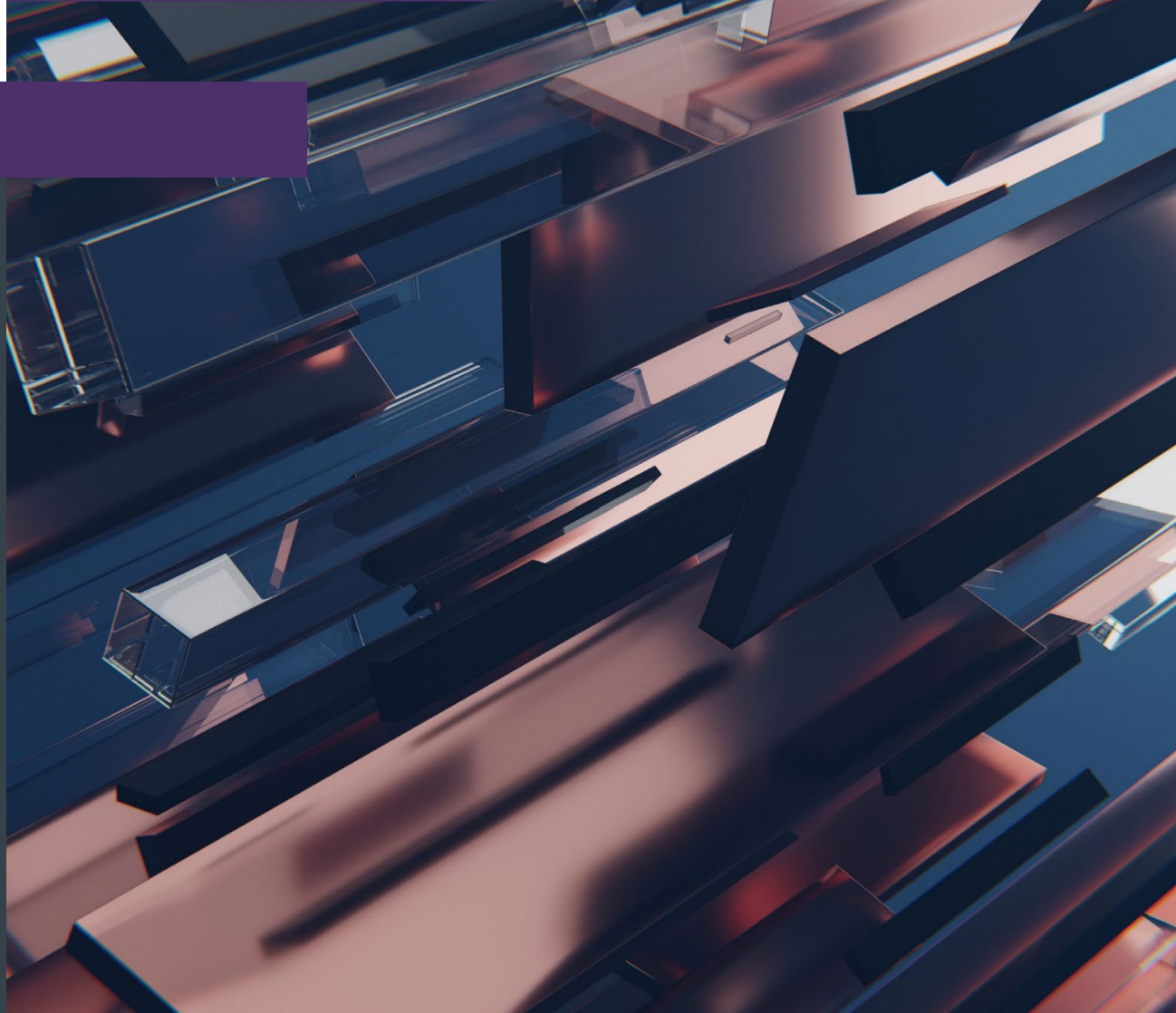


RESEARCH



# Digitalisation in construction report 2023

June 2023



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June 2023

Report written by:

Anil Sawhney, Head of Construction Knowledge and Practice, RICS  
Andrew Knight, Global Data and Tech Lead, RICS

Edited by:

Sam Birch, RICS Editor



**Published by the Royal Institution of Chartered Surveyors (RICS)**

Parliament Square

London

SW1P 3AD

**[www.rics.org](http://www.rics.org)**

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ISBN 978 1 78321 500 3

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# Forewords

Professionals working in the built environment have always used technology to assist them in making measurements, allowing them to proffer the objective advice on which confident markets and flourishing communities rely.

We have come a long way from the theodolite, and in recent years new digital technologies have proven nothing short of transformative for both professionals working in the built environment and society at large.

RICS is committed to supporting members as they develop the skills to leverage the opportunities presented by digitalisation, and to help them guide clients in navigating its potential risks. Against the era-defining backdrop of climate change, this report makes a significant addition to our shared understanding.

Now in its second iteration, this annual report uses data derived from the quarterly RICS Global Construction Monitor (GCM) to provide a vital benchmark of trends driving digital adoption, as well as a glimpse at what is to come.

While the increased response rate to the relevant questions this year indicates recognition of the importance of digitalisation among professionals, this is tempered by the mixed progress we observed on rates of adoption since the dramatic digital shift occasioned by COVID-19.

This year's findings should act as a wake-up call on how far we still have to go to realise the full potential offered by digital processes. The report does not merely identify the challenge, it also offers practical insight into the actions we must take as a profession to ensure digital technology plays a positive role in making change in our sector as we strive to achieve outcomes that are more resilient and sustainable.

I welcome this report, and I urge all professionals to consider a more proactive approach to digital adoption as we work to benefit society.

**Ann Gray**  
**RICS President**

The construction sector has long been associated with traditional practices and a slow adoption rate of innovative technologies. However, recent years have witnessed a remarkable shift towards digitalisation, with firms embracing innovative tools and processes to enhance efficiency, productivity and sustainability.

*Digitalisation in construction report 2023* offers crucial insights into the present state and future trajectory of digitalisation in the construction industry. Drawing from the RICS GCM survey conducted in Q4 2022, the report sheds light on key findings and trends currently shaping the sector.

This report highlights the vital role of digital technologies in the construction industry, particularly in addressing climate change and encouraging economic progress. It shows that despite an increased survey response rate in 2023, digital adoption in the sector is stagnating, particularly in areas like carbon emissions calculations and whole-life assessments.

There is an increasing emphasis on sustainability and environmental considerations for firms implementing digitalisation strategies in the construction domain. Considering the growing urgency surrounding climate change, companies face mounting pressure to minimise their carbon footprint and adopt sustainable practices.

This report emphasises the critical role of digital tools in the construction industry for delivering social value and supporting the net zero agenda. Despite this, adoption levels in emerging areas like environmental, social and governance (ESG) and carbon measurement remain low, with obstacles including cost, a shortage of skilled personnel and unclear client demand. This underscores the need for digitalisation to support whole-life thinking, social value measurement and the integration of ESG principles. The report advocates for collaboration between industry, government and academia, mandating data-driven processes and investing in skills development to overcome such hurdles. It further encourages high-level measures like mandating data-driven processes, investing in skills and competency frameworks, and promoting project and organisational integration.

