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**DODGE** DATA & ANALYTICS

# Using Technology to Improve Risk Management in Construction

ASSOCIATION  
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## Introduction

The construction industry is experiencing an explosion of new technology for the jobsite, which carries the promise of helping contractors improve their projects by addressing various project risks, including occupational risks, construction defect, property damage and general liability.

This report is based on two studies that examine the implications of emerging technology for risk management. A quantitative study was conducted with contractors to investigate how they manage risk and their assessment of new and emerging technologies. A qualitative study was conducted with insurers to share their insights on the current state of the construction industry in regard to using data to mitigate risk and the potential of current and emerging technologies to improve those capabilities.

We'd like to thank Triax for partnering on this study and allowing us to bring this important information to the construction industry.

## SUMMARY OF TOP FINDINGS

# Summary of Top Findings

### General Project Risk Management

Contractors still face significant challenges in managing risk on their projects.

■ **More than half report at least moderate difficulty in several broad risk management activities,** including preparing critical assessments of project risk and conducting ongoing management of those risks, along with dealing with accounting issues on projects.

■ **Fewer than half of contractors believe that there are clear ways to measure a project's overall risk performance,** which makes thinking strategically about how to handle risk across projects much more difficult.

■ **Nearly all contractors would prefer to be able to digitally collect and analyze safety and risk data, but over one third do not currently do so.** Resources to do so may be a big part of the challenge, especially for smaller companies. One factor exacerbating this issue is that only 19% of contractors have a budget for data analytics. Even among large companies, two thirds [66%] do not report having a budget for these activities.

■ **Most contractors are still early on their journey to effectively gather data to mitigate risk, analyze that data and use it to form strategic insights,** according to experts from insurance carriers and brokerages, based on the clients they deal with.

### Technology and Project Risk Management

Contractors and insurers alike are optimistic about the potential for technology to help manage risk. However, there are a few challenges that need to be overcome for contractors to be able to take full advantage of that potential.

■ **Over half of contractors are already highly engaged with technology to conduct employee training,** a critical risk management activity. In addition, over 40% are highly engaged with using technology to do safety incident documentation, jobsite hazard analyses and worker certification. This shows that many contractors already recognize the positive impacts that technology can have on risk, safety and productivity. As is true with many technology trends, large companies are on the vanguard of using technology for these activities.

■ **Nearly three quarters of contractors believe that IoT (Internet of Things) technologies like wearables and sensors will help improve occupational risks,** and around half believe they will help address property damage, construction defects, general liability and financial risks. This certainly suggests that many contractors are potentially interested in using these technologies.

■ **Most contractors don't have a dedicated innovation budget, and tend to pay for new technology by absorbing the costs in anticipation of long-term gains or by passing on the costs.** Despite the overall interest and expectation that contractors have in the potential of IoT technology to help them manage project risks, the lack of dedicated resources for technology investment is a challenge that the industry will need to overcome in order to see wider adoption of new innovations.

■ **Ease of use and costs are the top factors that influence contractors' decisions about technology.** With limited dedicated resources for technology at their companies, most contractors

need these products to be easy to use to encourage adoption by their workers in the field. Other factors that will encourage adoption are lower insurance premiums and increased productivity. While verifiable return on investment is not as influential for those looking at the technologies, many believe that it is essential to get buy-in from decision makers on these investments at their companies.

■ **Insurers also see the value of these products for their clients.** More data must be gathered on the specific benefits of using them before carriers are likely to consider changing premiums based on use, but carriers and brokers are both actively engaging in conversations with customers to encourage them to consider technologies that would help them address the specific risks they struggle with. One brokerage has even created a technology assessment panel, while another has a cost-sharing system for encouraging use of promising emerging technologies.



# Difficulty of Risk Management Activities

► Throughout the project lifecycle, contractors manage risk by a variety of means, but some of these activities present greater challenges than others. In the survey, contractors were asked to rate the level of difficulty they experience for six of these risk management activities on a scale of one to five, from no difficulty to very high difficulty. The chart below shows those who rated the difficulty medium (3) or high (4/5) for each of these activities.

### Most Difficult Risk Management Activities

The most challenging activity for contractors is the ongoing management of project

risks, which two thirds (66%) rate at a medium level of difficulty or higher. This is a challenge they primarily face during construction, and it is a fundamental, necessary response to risk that all must grapple with.

Identifying and assessing risks before construction begins are also challenges for contractors. Preparing a critical assessment of risk is the more difficult of the two, with nearly two thirds (63%) who report a medium or higher level of difficulty for this task, compared with about half (51%) who find identifying project risks to be at least moderately challenging.

The other factor that presents a significant challenge for contractors is determining accounting issues for projects. Many contractors (61%) find this at least moderately challenging, and 17% report a high level of difficulty with this activity.

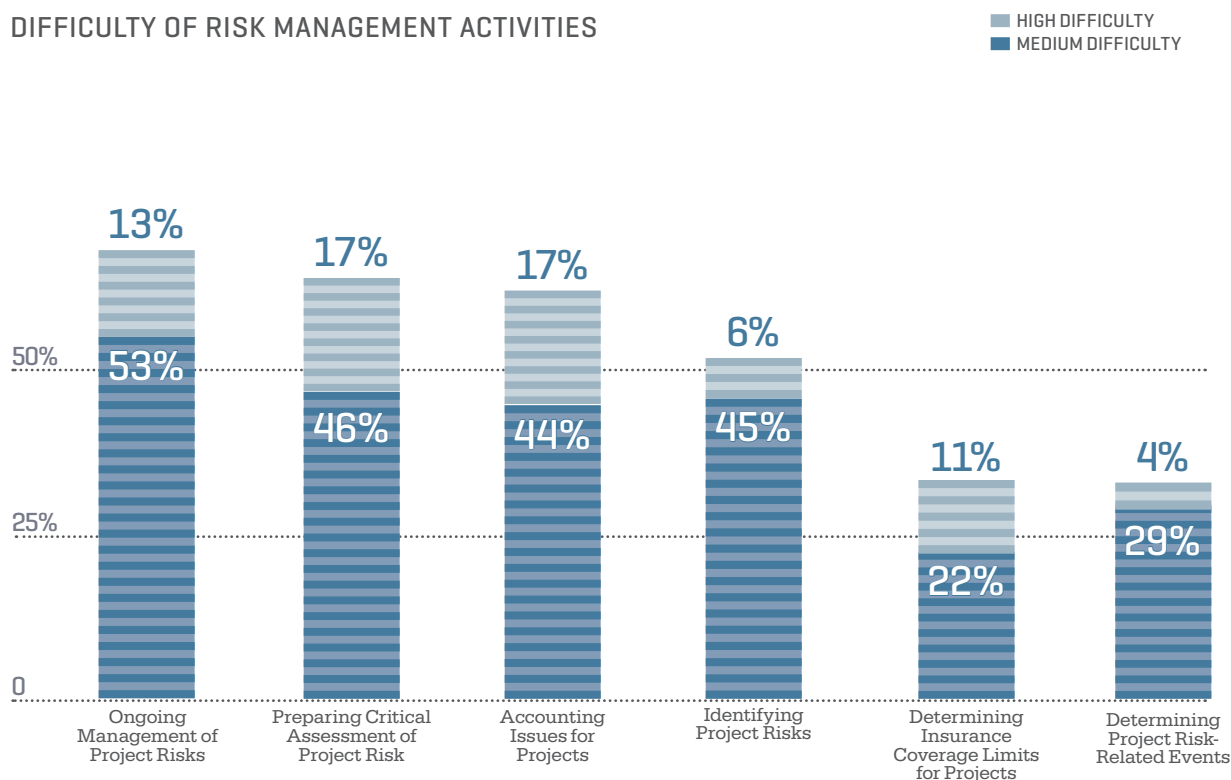
It is notable that there is no difference by the size or type of company in the level of difficulty associated with these activities. This is surprising, since larger firms with dedicated risk management resources still report basically the same level of concern about all of these factors. It suggests that the industry as a whole

needs better ways to help tackle these activities to reduce risk on their projects

### Less Difficult Risk Management Activities

One third of contractors find documentation of risk-related events or determining insurance coverage limits for projects challenging. Even though these percentages are lower than those for the most difficult activities, they still impact about one third of respondents, suggesting that the industry would benefit from ways to help contractors perform these activities.

