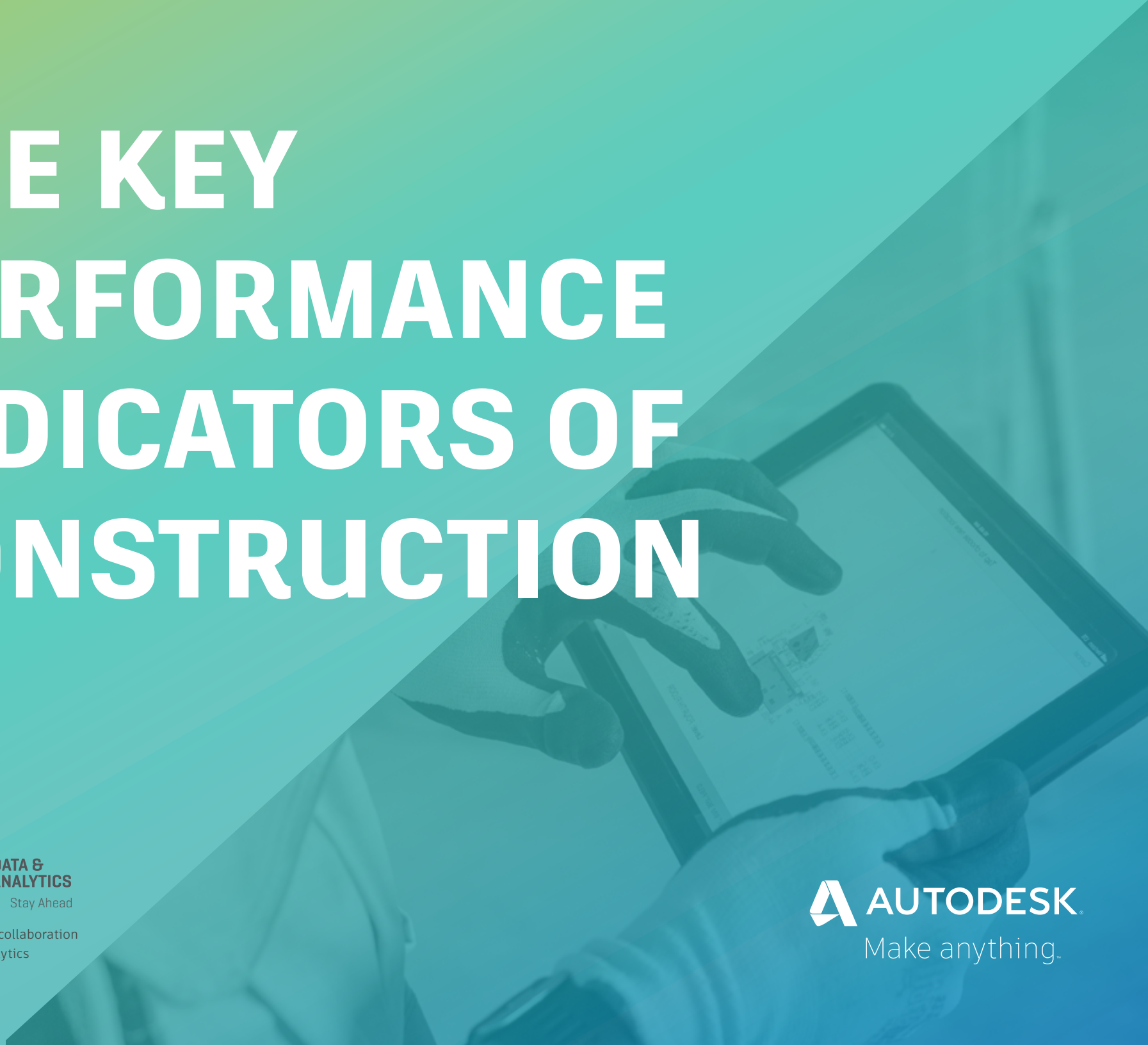
THE KEY PERFORMANCE INDICATORS OF CONSTRUCTION



DODGE DATA & ANALYTICS
See Ahead Think Ahead Stay Ahead

Research conducted in collaboration with Dodge Data & Analytics

AUTODESK
Make anything.

INTRODUCTION

Many companies use key performance indicators (KPIs) to gauge and compare performance in terms of meeting both strategic and operational goals. However, the construction industry as a whole lacks objective benchmarks, or a way to measure excellence across the industry. The aim of this eBook is to outline simple KPIs that companies of all sizes can start capturing today by using technology that digitizes this information and collects it in a central area. The comprehensive analysis of this data across the industry will help improve processes and lead to better performance and project delivery.

