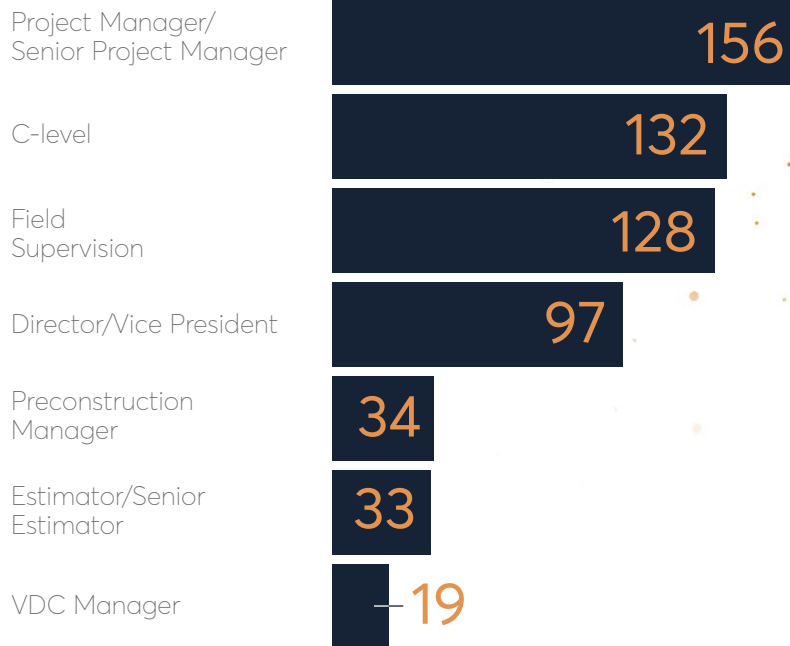
500 + 99

United States

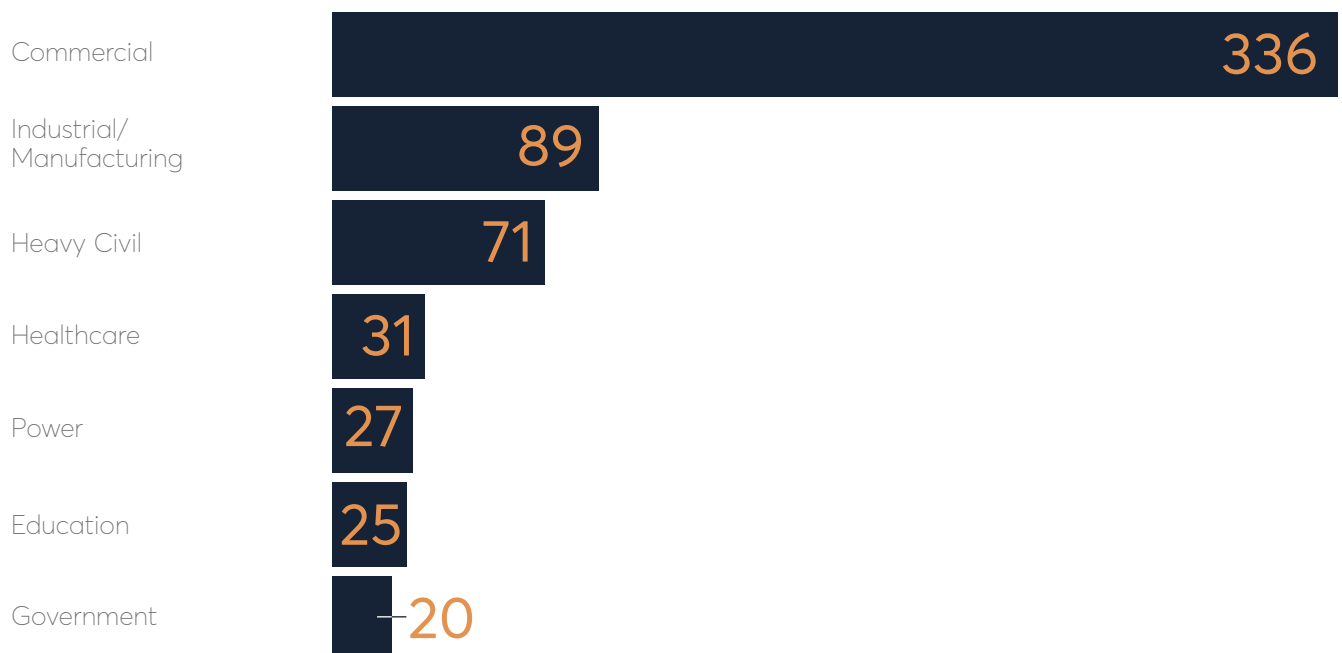
Australia
New Zealand
United Kingdom
Canada

Survey Demographics

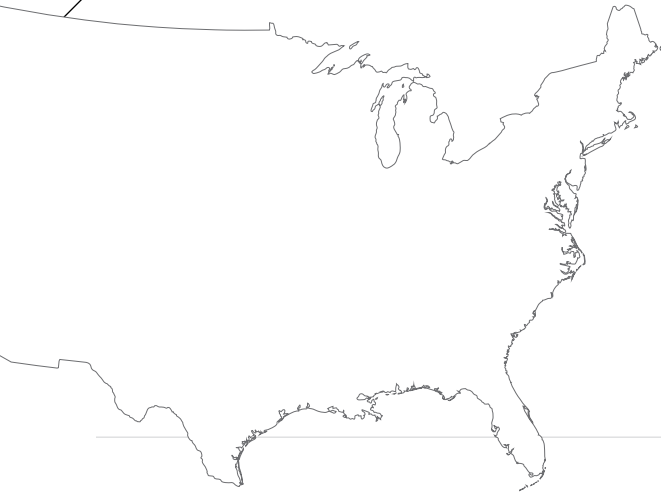
Position/Title



Industry/Sector



Executive Summary



The US will spend

\$177.5 Billion

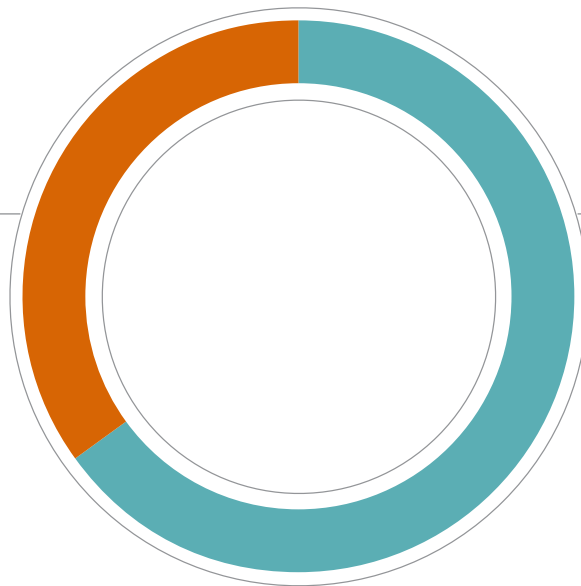
in labor costs on non-optimal activities in 2018.

Where is Time Being Wasted?

Construction professionals spend

35%

of time on non-optimal activities.



Only

65%

of their time is spent on optimal activities.

14+ Hours lost per person each week that could be spent on priority activities.

Opportunity to maximize time spent on optimal activities.

5.5

Hours/week

Looking for project data/information

4.7

Hours/week

Conflict resolution

3.9

Hours/week

Dealing with mistakes and rework

11.2

Hours/week

Project execution and coordination

8.2

Hours/week

Communicating/interacting with project stakeholders

7

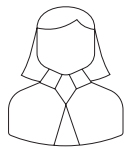
Hours/week

Organizing the jobsite

An Average Breakdown of Time Waste Per Role



C-level



Directors/Vice Presidents



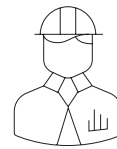
Project Managers



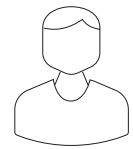
Preconstruction Managers



Field Supervisors



Estimators



VDC Managers

Total Weekly Hours Wasted

14.05

13.52

13.39

13.71

15.84

12.15

14.42



Annual Cost Impact



\$125,286.10

\$70,260.26

\$49,247.33

\$49,228.54

\$48,835.32

\$33,051.09

\$33,702.72

The Connection Between Rework, Bad Data and Communication

On average,

52%

of all rework globally is caused by poor data and miscommunication.

\$65 Billion

total US construction spending will go towards rework by year end.

\$31.3 Billion

of rework in the US will be caused by poor data and miscommunication in 2018.



How Construction Can Improve Data and Communication

Top 3 reasons for investing in field technology



Other considerations include...

