



## State of data capabilities in construction

Autodesk

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**Deloitte**  
**Access Economics**

# Expanding the toolkit: Report coverage

This report, commissioned by Autodesk, explores the use of data in the construction industry. The report seeks to provide insights to construction executives on the wide-ranging uses of data, the benefits of data-informed decision-making, and industry best practices in developing data capabilities.

The research provides a global industry perspective with a specific focus on 12 countries: Australia, Canada, France, Germany, India, Ireland, Japan, the Netherlands, the Philippines, Singapore, the United Kingdom and the United States of America.

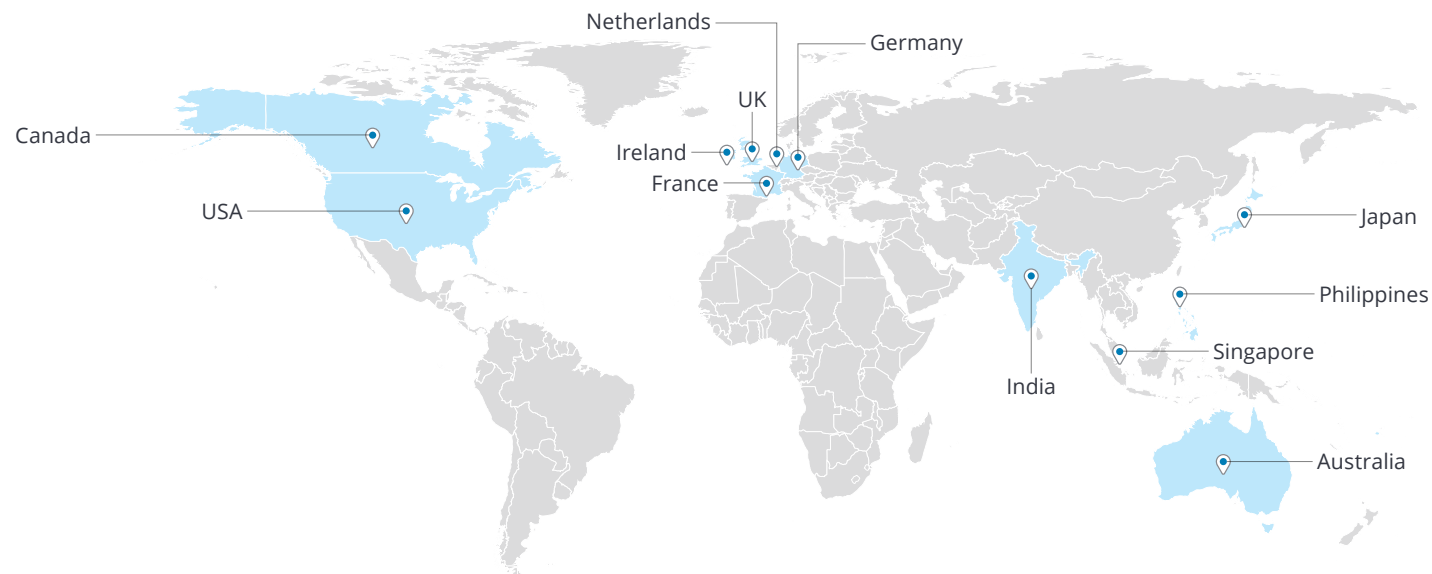
To inform the analysis, Deloitte Access Economics conducted a bespoke survey of 1,275 construction leaders, undertook six consultations with leading construction businesses and conducted extensive desktop research.

This survey was used to develop a comprehensive Data Capability Assessment (DCA), designed to assess the data capabilities of construction businesses based on 13 key indicators.

Further details about the methodology for the research are available in the Appendices.



## Countries in focus for this report



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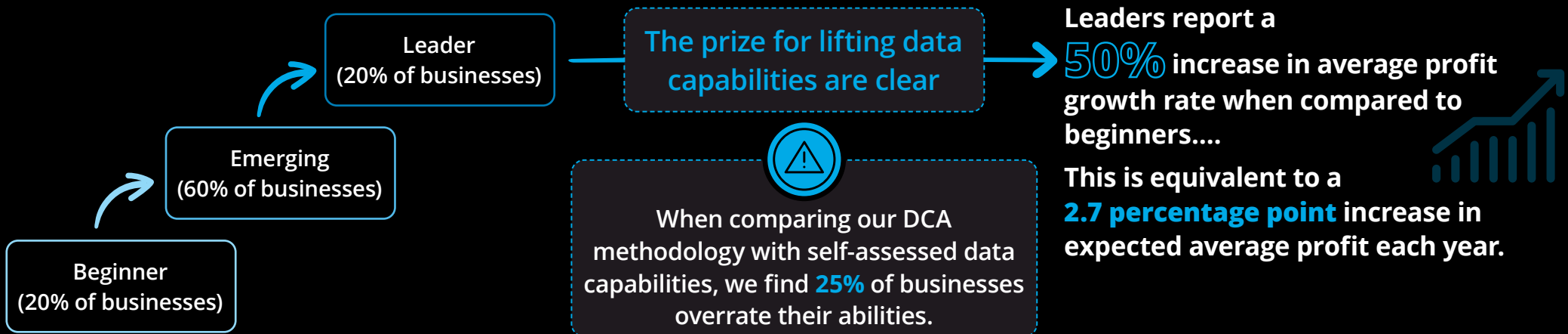


# Expanding the toolkit: use of data in the construction industry

**The use of data to inform decision making is vital to thrive in a competitive industry like construction.** There is an enormous amount of data being generated by business and consumers. Businesses need to view data as an asset and make sure it is being utilized effectively.

The **Data Capability Assessment (DCA)** provides a holistic and tailored construction industry benchmark to assess the data capabilities of a business.




It classifies businesses into the three categories: beginner, emerging and leader. We find that **80% of construction businesses could lift their data capabilities.**



## Benefits of greater data use

-  Reduced costs
-  Business growth through new projects
-  Track and measure performance

## Barriers to integrating data driven insights

-  Access to skilled staff
-  Data quality
-  Data security and risk

## Next steps for businesses

-  Develop business-wide strategy
-  Develop in-house data skills
-  Build standards and procedures
-  Build motivation for change
-  Identify quick wins

# Executive summary

## Data is vital for a thriving future construction industry

The global construction industry plays a key enabling role in the economy and society by designing, building and maintaining buildings and critical infrastructure. The industry delivers facilities for every industry including manufacturing, professional services and health care, and provides housing for the global population.

Given the importance of the construction industry, Autodesk has commissioned this research to analyze the outlook for the industry and the benefits of data-informed decision-making. The report is informed by a survey of 1,275 construction leaders from 12 countries: Australia, Canada, France, Germany, India, Ireland, Japan, the Netherlands, the Philippines, Singapore, the United Kingdom, and the United States of America.

## Where the construction industry is today

The construction industry has faced significant challenges over the past three years from COVID-19 restrictions and supply chain disruptions.

Despite the challenging global macroeconomic environment, it is clear that a recovery is underway in the industry. Our survey found that average profit growth for the industry was 14.2% in FY23. Looking forward, construction leaders are expecting the recovery to stabilize to 4.4% profit growth per year on average for the next five years.

Achieving the expected profit growth will not be a straightforward task for the construction industry. Construction businesses will also have to contend with a number of barriers to business growth.

The two most common challenges raised by construction businesses in our survey were cost pressures – namely **cost of raw materials (cited by 52% of business)**, followed by **labor costs (37%)**. Economic uncertainty (35%) and a lack of workers with suitable skills (34%) were also commonly cited challenges.

**Data provides a critical asset for businesses to help overcome these challenges and thrive in a competitive industry.** This report focuses on a variety of different types of data including financial information, project information, supplier information and others.

The most common benefit of using this data directly addresses the key challenges for businesses, with **reduction in costs being the most common benefit from greater use of data (cited by a third of businesses)**. In fact, 97% of businesses were able to identify at least one benefit associated with greater use of data.

So how does the global construction industry fare when it comes to the collection of data and its use to support decision making?

..... “We are already using data for reducing costs, forecasting revenue and margins, improving our environmental impact and making strategic adjustments throughout a project.”

..... - Bart Pigge, Director, Dura Vermeer



The average construction business expects **4.4%** profit growth over the next five years.



**97%** of surveyed businesses identified one benefit from greater use of data, with reduction in costs the most common benefit identified by **33%** of businesses.

# Executive summary

## State of data capabilities in the construction industry

There are various ways to assess the data capabilities of a business. For example, we could look at the number of data types being collected or analyzed. Our survey found the average business collects 11 different types of data out of a list of 13 options, including financial information or employee information. This figure drops to only 3 types of data when considering businesses that collect, analyze and use the information for business decision-making.

Another way to assess data capabilities is the frequency of actionable insights. Nearly one in five construction businesses get daily insights on project performance but obtain insights from administrative or supplier data less frequently.

While these indicators are useful starting points, a holistic perspective is needed. **To provide a comprehensive view we have developed a Data Capabilities Assessment (DCA) tool to provide a tailored construction industry benchmark.**

The DCA considers a business' use of data collection and analytics tools, the data strategy and the data talent within a business. Using these three pillars, we classify businesses as having beginner, emerging or leader levels of data capabilities using 13 different indicators.

Using this approach, **we classify 80% of construction business as beginner or emerging levels of data capabilities**, suggesting there is room for improving data capabilities in the industry. **The remaining 20% of the industry can be considered leaders in terms of their data capabilities.** We find there is significant variation in data capabilities across and within different countries.

## The prize for lifting data capabilities

There are clear business performance benefits from improving data capabilities. **Modelling for this report finds the impact of increasing data capabilities from beginner to leader levels is associated with a 2.7 percentage point increase in expected profit growth per year over the next five years.**

This represents a 50% increase in the average expected profit growth for construction businesses (increasing from 4.4% to 7.1% per year). For a business with \$25 million USD in profits, the uplift would be worth \$0.7 million in additional profits per year.

Improving data capabilities also enables the use of more advanced digital technologies. When comparing leaders in data capabilities with those in the beginner category, we find that leaders are:

- 9 times more likely to be using Internet of Things (IoT) and smart sensors
- 4 times more likely to be using mobile apps
- 4 times more likely to be using construction wearable devices
- 7 times more likely to be using artificial intelligence (AI) or machine learning (ML).

**This suggests improving data capabilities could be a key foundational step to unlock more advanced digital technologies within the construction industry.**

These digital technologies will also have a range of financial and non-financial benefits (like improved worker safety) that businesses can realise.



When asked to self-assess, we find **25%** of businesses overrate their ability to use data effectively when compared to their DCA score.



Leaders in data capabilities could see a **2.7 percentage point** increase in expected profit growth compared with beginners.

This uplift represents a **50% increase** in average profit growth from 4.4% to 7.1% per year.

# Taking the next step

## What are the next steps organizations can take to succeed?

In order to lift their data capabilities, construction businesses must overcome a number of barriers. The most common barriers are access to skilled staff (cited by 24% of businesses), data quality (21%), data security (20%) and a lack of funding (19%). In order to address these common barriers and others, this report recommends that businesses focus on progressing these five key priority areas.



### Develop in-house data literacy and skills

Access to skilled talent was the most common barrier to achieving greater data insights. Data training to increase data literacy or skills in analysis can be effective in addressing this barrier, with our survey finding that businesses that provide training to all team members are 2.5 times more likely to be data leaders compared with those who do not offer training to all levels of employee. This training should be directed to all staff regardless of seniority, from new starters to senior executives.



### Develop an organization-wide data strategy

Three quarters of businesses have an investment budget for data and analytics, but far fewer (only 24%) have clear priorities identified within the investment budget. Having identified priorities with specified timelines for testing, piloting, and scaling will be required for businesses to achieve goals identified in the data strategy. Businesses with an organization-wide data investment budget were 2.5 times more likely to be data leaders compared with those businesses who do not allocate specific funding towards investment in data.



### Centralize data team and implement organization-wide standards

A quarter of construction businesses do not have any data analytics roles or have even outsourced capabilities to another organization. Yet businesses with a centralised data team are nearly twice as likely to be data leaders compared with those who do not have central data resource within their organizational structure. A centralized team with unified data standards and procedures can reduce the occurrence of data silos and maximise any efficiencies in data collection or analysis.



### Building motivation for change

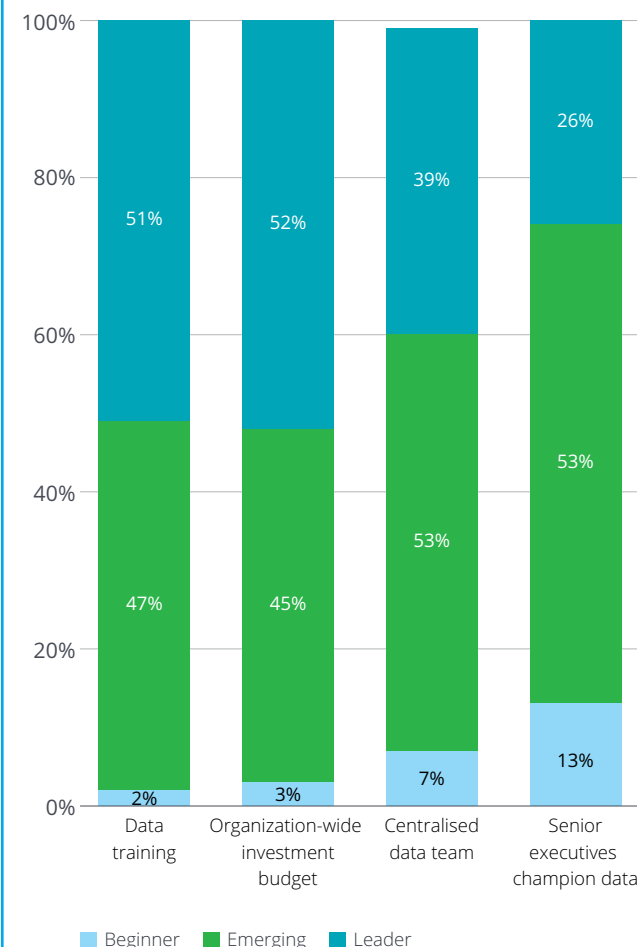
Achieving a smooth transition to more data-orientated processes requires the active acceptance of the team members implementing the change. Businesses must proactively identify user needs and clearly articulate the benefits of transformation to build enthusiasm, which requires a solid change management strategy. Leading from the top will be important. Businesses where the senior executive team were identified as the data champions were 30% more likely to be data leaders compared with those who did not identify the executive team as data champions.



### Identify quick wins

There are many quick wins for businesses looking to uplift their data capabilities. Finding and prioritizing these different tools or use cases can help get a business started and build a greater momentum for change.

## Key factors for lifting data capabilities





# 1 Outlook for the construction industry



# Global construction continuing on the path of recovery

## Profit growth is expected to cool down from 14.2% in FY23 to 4.4% on average over the next five years

The construction industry plays a key role in the economy.