DIFFICULTY OF RISK MANAGEMENT ACTIVITIES



# Contractor Approaches to Safety and Risk Management

► Contractors rated their agreement on a scale of one to five with a series of statements that allowed them to self-assess their use of several risk management practices. Their answers provide insights into the construction industry's approach to risk management.

### Monitor Risks

Most contractors [72%] state that they proactively monitor risk practices onsite. However, more than two thirds of them only "somewhat agree" with this statement. Therefore, even this most widely used approach is not rigorously adopted or pursued onsite.

### Standardized Risk Management Practices

Over half of contractors [53%] also agree that risk management practices are standardized across their projects. This includes risk assessment, documentation and reporting. However, only 16% strongly agree, and 37% somewhat agree, suggesting that not all practices are being standardized.

### Clear Ways to Measure Risk

Fewer than half of contractors agree that there are clear ways to measure project risk, and nearly one third disagree with this statement. Being able to measure risk is fundamental to managing it properly, especially on a construction

site, where risks are varied in both type and intensity.

61% of large companies [annual revenues of \$100 million or more] agree with this statement, compared with just 37% of smaller companies. This suggests that having resources dedicated to risk may make the ability to measure a project's overall risk performance easier.

### Frequent Measurement of Overall Project Risk

Only 43% agree that they frequently measure overall project risk. This is also the category with the highest percentage who are neutral about this activity, suggesting less certainty in the industry about its pursuit.

Large contractors are again far more likely to agree that they frequently measure overall

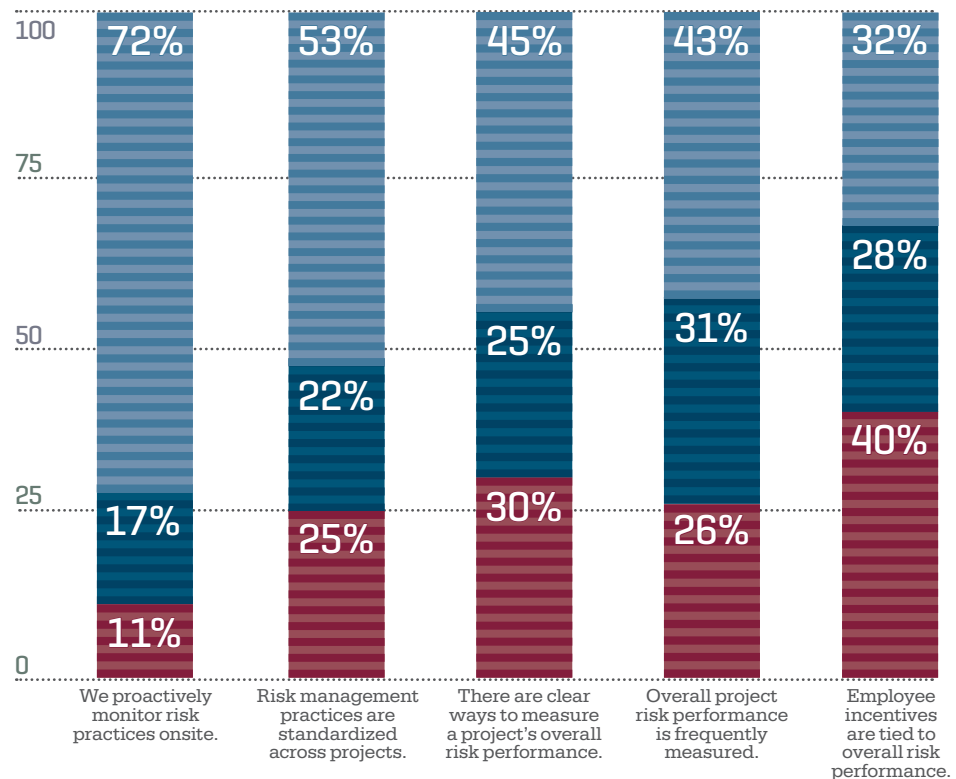
project risk than smaller companies, with the largest gap between the respondents from large [59%] and midsize [30%] companies.

### Employee Incentives

Tying employee incentives to overall risk performance is not only infrequent, but it is the only approach for which the percentage who agree that they do it [32%] is smaller than the percentage who disagree [40%].

APPROACHES TO PROJECT RISK AND SAFETY MANAGEMENT

■ STRONGLY AGREE/SOMEWHAT AGREE ■ NEUTRAL ■ STRONGLY DISAGREE/SOMEWHAT DISAGREE



# Means of Collecting, Analyzing and Acting Upon Safety and Risk Data

► In the era of big data, proper data management is essential to being able to extract useful analysis and insight. Many contractors do not have the in-house expertise to do data management well and may rely on third-party companies to manage data for them instead. Others may be less comfortable with using outside companies for such a critical function.

To benchmark the construction industry's means of collecting, analyzing and acting upon safety and risk data, contractors were asked to identify whether they conduct four data management activities [shown in the charts] in-house, using a vendor or

not at all. To gain insight into where the industry is headed, they were also asked about how they would prefer to do these activities in three years, if budget and resources were not an issue. A table on page 6 summarizes the differences by company size and type.

### Overall Observations

Some general patterns are evident for all the ways of dealing with data.

#### ■ In-house is currently the preferred method.

Whether collecting safety and risk data, analyzing it, incorporating it into existing data sets or developing insights based on it, more contractors do so in-house than use a vendor.

■ **Most contractors who are not doing these activities now would like to in the future.** Contractors generally recognize the value of these activities, which suggests that resource and expertise constraints are key issues preventing wider use.

■ **While in-house remains the preferred method in three years for all four activities, using vendors to perform them increases the most between the current and future desired states.** This suggests that many contractors who are not doing these activities now would prefer to use a vendor to do them in the future. However, this is not universal because the

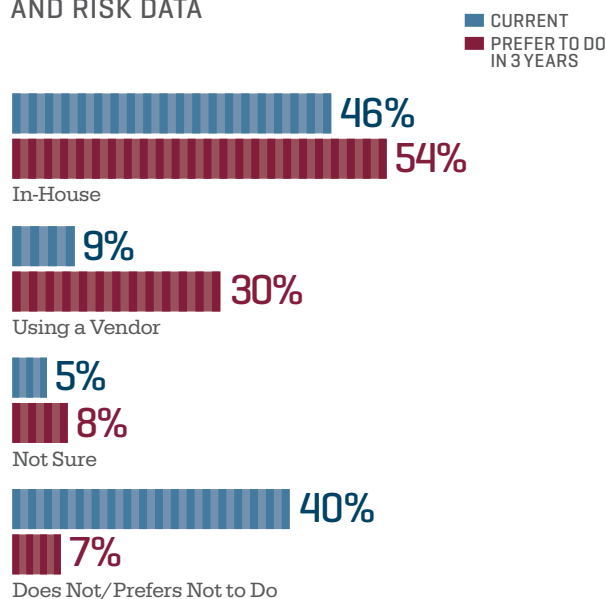
percentage who expect to do them in-house in three years also grows. Still, it is likely that many who do not perform these activities now also do not expect to have sufficient in-house expertise to do them in the future.