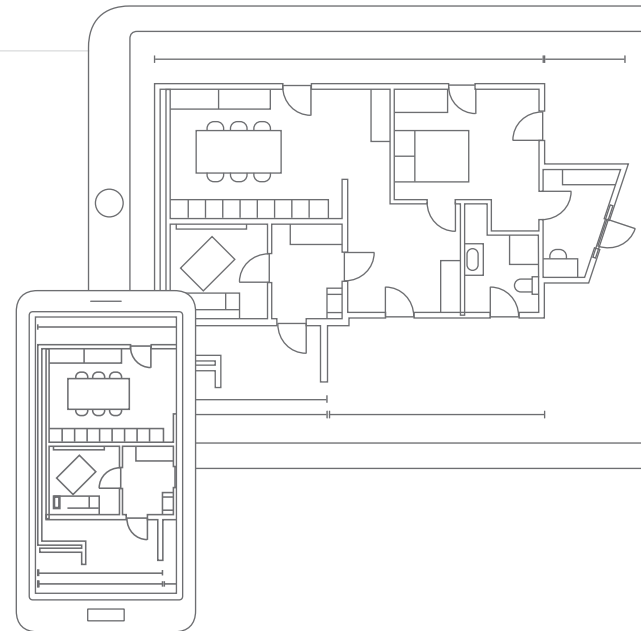


Using the Technology We Buy

75% of general contractors and subcontractors provide mobile devices to project managers and field supervisors.

BUT ONLY

18% consistently use apps on a mobile device to access project data and collaborate.



The Construction Technology Disconnect

Considering Field Needs

VS

Listening to Field Needs



said the needs of field staff is a top consideration for investing in technology.



receive feedback from potential users of new technology before buying.

Reasons Why Technology Fails



Poor fit with current processes and procedures



Difficult to use



Low adoption



Inadequate training



Does not integrate well with existing software and technology



1

WHERE CONSTRUCTION TEAMS SPEND AND LOSE TIME

Time spent on non-optimal activities will cost the US construction industry \$177.5 Billion in 2018 alone.

Construction professionals are spending a considerable amount of time on activities that take away from actual building on their project sites. Finding strategic ways to optimize their time is a critical step in reducing waste and staying competitive in today's market.

Where does time actually go for construction industry professionals? Six categories of construction activities were used to define the work related to project delivery:

- **Project execution and coordination**
The direction, regulation and supervision of a project from early development to completion.
- **Interacting with external stakeholders**
Effectively managing relationships with other key stakeholders including contractors, owners and designers while gathering their feedback and direction on a project.
- **Organizing people and the jobsite**
Coordination of resources (labor and materials) for successful project delivery.
- **Looking for project data**
Gathering project information such as revised drawings, material cut sheets and other relevant data at the jobsite.
- **Conflict resolution**
Managing disagreements between the general contractors, owners and subcontractors responsible for the delivery of a construction project.
- **Dealing with mistakes and rework**
Managing the mistakes on a project that result in rework, assessing the associated costs and determining why the errors happened.



Chapter 1 - Where Construction Teams Spend and Lose Time

Each respondent estimated the time spent on these six activities, grouped into the following categories:

Optimal Activities

- Project execution and coordination

Acceptable Activities

- Interacting with external stakeholders
- Organizing people and the jobsite

Non-Optimal Activities

- Looking for project data
- Conflict resolution
- Dealing with mistakes and rework

When asked how their time is spent, respondents indicated spending 11.2 hours on optimal activities including project execution and coordination. They're also spending 8.2 hours communicating with project stakeholders and 7 hours organizing the job site and people.

Time spent on non-optimal activities included 5.5 hours looking for project data, 4.7 hours on conflict resolution and 3.9 hours dealing with mistakes and rework. This adds up to 14.1 hours spent on tasks that take construction professionals away from optimal activities.

On average how many hours per week do you spend on the following activities?

Optimal Activities

Project execution and coordination

11.2
Hours

27.7%

Acceptable Activities

Communicating/interacting with project stakeholders

8.2
Hours

20.3%

Optimizing the job site and people

7
Hours

17.4%

Non-Optimal Activities

Looking for project data/information

5.5
Hours

13.4%

Conflict resolution

4.7
Hours

11.6%

Dealing with mistakes/rework

3.9
Hours

9.6%

35%

of working hours are spent on non-optimal activities

Chapter 1 - Where Construction Teams Spend and Lose Time

With 40.5 total hours spent across all activities per week, each team member is spending 13.4% of their time looking for project data, 11.6% on conflict resolution and 9.6% of their time dealing with mistakes and rework. This means construction teams are spending an average of 35% of their work hours on non-optimal activities each week.

In 2018, time spent on non-optimal activities such as dealing with mistakes and rework, looking for

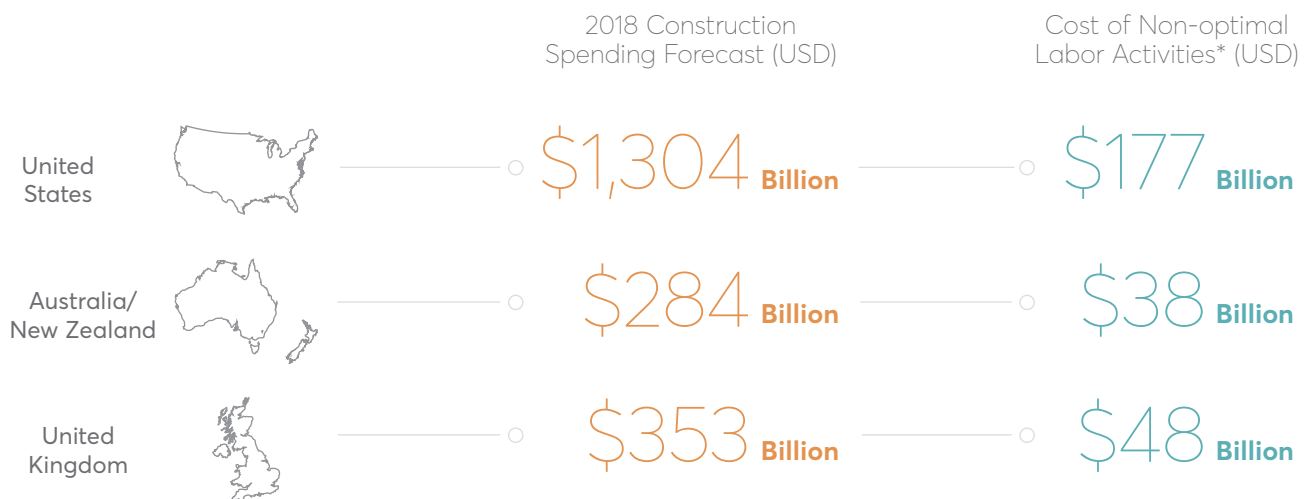
project data and handling conflict resolution will cost the US industry an estimated \$177.5 billion in labor costs.

Using known forecasting data for global construction spend, the worldwide cost of non-optimal labor activities can be predicted. Assuming a \$10.5 trillion spend, the waste amounts to \$1.4 trillion globally. While waste can never be entirely eliminated, the cost highlights the global opportunity available to those who focus on efficiency and process at every stage of construction.

“I would not be surprised if as much as half of the rework we experience is because of poor communication. There’s a lot of moving parts. It only takes one person to miss something or not tell someone what they did or where they put something to cause a problem.”

-Senior Project Manager


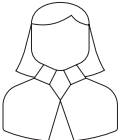

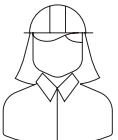

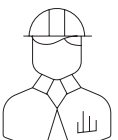

Commercial Construction Manager/General Contractor



*Cost of non-optimal labor activities = (2018 construction spending forecast) x (39% [percentage of completed contracts attributed to labor]) x (35% [percentage of total activities that are non-optimal])

The cost of non-optimal activities by position

Taking the number of hours respondents indicated they spend on non-optimal activities and matching it with FMI's salary data shows the following annual impact on key roles:

		Yearly Base*	Weekly Hours	Annual Impact
	C-level	\$356,801.85	14.05	\$125,286.10
	Directors/ Vice Presidents	\$207,857.79	13.52	\$70,260.26
	Project Managers	\$147,105.48	13.39	\$49,247.33
	Preconstruction Managers	\$143,671.29	13.71	\$49,228.54
	Field Supervisors	\$123,353.16	15.84	\$48,835.32
	Estimators	\$108,796.60	12.15	\$33,051.09
	VDC Managers	\$93,482.00	14.42	\$33,702.72



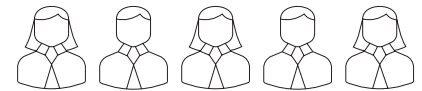
* Source: FMI

The cost to you and your organization

Most contractors employ multiple employees in each of these positions. To estimate an actual business cost to a mid-market firm, we assume two C-level, five directors/vice presidents, ten project managers, five preconstruction managers, fifteen field supervisors, ten estimators, and one VDC manager. An organization of this size has the opportunity to address \$2,437,232 in annual waste from time spent on non-optimal activities.



2 C-level



5 Directors/Vice Presidents



10 Project Managers



5 Preconstruction Managers

\$2,437,232

per firm wasted annually from time spent on non-optimal activities



15 Field Supervisors



10 Estimators



1 VDC Manager

Where teams are spending more time than expected

Respondents were asked where they typically spend more time than expected and gave a fairly even distribution in their answers.