**The economic value of the global construction industry was estimated at \$9.7 trillion USD in 2022 when measured by gross output.<sup>1</sup> The industry represents 13% of global Gross Domestic Product (GDP) and employs 7% of the global working age population.** Beyond the direct economic contribution, the construction industry is also involved in developing the buildings and critical infrastructure required by the rest of the global economy to operate.

Like many other industries involving physical tasks, construction was significantly impacted by the COVID-19 pandemic and associated supply chain disruptions. Physical restrictions and lockdowns meant that many construction sites were forced to suspend operation or operate at limited capacity, which led to global construction output falling by 2.4% in 2020.<sup>2</sup> More recently, the war in Ukraine has placed upwards pressure on costs, while rising global interest rates are creating pressures for funding new projects.

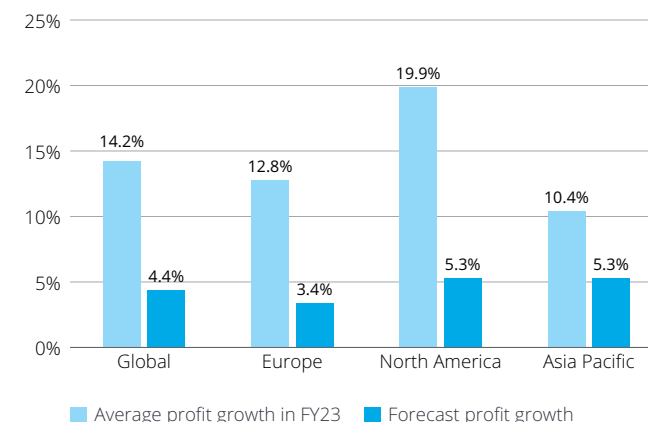
The combined impacts of these forces have already forced many construction businesses to shut down. In Australia, 27% of business failures in the first quarter of 2023 were in the construction industry,<sup>3</sup> while over 4,200 construction businesses in the UK became insolvent in the 12 months to June 2023.<sup>4</sup>

Despite the challenging global macroeconomic environment, **it is clear that a recovery in the construction industry is well underway. Deloitte's Construction Data Survey, which included responses from 1,275 construction leaders globally, found that average profit growth for a business was 14.2% in FY23.** The strongest growth in the industry was seen in North America, reflecting the stronger economic recovery seen in North America than the rest of the developed world in 2023.<sup>5</sup>

Looking forward, while the growth of profits in the industry is not expected to match the rapid pace in FY23, **businesses on average forecast that their profit growth over the coming five years will be 4.4% each year.**

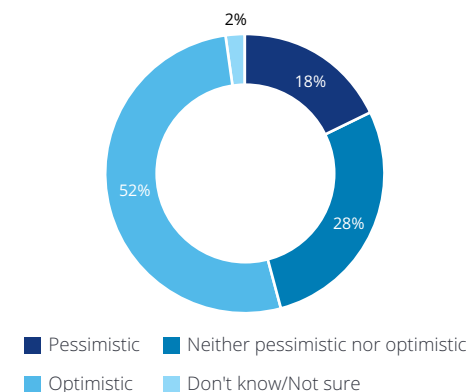
Over half (52%) of businesses are optimistic about industry performance in the short-term with only 18% being pessimistic. When asked about the performance of their own business, construction leaders were more bullish, with 58% being optimistic about their own business' growth and profitability in the short-term, compared with only 15% being pessimistic about their business performance in the same period.

## Average profit growth for FY23 and forecast growth in next five years, by region



Source: Deloitte Construction Data Survey (2023)

## Short-term outlook for the financial performance of the construction industry



Source: Deloitte Construction Data Survey (2023)

# Yet higher costs and economic uncertainty could prevent businesses realizing strong future growth

## Over half of businesses believe that cost of raw materials is the top barrier to business growth

Achieving the expected profit growth will not be a straightforward task for the construction industry. The International Monetary Fund (IMF) forecasts global real economic growth to be at 3.0% for 2023 and 2024, and only about 1.5% and 1.4% for developed economies.<sup>5</sup> These forecasts represent a downgrade in expected economic performance compared to previously released estimates. While economic growth does not translate directly into business profitability, it does provide an indication **that business conditions are weakening in the short-term future, which will impact business profitability.**

Construction businesses will also have to contend with a number of key barriers to business growth, according to the Deloitte Construction Data Survey. **The two most common challenges raised by construction businesses were around variable cost pressures – namely cost of raw materials (cited by 52% of business), followed by higher labor costs (37%).**

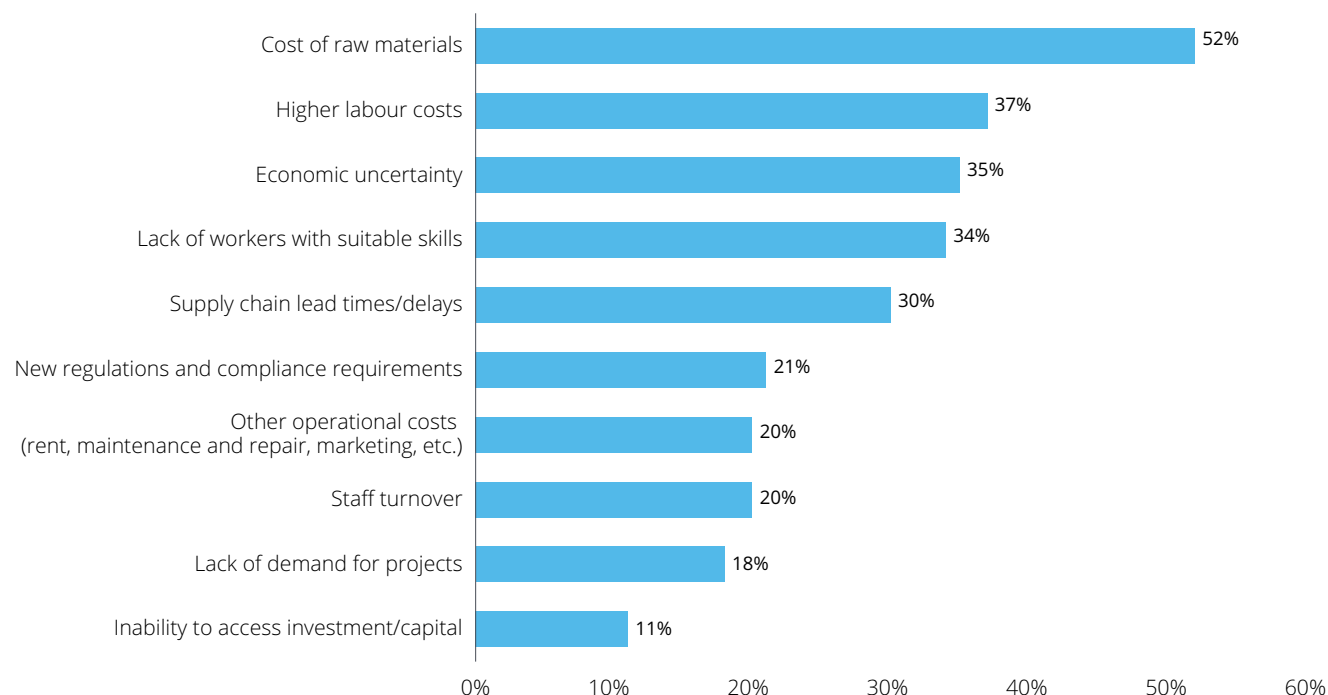
Cost of raw materials was cited as the most common barrier for 11 out of the 12 countries surveyed, with the one exception being Ireland. The IMF forecasts average inflation globally to be at 5.2% throughout 2024, which will maintain cost pressure on the profitability of the construction industry.<sup>5</sup>

The third most common barrier to growth identified by businesses was uncertainty in the broader economy (35%). Interestingly, construction leaders reported higher levels of optimism for the performance of the construction industry (52%), compared with the broader economic environment (39%). This gap between expected growth in the broader economy, and in the construction industry, suggests that achieving the anticipated level of revenue growth will require significant action by businesses to realise this growth.

Another significant challenge facing the industry is a lack of workers with suitable skills, which was identified as a significant challenge by more than one third (34%) of businesses. This has been a significant issue across economies recently as international migration was lower through the COVID period, and labor force participation rates dipped, particularly in the United States.

More importantly, finding employees with the right data or technology skills is increasingly difficult. This issue is explored further in a later section of this report (Section 4 – Taking the next step).

## Most common barriers to business growth



Source: Deloitte Construction Data Survey (2023)

# Data will be critical to overcoming barriers and reinforcing the recovery

**97% of businesses identify benefits from greater use of data, with reducing costs being the most common**

The use of data will play a crucial role in realising this profit growth and for business to thrive in a competitive environment. The effective implementation of data will also enable businesses to respond to the most pressing challenges facing them in the short- to medium-term.

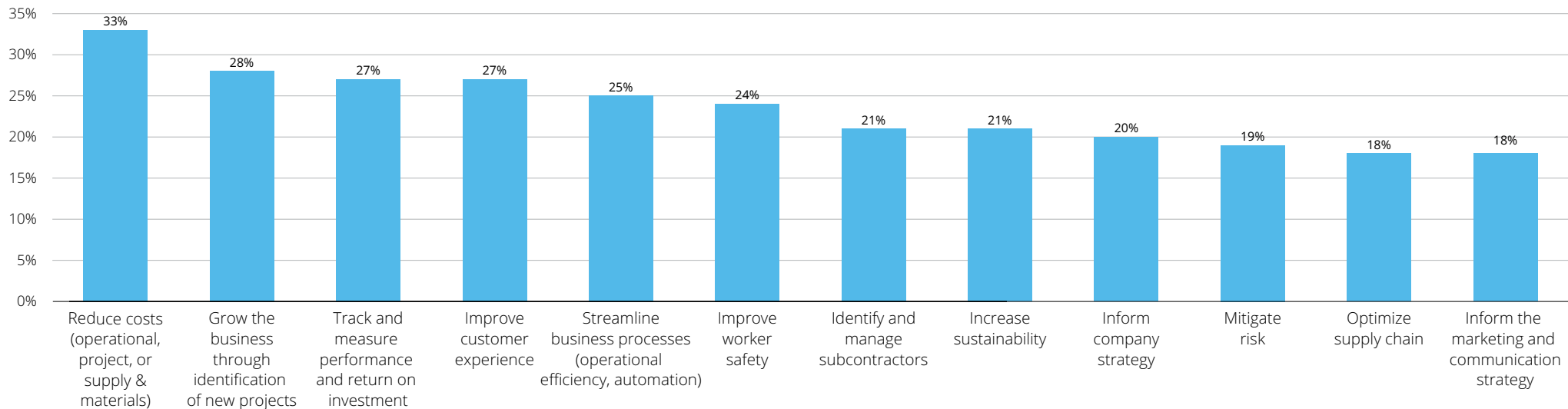
Businesses indicated that the most common benefit from the greater use of data is the reduction in project costs (33%), which directly addresses the two most common challenges facing the industry, being high material and labor costs.

More than just improving margins on existing projects, the increased use of data has the potential to identify new projects and by extension grow the business (28%). This was the second most common reported benefit of data in the industry.

The greater use of data can have benefits across the entire lifecycle of a building project. Beyond helping businesses win more projects, it allows them to optimize supply chains and planning, effectively track progress, and improve client satisfaction with their work.

Another significant benefit of improved data usage is its ability to improve safety conditions on site, identified as a significant benefit by 24% of businesses. By pre-emptively identifying risks, businesses aim to prevent accidents and hazards, rather than simply responding to them. This is of particular importance to the construction industry, with it having one of the highest rates of work-related accidents of any industry globally.<sup>6</sup>

Significant benefits to businesses from greater use of data



Source: Deloitte Construction Data Survey (2023)



## 2 State of data in the construction industry

# Opportunities for construction businesses to utilize data assets

## The average construction business captures 11 different types of data, but only analyzes 3 types

There is an enormous amount of data being generated by business and consumers. By 2025, the global data volume will reach 175 zettabytes, or 175 billion terabytes. This figure will represent a five-fold increase on the figure from 2018.<sup>1</sup>

Data comes in a number of forms – from numeric and textual data to more rich and complex data sources such as sound, images and videos.

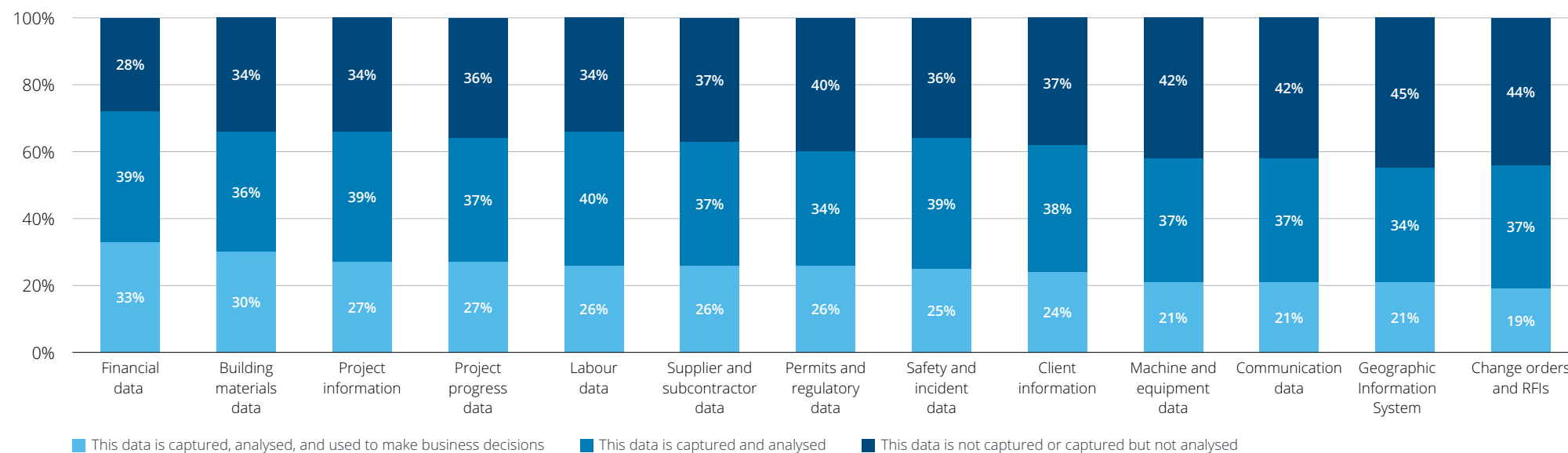
The multitude of data that a business collects is as an asset that allows a business to gain valuable insights and improve their operations. Analyzing data in a timely manner also allows businesses to quickly and effectively respond to changing conditions in the business or industry.

The construction industry is already aware of the importance of capturing data and analyzing data. The average construction business collects 11 out of the 13 potential types of data presented in our survey. Yet this figure shrinks to only 8 when considering businesses that both collect and analyze the data, and diminishes further to 3 when considering the data types that businesses collect, analyze *and* use to make decisions.