### 1. Collecting Data

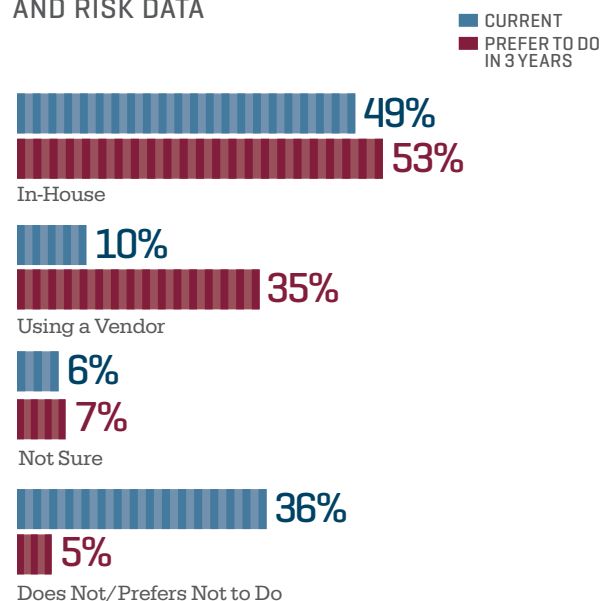
Contractors are largely split between those who currently collect project safety and risk data digitally in-house and those who do not collect it at all. Only 9% report using a vendor for this activity.

While the percentage who would like to use a vendor for this activity in three years more than triples, there is also significant growth in those who expect to do it in-house.

### 1. MEANS OF COLLECTING DIGITAL SAFETY AND RISK DATA



### 2. MEANS OF ANALYZING RAW SAFETY AND RISK DATA



# GENERAL RISK MANAGEMENT

## Means of Collecting, Analyzing and Acting Upon Safety and Risk Data (continued)

### ■ Difference by Company

**Size:** Over three quarters [76%] of large companies collect safety and risk data digitally, compared with only 38% of small companies and 53% of midsize ones.

### ■ Difference by Company

**Type:** 63% of GCs collect safety and risk data digitally, compared with 43% of trade contractors.

### 2. Analyzing Data

Nearly half [49%] of contractors analyze raw safety and risk data in-house, but over one third [36%] state that they do not currently analyze this data.

Data analysis has the highest percentage of those who would prefer to use a vendor in three years [35%] and only moderate growth in those who would prefer to do it in-house [53%].

### ■ Difference by Company

**Size:** Nearly all [81%] large companies analyze raw safety and risk data, compared with only 36% of small companies.

### ■ Difference by Company

**Type:** 70% of GCs currently analyze raw safety and risk data, compared with 42% of trade contractors.

### 3. Incorporating Raw Data Into Existing Data Sets

The highest percentage of contractors [44%] currently report that they don't engage in this activity, but the percentage who prefer not to do so drops to 7% in three years. This suggests that budget or resources are likely major obstacles to wider adoption of this practice.

While using a vendor increases 27 points between current practice and desired approach in three years, there is a notable nine-point jump in those preferring to do it in-house as well.

### ■ Difference by Company

**Size:** Although large companies [64%] do this activity now more than small [36%] or midsize [43%] ones, it is also the least frequently used by large companies among the four activities included in the study.

### ■ Difference by Company

**Type:** Over half [54%] of GCs engage in this activity now, but only 36% of trade contractors do.

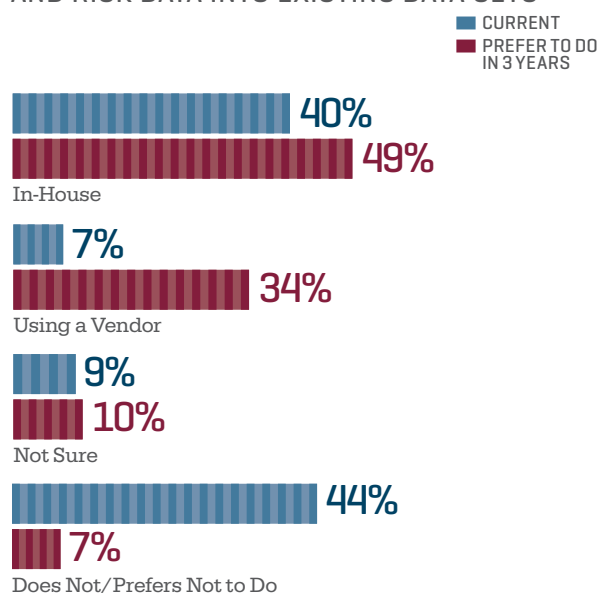
### 4. Develop and Act Upon Key Safety and Risk Insights

Despite the relatively high percentage who do not digitally gather or analyze data, a very high percentage [77%] report that they develop and act upon key safety and risk insights, with the majority doing so in-house. This is true regardless of firm type, and it demonstrates the opportunity to shift the industry toward greater reliance on empirical data, as more of it is gathered.

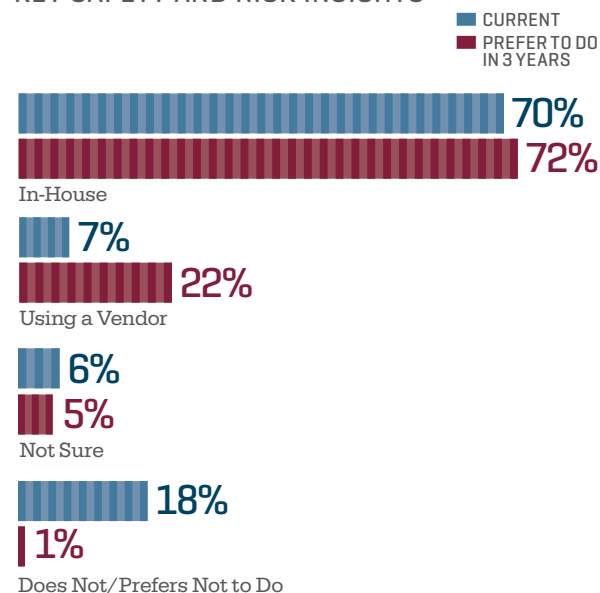
### ■ Difference by Company

**Size:** Companies of all sizes engage more frequently in this activity than in any of the others, but a higher percentage of large companies [87%] report doing so than small ones [62%].

### 3. MEANS OF INCORPORATING RAW SAFETY AND RISK DATA INTO EXISTING DATA SETS



### 4. MEANS OF DEVELOPING AND ACTING UPON KEY SAFETY AND RISK INSIGHTS



## GENERAL RISK MANAGEMENT

### Means of Collecting, Analyzing and Acting Upon Safety and Risk Data (continued)

#### SUMMARY OF DIFFERENCES BETWEEN COMPANY SIZES AND TYPES

	Small Companies	Medium Companies	Large Companies	General Contractors	Trade Contractors
Collecting Digital Safety and Risk Data	38%	53%	76%	63%	43%
Analyzing Raw Safety and Risk Data	36%	62%	81%	70%	42%
Incorporating Raw Safety and Risk Data Into Existing Data Sets	36%	43%	64%	54%	36%
Developing and Acting Upon Key Safety and Risk Insights	62%	81%	87%	79%	72%

## Budget for Data Analytics

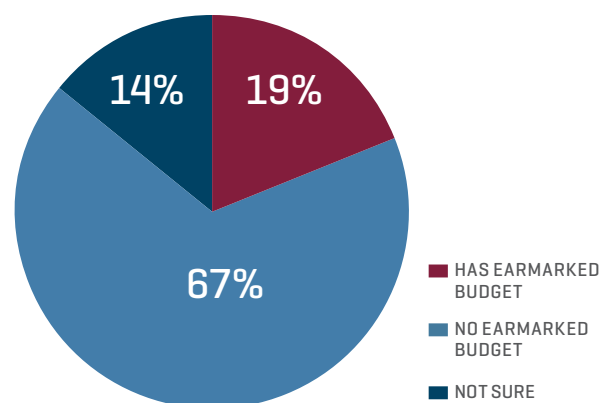
► Contractors were asked to indicate whether they have a budget earmarked for project risk data analytics and consulting. Only 19% have a budget established for this purpose. Even among large companies, only 34% report it.

The recent explosion of technology that can help gather data promises to cause the amount of data available to contractors to grow exponentially. However, data on its own serves little to no purpose, and being able to maximize the benefits of gathering it requires the data to be structured from

the start, and that structure should be determined by the specific analytics that will eventually be needed.