One reason for the absence of industry benchmarks is the lack of centralized data necessary to establish standards. All contractors using digital technology to manage their construction projects are generating data and information; however, many say they lack a single place to aggregate that information and knowledge of how to use it in a meaningful way. Having the ability to analyze data, such as project information around requests for information (RFIs) and change orders, not only provides useful context, but also enables contractors to understand patterns of issues in their building processes.

Autodesk commissioned a study with Dodge Data and Analytics to survey more than 200 contractors and trade professionals in order to identify and analyze current processes for planning and executing projects. The study revealed seven key process indicators that companies say are especially useful to interpret overall performance. The findings suggest that by adopting specific processes for project management, contractors can reduce risk, thus minimizing downstream problems and improving performance. The following summary of the report covers seven categories of project activities, including:

1. Problems discovered in construction documents
2. RFIs
3. Change orders
4. Schedule
5. Safety/Inspections
6. Labor productivity
7. Quality and close-out

Read the key findings and see how your company measures up.

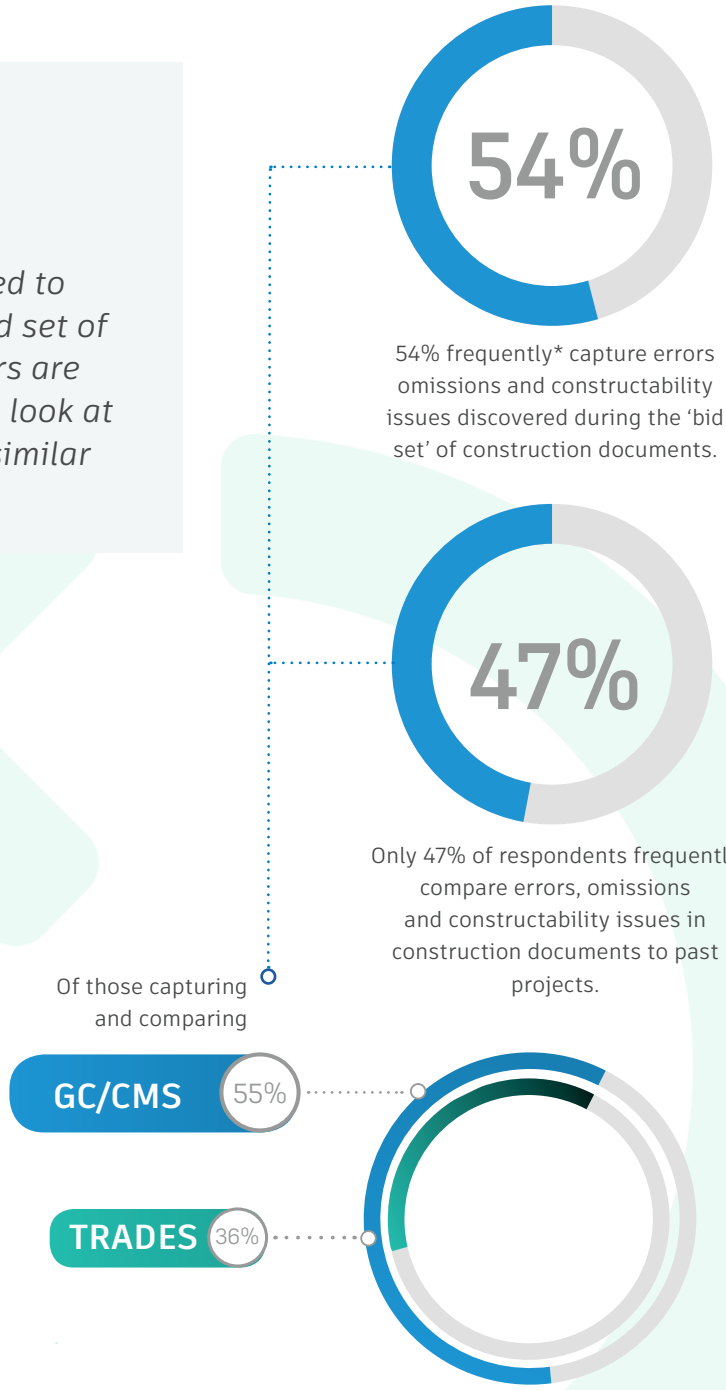
7 KPIs of Construction

1 | PROBLEMS DISCOVERED IN CONSTRUCTION DOCUMENTS

In this section, we look at the frequency, value, and difficulties related to errors, omissions, and/or constructability issues discovered in the bid set of construction documents in order to understand how many contractors are capturing this information and how frequently. More importantly, we look at reporting and how this information is being compared against past similar projects and used to conduct risk reduction activities.