One example is financial data, which is the most commonly collected type of data (86% of businesses capture financial data). Only one third (33%) of businesses reported that financial data was analyzed and used to inform business decisions.

Many companies have invested in improving their ability to effectively capture and analyze data. Yet this analysis suggests the greatest return on investment could be from using the data already being collected and analyzed to help guide businesses in their decision-making.

## Types of data captured and used for decision-making



Source: Deloitte Construction Data Survey (2023)

# Opportunities to increase frequency of actionable insights

## Only one third of construction businesses get daily insights from at least one data source

The ability of a business to effectively capture and generate insights from data is extremely important to thrive in a competitive environment like construction. Just as important is the timeliness of the insights generated. In order to prevent a cost overrun, or a project delay, a business must quickly identify potential issues and respond effectively.

The Deloitte Construction Data Survey found businesses were more likely to get more frequent insights on project information and progress, with the majority (55%) of them getting insights at least weekly, and nearly one in five (18%) getting daily insights in their projects.

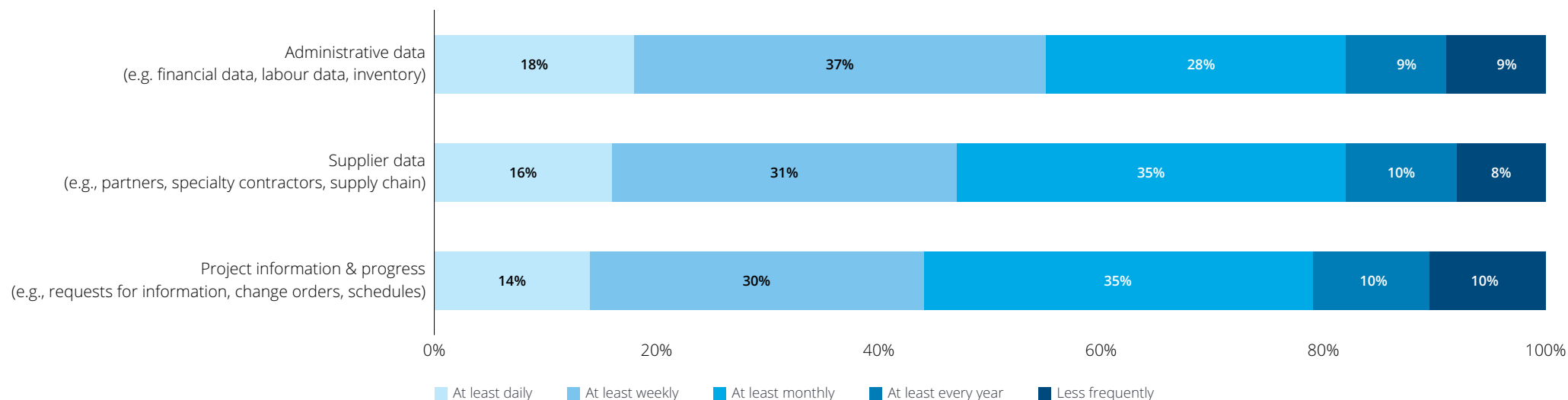
**Real-time data is becoming increasingly common to identify faults and unexpected issues in the construction process.** The use of real time 4D Building Information Modelling (BIM) software has been estimated to generate up to an 80% reduction in project operations and maintenance as users can identify problems more efficiently.<sup>2</sup>

Less than half (47%) of businesses generated weekly insights from administrative or supplier data. This suggests that there are potential improvements businesses can make to their data collection and analysis capabilities for back-office operations or suppliers. Improving these capabilities could assist the 30% of businesses who reported supply chain issues as one of their top challenges.

## How does the construction industry compare?

A survey of businesses from a range of industries found that more than three quarters (77%) generate actionable insights from data at least weekly or daily, compared with the 71% of construction businesses that generate insights at the same frequency. This suggests that there may be some gains to be made in the construction industry simply increasing the frequency of actionable insights generated by their data.<sup>3</sup>

## Frequency of actionable insights from data



Source: Deloitte Construction Data Survey (2023)

# A holistic model for assessing data capabilities

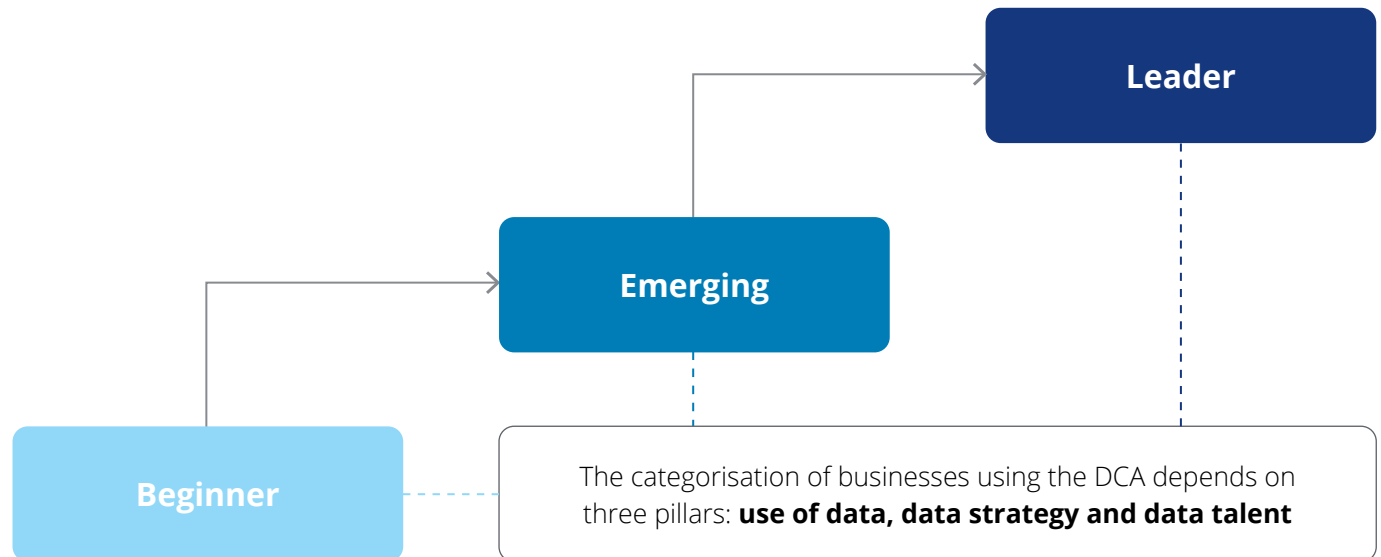
## Using 13 indicators to assess data capabilities across the construction industry

To assess data capabilities of businesses within the construction industry, **the Data Capability Assessment (DCA) was developed**. The DCA provides a standard benchmark to assess an organization's data collection processes and analytical capabilities. To calculate the DCA, the survey responses from each businesses were scored against three pillars: use of data, data strategy and data talent. These three pillars and their 13 indicators were selected to provide a holistic assessment of data capabilities within a business.

The scores from each pillar are then summed together and grouped based on the criteria outlined below to categorise the overall data capabilities of the business. The data capability categories include beginner, emerging and leader, as shown in the table below.

Further detail on the methodology to develop the Data Capability Assessment is provided in the Appendix.

## Data Capability Assessment categories (DCA)



	Beginner	Emerging	Leader
<b>Use of data</b>	Minimal data collection and analysis takes place	Forms of data are being collected but only limited datasets are analyzed  Data analysis occurs fairly infrequently, with the use of analytical tools limited to spreadsheets, etc.	Many sources of data are being collected and most datasets are being analyzed  Data analysis occurs frequently and with a variety of analytical tools and predictive tools, and is used to inform strategic decision-making
<b>Data strategy</b>	There is no current plan for the wider adoption or use of data	Future planning for the use of data is limited to operational functions, with no overarching strategy	The data strategy is comprehensive and holistic, with future planning clearly communicated across the organization
<b>Data talent</b>	There is no strategy to identify existing or required data skills, or to develop these through further training	There is recognition of the need for data skills, but central planning for skill development is limited  Further training is supported but self-directed	Talent is cultivated and directed, maximising the contributions of those possessing data skills and offering appropriate training across different levels of familiarity

# Most construction businesses can improve their data capabilities

## Four in five construction businesses could improve their data capabilities, with many opportunities to increase data talent

Using our DCA methodology, we classify 80% of construction businesses as having either beginner or emerging levels of data capabilities, as shown in the chart on the top right. This suggests there is room for improving data capabilities across the industry as a whole.

When looking at the three underlying data capability pillars, most businesses could improve components related to data talent, with businesses achieving just over half (53%) of the indicators necessary to achieve full capabilities in that pillar.

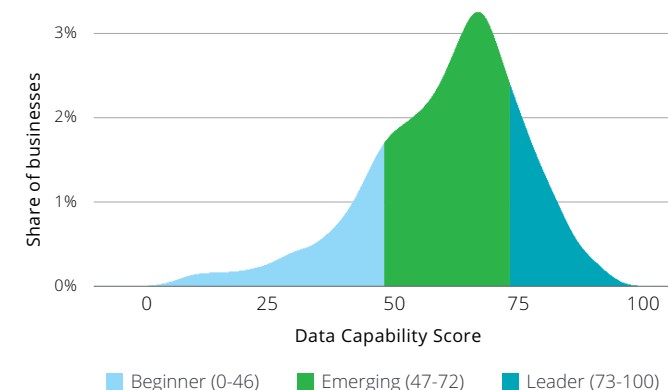
The average construction businesses achieved 59% of the total indicators when it came to use of data, while the average was 64% for data strategy indicators. These results suggest that while construction businesses may have developed a forward-looking strategic plan and investment budget for data collection and analysis, this hasn't yet translated into greater data collection capability and sufficient building of data talent within the business.

The following pages provide a breakdown of the DCA scores and analysis for three geographic regions: North America, Asia-Pacific and Europe.

## How does the construction industry compare?

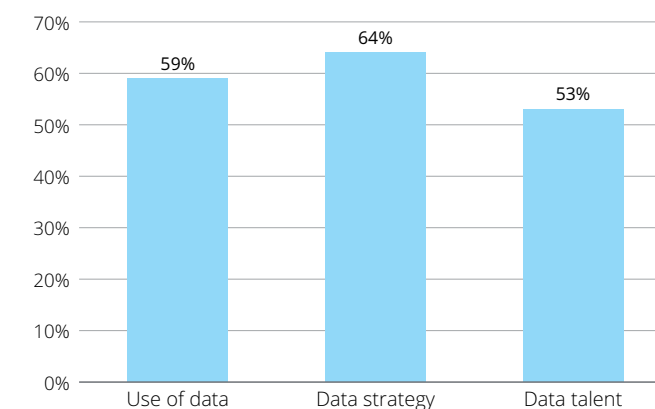
While this study focuses on the data capabilities of construction businesses, previous studies have looked at data maturity across businesses in a range of industries, including construction. Although the indicators and categories are not directly comparable, the Demystifying Data report developed for Amazon Web Services used a data maturity model to consider businesses within eight industries across the Asia-Pacific region. That study found that construction businesses had the equal greatest share of businesses in the bottom two categories of the data maturity (60%), along with organizations within health care and social assistance. Finance and insurance had the lowest share of businesses (a quarter) within the bottom two categories.<sup>3</sup>

## Distribution of data capability scores



Source: Deloitte Access Economics using the Deloitte Construction Data Survey (2023)

## Average score in the three data capability pillars



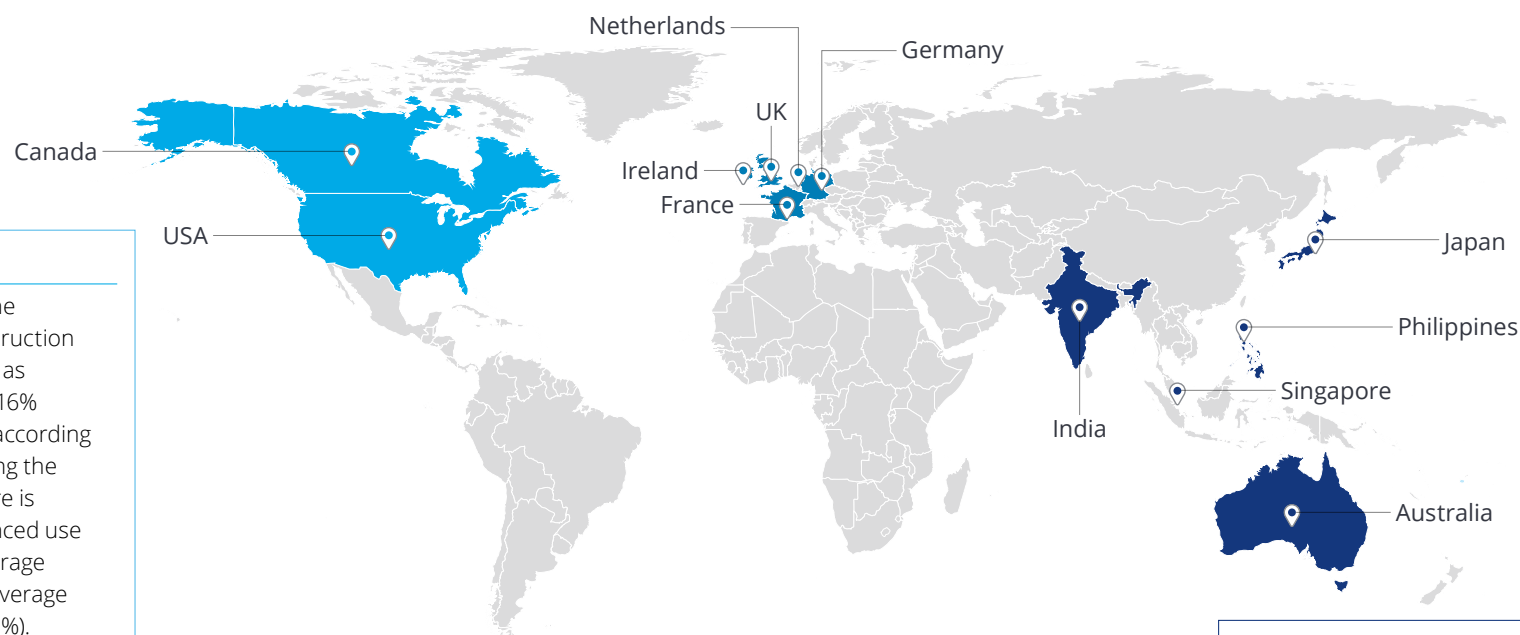
Source: Deloitte Access Economics using the Deloitte Construction Data Survey (2023)



# How do data capabilities compare across regions?

## Europe

The European businesses surveyed had the highest share of emerging data capabilities and a lower share of leader businesses compared to other regions surveyed. European countries have a relatively high average score for data talent.



## North America

North America has the lowest share of construction businesses classified as beginners, with only 16% within that category according to the DCA. Underlying the higher capability score is relatively more advanced use of data scores on average compared to global average (62% compared to 59%). Meanwhile, the average score for data talent is marginally lower in North America compared with the global average, suggesting this might be an area of improvement.