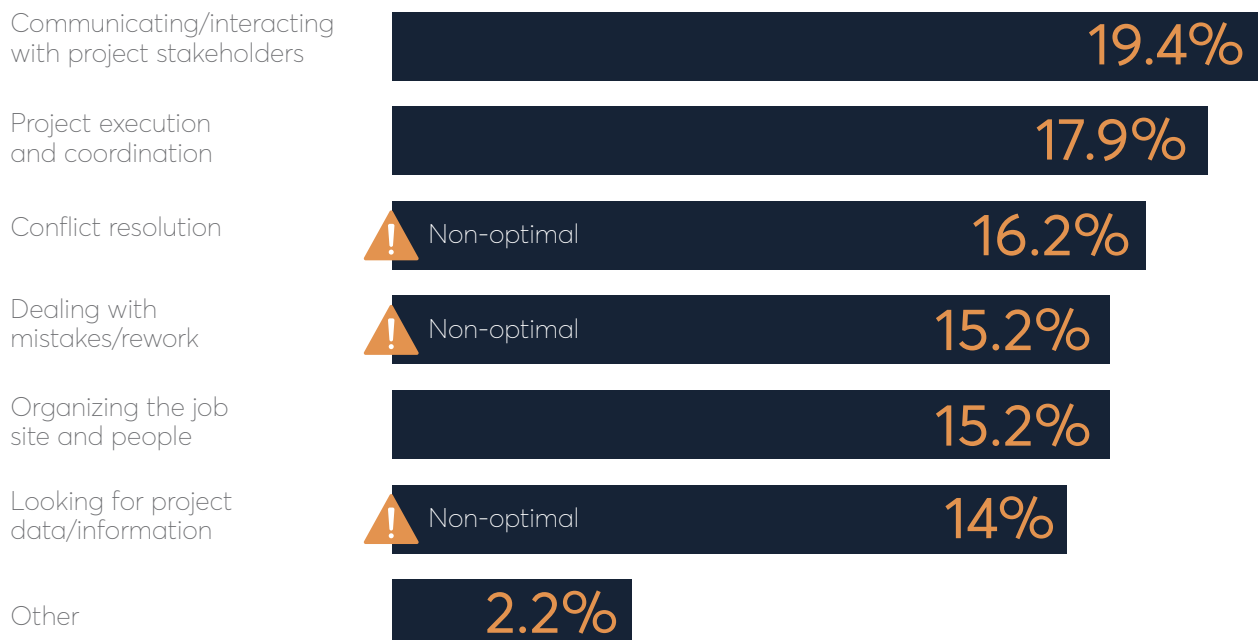
Non-optimal activities made up 45% of responses, suggesting that while respondents may see these activities as not preferable, they anticipate the

demands of projects requiring that they spend time on these activities. Communicating/interacting with project stakeholders was the top selection (19%) for requiring more time than expected. This suggests that while important, communication on projects is inefficient and should be a target for improvement.

45%

of respondents spend more time than expected on non-optimal activities

In which of the following areas do you most frequently spend more time than expected?

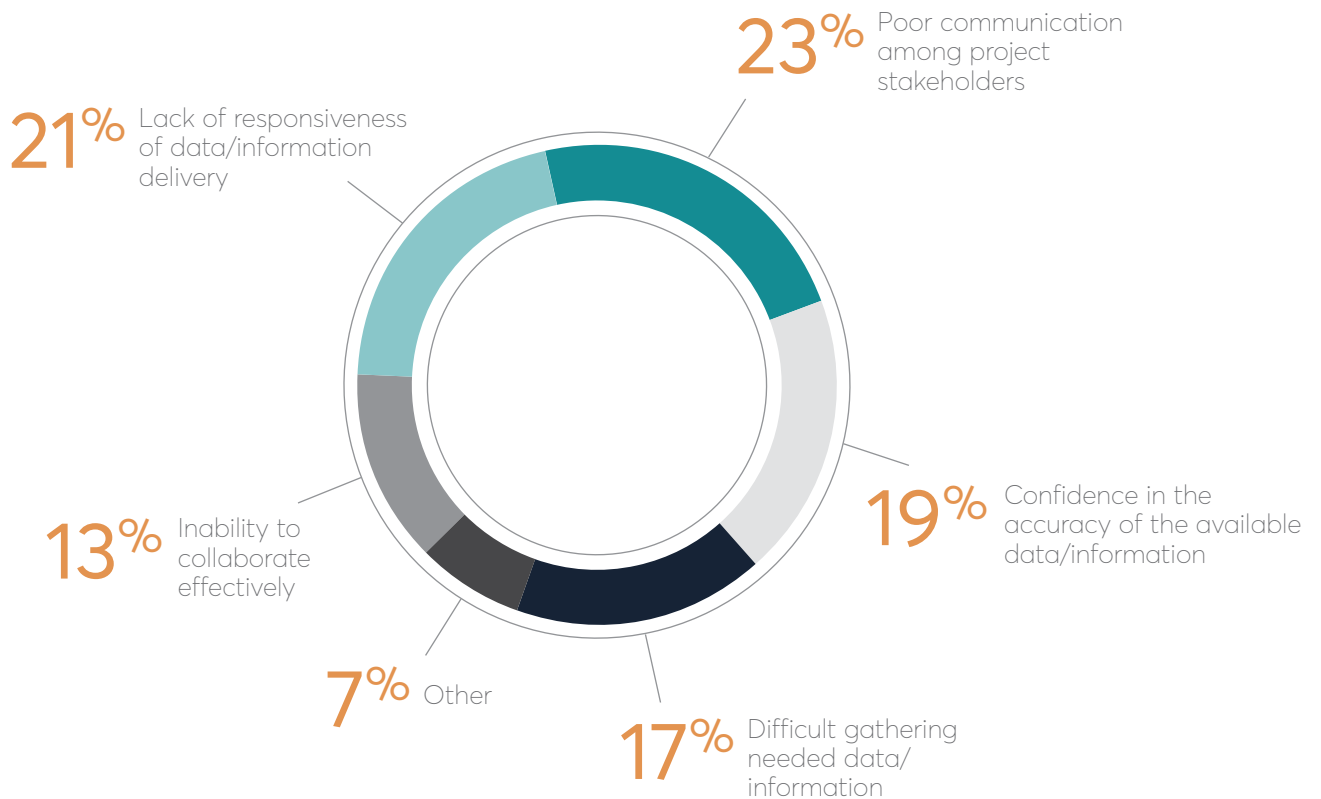


What's causing the extra time waste?

The most common single selection for spending more time than expected on a task was poor communication among project stakeholders (23% of respondents). Regardless of the activity, when more time is spent than expected, the majority of respondents suggest it was due to inaccurate project data or difficulty accessing the information they need.

While many of the non-optimal activities that occur on a project site cannot be eliminated altogether, analyzing and improving the amount of time required is an essential goal in order for construction teams to be competitive and profitable in today's market.

Why do you spend more time than expected on this task?





2

**POOR DATA AND
COMMUNICATION
ARE A BURDEN ON
THE CONSTRUCTION
INDUSTRY**

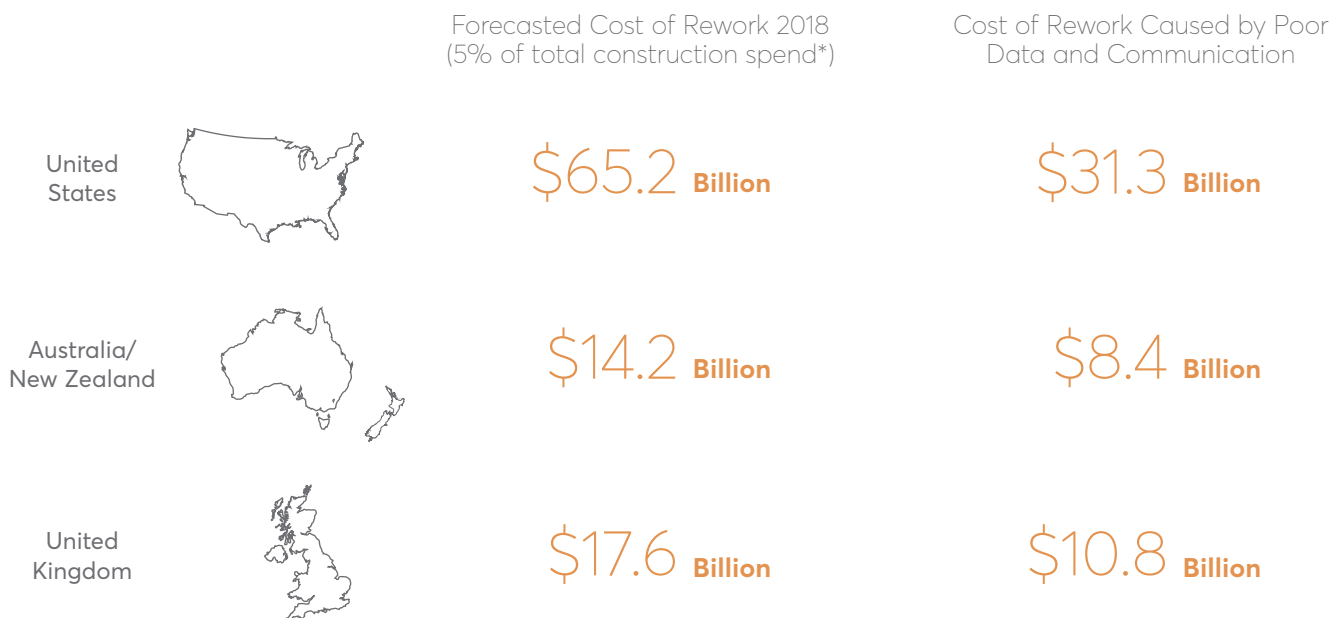
48% of all rework in the US is caused by poor data and miscommunication

Effective communication and the ability to access accurate project data is critical at every stage of construction. Poor data and communication often causes rework and can have long-term cost implications for owners and developers. FMI forecasts that construction spending will reach \$1.3 trillion in the US in 2018. With rework estimated at 5% of overall construction costs, this suggests that \$65 billion of construction spending will be on rework for the year.