NOTABLE STATS:

- Of those respondents who are capturing errors, omissions, and constructability issues and comparing them to past projects, 66% are using the findings to mitigate risk on future ones.
- While it's important to capture issues on current projects, it's equally critical to set up standard processes to compare them to past projects.
- **Why aren't companies recording this data?** Just over 50% of general contractors (44% of trades) said the biggest obstacle to capturing this information is how time-consuming or expensive it is, and about one quarter feel they don't have an easy way to do it.
- However, only 14% of all respondents who are frequently capturing this information on more than half of their projects reported a high/very high degree of difficulty doing so. It seems that once companies get past those initial barriers of cost and adoption, capturing and reporting this information in a succinct way becomes part of their standard operating procedure.



**Frequently = on over 50% of their projects*

2 | LOGGING RFIS & RESPONSES

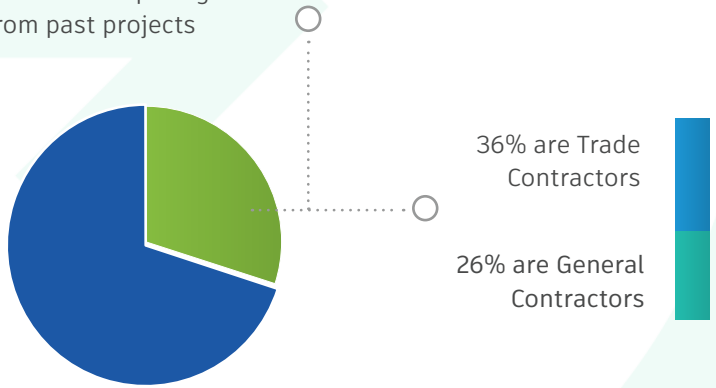
The questions in this section sought to determine how frequently respondents log RFIs and responses and how that information is being compared to past similar projects and used to conduct proactive risk reduction.

NOTABLE STATS:

- 73% of respondents are logging RFIs and responses on over half of their projects.
- Trade contractors more frequently report RFIs to senior management as potential sources of risk, at 75%, versus 64% of general contractors.
- Contractors not digitally logging RFIs and responses see the value in it, but they find that the obstacles, such as difficulty in adopting and cost of investing, prevent them from implementing the technology and processes to support these activities.
- A study conducted by SMACNA, Making RFIs More Effective, noted that design-build projects where the general contractor closely collaborates with engineers and architects tend to have far fewer RFIs and resultant change orders. This is mostly seen in GMP where design intent is communicated, but contractors and trades have freedom to design for maximum productivity outcome.
- Using historical data to identify the root cause of the RFI and measuring time to receive a response can help contractors see where the potential breakdowns in communication are occurring between teams, aiding them in implementing more efficient practices on future projects.

73% frequently create a log of RFIs and responses.

Only 30% are comparing RFI data from past projects

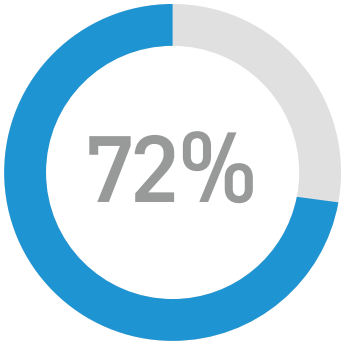


3 | DOCUMENTING CHANGE ORDERS

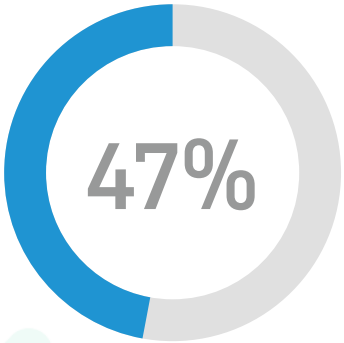
The findings in this section address the collection and documentation of change orders, including turnaround time, root cause evaluation, and schedule impact.