## Asia-Pacific

The Asia-Pacific region has the largest variation of data capabilities between countries of any region considered in this study, which reflects the diversity of economies in the region. The largest opportunity area for businesses in this region is to improve their scores for use of data.

# Spotlight on North America

## North America is at the forefront of the use of data, but can uplift capabilities by focusing on data talent

### Strong public spending will support the industry

The North American construction industry is estimated to be have a value of \$2.35 trillion and employs 18 million people across the US, Canada and Mexico.<sup>4,5</sup> The majority of employment, and value add, in the region occurs in the United States, being the largest economy in the region. The construction industry in the US is currently very two paced, with rising interest rates dampening demand for residential construction. At the same time, significant capital spending from the government, particularly as part of the Inflation Reduction Act, has spurred non-residential construction. In order to respond to the changing workforce, the industry will have to rely more on automating manual processes and technology.

### A leader in data usage

North America has the lowest regional share of construction businesses classified as beginners, with only 16% within that category according to our DCA methodology. Underlying the relatively high capabilities for North American construction businesses are relatively more advanced use of data scores on average compared to the global average business (62% compared to 59%). In fact, North American construction businesses have the highest share of businesses capturing and analyzing data, only behind Asia-Pacific in the capture of client information.

This may be reflective of the large capital markets and highly digitized economies of the United States and Canada, which encourages businesses to invest in cutting-edge technologies. Both the US and Canada have very competitive construction industries, which forces businesses to invest in new technology to improve productivity and reduce costs.

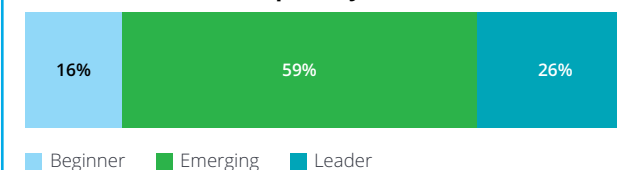
## Barriers remain and more benefits may still be realized

North American businesses are more likely to report that they store their data across too many platforms, meaning that consolidating data is a potentially significant change that businesses can make in order to develop their data capabilities. Other common barriers for North American businesses include access to skilled staff, data security and risk and data quality.<sup>6</sup> The average score for data talent is marginally lower in North America, suggesting training to increase data literacy should be an area of focus.

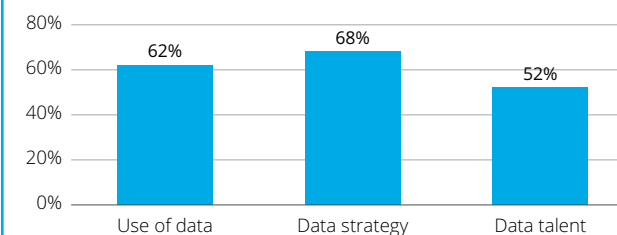
The most common benefit from greater data use is a reduction in costs. Given the thin margins in the construction industry and high level of competition in the North America, even minor cost savings can translate to significant increases in financial performance.

## Key stats for North America




### Distribution of data capability scores



### Average score in the three data pillars



### Top three benefits of data

-  Reduce costs
-  Track and measure performance and return on investment
-  Streamline business operations

### Top three barriers to greater data use

-  Access to skilled staff
-  Data security and risk
-  Data quality

# Case study: DPR Construction

DPR Construction is based in California, and operates across the US, Europe, and Asia. DPR specializes in technically complex and sustainable projects for the advanced technology, life sciences, health care, education, and commercial office markets.

DPR Construction's focus on highly complex and technical projects means that using data to improve decision-making is critical to business success. Both Hrishi Maha, who is the DPR lead on artificial intelligence, data science, and data engineering, and Rob Altomare, who leads the data analytics space, have seen the transformation of DPR toward being data-led and are looking for opportunities to push the boundaries further.

Hrishi, who has been working at DPR for 14 years, has seen the evolution of data analytics capabilities grow significantly. Where previously data was held in Microsoft Excel and data spread in multiple databases, leading to silos and duplication, DPR have now transitioned to a centralized data warehouse and data-driven model, enabling user-friendly data collection. DPR Construction have also moved completely to cloud-based systems and processes to enable greater access to those working on-site.

Now DPR Construction have a formal software development, data analytics and AI team, based across the US and India. Currently DPR had dedicated teams in all these areas, with Rob noting that Data and Development is viewed as a growth priority:

.....  
**"As the business has grown, the hunger for data has increased rapidly. We have had to make sure our investments in capabilities match not what we are currently doing, but what we want to be doing 5 or 10 years from now."**  
 .....

Currently, DPR use operational data to understand high-level priorities such as growth areas and areas for improvement. The operational data DPR collects is used for detailed analysis, with the firm employing analytical tools such as PowerBI and internally developed applications to deliver insights. One of the priorities at DPR is safety, with data used to track incident reporting, near misses, observations, inspections, and other leading and lagging indicators. This information is consumed via reports and dashboards on which safety metrics are tracked over time to allow DPR to see month-on-month improvements and take learnings from project to project.

Data is also seen as a key tool in meeting sustainability targets. DPR are targeting ambitious goals to reduce their waste, water, sewage, electrical usage and overall carbon footprint. Work is underway to ensure data analytics can support these targets, building towards the production of a comprehensive sustainability dashboard. This isn't currently required by legislation, and DPR believe that they are ahead of their competitors in this regard, with Rob noting that both DPR Construction and its clients believe this is the right thing to do.

One challenge to achieving data insights, according to Hrishi, is the potential disconnect between data and operations staff. When Hrishi first joined DPR he personally visited a lot of job sites to learn the industry, explaining that:

.....  
**"People on-site didn't necessarily understand how data worked for them. This led to skipping non-mandatory data entry, as they didn't understand the value. However, as the data team started to reach out to operational colleagues in the field to explain the potential benefits, we saw improvements in reporting."**  
 .....

Another challenge Rob points out is the potential for 'data overload,' or when there is so much reporting it becomes hard to identify key pieces of information. In response to this issue, Rob's team recently implemented 'Project Noise,' which seeks to reduce non-critical reporting and instill confidence in the reliability and accuracy of the data by providing a central repository for vetted and certified dashboards and reports.

Hrishi suggested that while DPR are happy with progress to date. DPR's ambition is to increase the use of predictive analytics across financial, sales and marketing, and scheduling data. Hrishi emphasized that this would represent a major step forward.

.....  
**"Leveraging data to improve decision-making and deliver customer value is our objective every day, where DPR truly becomes data-driven. Our job is to figure out the steps required to reach this point and respond to the latest developments in the industry and technology."**  
 .....

# Case study: Suffolk

Suffolk has operated across the United States for the past forty years and now has 10 offices across the country. Suffolk specializes in complex construction projects and emphasizes the integration of advanced technologies and data-driven strategies.

Recognizing the transformative potential of data and technology for the construction industry, Suffolk has made a concerted effort to integrate an innovative culture into its daily operations. For that reason, Suffolk became one of the first major US construction companies to appoint a dedicated Chief Data Officer (CDO) in 2016, a role held by Jit Kee Chin. Jit Kee recognises the significance of this appointment, stating that:

.....  
**"Creating the CDO role was cutting edge for the construction industry at the time. The role has an important function in the organization, but is also an important signal to everyone at Suffolk about the importance of data and innovation to what we do."**  
 .....

As CDO, Jit Kee recognised the importance of achieving some quick wins and short-term targets to build appetite for longer-term objectives. Jit Kee recalls that undertaking data analysis to improve the safety of workers was useful in demonstrating the importance and power of data across the company. This helped to create the rationale for building the longer-term strategy for improving data processes and analysis at Suffolk.

To ensure Suffolk was at the forefront of adopting innovative tech solutions, Suffolk Technologies was formed in 2019, which is a venture capital platform aiming to invest in high potential start-ups developing construction-related technology. This enables Suffolk to adopt and scale some of the leading technologies that are most applicable to the industry and generate financial returns by supporting founders in the early stages of their business journey. To date, Suffolk Technologies has invested in 30 start-ups, of which approximately 15 participated in their Boost accelerator program.

One of the businesses supported by the Suffolk Technologies fund was able to develop software which automates the taking of images by a 360-degree camera and maps them to the design drawings. This allows Suffolk to more efficiently track the progress of projects and have an accurate record of construction progress for different project components to share with stakeholders and clients. This solution replaced the labor-intensive process of taking photos, uploading and tagging them, and sharing with relevant clients.

When it comes to measuring the impact of investments in data analytics, Jit Kee cautions against exclusively focusing on measuring financial returns. While efficiency dividends are easier to measure, other benefits are harder, e.g., the value of better decisions. Additionally, larger-scale transformations often require changing entire workflow processes, and success relies on other factors, e.g., change management. That makes simplistic before and after comparisons difficult. Jit Kee states that:

.....  
**"Sometimes it can be a leap of faith at the start of a project. There are so many factors at a project level influencing whether you see an improvement or efficiency that you often can't clearly show the impact. One more important measure I use is whether people on the ground find it useful. If the answer is yes, its very likely to be working."**  
 .....

In fact, Jit Kee believes getting the input from operational staff is critical to the success of any data or tech investment in Suffolk. Jit Kee notes that there can be suspicion by staff that recording and tracking progress can be used as a performance metric that can lead to tools not being used or not used correctly. To address this issue, Jit Kee emphasised a 'no-fault' culture when launching dashboards and metrics, explaining that:

.....  
**"When we first start measuring a process through data, we are conscious there may be issues in how we are collecting the data or why this project differs from previous ones, which makes interpretation difficult.**

**Yet we also know that data can be very helpful for project teams to track progress. So we made sure to talk not about 'data-driven' decision-making, but instead about 'data-assisted' decision-making to emphasise to our staff that they are the ones who are making the decision at the end of the day."**  
 .....

Suffolk wants its employees, many of whom have decades of experience in the industry, to feel as though they are being supported by data. This results in a workplace where new tech solutions achieve high adoption rates faster and where data champions exist at all levels of the business.

# Spotlight on Europe

## Transitioning to a more sustainable economy driving demand for the construction industry

### Economic headwinds persist on the continent, but public investment will support the industry

The European construction industry is a major driver of employment and economic activity in the region, supporting 18 million jobs and contributing 9% of the GDP of the European Union (EU).<sup>7</sup> European construction businesses face a relatively more sluggish economic environment compared to other parts of the global economy at present. Inflation in the both the EU and UK remain above the average level in other developed nations, while GDP growth of all members of the EU and UK only grew by 0.5% and 0.6%, respectively, in the 12 months to June 2023, below the 2.6% observed in the United States over the same period of time.<sup>8</sup>

The transition to a more sustainable industry is a significant trend for European construction businesses. This trend is driven by regulation as well as business and client preferences. The transition for the construction industry will be supported by the €800 billion Next Generation Fund, an EU initiative designed to support the continent in reaching net-zero carbon emissions. Construction in the UK will be supported by the similar National Productivity Investment Fund, a £31 billion fund designed to support investment in transport, housing and digital infrastructure.<sup>9</sup>

### A high share of middling data capabilities

Surveyed European businesses had the highest share of emerging data capabilities and a relatively lower share of leader businesses compared to other regions considered in this study. The difference in data capabilities holds after considering other factors such as the business size or years in operation.

This is likely driven in part by the fact that European businesses in the past have struggled more than those in other regions to integrate data projects across their organization, or to develop long term roadmaps for digital investment.<sup>10</sup> Of course there is also variation across and within countries, for example, construction businesses in the Netherlands lead the region on average in the capture and application of data in construction.

There is also variation across and within countries. For example, construction businesses in the Netherlands lead the region on average in the capture and application of data in construction. To thrive in the challenging economic environment, and to effectively transition towards more sustainable operations, businesses will have to harness the power of data and technology or risk being left behind global peers.

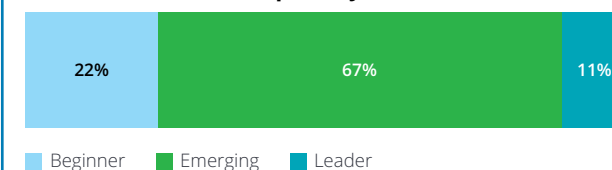
### Overcoming the regulatory burden

Accessed to skilled staff and data security and risk were the two most common barriers to greater data use reported by European construction businesses. These align closely with businesses in North America and the Asia-Pacific.

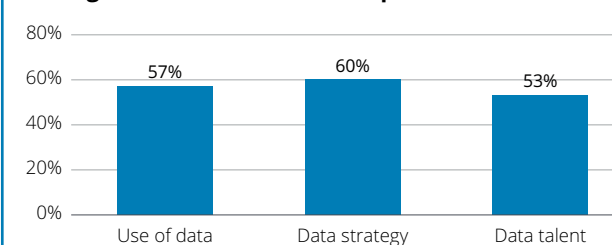
One barrier cited by European businesses that was less common in other regions was government regulation and legislation. Nearly one in five (18%) of European businesses listed government regulation and legislation as one of their top three barriers to data adoption. Europe is known to have a relatively strict regulatory environment compared with other regions.<sup>11</sup> Government regulation can have a mixed impact on data capabilities, with regulations like GDPR requiring more oversight for data processing and usage. While regulatory requirements may necessitate investment in data collection and analysis as businesses track and report on a number of metrics, regulations may focus businesses on compliance reporting rather than using data to generate commercial or innovative insights.

## Key stats for Europe




### Distribution of data capability scores






### Average score in the three data pillars



### Top three benefits of data

-  Reduce costs
-  Grow the business through the identification of new projects
-  Track and measure performance and return on investment

### Top three barriers to greater data use

-  Access to skilled staff
-  Data security and risk
-  Government regulation and legislation

# Case study: Dura Vermeer

Dura Vermeer is one of the top construction companies in the Netherlands with over 165 years of experience. The company now employs over 3,000 employees. Dura Vermeer is involved in all aspects of a project lifecycle for residential, non-residential, infrastructure and technology developments across the Netherlands.

Bart Pigge, Director at Dura Vermeer, and Gert-Jan Ditsel, Digital Construction Manager, are quick to realise that the use of data analytics has been critical to the success and longevity of Dura Vermeer. Bart reveals that:

.....  
**“We certainly value the insights data can provide. We are already using data for reducing costs, forecasting revenue and margins, improving our environmental impact and making strategic adjustments throughout a project. But there are so many more uses for our data and we are working towards making the most of the data we do collect.”**  
 .....

Dura Vermeer’s bespoke ERP system, Projectmaster, collects and analyzes financial data and other project data including the number of working hours for each project. With this data, Kental, another software application used by Dura Vermeer, provides forward-looking insights about the tenders Dura Vermeer are considering to bid for based on benchmarks from previous projects. This includes details from previous projects such as the groundwork and roofing, and stores the costs of the components.

With this information, Dura Vermeer can readily estimate the costs for similar prospective projects within 1-2 days, a task which can take up to 8 weeks normally.