Since this is such a new area, it is rare for contractors to already have the expertise necessary to analyze this data. However, dedicated funding is needed to either bring in in-house resources or to hire outside firms to help with data management. With the industry at an inflection point in terms of the data available, good data risk analytics may ultimately be necessary to compete as gathering data becomes a core competency for contractors.

#### CONTRACTORS WITH BUDGET EARMARKED FOR PROJECT RISK DATA ANALYTICS AND CONSULTING





# Insights From Insurers on Contractors' Data Gathering and Use Capabilities

► Insurance carriers and brokers are in a unique position to have a more comprehensive view of contractors' risk management practices than any individual contractor possesses. This extends to the current capabilities of contractors to gather data necessary for risk mitigation, analyze the data gathered and form strategic insights that help them to reduce project risk.

Therefore, in order to better understand contractor capabilities in these areas, 11 interviews were conducted with experts on construction and technology from insurance carriers and brokers. (For more information on the interviews, see additional insights on page 15 and the Methodology on page 16.)

### Data Gathering Capabilities of Contractors

The responses of the participants in the interviews varied in terms of the abilities of contractors to gather the data needed to mitigate risk. Three said that contractors are ineffective at this task, two said that contractors gather data, but at a rudimentary level, two said that capabilities vary too much by size of contractor to make any general statement about the industry, and four

stated that the contractors are moderately effective at this task.

Two of the participants also commented that contractors' data-gathering capabilities have improved significantly in the last two years.

The participants also shared the best practices they have witnessed for gathering data:

#### ■ The most commonly observed best practices are apps on mobile devices.

Two types of apps in particular were mentioned: those that track performance in the field [schedule, financial performance, labor/hours] and those that address safety by providing a means of gathering safety data, conducting training/toolbox talks and having safety meetings.

#### ■ A range of other best practices were provided, but there was no consensus about them.

A couple of participants reported telematics are a best practice for gathering data. In addition, strategies like engaging frontline workers in gathering data and leadership from senior management about its importance were also discussed. One participant recommended developing an end-in-mind data-gathering

strategy based on the analysis that contractors intend to produce.

### Contractor Effectiveness at Analyzing Data

There was more agreement among the participants that few contractors are very effective at analyzing data. The most positive response came from three participants, who rated them as fair at this effort. Most believed that only large contractors are effective at this, and a couple reference the need for contractors to have better, more complete data to do any analysis in a meaningful way.

Given the limited analytics most of the participants see performed, no more than two participants agreed on any best practice mentioned.

#### ■ Working with third parties was mentioned by two participants as a best practice.

Third parties can have a wider view of what is common in the industry, applying a critical context for understanding the results of the analysis.

#### ■ A couple also said some of their clients have the ability to trend data on projects.

One notes the importance of trending lagging and leading indicators.

#### ■ Processes that support the ability to analyze data effectively were mentioned by one participant.

These include having a structured program and holding people accountable for data gathering.

### Contractor Effectiveness at Developing Insights Based on Data to Inform Strategic Decisions

Most of the participants noted that very few or no contractors are able to use data at this level. Three did consider contractors fair at this activity, but the remainder see this capability at only a few companies, if at all.

Only a couple of best practices emerged from this discussion: trend analysis across projects and software that tracks site-specific non-insurable risks.

However, there was agreement among most of the participants that things are changing rapidly. While some believe that contractors having the ability to make strategic decisions based on data is still several years away, many see the industry generally improving on gathering and analyzing data to manage risk.

## TECHNOLOGY AND RISK MANAGEMENT

# Use of Technology to Manage Risk

► In order to understand the degree to which technology already helps to manage risks, contractors were asked to rate the level of engagement of applying technology for six risk management practices on a scale of one to five, from no engagement to very high engagement. The chart below shows the percentage of contractors who said they had a high or very high level of engagement with using technology for each of these practices.

### Highest Engagement

Employee training is the practice for which most contractors use technology, with over half [59%] rating

their engagement of technology for training at a high level. This includes everything from online toolbox talks and safety training modules to virtual reality training environments.

### Moderate Engagement

Between 44% and 47% of contractors are highly engaged in using technology for three risk management practices.

### ■ Safety Incident Documentation:

Technology not only helps to create more accurate documentation of incidents, but it can also support

trending and analysis of this data if captured in a consistent, structured fashion. Given the value of this, it is not surprising that almost half of contractors are already highly/very highly engaged with using technology in this area.

### ■ Job Hazard Analysis (JHA):

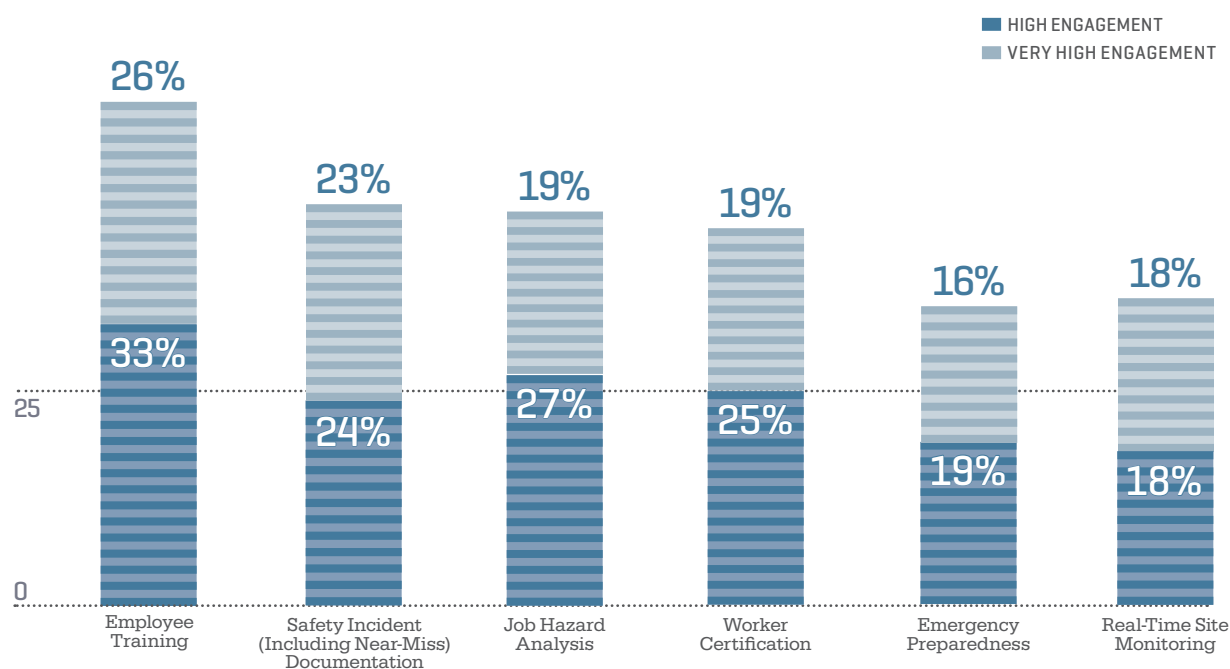
The *2017 Safety Management in the Construction Industry SmartMarket Report* revealed that conducting a JHA is a common practice among large companies (defined in that report as those with 100 employees or more), but that only about half of midsize and

less than one third of small companies conduct them. Previous studies, though, revealed that a JHA is one of the most effective ways to improve safety onsite. Technology supporting this activity could eventually help promote wider adoption of this important practice among small to midsize companies in the industry.