However, while the advantages of incorporating digitalisation strategies in construction projects are numerous, firms must address several challenges. One of the most prominent hurdles identified by the survey respondents is the dearth of skills and expertise within their organisations.

A further challenge pinpointed by respondents is the absence of standardisation across various platforms and systems. With a plethora of tools and technologies at their disposal, it becomes difficult for firms to ensure they are utilising the most efficient solutions tailored to their specific requirements. This lack of standardisation can also hinder effective collaboration with other stakeholders involved in the construction process.

Digitalisation is significantly impacting carbon footprint calculation in construction. More than half of respondents agree that digitalisation aids net zero carbon initiatives, but nearly half are yet to implement such tools in their projects. The increasing adoption of standards like ICMS and the upcoming Built Environment Carbon Database highlight the role of digital tools in tracking and comparing life cycle costs and carbon emissions in the sector.

Digitalisation is transforming construction by fostering whole-life asset thinking and enhancing social value measurements. While 57% of respondents affirm that digital tools can improve these areas, there's still significant room for growth, with 41% and 46% not yet using such tools for whole-life asset thinking and social value measurement, respectively. As the industry shifts toward outcome-

based approaches, digitalisation provides invaluable access to historical social impact data for more effective benchmarking of social value.

As we look towards the future, the report pinpoints critical trends that are poised to shape the digitalisation landscape in the construction sector. Among these trends, the adoption of artificial intelligence and machine learning technologies stand out as particularly significant. These innovations hold the potential to revolutionise multiple facets of construction, ranging from design and planning to project management and maintenance.

Lastly, the report underscores the necessity for ongoing investment in digitalisation strategies and technologies. While considerable progress has been made in this area, there remains a substantial journey ahead before digitalisation becomes truly mainstream in the construction industry. To realise this goal, companies must be prepared to invest in novel technologies, cultivate their employees' skills and expertise, and foster effective collaboration with other stakeholders in the construction process.

In summary, *Digitalisation in construction report 2023* delivers an invaluable snapshot of digitalisation in the construction sector. This report highlights the numerous benefits that digital technologies can bring to construction projects, while acknowledging the challenges companies may encounter when implementing these strategies. By offering insights into key trends and best practices, this report serves as an indispensable resource for those seeking to harness digital technologies to optimise their operations.

**Ben Huskisson**

**Chief Digital Officer, Executive Management Board, Gleeds**

# Executive summary

It is abundantly clear that digital technologies in the construction sector play a central role in addressing the climate crisis, delivering the social and equity outcomes demanded by society, and doing so in an economically prudent manner. For example, [a recent study](#) estimated that 20% of the cut in greenhouse gas emissions needed to address the climate crisis could come from digital technologies supporting broader industry transitions. Since 2020 the adoption of digital technologies in construction has accelerated significantly, but more ground needs to be covered in mainstreaming model-centric and data-driven work processes and practices. The blockers to adoption are well documented, and therefore now is the time for sector proponents to stop admiring the problem and make meaningful interventions to enhance adoption.

In 2021 RICS, with the help of its members, decided to conduct an annual study focused on digitalisation in construction and publish its results annually. To understand and benchmark progress, RICS first added four additional digitalisation-related questions to the fourth quarter of the RICS Global Construction Monitor (GCM) survey, which is produced every quarter. The study's first findings (based on the Q4 GCM 2021 survey) were made available in the [Digitalisation in construction report 2022](#).

This year's report analyses the global responses received during the Q4 GCM 2022 survey, which closed on 20 January 2023, and where relevant highlights changes since the 2022 report. A summary of the current responses surrounding the use of digital technologies is presented in Figure 1. RICS' GCM survey is based on professional sentiment monitoring, which has been found to foreshadow market movement accurately. Industry leaders currently use the GCM alongside other sources to assess market trends and conduct market analysis. Piggybacking on the GCM, therefore, helps assess market sentiment around digitalisation in construction. By repeating these new survey questions on an annual basis, RICS can highlight current levels of adoption and predict the direction of travel for the sector. These annual reports also capture the nature of the continuing barriers, challenges and progress made by the sector.

The 2023 report presents some good news and some bad news. The good news is that the response rate increased by 43% from 2022. The overall adoption rate has remained broadly similar, despite an anticipated drop due to the diminishing pressures of COVID-19. Therein lies the bad news: the adoption rate has stagnated, with important areas such as carbon emissions calculations and whole-life carbon assessments not showing any positive movement.