Data is also used to make sure projects are efficiently managed. For example, Dura Vermeer collects data on road usage around their construction sites and uses it to plan future transport routes and times with the goal of reducing time for employees and suppliers navigating peak periods. Gert-Jan adds:

.....  
**“Our data analytics aims to improve both our efficiency and the sustainability of our operations. We are using our data to estimate and forecast costs and waiting times as well as CO2 and NOx emissions from our operations. This data enables us to make informed decisions which are crucial for meeting our sustainability goals and obligations.”**  
 .....

Achieving data-driven insights has required Dura Vermeer to use a mix of products from tech vendors and self-developed platforms. One of the products used by Dura Vermeer is a digital cloud-based system for supply chain data management called 12Build, which helps when selecting subcontractors or suppliers. Another use of external data software at Dura Vermeer is the BIM360 hosted on the Autodesk Construction Cloud platform, which is used to track active projects progress, number of active users, documents and manage issues.

Using these products provides Dura Vermeer with analytic capabilities they would not be able to achieve otherwise, yet Gert-Jan recognises the need to think long-term when it comes to the use of products and platforms, noting that:

.....  
**“We are more than willing to partner with different providers when it comes to data analytics products or platforms, but we need to consider how these all fit together. Otherwise, we will quickly run into interoperability issues with our systems. Finding solutions that are compatible with our existing systems is a key priority at Dura Vermeer.”**  
 .....

When asked about their tips for other construction businesses looking to improve their data analytics capabilities, Bart and Gert-Jan point out the importance of having executive-level support to make sure strategic investments are made with clearly defined use cases for data from the start. This ensures the building of data analytics capabilities of a business is focused on where there is the largest potential for efficiencies and returns.



# Case study: Morgan Sindall Construction

Morgan Sindall Construction is part of Morgan Sindall Group, a UK-based construction and urban regeneration business founded in 1977, which now generates £3.6 billion annually. Morgan Sindall Construction undertakes projects for both the public and commercial sectors where people live, learn, work, play are cared for and protected.

The use of data and technology is deeply embedded into Morgan Sindall Construction, with the business actively using or trialling technology such as drones, automated imagery, automated excavation, people and plant sensors, and BIM modelling. They collate project-specific and operational data internally, and also purchase pipeline and market intelligence data from external providers. Steffan Speer is a Technical Director whose role focuses on identification of competitive advantages, with the use of data being a key focus area. Steffan explains that:

.....  
**“There are a myriad of technologies that have recently been applied to construction and the field is evolving rapidly. This can make it hard to decide what to invest in, but our simple rule of thumb is that if project teams can see a benefit, then things get implemented.”**  
 .....

Per Steffan, the executive leadership at Morgan Sindall Construction are highly supportive of increasing data analytics capabilities. When assessing proposed investments, the executive leadership look to identify direct links to improved operational efficiency and improved user experience, and for longer-term projects this can require detailed analysis prior to implementation. A strategic goal from the leadership is to build capabilities in predictive analytics to complement the existing data collection and analytics tools that provide a basis for retrospective analytics.

To realise these goals, Steffan explains that the business also has a specific team tasked with investigating the future of work, alongside the ongoing work on data collection. This team is investigating the potential to use tools such as PowerBI, alongside early stage exploration of the potential uses of AI/ML and middleware solutions in Morgan Sindall Construction operations.

Realising the potential of data analytics at Morgan Sindall Construction requires addressing some existing challenges. One focus area for Morgan Sindall Construction is removing data silos. As the business operates across multiple regions with a decentralised structure, this has led to data being stored separately by teams, without a common data repository. To address this issue, Morgan Sindall Construction is looking at investing in data warehousing technology. Once operational, this platform will increase the interoperability of systems, and improve communication and analysis across regions and functions.

Another barrier to achieving data-driven insights is the data quality. In particular, consistency of definitions and data collection processes is important to achieve improved analytics. Steffan explains:

.....  
**“Data cleaning and improving data quality is the foundational step required for our business to reap greater benefits from data analytics. We can have all the latest, cutting-edge data analytics platforms and tools but to make sure we are getting the best return from the systems we need a high-quality data.”**  
 .....

In order to build out data analytic capabilities quickly, Morgan Sindall Construction is partnering with external contractors or consultants for data-specific tasks. Steffan points out that carefully selecting the partners is important to achieve the desired outcome. Over the longer-term, the Morgan Sindall Construction is looking to increase the size of the in-house data analytics team to increase internal capabilities required to achieve the strategic objectives of the business.

# Spotlight on Asia-Pacific

## Asia-Pacific is a diverse region with the largest variation among individual countries

### An already strong region, where construction will continue to be supported by growing incomes

The Asia-Pacific region, home to the two most populous countries on the planet, is a major driver of global construction. The region produced an estimated \$4.36 trillion US of output in 2022, representing 45% of the global industry, a figure which is forecast to grow to 49% by 2030.<sup>12</sup>

For many countries in Asia-Pacific, population growth, combined with significant economic development, is expected to drive strong growth for both residential and civil engineering projects. Other countries – such as Australia and Japan – face ageing populations but have significant private and public investment to stimulate local construction industries.<sup>11</sup>

### A diverse region with varying levels of data adoption

Construction businesses in the Asia-Pacific region have relatively higher levels of data talent compared with global peers. As expected for such a diverse region, the Asia-Pacific region has the largest variation of data capabilities between countries.

Interestingly, variation in data capabilities are not entirely correlated with levels of economic development. In fact, Japanese construction businesses were the least likely to report that they are making the most of data. Conversely, businesses in India and the Philippines are leaders in the application of data to construction operations alongside Australian and Singaporean businesses.

In addition to this, businesses in Asia-Pacific are leaders in the use of data to track the environmental impact of their projects, with businesses in India, the Philippines, and Singapore the most likely to use data to track this.

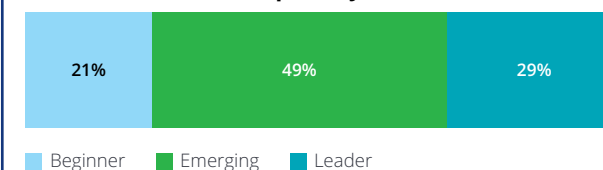
### Lack of funding holding back data capabilities

Lack of funding was the most common barrier identified by businesses within Asia-Pacific. Those businesses which do not have a dedicated investment budget to improving data capabilities are 57% more likely to cite lack of funding as a barrier to digital adoption than other businesses, suggesting developing an investment strategy with clear priorities could lead to an increase in data capabilities across the region.

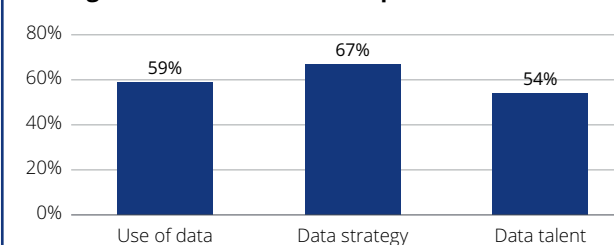
Data security and risk and data quality were identified as the next most common barriers for greater use of data. The issue with data quality may be a factor which is driving a relatively lower score in the use of data pillar.

## Key stats for Asia-Pacific




### Distribution of data capability scores



### Average score in the three data pillars



### Top three benefits of data

-  Reduce costs
-  Grow the business through the identification of new projects
-  Track and measure performance and return on investment

### Top three barriers to greater data use

-  Lack of funding
-  Data security and risk
-  Data quality



# Case study: Lendlease

Lendlease is a global company that employs over 7,600 people across four continents and has over \$120 billion in the development pipeline. The company has over 60 years of experience and has capabilities that span all stages of the property lifecycle across investment, development and construction.

Lendlease relies on strong data foundations to manage a portfolio of 250+ large-scale projects, with potentially 20-30 subcontractors involved in each project. Andrew Rampton, Group Executive - Construction at Lendlease, is quick to recognize that the success of the company is increasingly driven by the way it views data and the role data plays in the organization's decision-making, saying that:

.....  
**"The way that Lendlease operates means that sound data collection and analysis is core to our business. These days, we are not so much a construction company and more of an 'information management company,' which means our data management and analytics should be more like a Google than a traditional construction company."**  
 .....

Andrew points out that while the use of lagging indicators is well established in Lendlease and the construction industry more broadly, there is now a greater focus on using leading indicators to inform decision-making. Lagging indicators such as time, cost, quality and environmental, health and safety are used to inform and adjust projects frequently. Yet the nature of these indicators means they will always be reactive. Leading indicators that provide benchmarks and insights for products, projects and teams will increasingly be used to plan outcomes and inform future decisions.

While the use of both lagging and leading indicators can produce significant efficiency and quality improvements, the leading indicators offer greater dividends. Andrew explains one example:

.....  
**In a typical procurement process, many project teams will start the design largely from scratch and take weeks coming up with time and cost forecasts. Yet we've all done hundreds of similar projects before. Every business should be able to pull on data from past projects and produce accurate forecasts within a matter of days (or hours?)."**  
 .....

Making the most of the data Lendlease collects has required identifying and removing data silos. This is not an easy or simple task, as it requires integrating a variety of data points from a vast range of contributors. The issue is exacerbated when companies across the value chain are using different systems to collect, store and analyze their data, which may not be interoperable.

Partially in response to this challenge, Lendlease is developing its own data platform and software applications, to enable greater sharing and analysis across relevant stakeholders and which will hopefully generate time and cost efficiencies in future. Andrew notes that this is a trend across the industry; tech vendors are increasingly developing a platform-approach that enables data integration across applications.

Andrew recognizes that this interoperability issue points to the need to reimagine business processes and challenge some outdated concepts to realize the full transformative potential of data in the construction industry. In particular, Andrew points out that how a construction business views intellectual property (IP) needs to change by stating:

.....  
**"Intellectual property in the construction industry has historically been focused on the plans and designs we produce. We guard designs jealously like they are our keys to our success. Going forward, IP will be more about how construction companies compile and consolidate data - and the processes and models used - to inform our ability to plan and execute efficiently."**  
 .....

When this approach takes hold, construction will fundamentally change from a cost-competing industry towards an industry that focuses on and recognizes the importance of data sharing and collaboration to produce higher-quality places that better respond to the challenges society will face in the future.

# Case study: Hansen Yuncken

Hansen Yuncken is one of the oldest construction businesses in Australia, and is a world leader in sustainable architecture. They have built some of the most iconic buildings in Australia, including the Museum of Old and New Art in Tasmania and are using technology to continuously improve their operations.

Innovative construction techniques have been a part of Hansen Yuncken as far back as the 1920s, when the company was the first to use a suspended scaffold to restore the dome of the State Library of Victoria. In more recent years, Hansen Yuncken developed an award-winning management system, HYway, which combines geographic information with project planning and management systems. HYway provides the Hansen Yuncken team, clients and partners with a holistic view of the project, and has recently won a Platinum Award in Intranet Innovation.

Rexine Jones, the Chief Financial and Information Officer of Hansen Yuncken, recognises that this innovative culture does not happen by default, but needs to be actively and continuously encouraged. Rexine notes that as a national company there are often opportunities to learn from what teams are doing in different jurisdictions, explaining that:

.....  
**"We have noticed that business champions can have a significant impact on the quality and use of data in a region. In some regions of the business we've seen a strong bottom-up demand for technology, which has driven uptake. This has allowed to us to figure out successful models and apply them to other geographies."**  
 .....

One important learning to encourage adoption and use of data was ensuring the technology was user friendly. Even technology that had provided significant increases in capabilities did not lead to material results in terms of capability uplift as staff found the device less user friendly, which led to lower usage rates among staff. For this reason, Hansen Yuncken has focused on making sure devices are user friendly and the benefits to staff from using the technology are clearly communicated. Rexine emphasises that:

.....  
**"Once our team knows that the tech is designed to make their job easier or safer, they are more likely to go beyond the functions that were simply demonstrated to them. This is when the real benefits of the tech will be realised."**  
 .....

Data analytics is key in addressing one of the biggest risks Hansen Yuncken face according to Rexine – time overruns. Rexine notes that more than half of the cost overruns in recent years have been attributed to issues related to timing. For example, unexpected delays can have knock-on impacts for other subcontractors who are unable to start. Better and more frequent data analytics are able to better sequence a build and better utilise subcontractor time to make sure workflows are able to progress efficiently. Rexine explains:

.....  
**"Sometimes we get fixated on chasing big time-saving applications, but more often it's the tech that can save a few minutes here and there that has the biggest impact when they are scaled up across the entire business."**  
 .....

Another key benefit of data analytics is preemptively identifying and mitigating risks. Addressing potential mistakes before they materialize is not only more efficient but also significantly cost-effective. This is particularly important for construction management companies, given they take on the ultimate risk for a project. If a defect is discovered months down the track, the cost of repair generally is borne by Hansen Yuncken, as the work by contractors will often already be signed off.

Rexine highlighted the benefits of using of 4D modelling, which allowed the company to look back on construction projects, both to identify when a mistake may have been made, and analyze the potential causes of it. This has resulted in continuous learnings from significant experience of the business that can be applied to all future projects the business undertakes.

# Spotlight on business functions

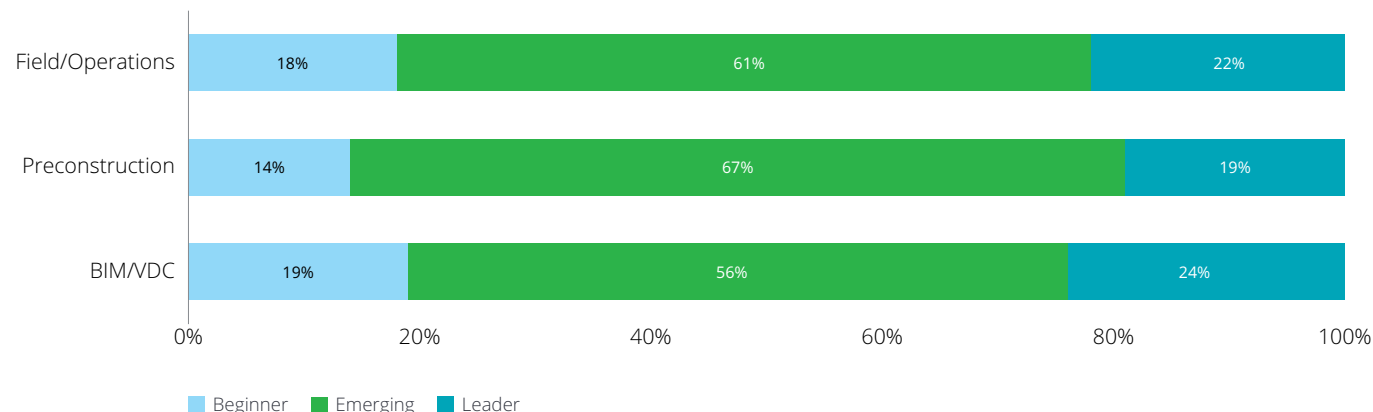
## Data usage differs across business functions

The surveyed building information modelling/virtual design and construction (BIM/VDC) businesses had the highest share of leaders in data capability at 24%, with this being slightly higher than the Field/Operations (22% data leaders) and Preconstruction (19% data leaders). BIM/VDC businesses also took the lead in the use of data pillar and data talent pillar, scoring respectively 61% and 62%.