NOTABLE STATS:

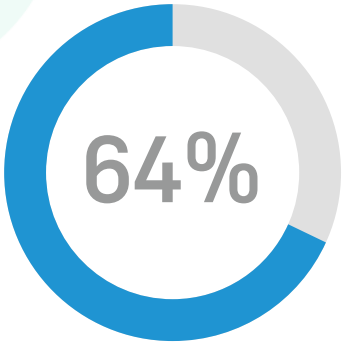
- 64% of respondents typically collect and document change orders on over half of their projects, with general contractors capturing this information at a frequency 10% higher than trades.
    - This trend continues through other data points around capturing root cause, schedule impact, etc. If the general contractor has a change order log, some trades may not see the need to keep one of their own.
    - Analyzing data from change orders can help general contractors assess performance of trade contractors. What was the root cause of the change order? How long did it take them to turn it around? This information can help general contractors select the best specialty contractor for their project.
- **What's holding them back?** According to feedback from the survey respondents, companies perceive that investing in processes to better capture and document change orders is both too time-consuming and too expensive.
- Of those who are rarely (on less than 25% of projects) collecting change order information, 69% feel if they were able to do this more frequently, it would help them gain a deeper understanding of the issues impacting their project delivery process.



72% capture the root cause of a change order.



47% capture start, finish, and turnaround times.



64% evaluate schedule impact of change orders.

LET'S COMPARE: CAPTURING AND COLLECTING INFORMATION

1.

- Only 53% of respondents are capturing errors, omissions, and constructability issues in the bid set of construction documents.
- Dedicating more time and resources to this phase could help contractors identify potential risks and issues earlier in the process, potentially leading to a reduction in RFIs and change orders downstream, and less disruption in scheduling and productivity.

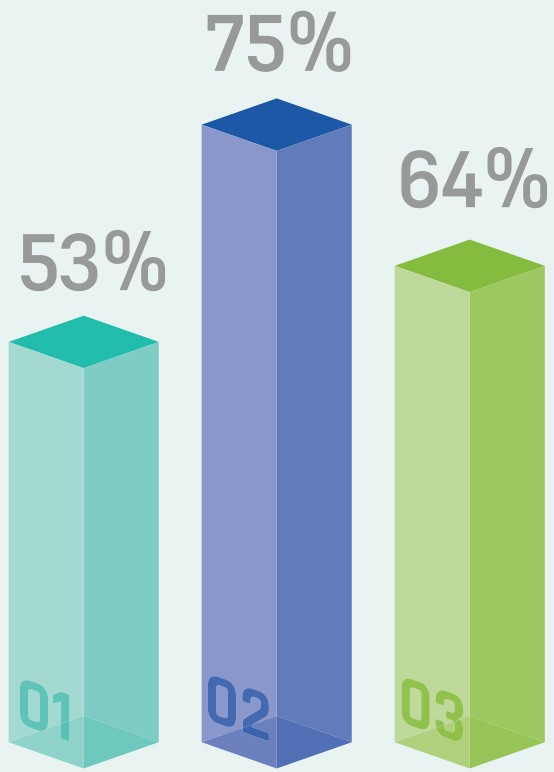
2.

- 75% of respondents are creating a log of RFIs and responses.
- General Contractors are more frequently capturing and collecting data around RFIs, responses, and change orders vs. trades.
- RFIs and change orders could be mitigated if more time was spent reviewing documentation during preconstruction.

3.

- 64% of respondents indicated that they are frequently collecting and documenting change orders on their projects. What's interesting is that large companies (defined as <$100M) do it at a frequency 10% less than small companies (defined as >$100M in revenue).
- This trend continues as we look at other change order activities such as capturing turnaround times, root cause, and schedule impact.

Companies capturing and collecting critical project information on at least 50% of their projects