The survey found that in the US, rework directly caused by inaccurate, inaccessible and incompatible project data accounts for 48% of the total quantity of rework. Applied to the US industry at large, this cost is more than \$31.3 billion annually.

Globally, an average of 52% of rework was caused by poor project data and communication, representing a worldwide cost of \$280 billion in 2018.

52% (\$280 Billion)
of rework caused by poor project data and communication globally



*FMI completed contracts data

Breaking down the causes and costs of rework

To further break down the \$31.3 billion that is wasted on rework in the US—when asked what they attribute rework to on their projects, 22% of respondents pointed to poor project data and 26% cited poor communication among stakeholders.

When viewing each item as individual contributors to rework, poor communication represents an annual cost of \$17 billion to the US construction industry and poor project data represents \$14.3 billion. The remaining 52% of rework could be caused by a number of other factors including design changes or issues, faulty or delayed materials, unforeseen conditions and more.



\$31.3 Billion

OR

48% of all rework in the US is caused by poor data and miscommunication

22%

poor project data

\$14.3 Billion

26%

poor communication

\$17 Billion

The causes of miscommunication

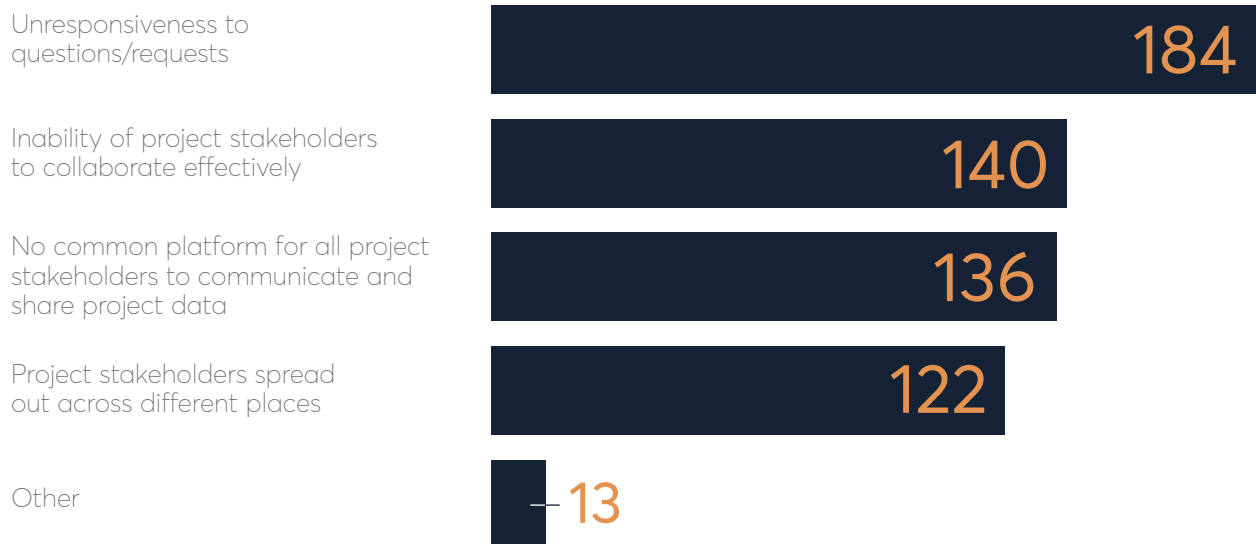
When asked about the cause of poor communication among project stakeholders, the top choice was unresponsiveness to questions/requests (30.9% of respondents), followed by the inability of project stakeholders to collaborate effectively (23.5% of respondents).

Top cause of poor communication among project stakeholders

30.9% chose unresponsiveness to questions/requests

23.5% chose inability of project stakeholders to collaborate effectively

What is the primary cause of poor communication among project stakeholders? Select one.



The causes of poor project data and information

When asked what the primary cause of poor project data and information was, 34.4% chose erroneous or incorrect project data—meaning it was outdated or otherwise faulty, while 23.8% cited difficulty accessing needed project data.

When construction firms are forming their technology deployment strategy, a top priority should be choosing tools that enable teams to more easily communicate and access accurate project data.

Top cause of poor project data and information

34.4% chose erroneous or incorrect project data

23.8% chose difficulty accessing needed project data

What is the primary cause of poor project data and information?

Erroneous or incorrect project data/information

205

Difficulty accessing needed project data/information

142

Inability of project stakeholders to easily share project data/information

134

Project stakeholders withholding project data/information

88

Other

26

Improved data could strengthen relationships between contractors and owners/developers

To understand the challenges owners have, they were asked how capturing and retaining more data during design, construction and closeout would impact their projects over their full lifespan. With 71% of owners indicating that it will reduce lifecycle operation costs, it's clear they feel strongly about this issue.

71%

of owners indicate that capturing and retaining more data during design, construction, and closeout will reduce or significantly reduce lifecycle operations costs.

Providing construction teams with better access to project information and the ability to capture data from the field more accurately not only has short-term benefits, but will also benefit the contractor/owner relationship and reduce long-term costs.

Capturing and retaining more lifecycle data/information during design, construction, and closeout would:

Significantly reduce lifecycle operations costs

21

Reduce lifecycle operations costs

48

Have no impact on lifecycle operations costs

20

Increase lifecycle operations costs

8

Improved data could strengthen relationships between contractors and owners/developers

Many types of data can be captured on a project, however, owners' top choices to reduce long-term facilities costs included as-built data for general information sharing and contractor or vendor operational performance data.

This clearly shows that post-construction, the most value that you can add for owners is to provide them with complete, accurate as-builts and data that shows the quality and quantity of work done during

construction. A basic as-built is contractually mandated, but viewing the comprehensiveness of the turnover phase as a differentiator can help firms stand out from the crowd.

Owners are increasing their use of technology throughout the operational phase of the facility and are coming to rely on the seamless transition of all construction data into their facilities and operations teams. Contractors able to anticipate this need by providing this data have a large advantage over firms that do not.

As an owner/developer, please rank the following categories of construction data based on their value in helping reduce costs for long term facilities operations.

More Valuable



Less Valuable

- 1 Internal access to as-built data for general information sharing between departments
- 2 Contractor or vendor operational performance
- 3 Building equipment data for asset management
- 4 Building systems sequence of operations (backup power generation, chiller systems, boiler systems, etc.)
- 5 Portable (mobile) facility data for preventative maintenance and repairs
- 6 Historical construction data (change orders, schedules, daily reports, etc.)
- 7 Facility emergency preparedness data (valve locations, O&M manuals)



3

**THE INDUSTRY IS
PRIORITIZING TECH
INVESTMENTS FOR
THE FIELD**

While the industry understands the problem, many may not be making the right choices

Over the last decade, there has been a dramatic increase in available technology for the construction industry. While many aspects of the jobsite may look the same, everything is becoming smarter. From GPS-connected heavy machinery and drone imaging to the adoption of new generations of business-ready mobile devices, the technology on site is radically different. In times of radical change, it can be challenging to prioritize areas of investment and understand how to measure the ROI. This research focuses specifically on the role of mobile technology in this change by cataloging the motivations for investment and understanding the observed impact.



Top reasons for investment

The reasons that participants gave for investing in construction-specific technology directly reflect the challenges with project data integrity and accessibility that the industry is experiencing. In addition to the goal of improving project productivity (57% of respondents), the two biggest reasons for investing were to gain better access to project data (58% of respondents) and to improve the accuracy of project data (56% of respondents).

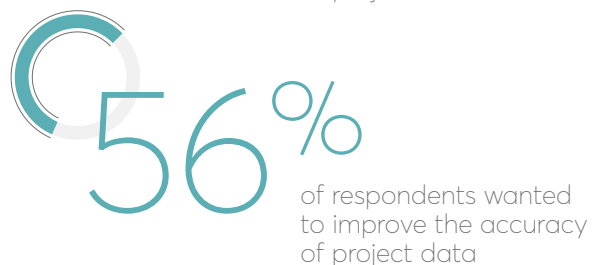
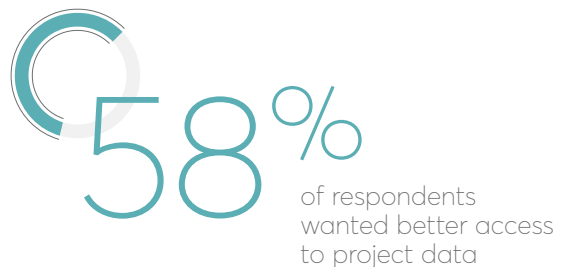
The alignment of these top motivations with the previously identified challenges is promising. Beyond the top three, the responses show alignment around the need to boost productivity, with only 7% indicating that they don't rely on industry-specific technology to build.