### ■ Worker Certification:

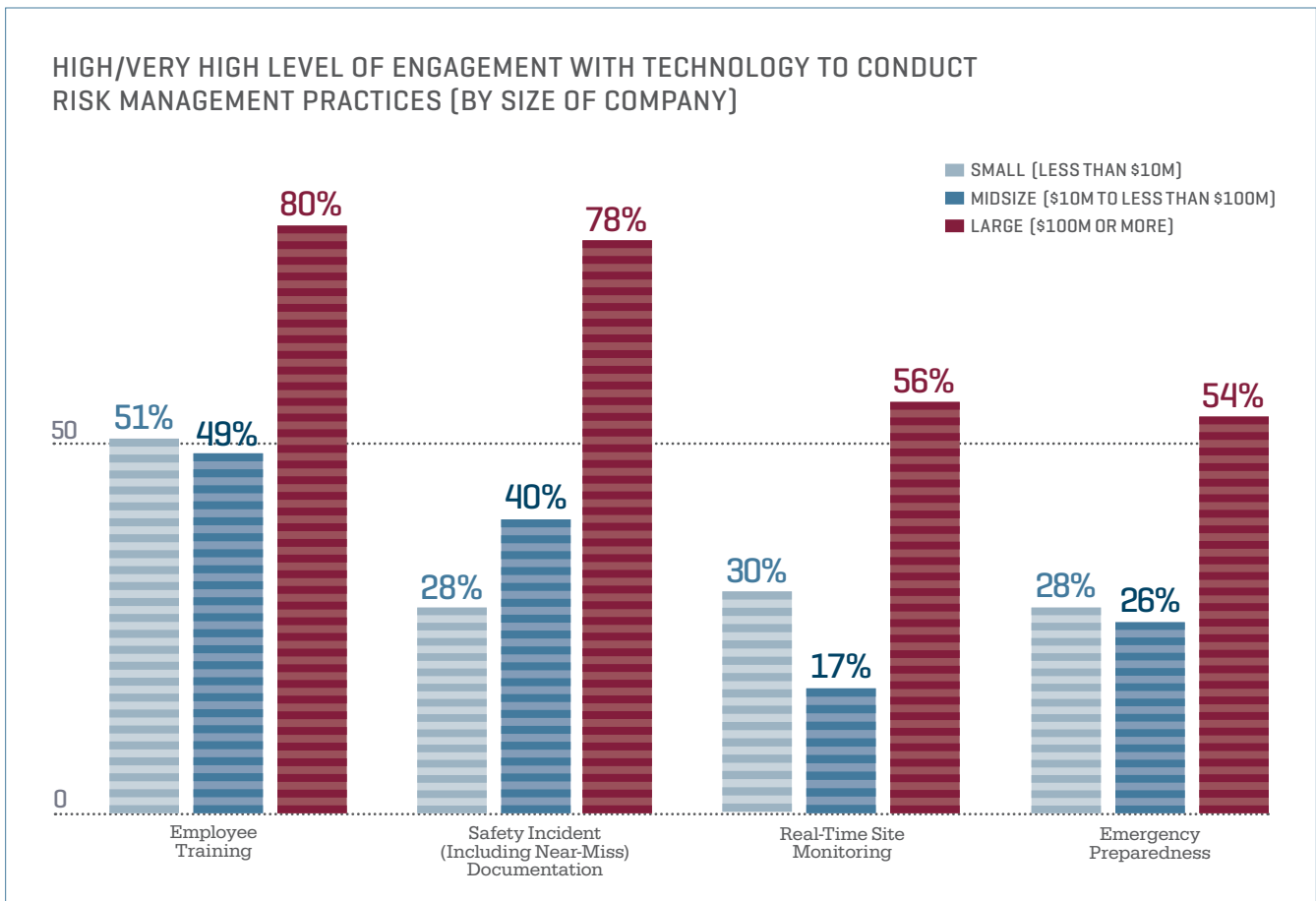
Workers can use online tools to obtain certification, and wearables can be used to track the certifications workers have to make sure they are doing appropriate tasks onsite.

### HIGH/VERY HIGH LEVEL OF ENGAGEMENT WITH TECHNOLOGY TO CONDUCT RISK MANAGEMENT PRACTICES



# TECHNOLOGY AND RISK MANAGEMENT

## Use of Technology to Manage Risk (continued)



### Lower Engagement

Two emerging areas for technology include emergency preparedness and real-time site monitoring. In the interviews with technology experts from insurance companies and brokers [see page 15], real-time site monitoring was widely recognized as having a high level of potential for reducing risk onsite. However, most of the experts believe that technology only offers limited potential to help contractors prepare for emergencies.

### Variation by Company Size

In the construction industry, large companies have been at the vanguard of major technology adoptions, including BIM, use of drones and other areas, and it is no surprise that they also lead in the use of technology to manage risk in several areas.

As the chart demonstrates, for large companies, a high level of engagement with technology is already common practice for employee training and safety

incident documentation.

For employee training, small and midsize companies are also rather highly engaged, probably due to the relatively low bar for entry for accessing online training. However, there is a much larger gap, especially between large and small companies, in the use of technology for safety incident documentation, suggesting that this presents bigger hurdles for companies with fewer resources.

Over half of large companies are also using technology for emerging areas like real-time site monitoring and emergency preparedness. This bodes well for wider use of technology in these areas across the broader industry in the next few years.

### Variation by Company Type

GCs are more engaged with technology for safety incident documentation and real-time site monitoring than are trade contractors.

# Approach to Budgeting for New Technology to Address Project Risk

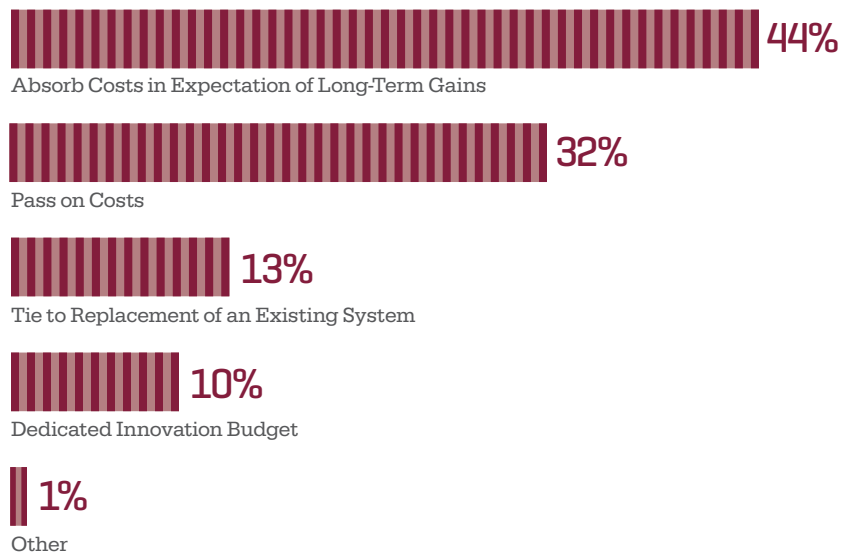
► The construction industry is experiencing a major increase in various technology solutions that help address project risk. Venture capital has been funding innovation in this sector, and many technologies from other industries are also now under consideration for use in construction.

However, all of these technologies require some significant investment by contractors. This is particularly true of emerging technologies that may be priced at a premium before they can be scaled up and made more affordable.

In order to better understand how prepared the construction industry is to embrace these technologies, contractors were asked how they approach budgeting for new technology to help mitigate project risk. The options available ranged from having a dedicated innovation budget to absorbing the costs in the hopes that the investments eventually pay off.

The findings suggest that, despite a high degree of interest in technology and its impacts on risk, productivity and safety, few contractors are in a position to easily take advantage of emerging technologies.

### HOW CONTRACTORS BUDGET FOR NEW PROJECT RISK MITIGATION TECHNOLOGY



■ **Very few contractors have separate budgets prepared for their investments in project risk mitigation technology.** Only 10% have an actual dedicated innovation budget, and only 13% deal with it by incorporating the cost into the replacement of an existing system.

■ **The most common means to fund new technology is to just absorb the cost in expectation of long-term gains.** This makes investment in new technology challenging for contractors, and it

likely places pressure on seeing a quicker return on investment, rather than seeing these investments as supporting longer-term business goals.