1 | Capturing Errors and Omissions

2 | Capturing a Log of RFIs and Responses

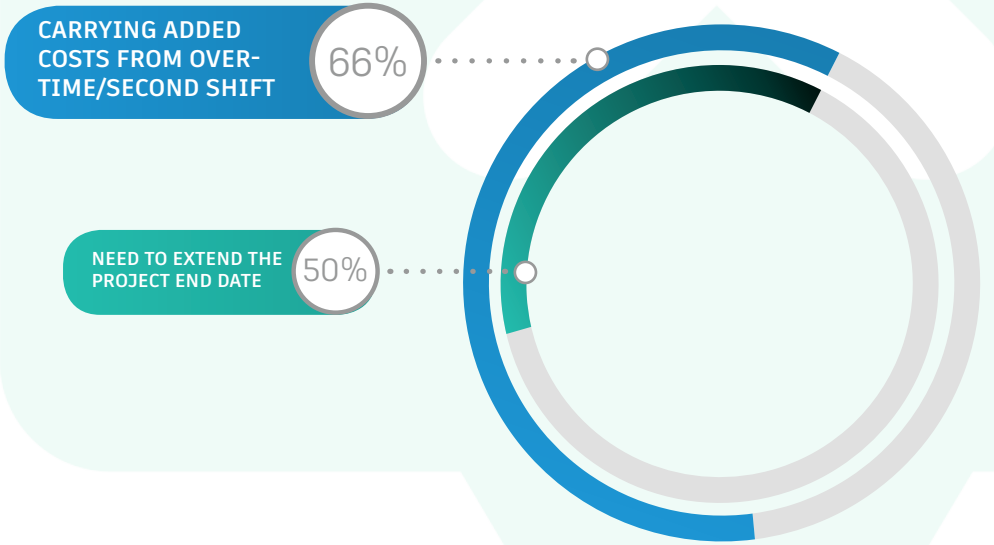
3 | Collect and Document Change Orders

4 | UPDATING THE PROJECT SCHEDULE

This section looks at responses as they relate to the frequency of updating schedules and other related activities and outcomes, including the impact of slippages.

NOTABLE STATS:

- 42% of respondents reported that they update schedules daily or weekly.
    - Of that percentage, 20% said that they update the schedule within 1-2 days of becoming aware of a situation requiring schedule modification. This number is extremely low, considering the importance of capturing schedule changes in a timely manner, allowing for a clearer understanding of the status of the project—what's completed, what remains, etc.
- Over half of the respondents (52%) indicate using overall and look ahead schedules on more than half of their projects. These respondents more than likely belong to companies who are adopting additional Lean practices on their construction projects.



66% of general contractors are carrying added costs from overtime/second shifts on at least three quarters of their projects due to schedule slippage, with **50%** of them needing to extend the project end date.

LET'S COMPARE: REVIEWING PAST PROJECT INFORMATION

1.

- 47% of respondents indicated they are looking at errors discovered during constructability reviews on past projects to find patterns and trends.
- If 30% of companies increased the frequency of reviewing past information for these activities, they could perhaps mitigate issues that occur during the build phase, such as schedule slippage and change orders.

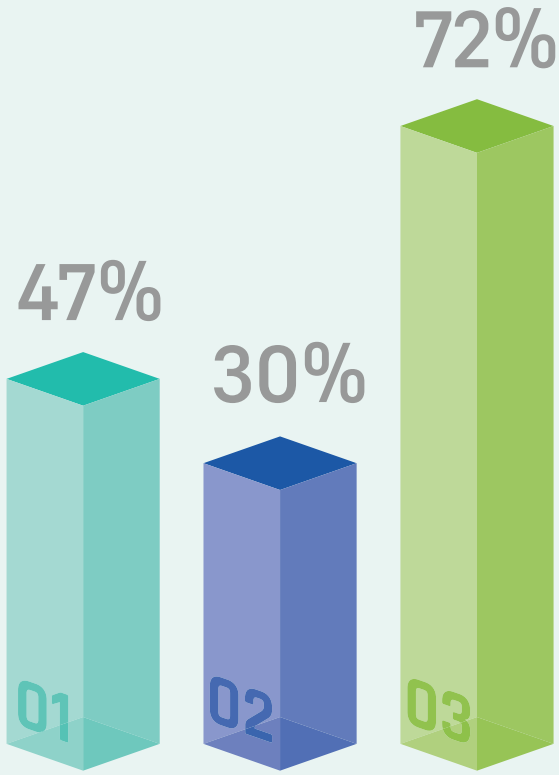
2.

- Per the report, only 30% of respondents are looking at historical information, such as RFIs/response times, from past projects and comparing those findings to less than half of their current ones to identify trends and patterns.

3.

- We see that a high percentage (72%) of companies review documents to uncover the root cause of change orders on over half their projects.
- Reviewing root causes could help prevent the same errors from repeating by enabling companies to catch them earlier in the design process.

Companies capturing critical project information on at least 50% of their projects.



1 | Capturing Errors and Omissions

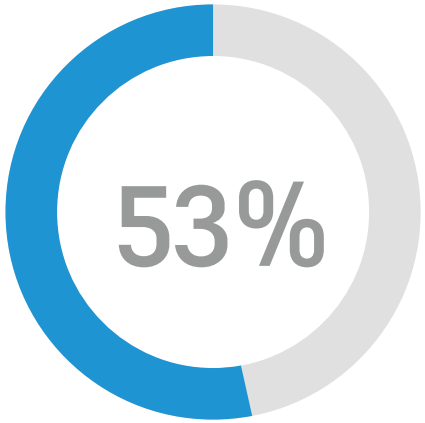
2 | Capturing a Log of RFIs and Responses