“I will say it's gotten better than it used to be, but it could still be better. A lot of time could be saved if I could just get the information I needed from my laptop instead of asking someone back in the office for it and having to wait an hour or even a day for them to get back to me.”

-Superintendent

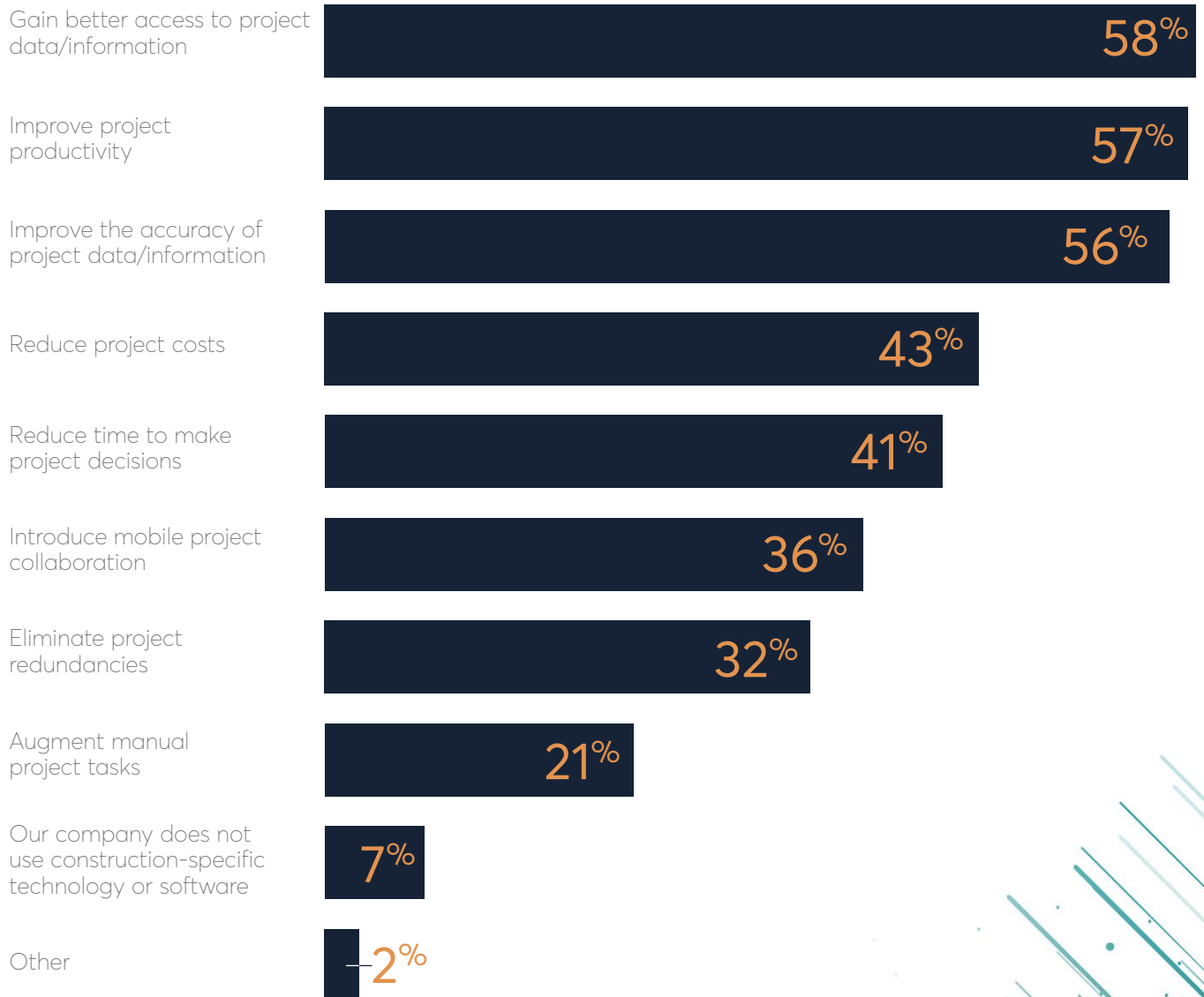
Commercial Construction Manager/General Contractor

Accuracy and access to project data are top reasons for tech investment



Top reasons for investment

For what reasons have you or your company used construction-specific technology or software? Select all that apply.



Important considerations when investing in construction tech

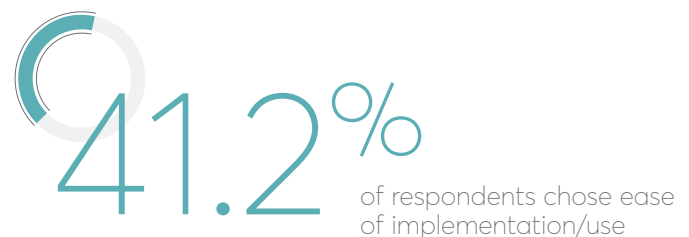
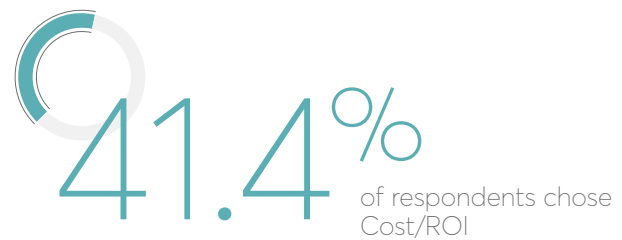
To further understand why teams are choosing construction technology, respondents were asked to pick their top two reasons for investment. Two responses were clear leaders: cost/ROI was selected 248 times and ease of implementation/use received 247 selections. Again, we see alignment around what the industry needs from construction technology: Improvement in the predictability and quality of project delivery through tools that are easy to use by all stakeholders.

Minimizing recurrent challenges received 170 selections, gaining a competitive advantage received 160 selections and integration with other technologies received 132 selections. This forms a second tier with significant value. These three selections suggest a new urgency in technology as a differentiator:

technology helps advanced firms stand out from the competition by offering better outcomes and visibility to owners. To provide this improved service, firms must build an integrated tool chain where information is reliable and project status is always visible. Data entered in one system needs to be automatically shared with other critical systems. In addition to providing greater efficiency within the team, there is less opportunity for error and long-term data loss.

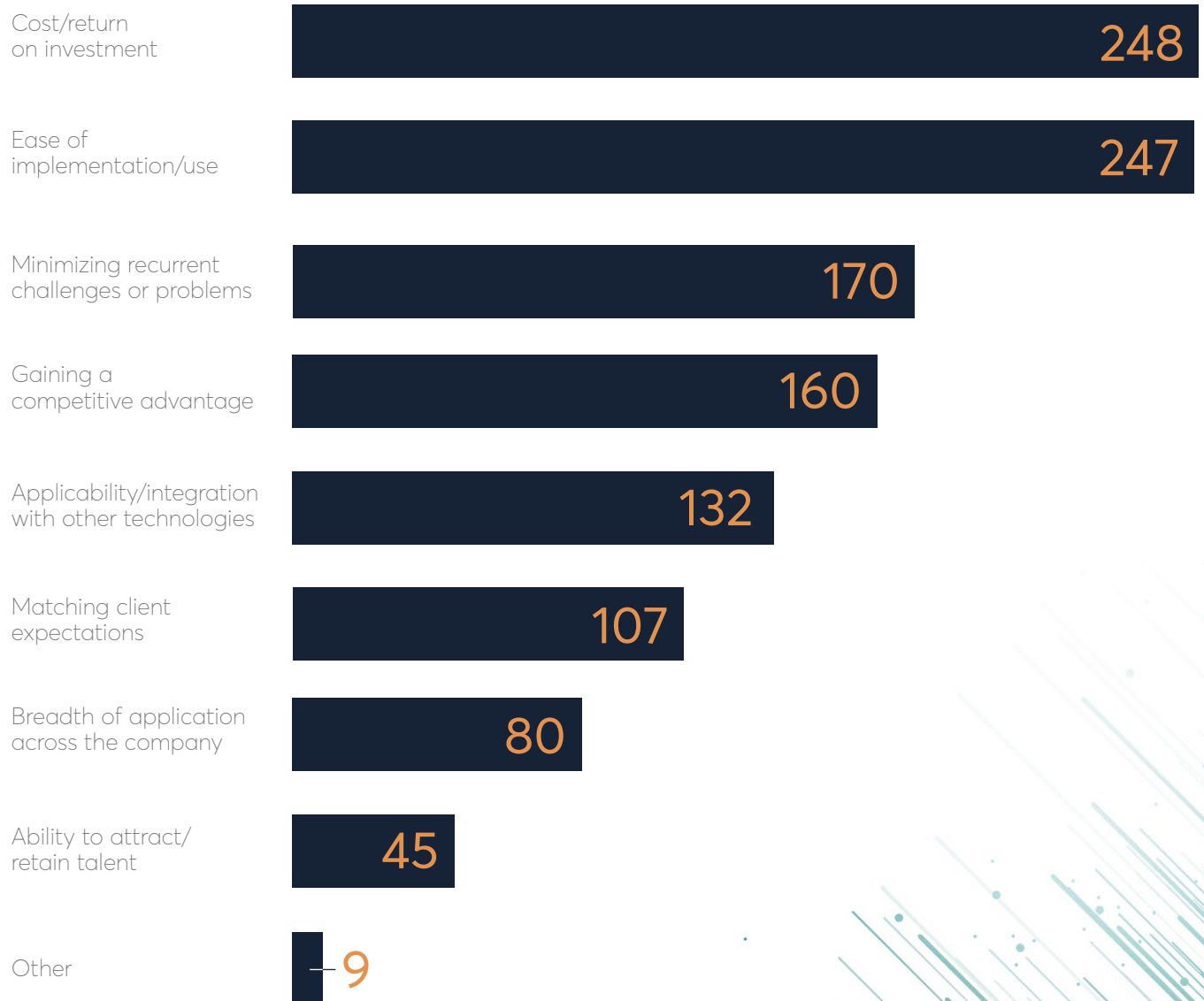
It was slightly surprising to see the firm's ability to attract and retain talent as the lowest-ranked value on the list. While the labor shortage remains a key consideration in other aspects of the business, it does not seem to outweigh the higher order value proposition of the other considerations.