## Q4 2022 Global Construction Monitor Four survey questions on data and technology

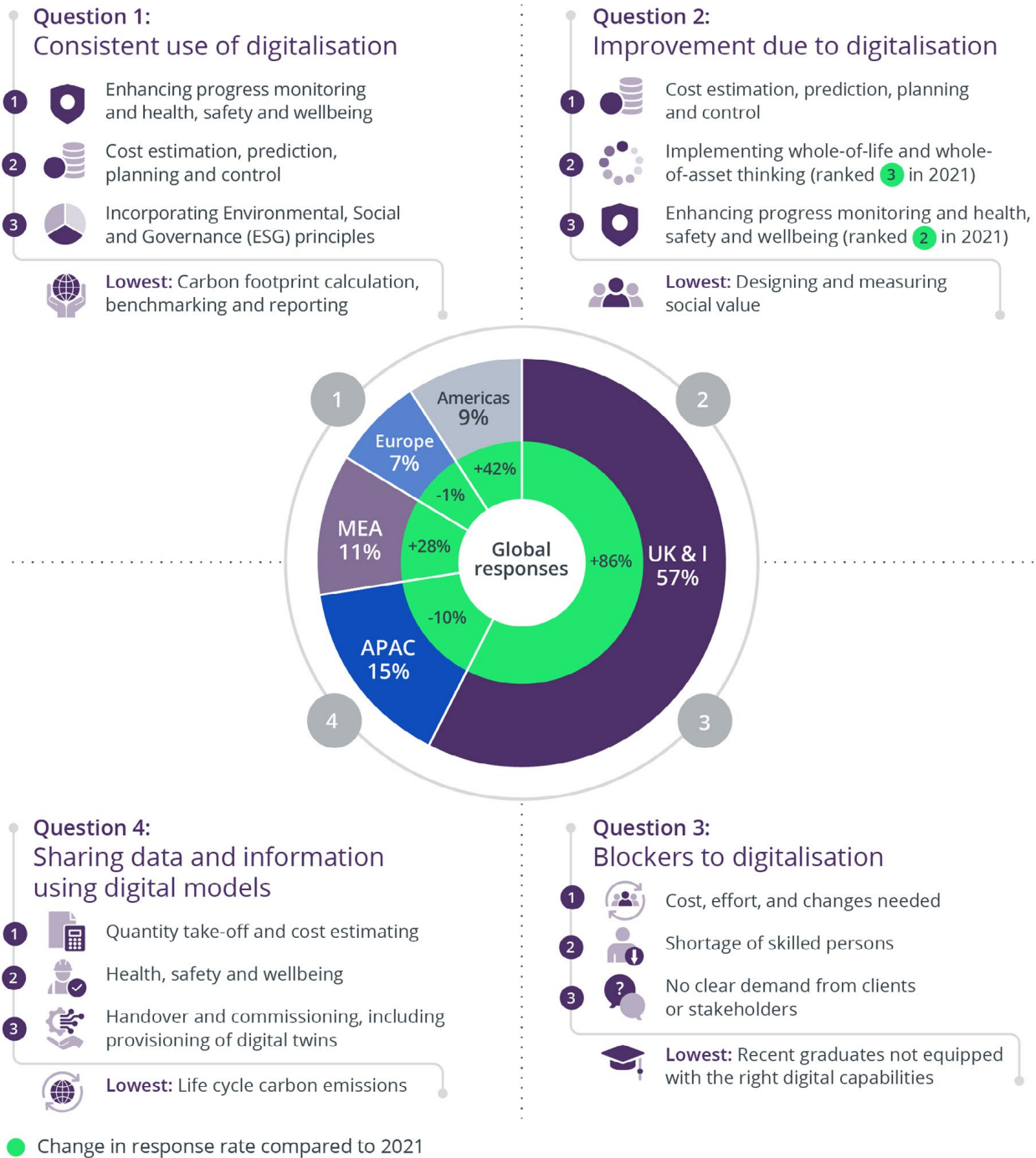


Figure 1: Summary of responses to and findings from digitalisation questions



# 1 Introduction

At the headline level, Q4 of the 2022 RICS GCM – a leading indicator of market conditions in the construction sector – showed a slight pick-up in global construction activity over the quarter, even if momentum remains much more modest compared to the picture seen twelve months ago. In Q4 of 2022, in addition to the regular set of questions, the survey once again sought the opinions of thousands of professionals about the pace and impacts of digitalisation across the sector. Contributors were asked to share their thoughts on four aspects of digitalisation in construction:

- 1 **Degree of adoption:** Contributors were asked to state in how many of their projects (on a scale ranging from all projects to no projects) their organisation consistently uses processes and practices driven by digitalisation (defined as BIM or digital twins) across the following six functions:
  - cost estimation, prediction, planning and control
  - enhancing progress monitoring and health, safety and well-being
  - implementing whole-life and whole-asset thinking
  - carbon footprint calculation, benchmarking and reporting
  - incorporating ESG principles, and
  - designing and measuring social value.
- 2 **Resulting improvements driven by digitalisation:** Contributors were asked to state their level of agreement with the statement ‘processes and practices driven by digitalisation (defined as BIM or digital twins) help or are likely to help my organisation improve...’ from ‘strongly agree’ to ‘strongly disagree’ for the same six functions.
- 3 **Blockers to adoption:** Contributors were asked to rate the following blockers by the extent to which they think these blockers hinder the digitalisation of design and construction processes and practices (from high to low):
  - cost, effort and changes needed
  - ability to influence the building information model or digital twin parameters
  - no clear demand from clients or stakeholders
  - lack of data standards
  - disciplinary silos
  - inconsistent approaches adopted by supply chain partners
  - difficulty in realising benefits
  - shortage of skilled persons, and
  - recent graduates not equipped with the right digital capabilities.

**4 The current state of data and information sharing using digital technologies:** Contributors were asked to select whether they provide and/or receive data and information to/from other team members about materials, products and systems via digital models across the following five areas:

- quantity take-off and cost estimating
- health, safety and well-being
- handover and commissioning, including provisioning of digital twins
- production and fabrication, and
- life cycle carbon emissions.

Survey questionnaires were sent out on 9 December 2022, with responses received until 20 January 2023. In the Q4 2022 round of the GCM survey, the total number of responses increased by 43%. The regional distribution of respondents is shown in Figure 2 (MEA denotes Middle East and Africa; APAC denotes Asia-Pacific). Overall responses increased across every region aside from Europe, which maintained its response rate compared to the prior year, and APAC, which dropped by 10%. UK and Ireland had the highest increase at 86% more responses.