3 | Collect and Document Change Orders

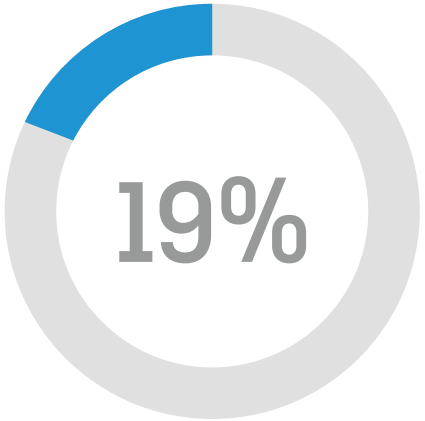
5 | SOFTWARE FOR SAFETY & INSPECTIONS

This section asked respondents if and how they are using software to manage safety and/or inspections for their construction projects.

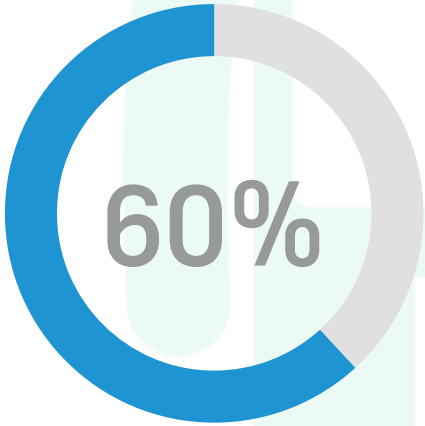
NOTABLE STATS:



53% of large general contractors are utilizing software to manage safety and/or inspections on at least half of their projects.



We see a significant drop in software use by trade contractors (19%).



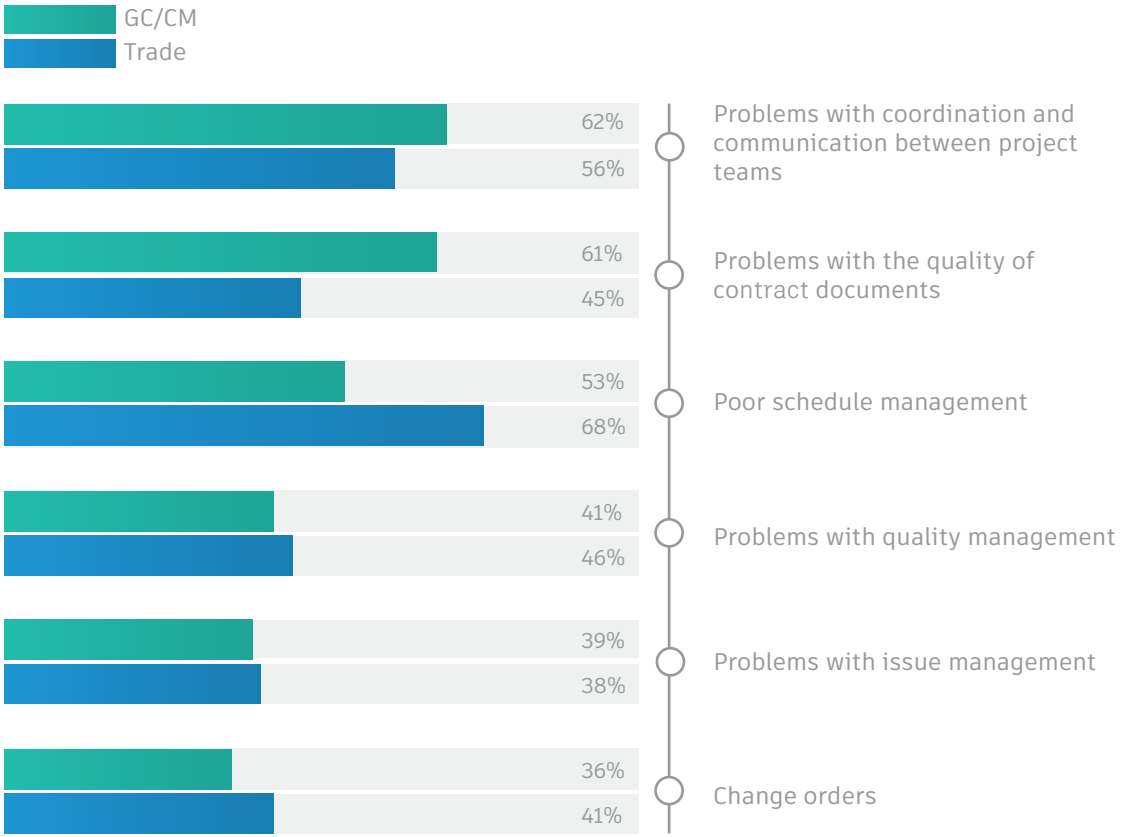
60% of general contractors and trades feel using software to manage safety and/or inspections during construction is of high value to improving this process.