Top considerations when investing in construction technology



Important considerations when investing in construction tech

What is most important to you or your company when considering investment in construction-specific technology or software? Select the top two.



Factors influencing construction technology investment

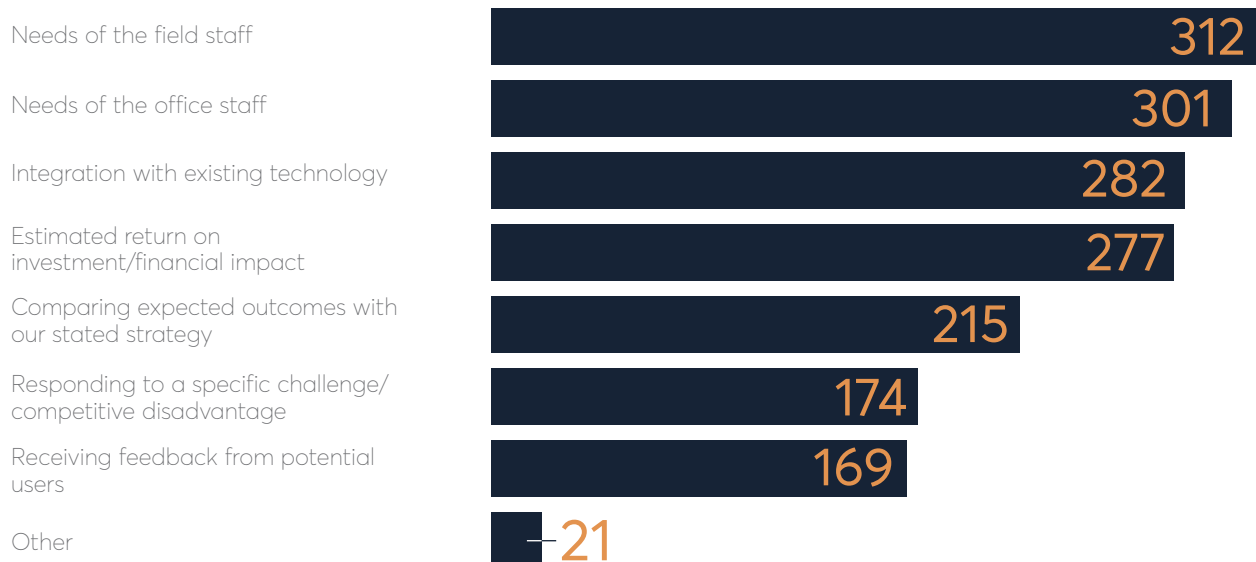
The people making decisions about technology recognize that equipping field and office teams with the right tools is a priority, but they are not yet including them in the decision making process. While the top choice of considerations for technology investment was the needs of the field staff with 52% of respondents, only 28% considered receiving feedback from potential users of new technology before investing in it.

This suggests that firms are not fully piloting new technology before adoption. Understanding the needs of teams on paper is different than responding to data gathered through

a pilot where the end users in the field are given an opportunity to evaluate the technology for themselves.

Managing adoption of technology through an intentional series of pilot phases minimizes the upfront commitment to any particular vendor while preserving the flexibility to adapt and change when new information is presented. It also transforms the role of the end user from a passive recipient of a corporate mandate to an active participant in the decision making process. Because all of the stakeholders have had a chance to provide input, they will be more committed to the program's success.

When investing in construction-specific technology or software, what is involved in the decision? Select all that apply.



An aerial, top-down view of several pieces of heavy construction machinery, including compactors and rollers, arranged in a diagonal line on a dark surface. The machinery is primarily orange and grey, with some yellow and blue accents. The background is a dark blue gradient with some light streaks and small white dots, suggesting a night or low-light environment. A white circle containing the number '4' is positioned in the upper right quadrant, with a thin white line extending from it towards the text below.

4

**PURCHASING
MOBILE DEVICES
IS NOT ENOUGH**

Only 18% of companies consistently use construction apps on mobile devices to access data and collaborate

It's not just what devices you deploy; it's how you use them. 75% of general contractors and specialty trade contractors provide mobile devices to their project managers and field supervisors. However, only 18% of companies consistently use apps on mobile devices to access project data and collaborate with project stakeholders.

Less than one-fifth of companies consistently use their devices to collaborate effectively—despite the fact that over half of participants indicated that their reason for using construction-specific technology was to gain better access to project data. This suggests a significant disconnect occurring between when the decision to purchase technology is made and the eventual deployment and adoption of those tools.

“Construction is a project management business, which means good communication is critical. There are so many technologies available on the market, that I think it’s malpractice not to be utilizing for this purpose.”

-Chief Operating Officer
Nonresidential Construction Manager/
General Contractor



of general contractors and specialty trade contractors provide mobile devices to their project managers and field supervisors.



of companies consistently use apps on mobile devices to access project data and collaborate with project stakeholders.

Chapter 4 - Purchasing Mobile Devices is Not Enough

Teams that are using mobile devices less than 80% of the time for collaboration and data access are not using them effectively. Their need for project information and communication tools is not lower than that of other groups, so this implies they are relying on other tools for collaboration instead of fully utilizing their mobile devices.

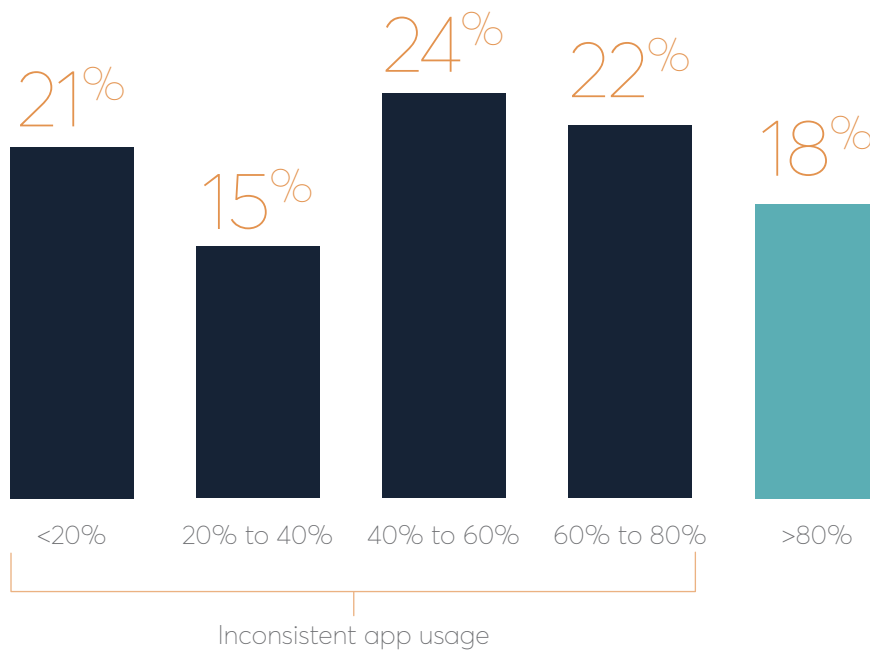
While it may seem extreme to assert that usage lower than 80% is not acceptable, anything below that mark indicates teams are working from data sources that are unreliable and rapidly deprecated. It also means decisions are disconnected from the official project archive. This results in a long-term disadvantage for the

operational phase of the asset's life because potentially critical decisions and changes can be lost.