■ **The other major strategy is to pass on the costs.** This approach also creates obstacles to technology adoption, and may create more difficult client relations.

Surprisingly, there is no difference by company size or type for this response.

The insurance sector is aware of this challenge, and at least one company has instituted

a cost-sharing program with select clients for certain technologies. For example, the company shared the cost for several of their clients to adopt telematics for their vehicles. When the initial telematics contracts expired after two years, all of the contractors who participated in this effort saw sufficient value to take on the full cost of renewing their contracts.

For more information on how the insurance sector is helping to drive contractor adoption of technology, see pages 14 and 15.

## Likely Impact of IoT Technology on Various Types of Risks

► With the increasing use of sensors on the jobsite, the construction industry is entering into the age of the Internet of Things (IoT). While other Dodge studies have shown that use of IoT technology is still emerging, concerns about improving productivity and safety, and an influx of venture capital money, has led many to believe that construction is at an inflection point for use of this type of technology, including one of the technology experts from insurance companies and carriers interviewed for this study [see page 15].

Contractors were asked about the applicability of IoT technology to help mitigate seven specific types of risks. The five with the greatest potential are listed in the chart at right, which shows the percentage who find that this technology could provide a medium or high level of improvement for their risk performance in each category.

### Greatest Potential

The risk area that IoT technology can best improve is occupational risks. Proximity sensors and wearables help reduce the risk and impact of falls, biometric devices reveal worker impairment and help reduce the risk of injury, and visual monitoring, combined with sensors and the application of artificial intelligence, provides

data on hazardous behaviors and environments. These opportunities are probably why almost three quarters [73%] expect IoT technology to help impact occupational risks, and the majority of them expect a high level of improvement.

### High Potential

Over half of contractors see potential for IoT technology to reduce risks to the general public and the risk of property damage. All of the technologies mentioned for occupational risks also help address these other areas.

### Moderate Potential

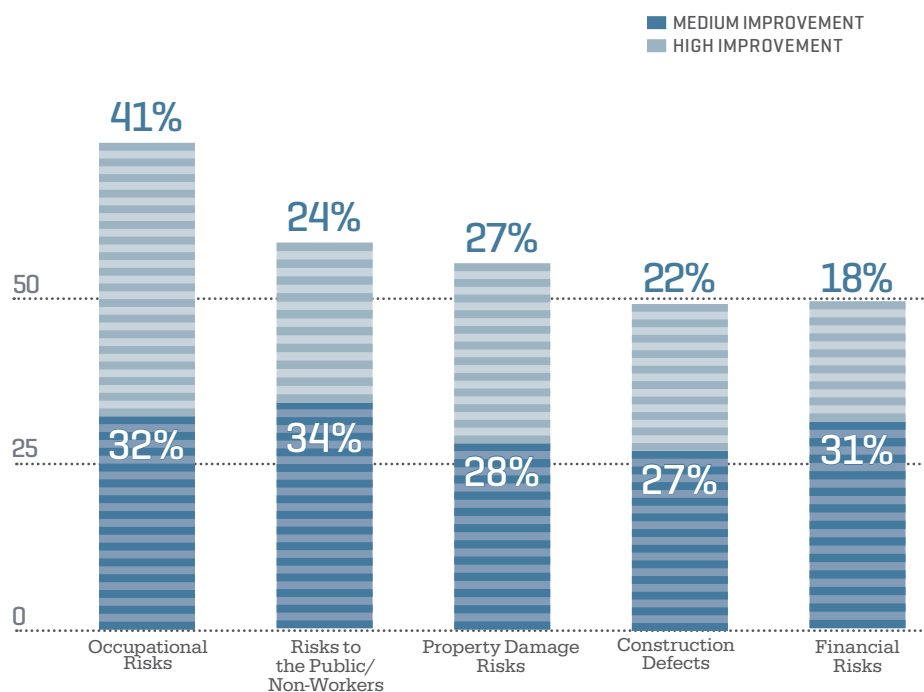
Nearly half of contractors expect IoT technology to provide at least a moderate level of improvement for construction defects and financial risks. Interestingly, small contractors see the greatest potential for IoT technology to have a high level of improvement on their risk performance in these areas, with 36% expecting high improvement for construction defects and 28% expecting the same for financial risks.

This is not typical of the construction industry, which usually has large companies leading the charge for technology adoption. It may reflect lower barriers to entry for the use of IoT than other types of technology (such as robotics, augmented reality, etc.), and the challenges small firms face that these technologies can address.

### Low Potential

Few contractors expect IoT technology to impact their contractual risks or risks due to natural disasters.

TYPES OF RISKS FOR WHICH IoT CAN BEST IMPROVE CONTRACTORS' PROJECT RISK PERFORMANCE





## Factors Impacting Use of New Technology for Project Risk Mitigation

► With so few contractors having an innovation budget devoted to new technologies [see page 10], the factors influencing the decision to invest in technology become even more important. In order for the industry to encourage wider use of risk-reducing technologies, it is critical to understand what contractors consider when evaluating technology, the capabilities needed from the technology, and the barriers preventing technology proponents from getting buy-in from financial decision-makers at their companies.

### Most Important Factor Considered When Evaluating Technology in General

Contractors were asked to select the top three from a list of six factors that could be used to evaluate technology at their companies.

■ **Ease-of-use and cost are the top factors considered.** Cost is always a paramount concern for contractors, and with so few with budgets for technology adoption, it becomes an even greater point of sensitivity. Therefore, it is particularly striking that ease-of-use is selected as a top factor by an even higher percentage of contractors than cost. Contractors are typically focused on getting

their immediate work done and do not often have time to learn how to use complicated technology. Investments in technologies that the field workers will not use has no impact on reducing risk.

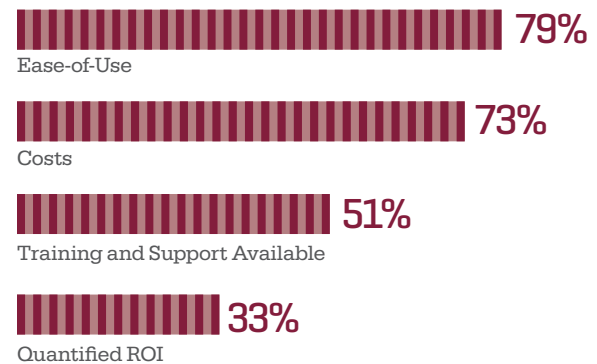
■ **Over half also prioritize the availability of training and support.** The influence of this factor, scoring much higher than quantified ROI, is evidence again that whether workers will actually use the technology has a strong influence on a contractor's decision to adopt it.

■ **Very few contractors [10%] rank the reputation of the technology provider as a top factor.** This is important because, with many new vendors entering the field, it demonstrates that technology for the construction industry is an area that is particularly ripe for disruption, as contractors show no particular preference for technology from well established companies.

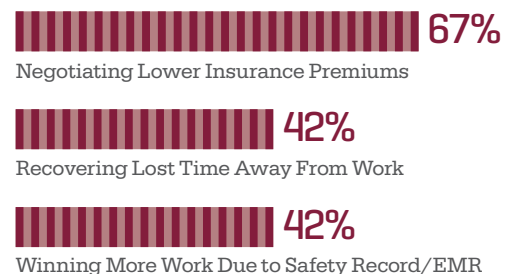
### Difference by Company Size

In terms of how they evaluate technology, small, midsize and large companies largely prioritize the same issues. The only significant difference is that large companies more frequently consider the ability to integrate with

### MOST IMPORTANT FACTORS CONSIDERED WHEN EVALUATING TECHNOLOGY (RANKED IN TOP 3)



### MOST IMPORTANT CAPABILITIES ENCOURAGING ADOPTION OF TECHNOLOGY FOR RISK MITIGATION (RANKED IN TOP 3)



other technology tools to be a top factor than do smaller companies. This is likely due to the fact that large companies have probably already invested in other tools.