6 | LABOR PRODUCTIVITY

In this section, respondents highlighted the top factors that they felt decreased labor productivity. Additionally, trade contractors were asked about their prefabrication activity.

Labor Productivity

- When it comes to top factors decreasing labor productivity, more trades (68%) point to poor schedule management.
- On the other hand, 60% of general contractors see problems with coordination and communication between project team members and issues with the quality of contract documents as the key contributors to decreased labor productivity.
- Better communication between all project stakeholders and making sure people across the organization, are connected to the information they need can be considered crucial components for improving productivity.



6 | LABOR PRODUCTIVITY

In this section, respondents highlighted the top factors that they felt decreased labor productivity. Additionally, trade contractors were asked about their prefabrication activity.

Prefabrication

- 14% of trades report prefabricating more than 50% of their work in the shop versus in the field.
- Only 17% of trades evaluate and compare the percent of prefabrication on current projects to similar previous projects. If trade contractors adopted this evaluation and comparison as a common practice, they could look at metrics to understand the cost and labor savings of prefabrication that can be shared with general contractors—possibly winning the trade contractor additional contracts.
- 70% of trades say prefabrication at least moderately improves labor productivity—something to think about as BIM becomes the standard for prefab construction.

Trades cite that design which does not lend itself to prefabrication as the top obstacle to doing more of it

TOP OBSTACLE TO TRADES DOING MORE PREFABRICATION

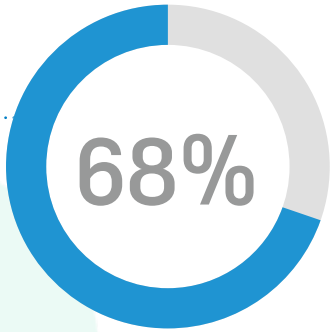
(For trades that believe there is some level of value to prefabrication)

7 | QUALITY & CLOSE-OUT

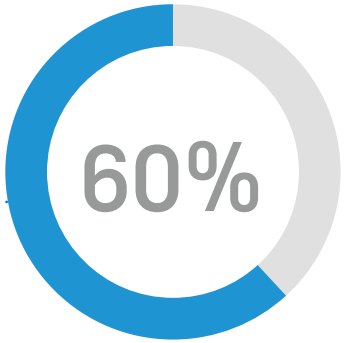
In this section, we look at respondents' answers to if and how they are using software to manage punchlist/close-out activities, including the frequency and value of engaging in "punchlist-as-you-go" (i.e., punchlisting is happening continually throughout the construction process as parts of the work are completed) versus the more traditional approach of punchlisting at the end of construction. Additionally, respondents were asked about the frequency and impact of problems getting off the job.

NOTABLE STATS:

- Almost 70% of general contractors use software to manage punchlist/close-out activities on at least 25% of their projects. This is seen at a higher frequency with large general contractors, who use it almost twice as much as small companies.
- 76% of the general contractors using software to manage quality and close-out rate its value as high or very high and cite it as a key factor in improving the process. However, the survey found that 68% of trades are not using mobile tech on 75% of their projects.
- 44% of general contractors are also engaging in punchlist-as-you-go on at least half of their projects.



68% of general contractors reported experience problems "getting off the job" on at least 25% of their projects.



Almost 60% say it has a high to very high negative impact on their profitability.