#### Responses by region

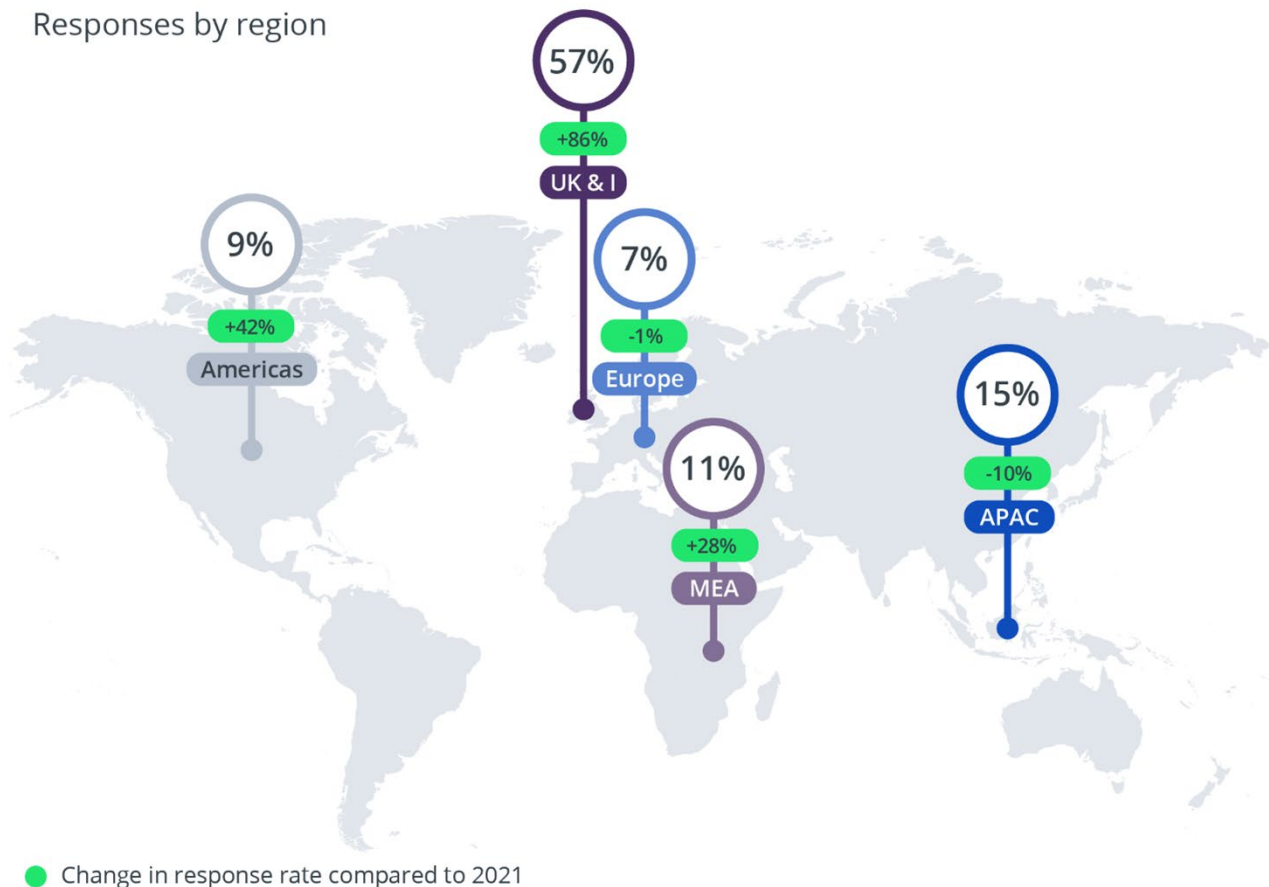


Figure 2: Regional responses

## 2 Consistent use of processes and practices driven by digitalisation

Figure 3 shows the responses to the first question added to the Q4 GCM survey, regarding the consistent use of digitalisation in six design and construction workflows. Contributors were asked to state for how many of their projects (on a scale ranging from 'all projects' to 'none of our projects') does their organisation consistently uses processes and practices driven by digitalisation (defined as BIM or digital twins) across six functions. As can be seen from Figure 3, the level of use varies across the six processes, with the highest usage reported for 'cost estimation, prediction, planning and control' and the lowest usage for 'carbon footprint calculation, benchmarking and reporting'.

My organisation consistently uses processes and practices driven by digitalisation (defined as BIM or digital twins) for:

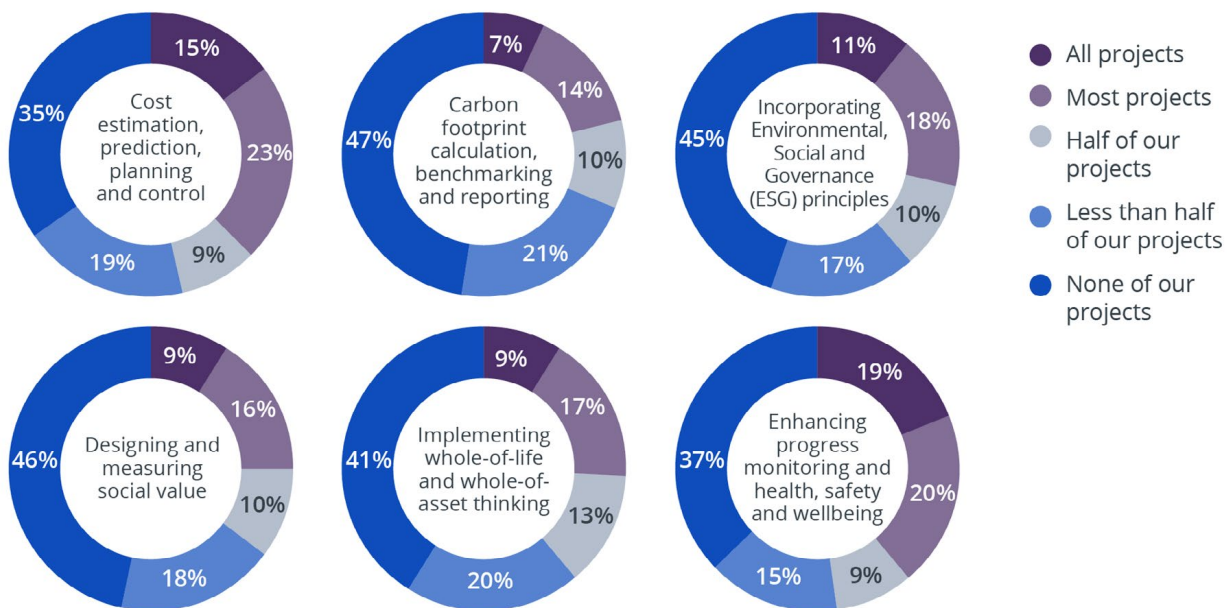


Figure 3: Consistent use of processes and practices driven by digitalisation (note: values may not add up to 100% because of rounding)

The proportion of respondents not using digital technologies on any of their projects across the six listed functional areas increased from 40% in the Q4 2021 survey to 42% in the Q4 2022 survey. There was no overall movement in usage level from the previous survey to the current survey. The level of usage of respondents using digital tools on all of their projects as an average across all six functions remained at 12%, and on most of their projects it remained at 18%.

The top three areas (considering ‘all projects’ and ‘most projects’ responses) where digital technologies see the most reported usage also held steady:

- 1 Enhancing progress monitoring and health, safety and well-being
- 2 Cost estimation, prediction, planning and control
- 3 Incorporating environmental, social and governance (ESG) principles

Well over one-third (39%) of the respondents reported using digital technologies for ‘enhancing progress monitoring and health, safety and well-being’ across most or all of their projects. This is counterbalanced by a large proportion of respondents reporting use on less than half or none of their projects. Despite having the second-most overall reported usage of digital technologies (all projects + most projects + half of our projects + less than half of our projects), ‘cost estimation, prediction, planning and control’ is also where just 35% of respondents selected ‘none of their projects’. On average, over 60% of respondents selected less than half or none of their projects across the six functions. Similar responses were reported in the 2022 report.

Almost half of respondents (47%) reported not using digital technologies at all for ‘carbon footprint calculation, benchmarking and reporting’. Like 2022, this function also ranked lowest in usage level in 2023. Only 7% of contributors reported using digital technologies for this function on all their projects. Similarly, close to half (45%) of respondents reported that they do not use digital technologies at all to incorporate ESG principles into their projects, while slightly less than one-third of respondents (29%) reported using digital technologies to incorporate these principles on all or most of their projects. ‘Designing and measuring social value’ was another area in which contributors reported low usage levels, with 46% reporting not using digital technologies at all on their projects.

An average of almost 40% of respondents in the Q4 2022 survey reported using digital technologies for all or most of their projects when looking across ‘cost estimation, prediction, planning and control’ and ‘enhancing progress monitoring and health, safety, and well-being’. The corresponding average was 37% in the Q4 2021 survey and showed a slight positive movement in adoption.

Using the relative importance index (RII) on the responses to question 1 shows a ranking of adoption and a slight positive shift in adoption from 2022 to 2023 (see Table 1).

Uses	RII	
	2023	2022
Enhancing progress monitoring and health, safety and well-being	<b>0.54</b>	0.54
Cost estimation, prediction, planning and control	<b>0.53</b>	0.52
Incorporating environmental, social and governance (ESG) principles	<b>0.47</b>	0.47
Implementing whole-life and whole-asset thinking	<b>0.47</b>	0.46
Designing and measuring social value	<b>0.45</b>	0.44
Carbon footprint calculation, benchmarking and reporting	<b>0.43</b>	0.42

Table 1: RII ranking of use (2023 data taken from Q4 2022 report; 2022 data taken from Q4 2021 report)

This ranking reflects the influence of market drivers, the regulatory landscape and barriers that have led contributors to focus on different process and practice areas to a greater or lesser extent.