Almost half of the responses indicate usage between 40% and 80% of the time, which is encouraging. This suggests an understanding of the importance of these devices but an inconsistent adoption within the team. Clearly defining process and standards will help these organizations grow into consistent users of technology.

More than one-third of responses indicate little to no usage for these critical workflows. The challenge to these organizations is more fundamental and will likely involve a strategic re-examination of current priorities and technology investments.

How frequently does your company use apps on mobile devices to access project data and information and collaborate with stakeholders (i.e. for more than just making/receiving emails, phone calls, and text messages)?



Usage lower than 80% indicates that teams are working from data sources that are unreliable and rapidly deprecated.

Expectations with construction tech are often met, but should they be?

In their own words, respondents' experience with construction-specific technology or software has met or exceeded expectations. While there are instances of failed technology deployment, a greater number of people are finding success. Nearly four times the number of respondents had an experience with technology that exceeded expectations (39% of respondents) versus those that had failed efforts (11% of respondents).

There is a clear disconnect between the satisfaction respondents have with construction technology and the actual utilization of mobile devices for

communication and sharing project data. Construction teams are purchasing these tools to solve the challenges they are experiencing in the field, but only one-fifth are properly leveraging them. It is possible that the feedback loop is not complete, meaning the decision-makers for technology are getting an incomplete picture of how solutions are being adopted by the users in the field. Even if this user feedback is being taken into consideration, it seems safe to suggest that expectations are being set too low for the evaluation of construction technology.

What has been your experience with construction-specific technology or software compared to expectations overall?

Significantly exceeded expectations

14%

significantly exceeded

Somewhat exceeded expectations

25%

Met expectations

50%

Somewhat failed expectations

10%

Significantly failed expectations

1%

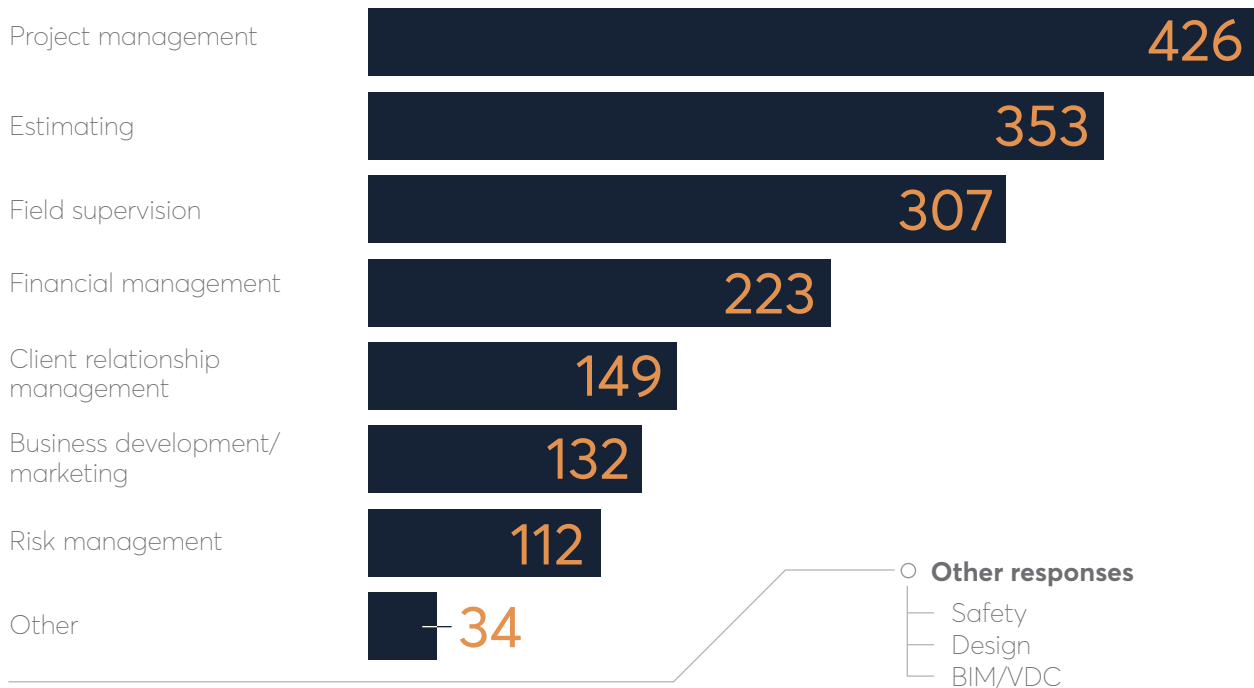
significantly failed

There's great potential in construction tech to be realized

Almost half (45% of respondents) believe they have broadly or fully deployed construction-specific technology or software across their organizations. However, this may be overstated. Of the eight ways that respondents could select as examples of utilizing construction-specific technology or software, more than 69% selected four or fewer examples, while 52% selected three or less. Respondents indicate having successful technology deployments—but with so few categories of utilization selected, the numbers just don't add up.

Project Management and Estimating are the most consistently adopted technologies, but Field Supervision and Financial Management are equally essential to project delivery. Technology specifically aimed at improving the connectedness of field teams is a relatively new category within the overall construction space and the adoption gap suggests that there is progress to be made in fully realizing that potential.

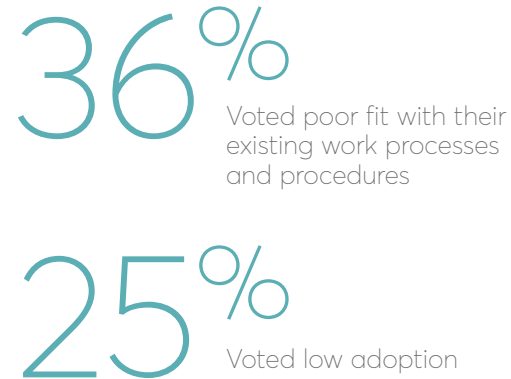
Which of the following teams or business units within your company currently utilizes construction-specific technology or software? Select all that apply.



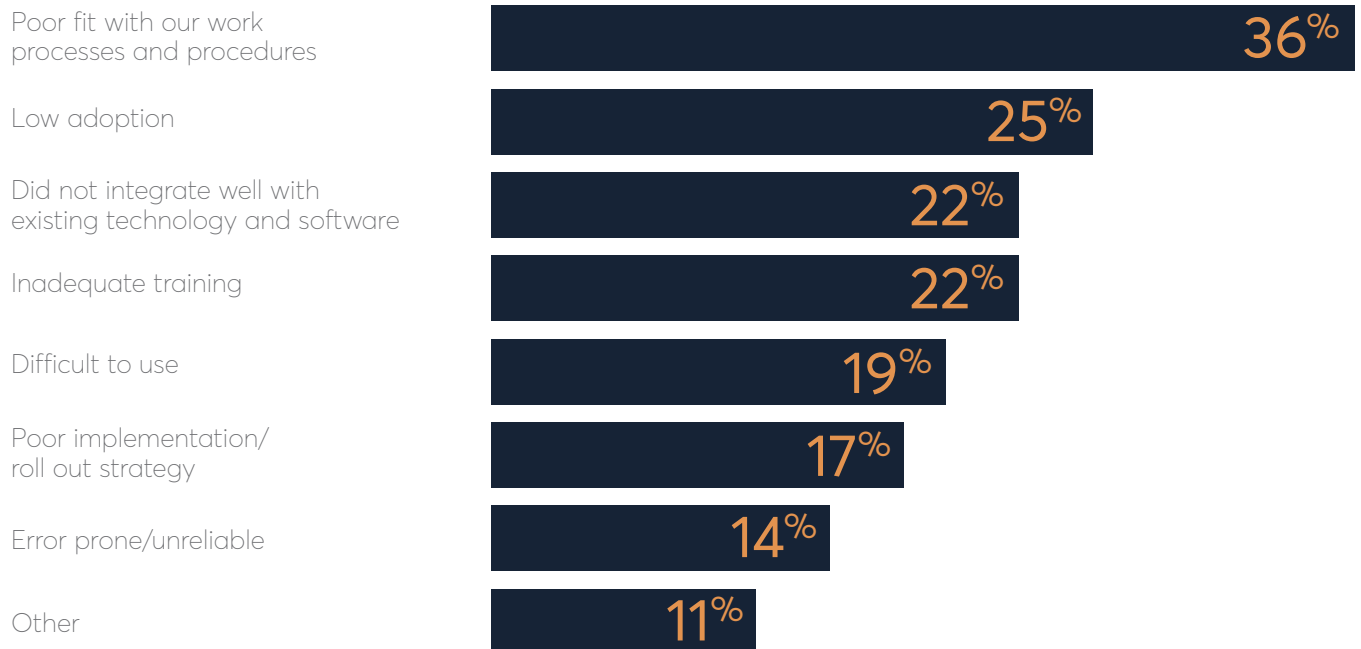
Why construction technology expectations are not met

The most frequently cited reasons for missed expectations for construction-specific technology or software was poor fit with their existing work processes and procedures (36% of respondents), low adoption (25% of respondents) and not integrating with existing technology and software (22% of respondents). There is a clear relationship between inadequate training (22% of respondents) and the tools being difficult to use (19% of respondents). This ties directly into poor implementation and rollout strategy (17% of respondents).