Surveyed businesses specializing in Field/Operations displayed higher level of data strategy than businesses with other specialties at 66%. However, these businesses only scored a modest 53% in data talent, suggesting that there are components in data talent that Field/Operations businesses could improve on.

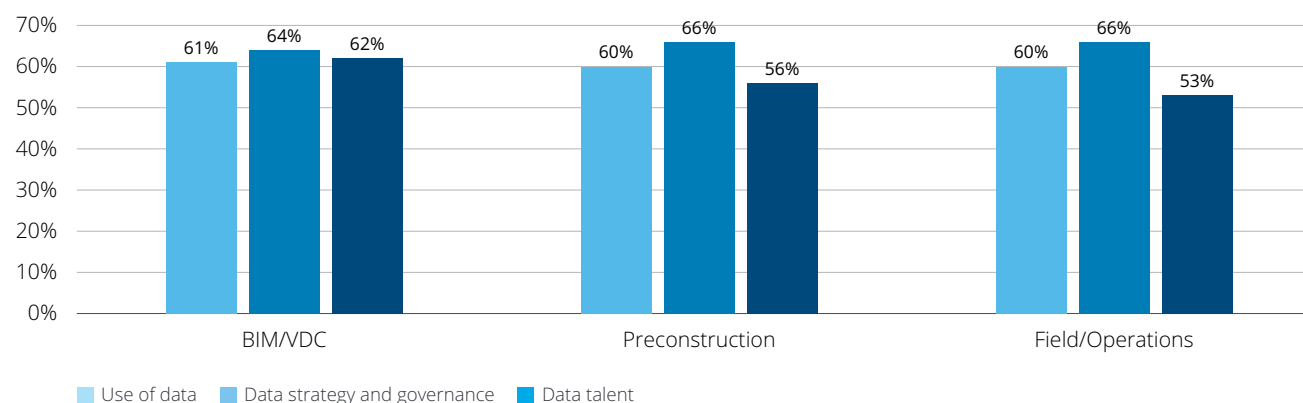
Surveyed businesses specializing in Preconstruction, which offer services that support owners, architects, and engineers in making decisions prior to construction beginning, had the lowest share of beginners, and the highest share of emerging data capabilities businesses. In terms of the underlying components of data capability, survey results show that Preconstruction performed admirably in data strategy, but slightly lagged behind BIM/VDC businesses when it comes to data talent.

## Distribution of data capability score – by business functional area



Source: Deloitte Construction Data Survey (2023)

## Average score in the three data capability pillars – by business functional area



Source: Deloitte Construction Data Survey (2023)



# 3 Benefits of data

# The benefits of data leadership

## Businesses with leading data capabilities are more optimistic, more likely to have international operations and more likely to adopt advanced tech

The vast majority (94%) of construction businesses believe that data collection and analysis has been effective for decision making, with nearly a third (31%) reporting it has been extremely effective.

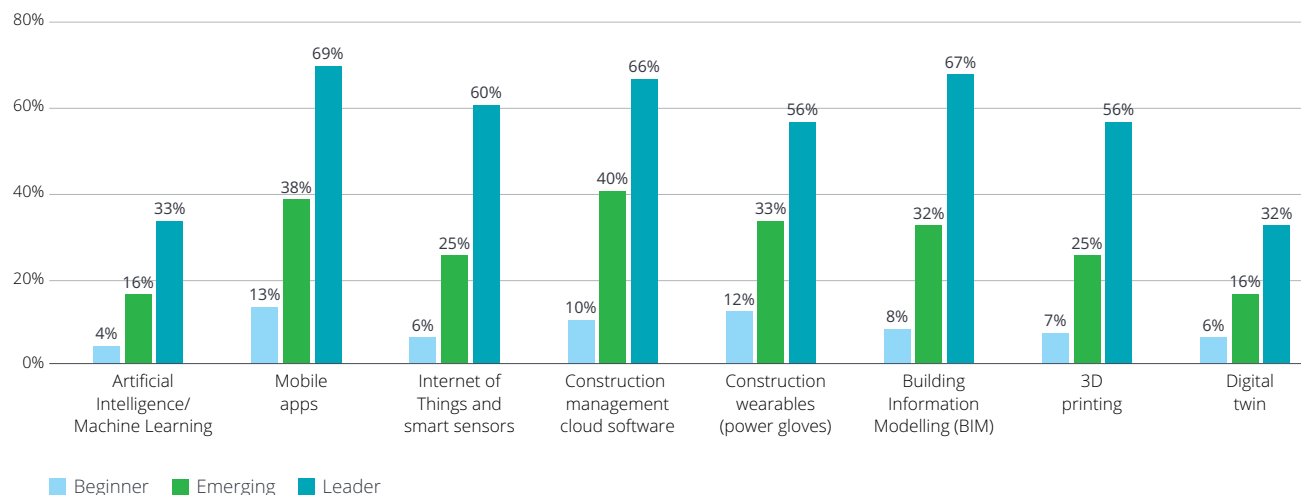
Businesses that embrace data for decision making are realising significant benefits in their business performance. Consider the following insights from our survey:

- Leaders in data capabilities are **1.7 times** more likely to be optimistic about the future financial performance and growth of their businesses, compared with businesses with beginner levels of data capabilities
- Leaders are **3 times** more likely to have international operations when compared with businesses with beginner levels of data capabilities

- Businesses that have leader levels of data capabilities are likely to have already adopted advanced technologies such as drones, BIM, and digital twins. In fact, **leaders have on average adopted 9 technologies out of 17, compared with an average for only 1 for beginners and 5 for emerging.\***

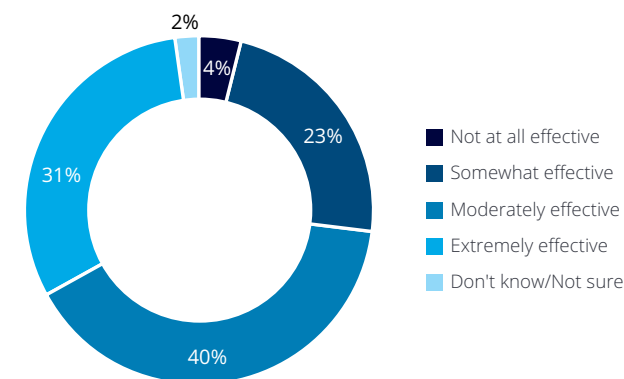
From an industry perspective, the greater use of data allows for better communication and planning between businesses, clients and subcontractors. This can improve knowledge sharing and increase productivity by ensuring materials are delivered when needed and workflows can be efficiently managed through out a project.

## Technology adoption rates, by Data Capability Assessment category



Source: Deloitte Construction Data Survey(2023)

## Effectiveness of data collection and analysis for decision making



Source: Deloitte Construction Data Survey (2023)

# The data dividend

## More than 50% increase in average expected profit growth is associated with a move from beginner to leader

Most businesses understand the value of data to streamline operations or improve decision making, although it can often be difficult to measure the impact.

To assess the value of being data driven, Deloitte Access Economics has modelled the relationship between expected financial performance and data capabilities.

The results show that a leader in data capabilities have, on average, a **2.7 percentage point** higher expected annual profit over the next five years in comparison to a business with beginner data capabilities. For the average business, this uplift could increase the average profit growth over the next five years from 4.4% per year to 7.1% per year.

For a business with \$25 million USD in annual profits, the step up in data capabilities from beginner to leader could be worth an additional \$0.7 million USD per year in additional profits.

This result holds after accounting for years in operation, location, employment size and areas of construction specialisation. Further detail on the methodology used for these modelling results are available in the Appendix.

These results align with other modelling around the benefits of data collection and data analytics. A survey of over 3,100 organizations across Asia-Pacific, including construction, found that businesses with higher data maturity earned 8.7% higher revenue per year.<sup>1</sup> Other research has found evidence that investment in data and the efficient sharing of data has been shown to reduce costs and improve the quality of construction projects.<sup>2,3,4</sup>



**Leaders report a 50% increase in average profit growth rate when compared to beginners. This is equivalent to a 2.7 percentage point increase in expected average profit each year.**



**\$0.7 million USD** is the expected additional annual profit which can be generated as a result of stepping up from Beginner to Leader in data capabilities, for a business earning \$25 million USD in annual profits



# 4 Taking the next step

Outlook for the  
construction industry

State of data in the  
construction industry

Benefits of data

Taking the next step

# Overcoming the barriers to being data driven

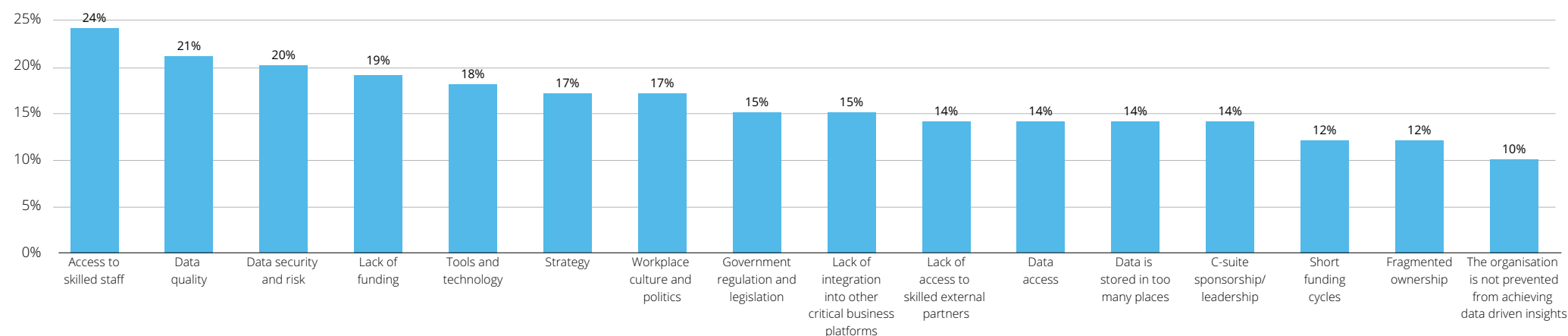
## Over 90% of construction businesses face at least one barrier to being data driven

To realise the potential of data in the construction industry, a number of barriers to collecting and analyzing data will have to be overcome. Nearly 90% of businesses operating in the industry face at least one barrier to integrating data-driven insights into business processes, with access to skilled staff, data quality, and data security and risk identified as the most common barriers faced by construction businesses.

Taking action to effectively address these barriers can significantly enhance the data capabilities of a business. Looking specifically at the key challenges identified our research finds:

- **Data training can build in-house data skills** – a quarter of businesses report access to skilled staff as a key barrier to integrating data-driven insights. This issue is shared across all industries and reflects the high demand for such skills in the modern economy. One solution is to develop in-house data skills for existing staff. Our survey finds that businesses who provide training to all team members are 2.5 times more likely to be data leaders compared with those who do not offer training to staff.
- **Centralised data teams and standards can improve data quality and data security** – the quality and security of data can be improved by standardised data team structure and processes. Businesses with a centralised data team are nearly twice as likely to be data leaders compared with those who do not have central data resources within their organizational structure.
- **A clear investment strategy with senior executive support can reduce lack of funding for data analytics** – funding challenges require senior executive buy-in. Businesses where the senior executive team were identified as the data champions were 30% more likely to be data leaders compared with those who did not identify the executive team as data champions, while those with an organization-wide data investment budget were 2.5 times more likely to be data leaders compared with those businesses who do not allocate specific funding towards investment in data.

## Barriers to integrating data driven insights



Source: Deloitte Construction Data Survey (2023)



# Importance of data training

## New starters are most likely to benefit from data training, with a third having basic levels of data literacy

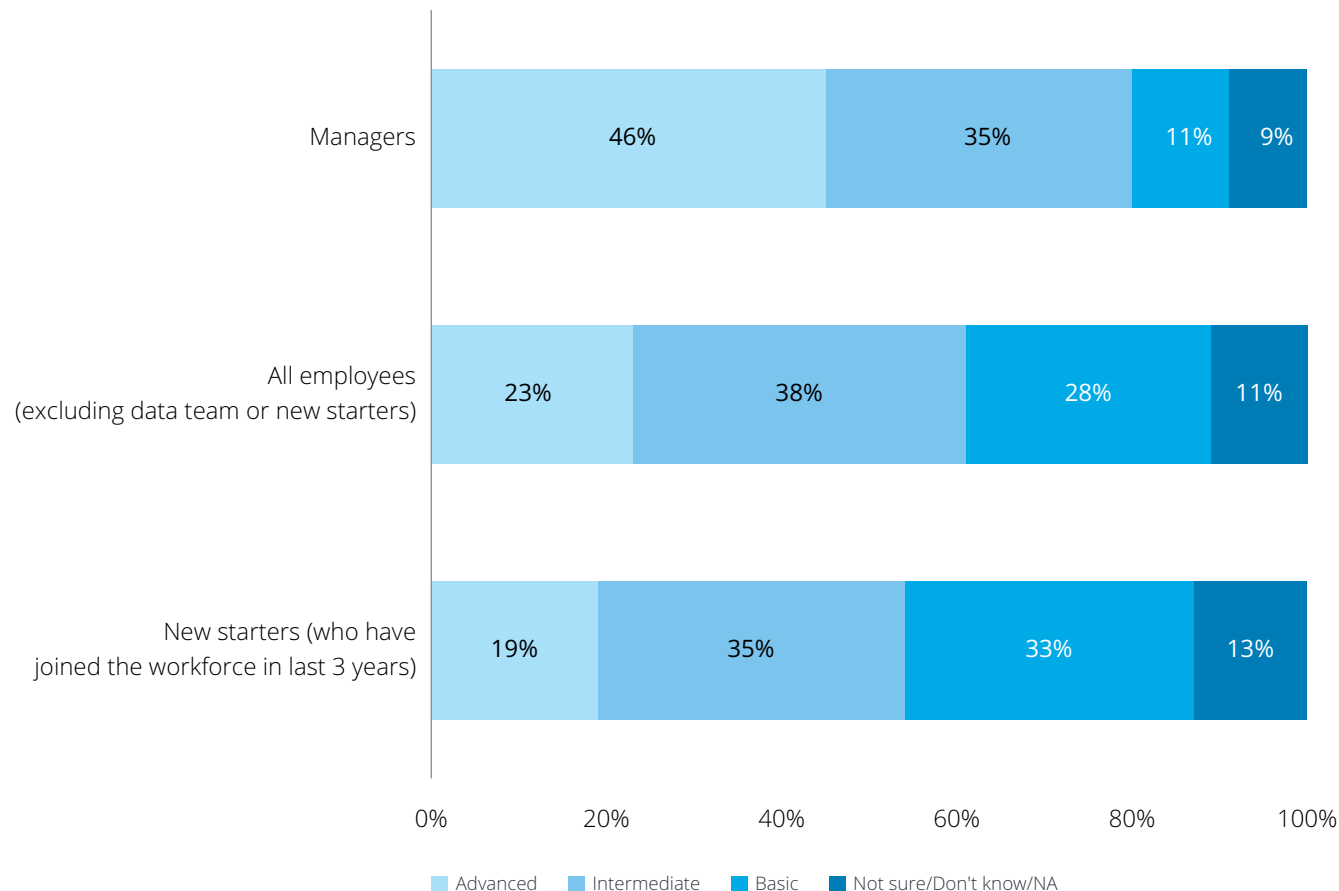
A lack of access to skilled staff was the most common barrier to achieving greater data insights, with nearly a quarter of all businesses reporting this issue. Data training to increase data literacy or skills in analysis can be effective in addressing this barrier, with our survey finding that **businesses who provide training to all team members are 2.5 times more likely to be data leaders** compared with those who do not offer training to all levels of employees.