Like 2022, in 2023 there are also some regional variations in ranking these functions by level of use. Contributors from the Americas and Europe reported the highest levels of adoption of digital technologies for 'cost estimation, prediction, planning and control' (RII of 0.60 and 0.57, respectively), while 'enhancing progress monitoring and health, safety and well-being' came second (RII of 0.57 and 0.54, respectively). At the other end of the spectrum, responses from Europe and the UK also ranked 'carbon footprint calculation, benchmarking and reporting' (RII of 0.42 and 0.42, respectively) slightly higher than 'designing and measuring social value' (RII of 0.41 and 0.41, respectively).

No significant change was noticed when the highest levels of use (all projects or most projects) were compared with the lowest level of use (no projects). Table 2 and Figure 4 show the gap in adoption levels in 2022 and 2023.

#### Use on most and all projects versus none of our projects

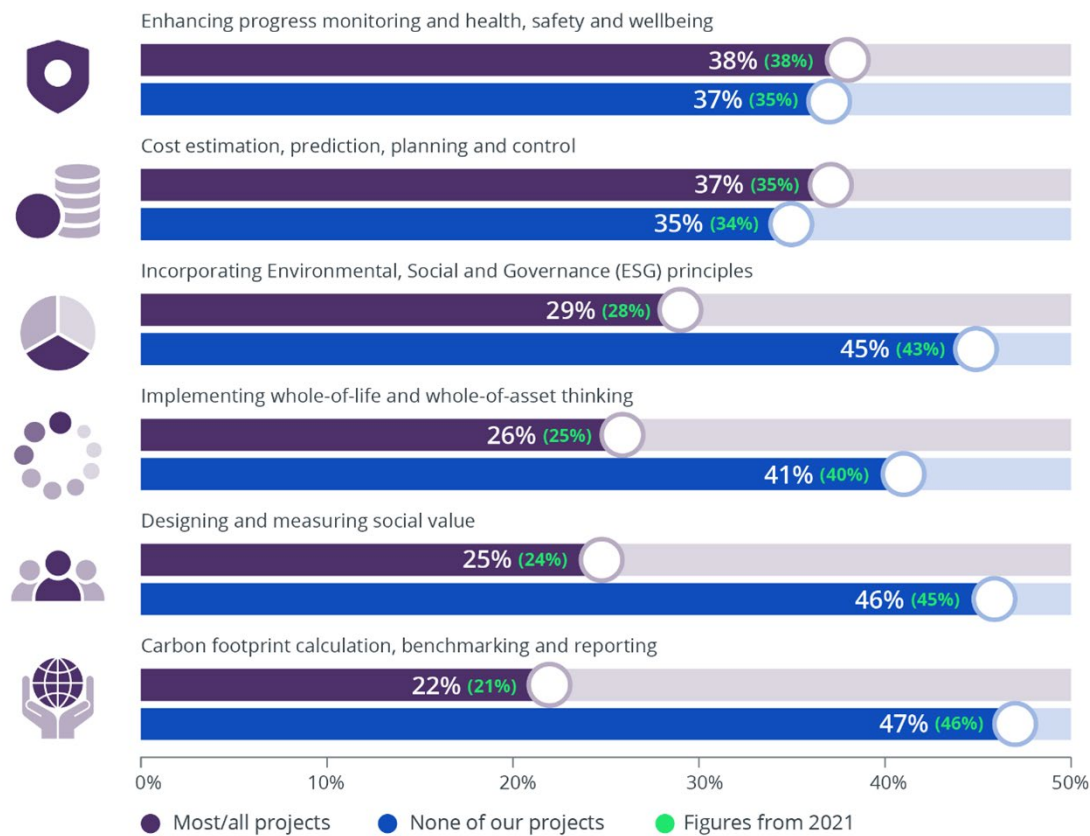


Figure 4: Use on most or all projects versus no projects

Uses	Gap between high usage and no usage (%)	
	2023	2022
Cost estimation, prediction, planning and control	1	1
Enhancing progress monitoring and health, safety and well-being	2	3
Implementing whole-life and whole-asset thinking	-15	-15
Incorporating environmental, social and governance (ESG) principles	-16	-15
Designing and measuring social value	-21	-21
Carbon footprint calculation, benchmarking and reporting	-25	-25

Table 2: Gap in usage (2023 data taken from Q4 2022 report; 2022 data taken from Q4 2021 report)

Although the changes from the prior year are small, they show a consistent increase in those with high usage ('all projects' and 'most projects'). This leads to the conclusion that a digital divide is emerging, with two camps of adopters and non-adopters, pointing to challenges and opportunities for the sector as a whole.



## 3 Improvements driven by digitalisation

The second question asked respondents to state their level of agreement with the statement 'processes and practices driven by digitalisation (defined as BIM or digital twins) help or are likely to help my organisation improve...' from 'strongly agree' to 'strongly disagree' across the same six functions. The global responses across all six functions (see Figure 5 and Figure 6) show an increasingly low level of disagreement (strongly disagree and disagree), ranging from 3% to 8% compared to between 7% and 10% in the previous survey. The results generally align well with the rankings of these six functions regarding levels of use, indicating that perceived benefits correlate strongly with the likelihood of adoption.

Processes and practices driven by digitalisation help or are likely to help my organisation improve (global responses)