### Difference by Company Type

General and trade contractors also largely prioritize

the same issues when evaluating technology, with the only exception being the greater likelihood that trade contractors will prioritize cost. For the trades, cost takes precedence over ease of use, unlike the general contractors.

# TECHNOLOGY AND RISK MANAGEMENT

## Use of Technology to Manage Risk (continued)

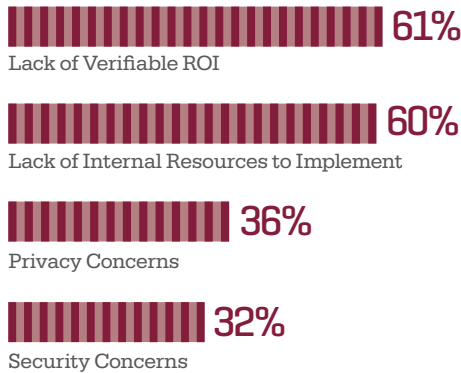
### Most Important Capabilities Encouraging Adoption of Technology

The most influential factor for contractor adoption of IoT technology is the possibility of lower insurance premiums. This is consistent with previous studies conducted by Dodge on the adoption of safety management practices, in which reduced insurance rates also influence all levels of decision-makers at contractors to invest in safety management practices, from those in the C-suite to project managers.

Insurance also features prominently in the responses to a different question about the top factors encouraging adoption of IoT technology. Claim frequency is selected in the top three by nearly half [43%] of contractors, and insurance premiums tops the list for this question as well, selected by 76%.

Many of the insurance industry technology experts who participated in interviews on risk-reducing technology [see page 15] state that reductions in contractors' insurance premiums based on technology adoption are unlikely until there is enough actuarial data on the impact of those technologies. However, some of them note that contractors with high deductibles should also consider the savings in these areas, along with the reduction in their claim frequency, which

### TOP BARRIERS TO DECISION-MAKER BUY-IN ON NEW TECHNOLOGY FOR PROJECT RISK MITIGATION (RANKED IN TOP 3)



would ultimately affect the price of premiums.

Almost half of contractors [42%] also consider improving productivity by recovering lost time away from work another top capability. An even higher percentage [68%] also selected this as a top factor encouraging the adoption of IoT technology, demonstrating the influence of workforce concerns on contractors.

It is notable that there are no significant differences by company size or type for these factors.

### Top Barriers to Buy-In From Decision-Makers on Technology

While ROI is not a very influential factor in the consideration of new technology, the lack of verifiable ROI is considered a major obstacle when trying to

get decision-makers' buy-in on technology. 61% consider this a top barrier.

The other major factor is the lack of internal resources to implement. Surprisingly, there was no difference by size of company. This may be a reflection of concerns about staffing in general, even for larger companies, in an area as competitive as technology. It also corresponds directly with the high level of influence that ease-of-use has on the decision to adopt technology. Clearly easy implementation requiring no internal resources is a major priority in the industry right now.

Those two challenges are much more influential than larger concerns about privacy and security, which are only selected as one of the top three barriers by about one third of respondents.

# Insurance Carriers and Emerging Technology

► Insurance carriers and brokers can help contractors control risk because they can reveal how a contractor's risk profile compares with that of the larger industry. The insurance sector can also serve as advocates for risk-reducing technologies. To better understand contractors' perception of this influence, they were asked whether they agree that their relationship with carriers is a partnership and to what extent they agree that their carriers are tracking emerging technologies and will offer reduced premiums to encourage their adoption.

■ **Most contractors believe that their relationship with their insurance carrier is a partnership.** 56% agree with this statement overall, and 21% are in strong agreement with it. It is notable, though that small contractors are more likely to disagree with this statement than midsize or large contractors.

■ **There is greater uncertainty about the degree to which carriers understand the importance of emerging technologies for project risk.** The highest percentage of contractors [47%] are neutral, suggesting that they are not sure whether carriers recognize the importance or not. However, only 15% disagree with this statement, and more than twice as many [38%] agree.

■ **Contractors have the greatest uncertainty**

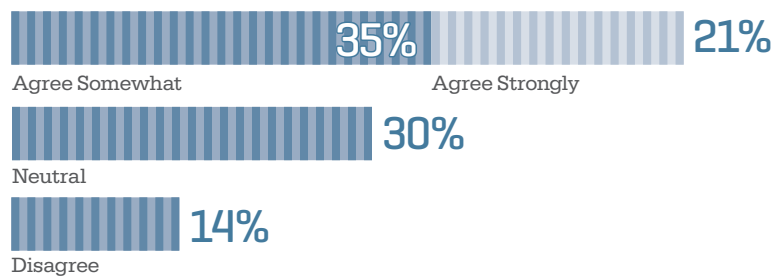
## about whether carriers are open to integrating emerging technology into project risk pricing.

62% are neutral about whether carriers are open to integrating emerging technology into project risk pricing. While far more

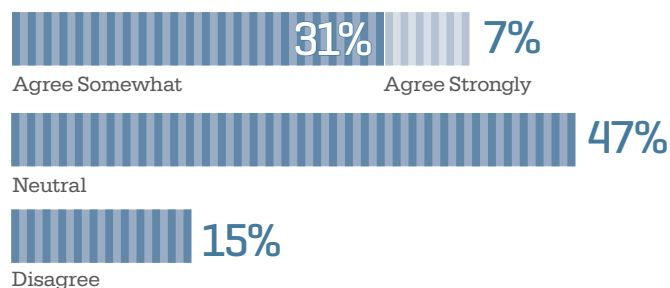
agree (30%) than disagree (8%), that still suggests that contractors do not know what insurance carriers will do. The interviews with representatives from the insurance industry suggest that carriers themselves are still in the process of figuring

out the implications of the use of these technologies. While most advocate for their use, they will need more data on the impacts of these technologies before their adoption by contractors can influence the pricing of insurance offerings.

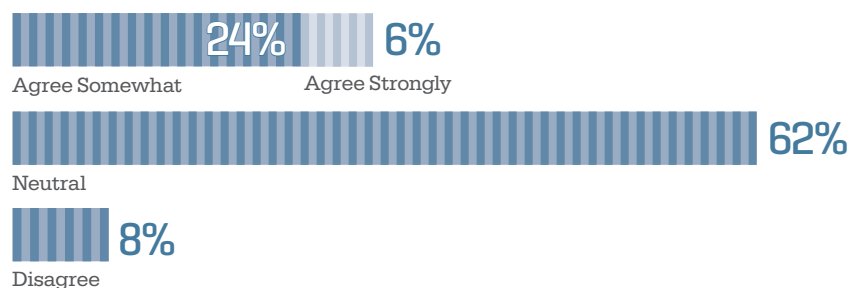
### OUR RELATIONSHIP WITH INSURANCE CARRIERS IS MORE OF A PARTNERSHIP THAN A ONE-OFF TRANSACTION.



### MY INSURANCE CARRIER UNDERSTANDS THE IMPORTANCE OF EMERGING TECHNOLOGY FOR PROJECT RISK.



### MY INSURANCE CARRIER IS OPEN TO INTEGRATING EMERGING TECHNOLOGY INTO PROJECT RISK PRICING.



# Insights From Insurers on the Potential of Technology to Help Mitigate Project Risk

► Technology and construction experts from 10 insurance brokerages and carriers were asked to discuss the emerging technologies in the construction industry that are best suited to address risks, and the types of risks that can best be addressed by technology. They also were asked to comment on the role that they play with their clients to encourage the adoption of technology and the role insurance carriers can have in the future to help support the use of technology that can address risk.

### Top Emerging Technologies for Mitigating Project Risk

Two types of technology were frequently mentioned by the participants as having the greatest potential to address project risks:

■ **Wearables:** This is a broad category that includes several different types of wearables, from sensors that track the movements of workers on the project and that can help detect falls or unsafe behaviors; to biometric monitoring devices that can notify supervisors of workers who are impaired; to headsets for augmented reality.