Reasons for technology expectations not being met



When your expectations of construction-specific technology or software were not met, what was the underlying reason?



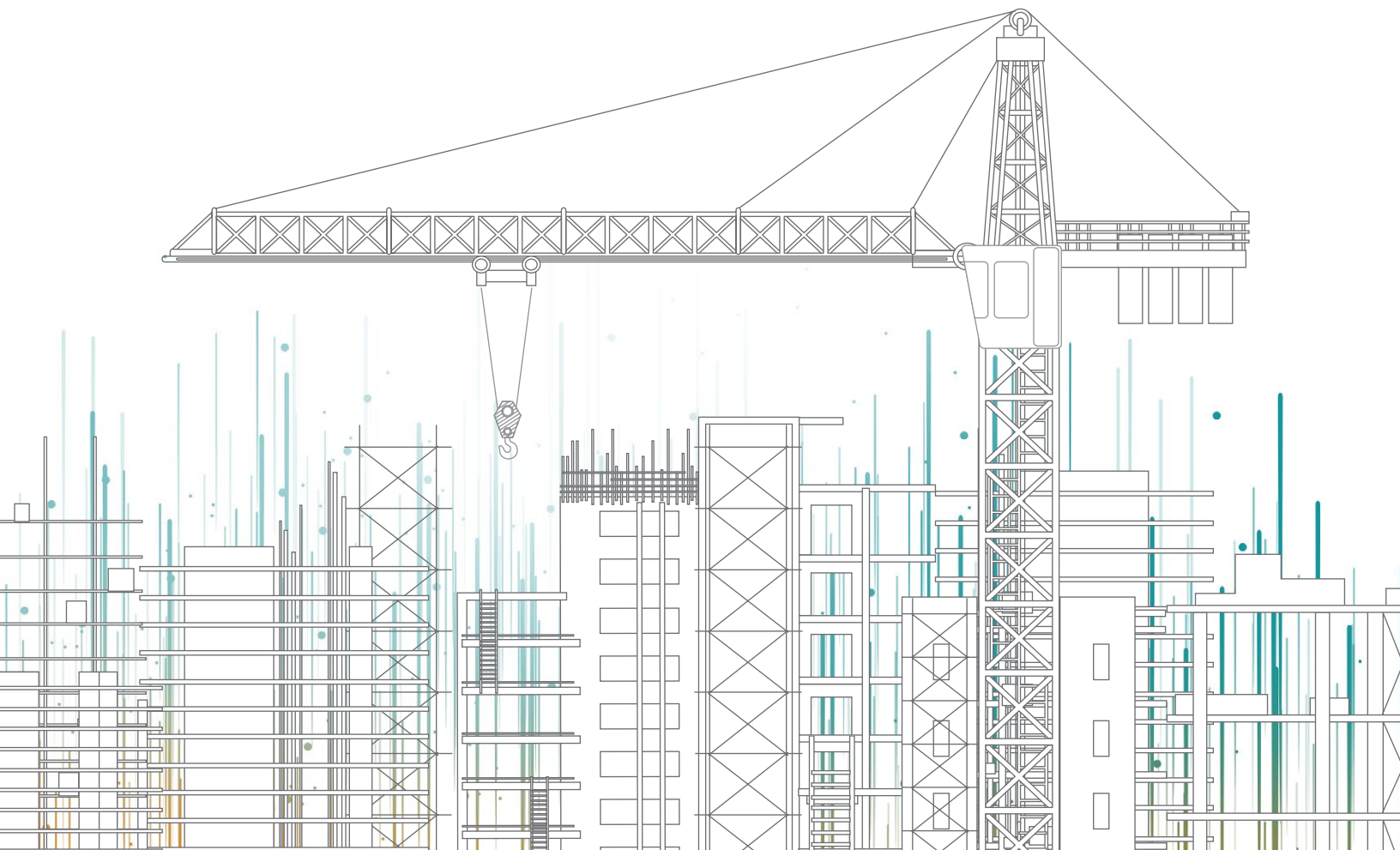
Why construction technology expectations are not met

In the usage spectrum of construction specific software, users that showed moderate use were most disappointed by poor fit with existing work processes and procedures. Respondents who exhibited maximum use were most disappointed by inadequate training and error-prone software. Respondents who showed minimal use were most disappointed by poor fit and low adoption.

Organizations are not receiving input from their end users in the decision making process, leading to poor fit and low adoption of technology

upon rollout. It also seems that teams are not providing the proper level of training to their users, further decreasing adoption levels and missing user expectations.

Teams are adopting mobile technology, but many are not implementing the right strategy for a successful deployment. It is important to understand the specific workflows and needs of the team while reviewing potential solutions with real input from the end user. This will help in the selection of a solution that is easy to use, achieves high levels of adoption and delivers impact.



Construction Disconnected

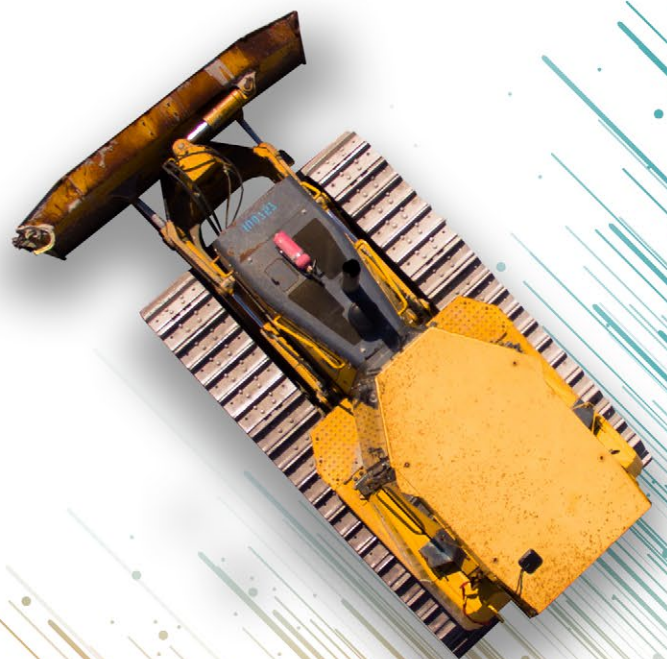
The construction industry has reached a turning point. Firms are recognizing the need to enable better communication and access to project information for their entire team. However, many are off to a rocky start in this transition and the opportunity remains for firms to optimize how to invest in and approach technology deployment.

Industry leaders need to better strategize the rollout of mobile devices alongside best in class solutions that are proven to support the workflow needs of their teams in the field. With strategic deployment, you increase the chance of achieving the high levels of technology adoption needed in the field and office. Objectively implementing and evaluating a pilot program will allow teams to make the right choices for mobile device and technology rollout.

Today, very few decision makers are including potential users in the decision making process before making technology investments. Teams need to employ a methodical approach to the rollout of construction technology by including all stakeholders; otherwise, adoption levels will continue to be low. Leaders also need to focus on refining their relationship with the tools they've already deployed, choosing the correct next steps in integrating new technology and further reducing waste.

Construction teams are now feeling a sense of urgency to fully embrace technology to help drive productivity. With 35% of time spent on non-optimal activities like conflict resolution, dealing with rework and looking for project data—the costs are quickly stacking up. The most striking example of this unnecessary spending is the cost of rework caused by poor data and communication, which will be \$280 billion worldwide in 2018.

The industry is thinking about technology for the right reasons. Top firms are providing funding for technology research to find the most effective ways to help their teams build well. While waste on the construction site will never be fully eliminated, there is great hope for a dramatic increase in construction productivity on the horizon.





PlanGrid is the first construction productivity software that allows contractors and owners in commercial, heavy civil and other industries to collaborate, collect and share project information from any desktop or mobile device through the entire project lifecycle. PlanGrid increases project efficiency by streamlining document management, providing construction teams with easy access to all project information from any device and enabling seamless collaboration within teams.

PlanGrid is used on more than one million projects across commercial, heavy civil and other industries in 90 countries. Headquartered in San Francisco and founded in 2011, PlanGrid has \$69 million in funding from Sequoia Capital, Tenaya Capital and other top venture capital firms.

United States
+1 (415) 963-4088
www.plangrid.com

Canada
(800) 646-0796
www.plangrid.com/ca-en
www.plangrid.com/ca-fr

United Kingdom
+44 (0) 20 3695 0292
www.plangrid.com/gb

Australia
AUS 1800 316 406
www.plangrid.com/au

Hong Kong
+852 5808 3598
www.plangrid.com/zh



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Authors

Eric Thomas
Content Marketing Manager
PlanGrid

Peter Schott
Senior Product Marketing Manager
PlanGrid

Jay Bowman
Principal
FMI

Jay Snyder
Technology Practice Leader
FMI

Natalie Spare
Data Consultant
FMI

Designer

Lynn-Kai Chao
Senior Graphic Designer
PlanGrid

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