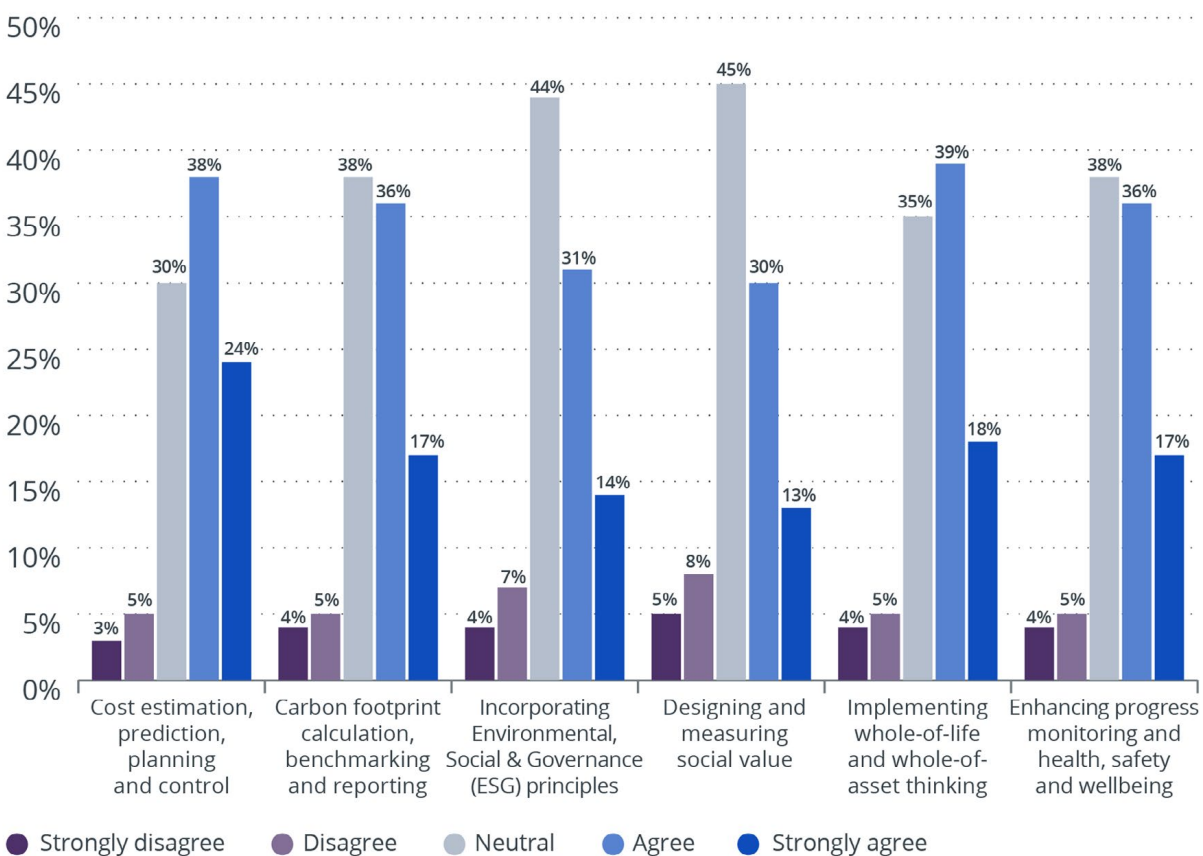


Figure 5: Responses to perceived improvements driven by digital processes and practices

Across regions, a broadly consistent picture is seen when considering improvements from digitalisation. Of the six regions, MEA continues to report the most favourable realisation of improvements, with the UK and Ireland having the least positive perception of outcomes.

### Benefits of digitalisation to my organisation

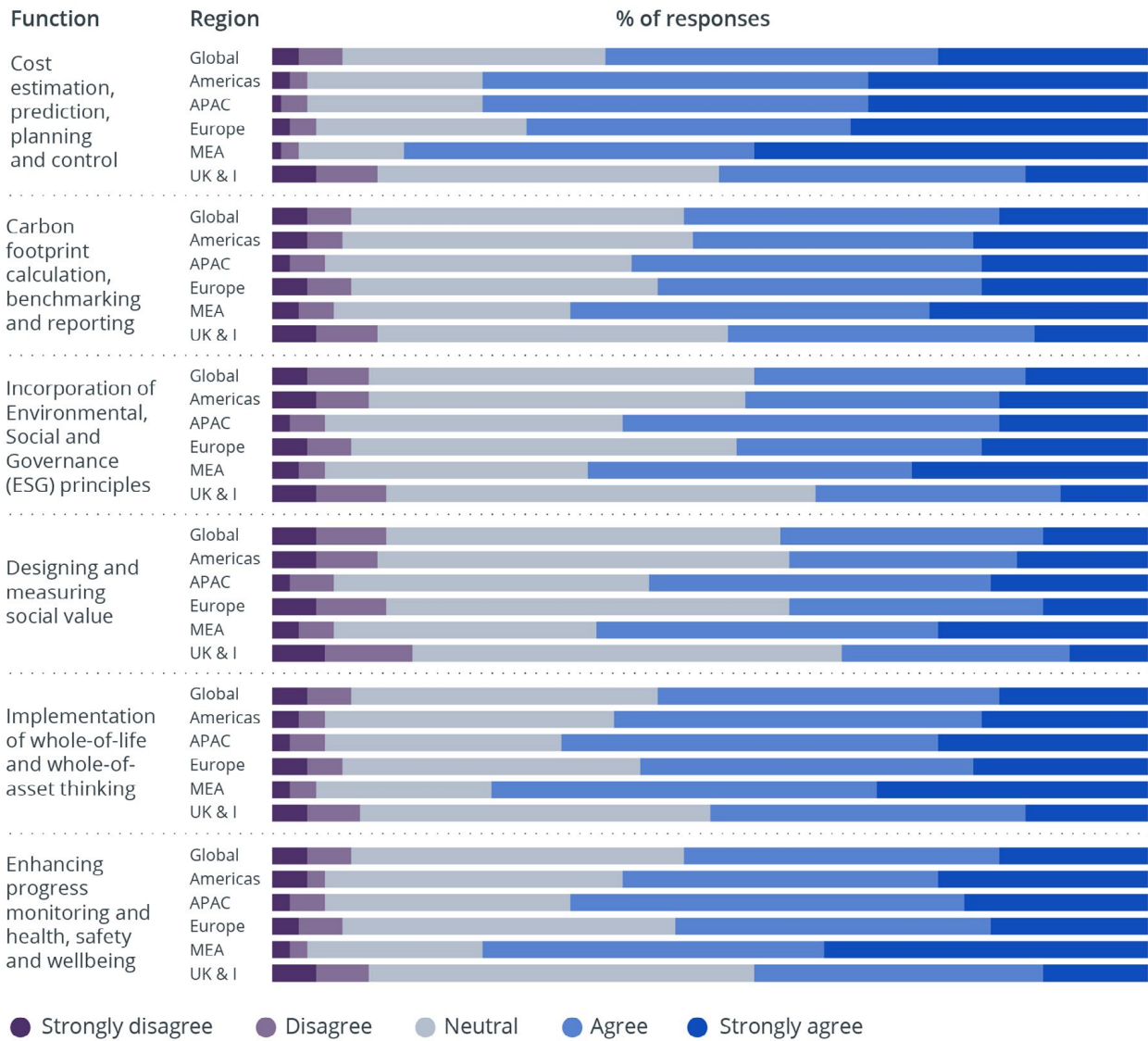


Figure 6: Perceptions of improvements by function and region

The ranking of improvements by function for 'strongly agree' and 'agree' responses is shown in Figure 7. This ranking partially aligns with the ranking by level of usage. The 'carbon footprint calculation, benchmarking and reporting' function was ranked sixth by usage level but fourth by improvement level. A similar level of disparity in ranking for the functions was seen in 2021. Unexpectedly, every function shows a drop in perceived improvements, with an 11-point decrease in the 'cost estimation, prediction, planning and control' function. Other functions do not show such a drastic drop. It is unclear why there is a drop of 11% but it is concerning and something to watch in next year's survey.