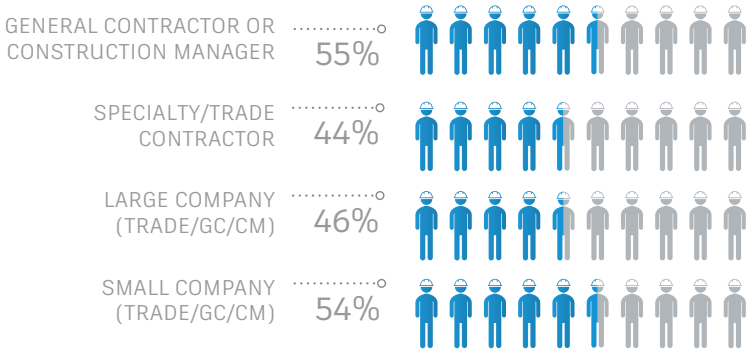
LET'S COMPARE: KPIS SIDE-BY-SIDE

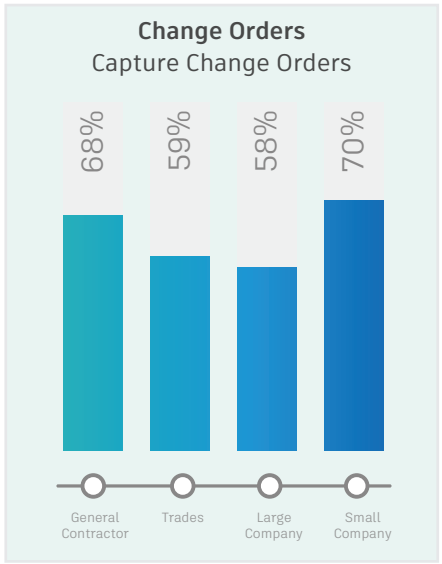
WHAT IS THE DATA TELLING US?

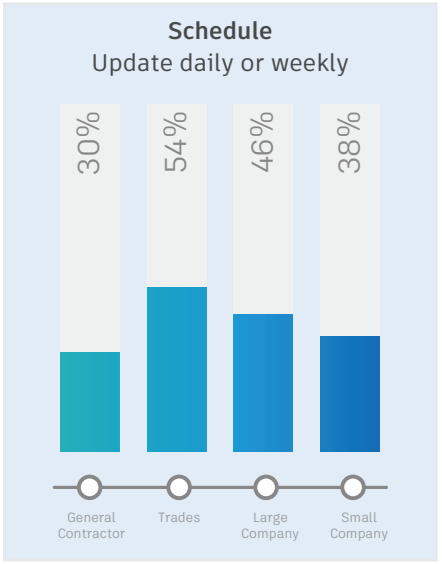
- We see a trend that, in most cases, smaller companies are capturing this data at a higher frequency than larger ones.
- This could be that, while larger companies are often more willing to try things on a one project/pilot basis, smaller companies are more successful at getting policies/practices implemented consistently over all or most of their projects.
- This research aims to puts a spotlight on these process-based KPIs so that more people will be aware of them and therefore want to try implementing them.

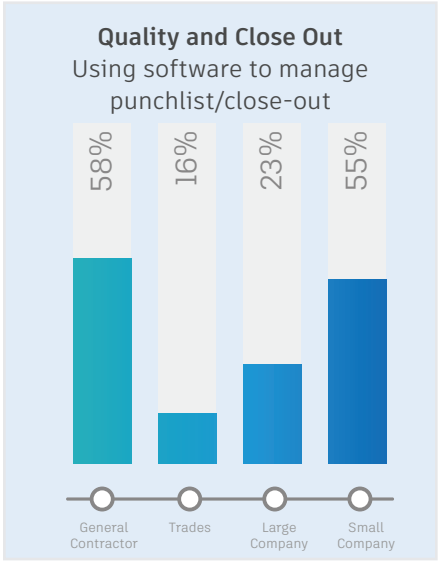
Respondent Demographics:

209 Total Respondents









CONCLUSION

As an industry, where do we go from here? The data from the study tells us that adoption of best practices around these seven key activities is still relatively low, hovering just above 50% for those companies applying them to over half of their projects. However, the data also shows that companies reporting frequent use of these practices assign a high value to them, confirming that they are seeing improvements in project performance through their implementation. The information in this study provides, at the very least, a general understanding of industry benchmarks that can be reviewed. You can use the metrics found in the report to look at your company's existing operations, identify areas for improvement, and begin setting standards for establishing best practices in your company.

While measuring metrics such as safety, profit, and client satisfaction are vital, they only tell half the story and will not necessarily help you improve outcomes on future projects. Looking for correlations between activities, such as RFIs and change orders or RFIs and schedule, will help you gain a better understanding of what's causing issues on projects. If you're digitally capturing this information with technology, the insights are there, you just have to dig them out and look for patterns that will help you identify areas of improvement.

As the saying goes, what gets measured gets managed. Over the past five years, the abundance of technology tools available to contractors has helped them capture and track critical data and information on construction projects.

Taking that next step—gathering the pertinent data, analyzing it, and using it in a meaningful way—will help you to improve projects and the overall operational performance of your company. By understanding key trends, issues, and other barriers that erode your project margin, you'll be able to set goals around improving those specific processes. While it's important to use KPIs to see how you stack up against the competition, it's critical to first set benchmarks within your own organization. This will not only help maximize company profits, but also contribute toward your goal of creating a safe environment for your workforce while continuing to deliver high-quality projects to your clients.

SOURCES

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