■ **Visual auditing:** While video and photo-documentation of sites is already quite common, several were particularly excited about technologies that pair

these visuals with artificial intelligence that can detect trends, see deviations like safety violations and help flag areas most likely to have an issue. They can also detect issues with building construction and other potential defects in real time.

Many believe that these two types of technology are critical to helping address occupational risks, such as avoiding injuries and workmen's comp claims. One participant states, "Going forward, it is going to be standard operating procedure that when you show up to work, you get issued your wearable, and go along as you've always done, but there's data being collected that will be used to mitigate those risks." Another points out that visual auditing can help recognize issues "that everyday workers may not see and recognize."

Visual auditing was also seen as a valuable tool for addressing construction defects, property damage and general liability risks. One participant notes that the intelligence gathered through this means can address a wide variety of risks by revealing people who aren't following best practices onsite: "If people aren't adhering to best practices on a jobsite, they tend to cause damage to humans or to property."

Other technologies that were included in the risk discussion included external robotics,

such as exoskeletons, digital twins and material tracking/verification technologies that employ barcodes to verify that the appropriate materials are delivered to sites.

### Existing Technologies For Addressing Project Risks

In addition to the emerging technologies, there were some better established ones that were cited by participants as important for project risk mitigation.

■ **Subcontractor Prequalification Software:** Several saw the use of this software as a best practice among their clients. Not only was it the top technology identified for managing financial and contractual risks, but at least one participant notes that it is important to help prevent construction defects: "If you hire subs that have the right business practices, the right financial position and the right safety practices, they tend to be the ones that deliver quality work, and quality work means fewer defects."

■ **Telematics:** Several mentioned telematics systems as a best practice for gathering data [see page 7 for a more complete discussion of their insights on contractors' ability to gather data for risk mitigation]. However, a couple note that having data on unsafe driving practices could expose contractors to

increased liability if they do not act on that data.

### Software tracking construction progress and documenting construction activity and as-built conditions:

A few note that increased transparency of activity onsite could keep claims from lengthy litigation by providing clear data on the party at fault.

### Encouraging Wider Use of Risk Mitigation Technology

Nearly all of the participants made it clear that their goal is to help improve the industry because better-performing clients help their bottom line. A few also suggest that the interest in improving evidenced by contractors willing to consider these technologies may influence their decision about who to insure.

Few believe that carriers will offer reduced rates in the near future to contractors due to technology adoption, largely because the area is too new to have sufficient data to support that decision. However, most engage in conversations about technology with their clients, often geared toward the specific challenges each contractor faces. One reports that their company has a technology assessment panel, and another describes a cost-sharing program to encourage contractors to try using emerging technologies.

# Methodology

► The findings reported in this study are from two different studies: a quantitative online survey of contractors and a qualitative set of in-depth interviews with technology and construction experts from insurance carriers and brokerages.

### Contractor Study

Dodge conducted a 10-minute online survey from November 11 to 28, 2018 among contractor professionals with the following qualifications:

- **Respondents had to be employed at a general contractor, construction management company, design-builder or specialty trade contractor that has done project work in the U.S. in the last five years.**
- **At least half of the company's work in the last five years had to be related to general building.**
- **Respondents had to have significant involvement with risk evaluation or management, safety initiatives at their company or their insurance program.**

The sample was provided by the Dodge Data & Analytics Contractor Panel and a partner association, IRMI (International Risk Management Institute).

135 surveys were completed.

- **80 respondents were general contractors, construction managers or design-builders.**
- **55 respondents were specialty trade contractors.**

Throughout the report, statistically significant differences by company type are included in the analysis. In addition, the analysis includes differences by company size. Companies were split into three categories.

- **Small (2017 annual revenues of less than \$10 million): 47 respondents**
- **Midsized (2017 annual revenues of \$10 million to less than \$100 million): 47 respondents**
- **Large (annual revenues \$100 million or more): 41 respondents**

### In-Depth Interviews With Insurers

From December 2018 through March 2019, Dodge conducted 11 telephone interviews with 12 representatives from 10 companies, including six insurance companies and four brokerages. The interviews lasted approximately 20 to 30 minutes.

Confidentiality of the responses was a guarantee for participation.

Participants were recruited by Dodge Data & Analytics and by Triax based on their expertise on the use of technology in construction to address project risk. All participants were in positions of authority that specialized in construction, including six vice presidents, three directors, and one each of the following: consultant, practice vendor and specialist.

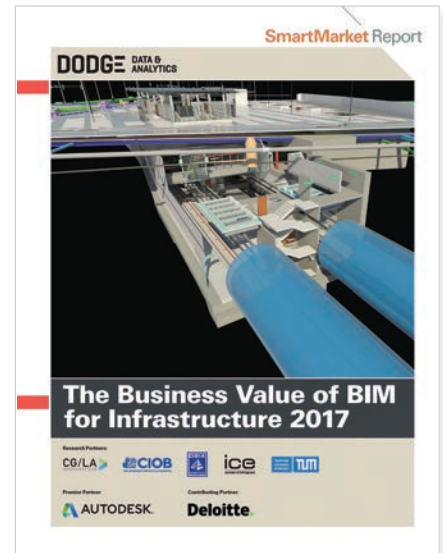
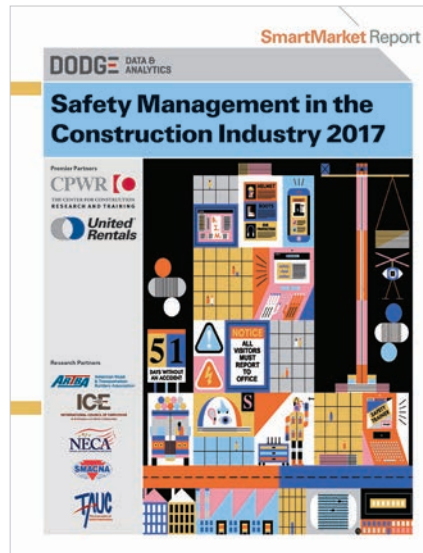
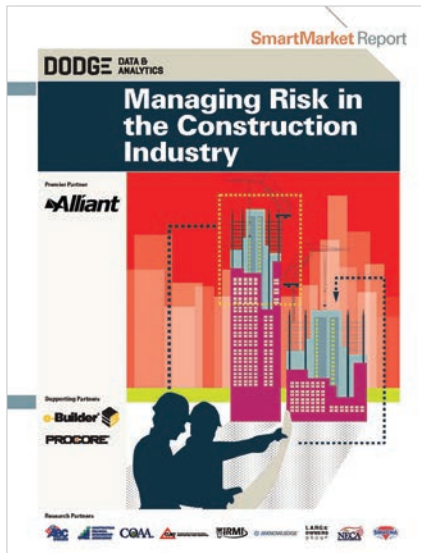


## About Dodge Data & Analytics

Dodge Data & Analytics is North America's leading provider of analytics and software-based workflow integration solutions for the construction industry. Building product manufacturers, architects, engineers, contractors and service providers leverage Dodge to identify and pursue unseen growth opportunities and execute on those opportunities for enhanced business performance. Whether it's on a local, regional or national level, Dodge makes the hidden obvious, empowering its clients to better understand their markets, uncover key relationships, size growth opportunities and pursue those opportunities with success. The company's construction project information is the most comprehensive and verified in the industry. Dodge is leveraging its 100-year-old legacy of continuous innovation to help the industry meet the building challenges of the future. To learn more, visit [www.construction.com](http://www.construction.com).

## About Triax Technologies

Triax Technologies, Inc. develops and delivers Internet of Things (IoT) solutions for the construction industry. Its flagship Spot-r system connects workers, equipment and managers through a proprietary, minimal infrastructure network, sensors and a cloud-based dashboard. By providing real-time, data-driven visibility into daily site operations and safety incidents, Spot-r is changing the way construction companies manage resources, information and risk. Triax develops intelligent, actionable solutions that address the complexities of an active jobsite, and helps firms streamline processes and build safer and smarter. More information can be found at [www.triaxtec.com](http://www.triaxtec.com).



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