### Improvements (strongly agree and agree)

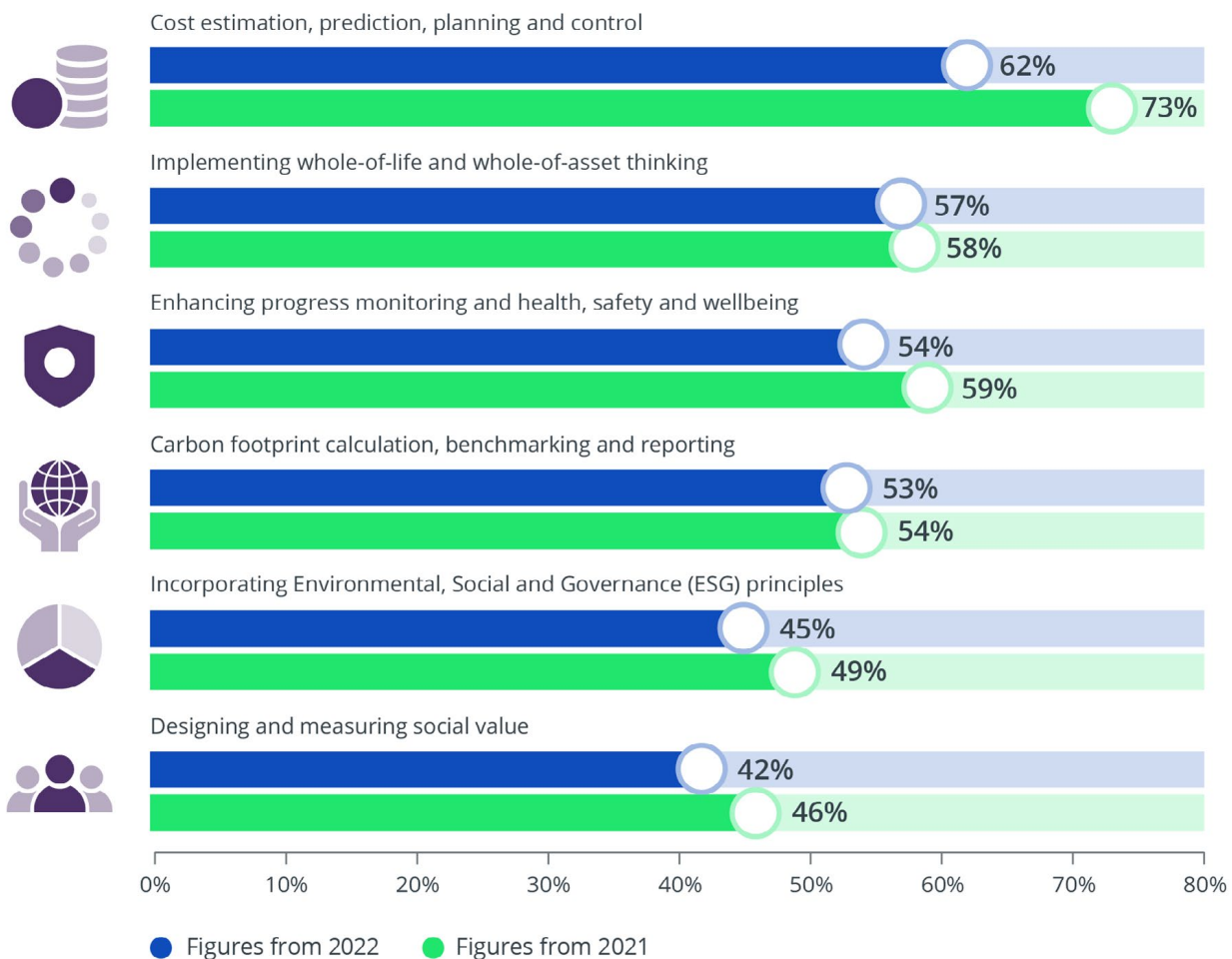


Figure 7: Ranked improvements in functions driven by digitalisation

Table 3 shows the positive bias toward agreement on the improvements associated with digitalisation. Respondents viewed digital tools as benefitting the six work processes, with a positive bias ranging from 8% to 21% (compared to 11% to 23% in the 2021 survey), with 'cost estimation, prediction, planning and control' showing the highest positive bias. The rankings of these functions is also summarised in Table 3.

	Positive bias towards agreement (strongly agree minus strongly disagree)		Comparison of ranking by usage and improvement			
	2023	2022	2023		2022	
			Usage ranking	Improvement ranking	Usage ranking	Improvement ranking
Cost estimation, prediction, planning and control	21%	23%	2	1	2	1
Enhancing progress monitoring and health, safety and well-being	14%	17%	1	3	1	2
Implementing whole-life and whole-asset thinking	14%	16%	4	2	4	3
Carbon footprint calculation, benchmarking and reporting	13%	14%	6	4	6	4
Incorporating environmental, social and governance (ESG) principles	10%	12%	3	5	3	5
Designing and measuring social value	8%	11%	5	6	5	6

Table 3: Difference between strong agreement and strong disagreement in responses related to improvements (2023 data taken from Q4 2022 report; 2022 data taken from Q4 2021 report)

## 4 Improvement versus adoption

Looking at the gap between adoption and favourable views of digitalisation (see Figure 8), there still appears to be a considerable 'pull factor' that should drive more adoption across all process and practice areas, with even the more established areas of 'cost estimation, prediction, planning and control' and 'enhancing progress monitoring and health, safety and well-being' showing a significant gap between adoption and perceived value. There is also a considerable gap, and therefore pull, for 'carbon footprint calculation, benchmarking and reporting', providing a degree of optimism that this area will see greater adoption soon.

Consistent use of processes and practices driven by digitalisation versus improvements resulting from digitalisation