Data training should be directed to all levels of staff. Our survey found that **new starters typically have the lowest levels of data literacy in a construction business**, with 33% only possessing basic skills. This finding contradicts expectations of generational gaps in tech familiarity and capabilities of 'digital natives,' instead suggesting that industry or workplace-specific data skills are developed through experience and job-specific training.

The importance of job-specific training reinforced by **project managers possessing the highest proportion of advanced data skills** and most likely to receive data training of any employee group in the business, with nearly two thirds (63%) undergoing training on using or interpreting data.

Despite the demonstrated importance of training, our survey found **13% of businesses don't offer data training of any kind**, to any of the listed team members. Given the importance of data training across all levels of seniority, this finding suggests an important action for business looking to improve their data capabilities.

## Data literacy of construction industry employees



Source: Deloitte Construction Data Survey (2023)

# Improving data quality and security through centralized processes and teams

## A quarter of businesses do not have any data analytics roles or outsourced capabilities to another organization

Less than a third of construction businesses have a centralised data team, with teams commonly operating in silos. This can create inconsistency across data standards and processes. In fact, a quarter of businesses do not have any data analytics roles in their business, nor have they outsourced capabilities to another organization.

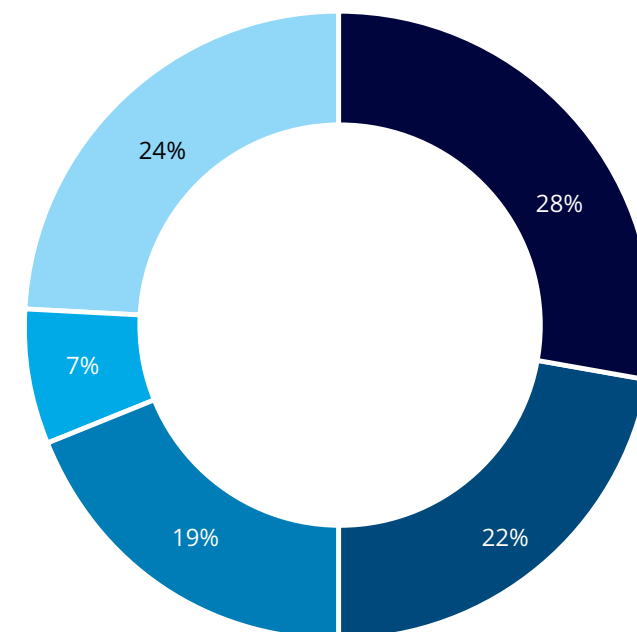
A centralised data team and standardised processes can address two key barriers for businesses seeking to increase data capabilities:

**1. Improving data quality and access.** Issues relating to data quality often result from inefficiencies in the storage and analysis of data. Yet 29% of businesses state that they store data on too many different platforms. Further to this, 26% of businesses are experiencing difficulties integrating data across their various platforms, highlighting the need for investment in centralised data warehousing. Poor data quality and processes are a key barrier to greater data capabilities and associated benefit. Another study finds that 'bad data' costs the global economy more than \$1.84 trillion USD each year.<sup>1</sup>

Improved access to data can also benefit operational efficiency. Management and executive-level employees in the construction industry spent an average of 11.5 hours per week researching and analyzing data. However, much of this time is spent inefficiently, suggesting that improvements in data availability could have an immediate impact on productivity.

**2. Data security and risk.** Concerns surrounding the security of data, and the associated risks of any security breaches, were highlighted as a significant barrier to data use. Security and risk processes would benefit from a centralised data team but beyond that, 12% of construction businesses reported that they do not have a well-defined data governance policy. Similarly, 24% of businesses do not view loss of data or data breaches as a risk, which suggests that such risks may not have been fully evaluated. Improvements around data security do not have to extend to large-scale investment in systems, as improvement in these procedural elements would immediately mitigate some of the risk associated with data usage.

## Structure of the data analytics team



- There is a centralised data and analytics team that works across the organisation to capture and analyse data
- Every department/team has its own dedicated data and analytics professionals
- Some departments/teams have dedicated data and analytics professionals
- The organisation's data and analytics functions are outsourced
- We do not have formal data and analytics roles

Source: Deloitte Construction Data Survey (2023)

# An investment budget to prioritize use cases

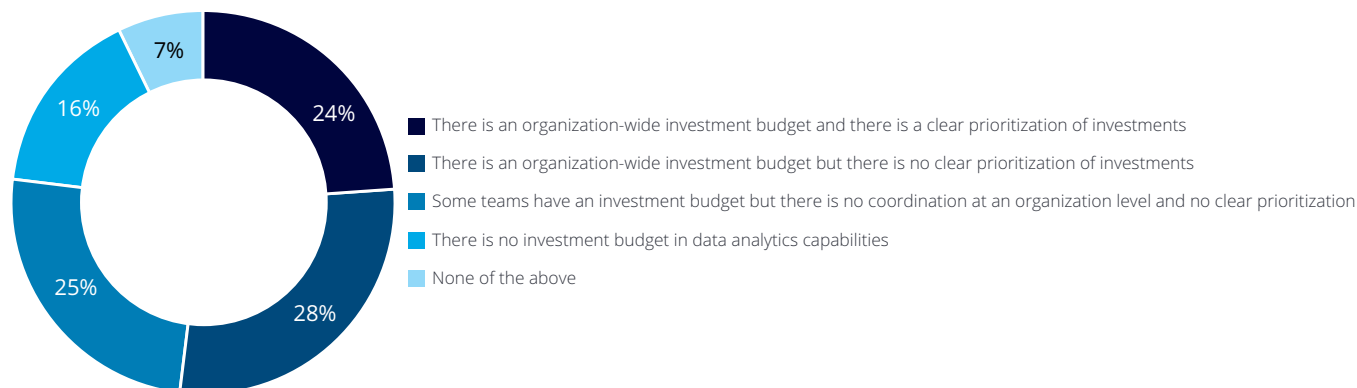
## Three quarters of businesses have an investment budget for data and analytics

An effective approach to investment is key to building data capabilities. While 16% of businesses reported that they had no specific provision in their budget for investment dedicated to data analytics capabilities, over three quarters of businesses have a dedicated budget to develop their data capabilities. However, this investment is often not clearly targeted, with **just 24% of businesses having a clear strategy for investment prioritization.**

In terms of investment allocated to data analytics, **twice as many businesses report investment in data as increasing as those that report investment decreasing.** The most common area to increase investment is in data collection or analytical tools or software categories followed by data architecture and training and recruitment practises. Overall, more businesses expect to invest in internal recruitment and training relative to external contracting to develop their data capabilities, suggesting a desire for businesses to retain control of their data capabilities within the company.

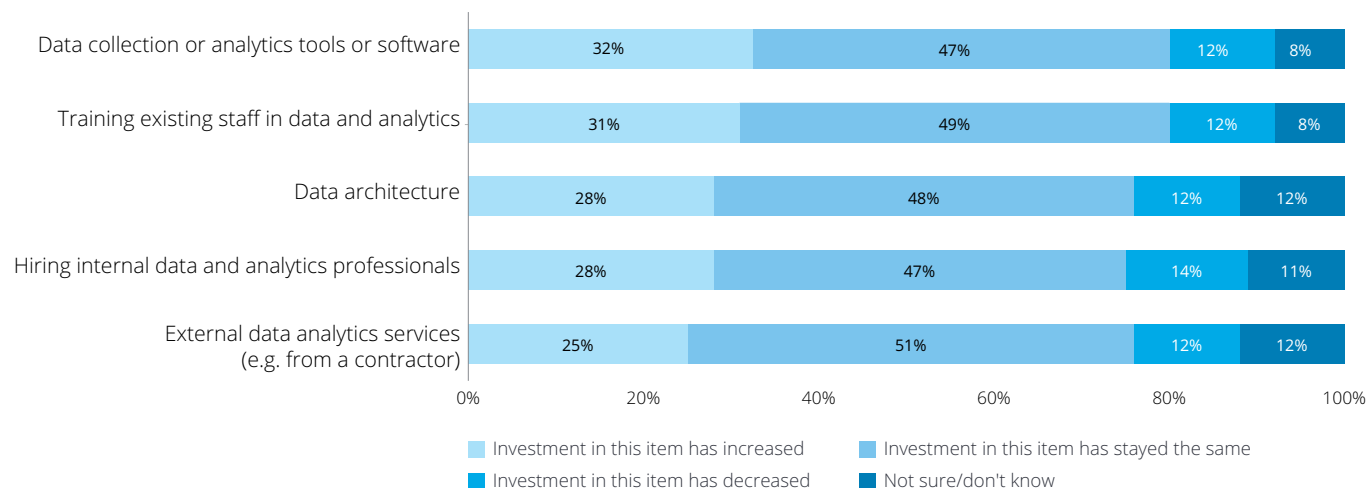
Having a 'data champion' can help to develop an investment budget with a clear list of priorities. 'Data champions' are most commonly project leaders rather than executives, suggesting that those working with data have a clear view on its value. Yet **businesses where the senior executive team were identified as the data champions were 30% more likely to be data leaders** compared with those who did not identify their executive team as data champions. Despite this clear benefit, nearly one in five businesses did not believe that there is a data champion within their business and a further 9% could not identify a data champion.

## Investment approach towards data analytics capabilities



Source: Deloitte Construction Data Survey (2023)

## Investment allocation in data analytics



Source: Deloitte Construction Data Survey (2023)

# Overconfidence in data capabilities

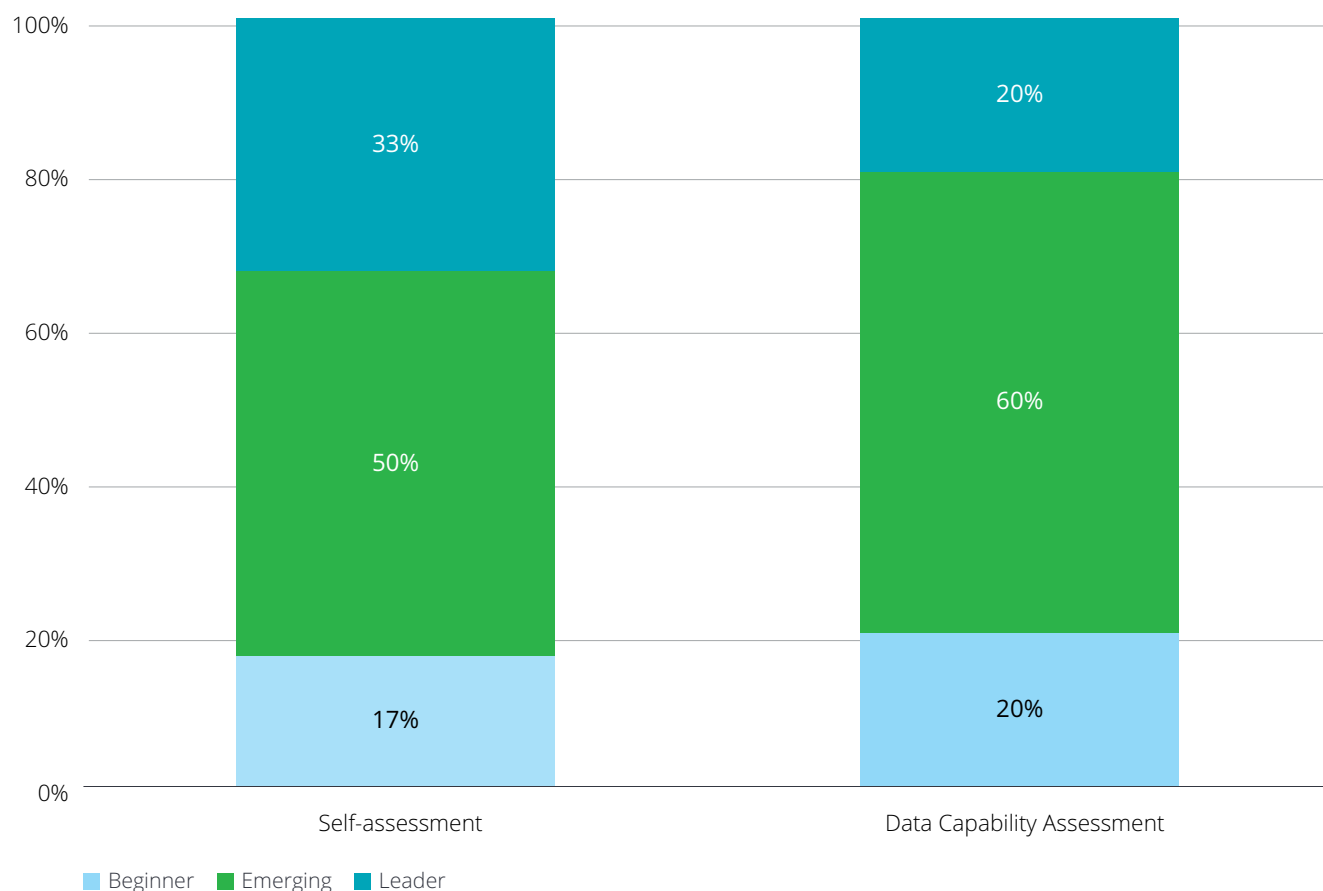
## When businesses were asked to self-assess their business's data capabilities, we found an overconfidence bias across all geographies

The Data Capability Assessment (DCA) used in the evaluation of construction businesses' use of data is calculated across 13 indicators to provide a comprehensive, robust test of the competency. However, the survey also included a self-assessment, where businesses were asked to rank their ability to utilise data across four categories – collection, storage, analysis, and strategy. Comparing the two metrics provides a view of how businesses perceive their data capabilities relative to the output of the DCA.

Typically, businesses overrated their data capabilities, with **33% self-assessing their capabilities as aligned with the leader categorisation, versus only 20% of businesses identified as leaders through the DCA**. This overconfidence effect is a common phenomenon and well-established source of bias in survey results, with participants subjective confidence in their abilities normally greater than an objective assessment of those judgments.

In practise though, this bias can represent a barrier to increased data usage. If businesses believe that they are already operating at the leading edge of technology with regards to their data usage, then they are less likely to explore how they can further improve their capabilities. This inability to recognise the true extent of their capabilities can limit the investment and the strategic planning necessary to further integrate data into business practises, with follow-on implications for operational performance.

Comparison of self-assessment and Data Capability Assessment (DCA)



Source: Deloitte Construction Data Survey (2023)

# Taking action

## In order to address the barriers and challenges identified, this report recommends businesses focus on progressing five key priority areas

Improving data capabilities for many businesses may not require significant changes to their ways of working or extensive funding. Instead, **taking early and effective action towards progressing priority areas** will ensure that businesses have the potential to realise the numerous benefits that come from more technologically advanced operations.

In order to address the barriers and challenges identified, this report recommends businesses focus on progressing five key priority areas:



### Develop in-house data literacy and skills

Developing businesses data capabilities is key to unlocking the potential of technology in the construction and engineering industry. The attraction and retention of team members with digital skills will be an important aspect of this process, as will the provision of data training designed to accelerate upskilling. Currently, 24% of construction businesses do not have formal data analytics roles, while just 58% offer further training to their data professionals.



### Build motivation for change

Achieving a smooth transition to more data-orientated processes requires the active acceptance of the team members implementing the change. Businesses must proactively identify user needs and clearly articulate the benefits of transformation to build enthusiasm, which requires a solid change management strategy. This should include skill development, transition support, clear communications of defined milestones, and consistent tracking of success measures.



### Develop an organization-wide data strategy and track progress

Through the development of a holistic data strategy, businesses can identify goals to progressively build their digital capabilities, acting within specified timelines and alongside allocated funding. There is no budget allocated for investment in data analytics capabilities in 16% of construction businesses.



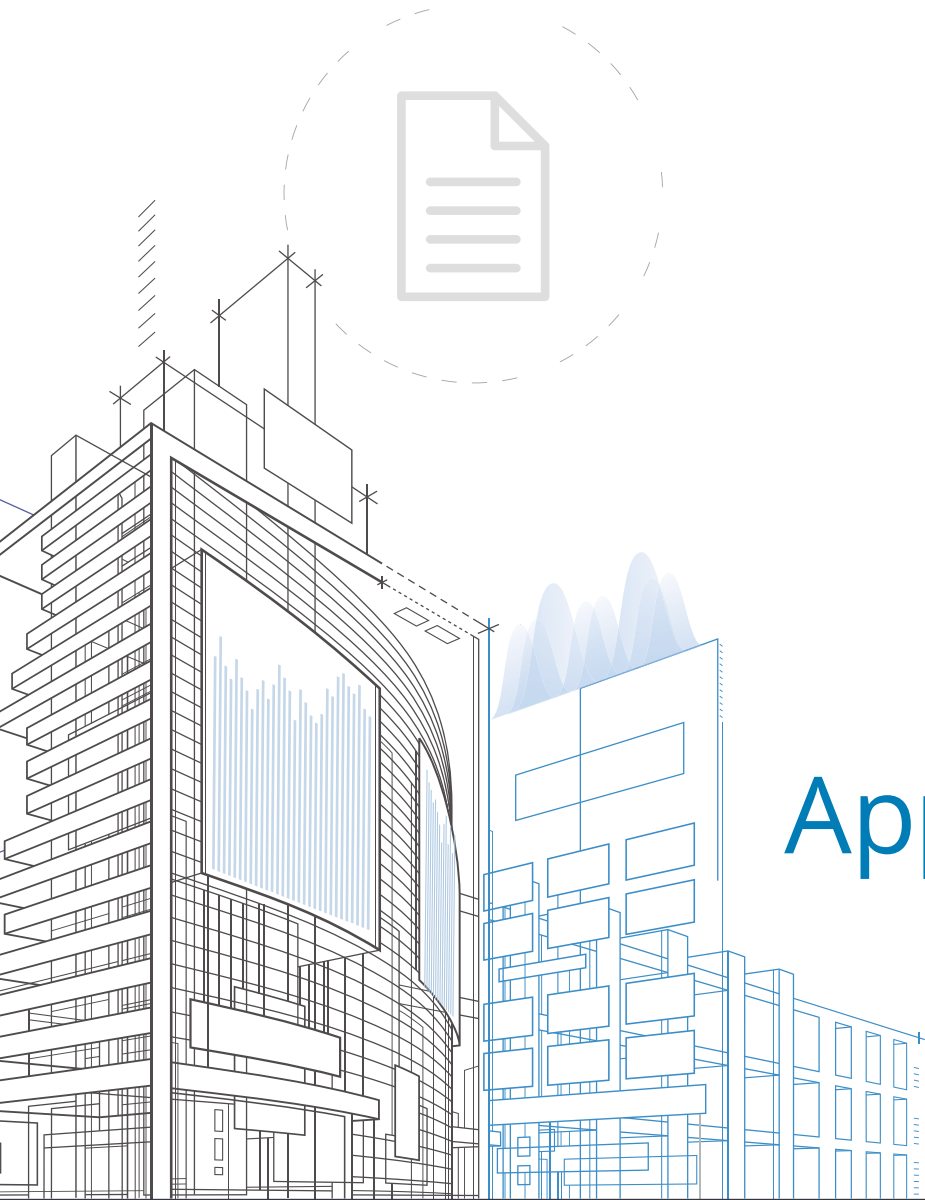
### Build organization-wide standards and procedures

The adoption of common data standards and procedures will allow businesses to reduce data silos, increase efficiency in their data recording and reporting processes, and improve their data quality. This will allow increase business's analytical capabilities, providing richer insights from data. Just 59% of construction businesses reported that they gather data efficiently using standardised processes.



### Identify the quick wins

By adopting a flexible approach to transition, and listening to feedback at each step, businesses can identify aspects of their data process which may require additional attention, but also those aspects where a successful trial could justify a wider implementation of technologies or data practises. By concentrating on solutions which are easy, fast, and economical to implement, businesses can build momentum and demonstrate the positive case for change through visible and immediate impacts.



# Appendices

Outlook for the  
construction industry

State of data in the  
construction industry

Benefits of data

# Appendix A.1 This report

Deloitte Access Economics was commissioned by Autodesk to understand the use of data in the construction industry in Australia, Canada, France, Germany, India, Ireland, Japan, the Netherlands, the Philippines, Singapore, the United Kingdom and the United States of America. The report highlights the benefits and barriers to these businesses from being data driven.

This report is informed by a survey fielded by Dynata and Censuswide from July to August 2023. Survey respondents were either construction managers or executive level. A total of 1,275 organizations participated in the survey (see table for individual country sample breakdown).

63% of the survey responses are from construction directors, c-suite or business owners. The remainder of the sample are construction managers.

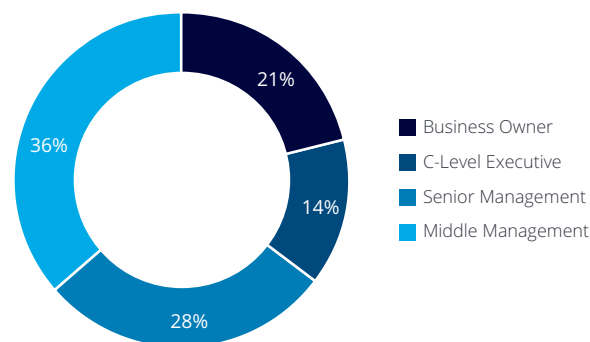
Further breakdowns of the survey are shown below.

## Sample size of survey by country

Countries	Sample size
United Kingdom	115
Ireland	126
Germany	135
France	98
Netherlands	135
United States of America	248
Canada	67
Australia	78
Singapore	52
Japan	95
India	73
Philippines	49
Other	4
<b>Total</b>	<b>1,275</b>

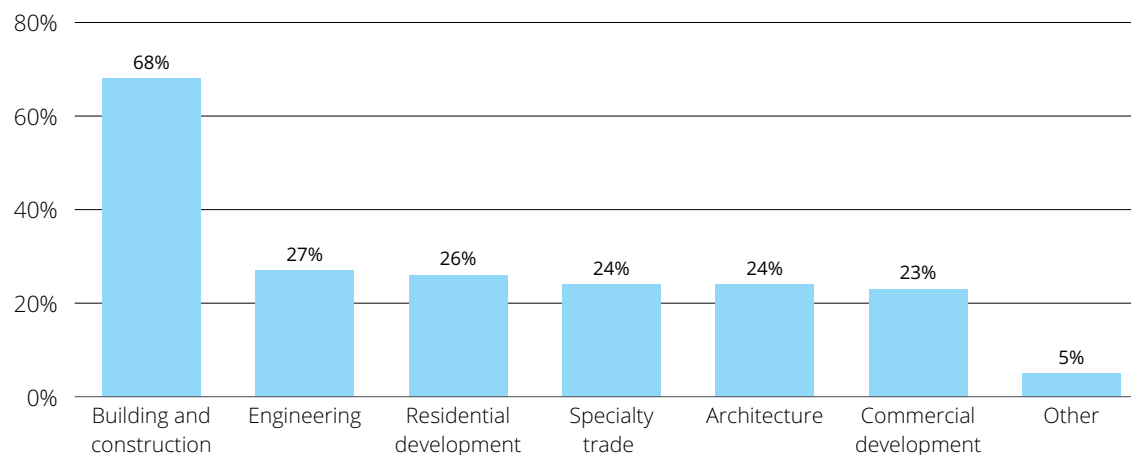
Source: Deloitte Construction Data Survey (2023)

## Survey respondents by business role



Source: Deloitte Construction Data Survey (2023)

## Services provided by respondent businesses



Source: Deloitte Construction Data Survey (2023)

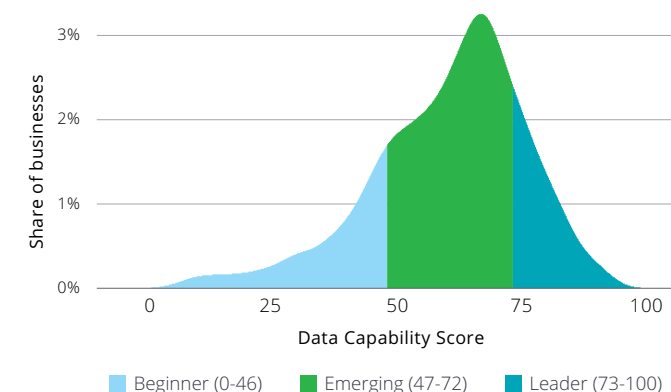
Note: Respondents could select multiple options

## Appendix A.2 Data Capability Assessment (DCA)

The Autodesk Data Capability Assessment (DCA) was used to assess the data capabilities of construction businesses. This will provide a standard measure to compare digital capabilities across businesses in different countries. To measure the data capabilities, the following steps were undertaken.

1. Survey questions were divided among the three major data pillars: Use of data, Data strategy, and Data talent. The number of questions vary between pillars and a total of 13 questions were used to inform the analysis.
2. Each response within each question was allocated a score, based on the within-question level of data maturity. The maximum possible score in each question varied.
3. Responses were scored then summed together within each pillar based on the scoring adopted in step 2.
4. The scores across the pillars were then summed to yield a total score ranging from zero to 183. In the sample, the average score is 108.12, the lowest score is 3 and the highest score is 170. These scores were then scaled to indices between 0% and 100% based on the maximum possible score.
5. Respondents were then grouped into three data maturity categories based on the cut-off scores shown in the table below.

**Distribution of responses based on cut-off scores**



Source: Deloitte Construction Data Survey (2023)

### Data Capability Assessment categories and cut off scores

Classification	Description	Lower bound	Upper bound
<b>Beginner</b>	Minimal data collection or analysis takes place. There is no current plan for wider adoption and use of data. No strategy exist to identify data talent or to develop data skills through further training.	<b>0</b>	<b>46.5</b>
<b>Emerging</b>	Forms of data are being collected but only limited datasets are analyzed. Data analysis occurs fairly infrequently. Future planning for the use of data is limited to operational functions, with no overarching strategy. There is recognition of the need for data skills, but central planning for skill development is limited.	<b>46.5</b>	<b>72.5</b>
<b>Leader</b>	Many sources of data are being collected and most datasets are being analyzed. Data analysis occurs frequently and with a variety of analytical tools to inform decision making. The data strategy is comprehensive and holistic, and clearly communicated across the organization. Talent is cultivated and directed, maximising the contributions of those possessing data skills. Appropriate training across different levels are offered.	<b>72.5</b>	<b>100</b>

Source: Deloitte Access Economics analysis and Deloitte Construction Data Survey (2023)



## Appendix A.3 Benefits modelling

A standard linear regression model was used to determine the impact of a step up in digital capabilities from the DCA Beginner category to the Emerging category and Leader category. Results controlled for business length of operation, number of employees, region of headquarter and type of service provided. Including these controls ensures that the results account for all the aforementioned factors.

$$5\text{-year Profit CAGR (\%)} = \beta_0 + \beta_1 \text{dca\_category} + \beta_2 \text{age} + \beta_3 \text{no\_employee} + \beta_4 \text{region} + \beta_5 \text{functional\_area} + \epsilon$$

The results are in the adjacent. Some caveats apply, as detailed below:

- There is likely a correlation where high profit growth expectation implies strong financial performance and, as a result, more funds are provided to invest into improving data capabilities.
- Business functional areas in the model, including BIM/VDC, Fields/Operations, Preconstruction and Other, might not be specific enough to describe the construction industry.
- R-square of the model is low indicating that other relevant variables explaining profit expectation are being omitted due to data limitation, or that the relationship being digital capabilities and profit growth expectation might not be strictly linear.

Results remain highly statistically significant even after controls for differences in digital capabilities across the countries are applied.

There is strong evidence of profit growth expectation increasing along incremental steps of the data scores index. In particular, a 10% movement up the DCA index is found to be associated with a 0.6% increase in 5-year profit CAGR. This result is statistically significant at the 1% level.

Digital capabilities are also found to be positively associated with revenue growth expectation with strong statistical significance. The relationships between digital capabilities and both profit and revenue growth expectations suggests that digital capabilities are closely and positively linked with construction businesses' future growth prospects.

There is also evidence that a positive relationship exists between digital capabilities and profit and revenue growth in the previous financial year.

Source: Deloitte Access Economics analysis and Deloitte Construction Data Survey (2023)

### Econometric results

Dependent variable	5-year Profit CAGR
Intercept	7.58 (1.85)***
DCA Category: Emerging	1.72 (0.41)***
DCA Category: Leader	2.69 (0.52)***
Age [More than 1 year, up to 3 years]	-3.00
Age [More than 3 year, up to 10 years]	-3.99*
Age [More than 10 years, up to 20 years]	-3.87*
Age [More than 20 years]	-4.92**
Size	0.00
Region [APAC]	-0.07
Region [EMER]	-1.71***
Functional area [Field/Operations]	-0.36
Functional area [Other]	-1.40*
Functional area [Preconstruction]	0.70

\*  $p < 0.05$  \*\*  $p < 0.01$  \*\*\*  $p < 0.001$

Source: Deloitte Construction Data Survey (2023)

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