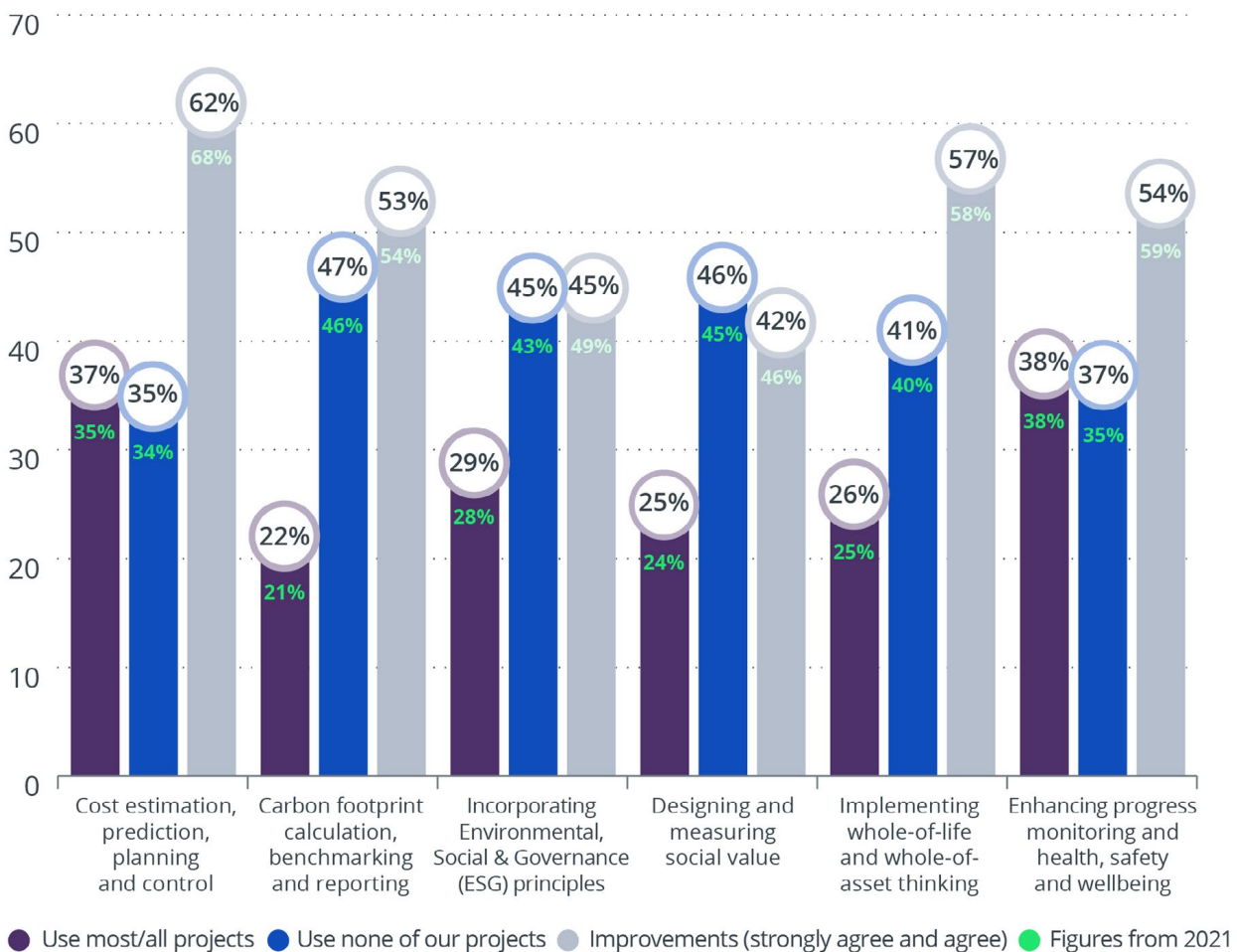


Figure 8: Level of use versus perception of improvements

# 5 Blockers to digitalisation

The gaps highlighted in the previous chart lead naturally to an examination of the barriers to adoption cited in the survey responses. The third additional question in the Q4 2022 GCM survey asked respondents to rank nine blockers using a high, medium and low scale.

Figure 9 provides a ranked listing of these blockers from the 2022 and 2021 surveys, with 'cost, effort and changes needed' as the highest-ranked blocker and 'recent graduates not equipped with the right digital capabilities' as the lowest-ranked. Unsurprisingly, the 'cost, effort and changes needed', 'shortage of skilled persons' (rather than recent graduates) and 'no clear demand from clients or stakeholders' continue to be cited as the most significant barriers. As is true of many change initiatives, there is an issue with the realisation of improvements, which is compounded by the fragmented nature of the construction sector and the use of unstandardised data.



## Global response – blockers you think hinder digitalisation of the design and construction processes and practices

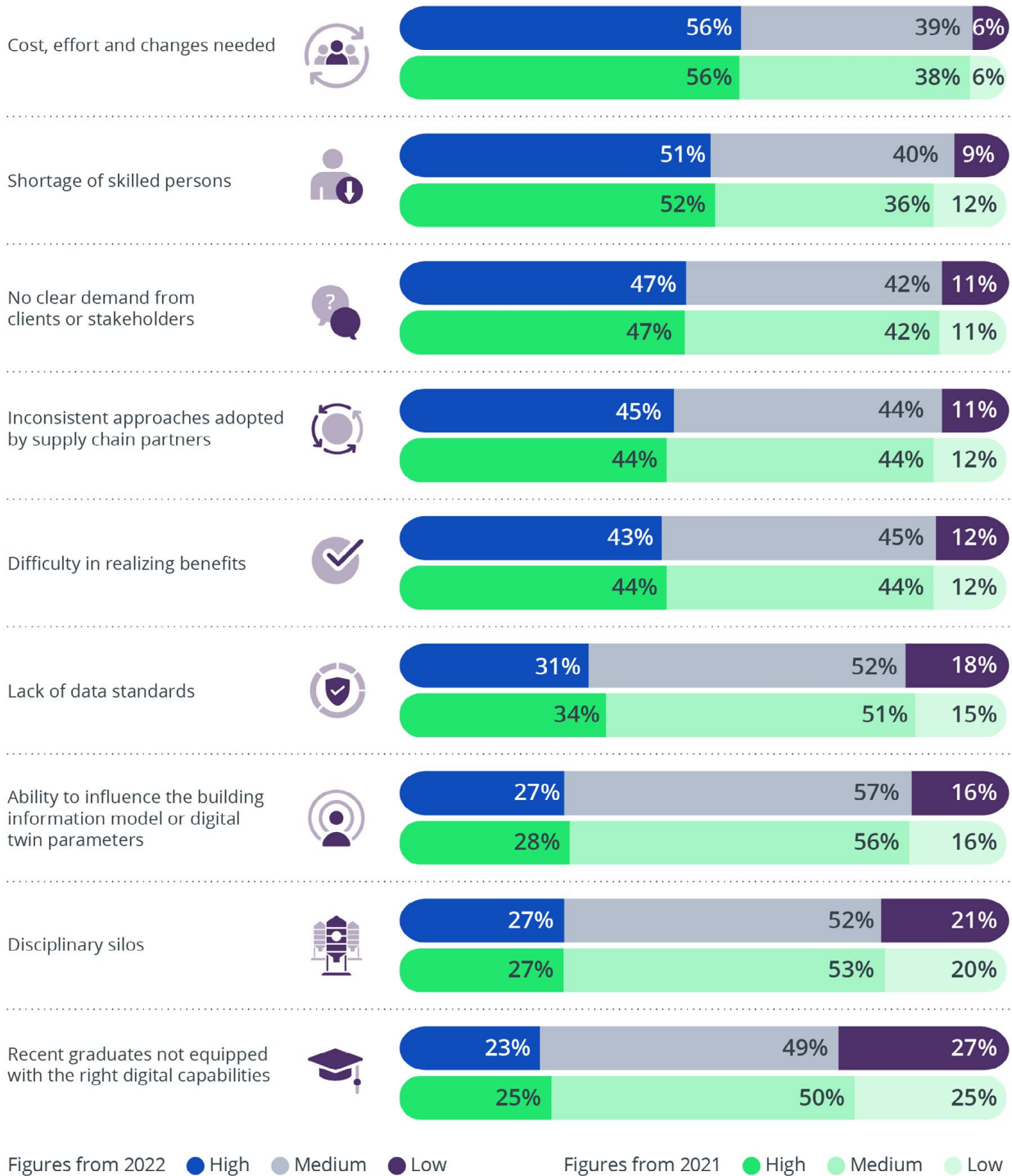
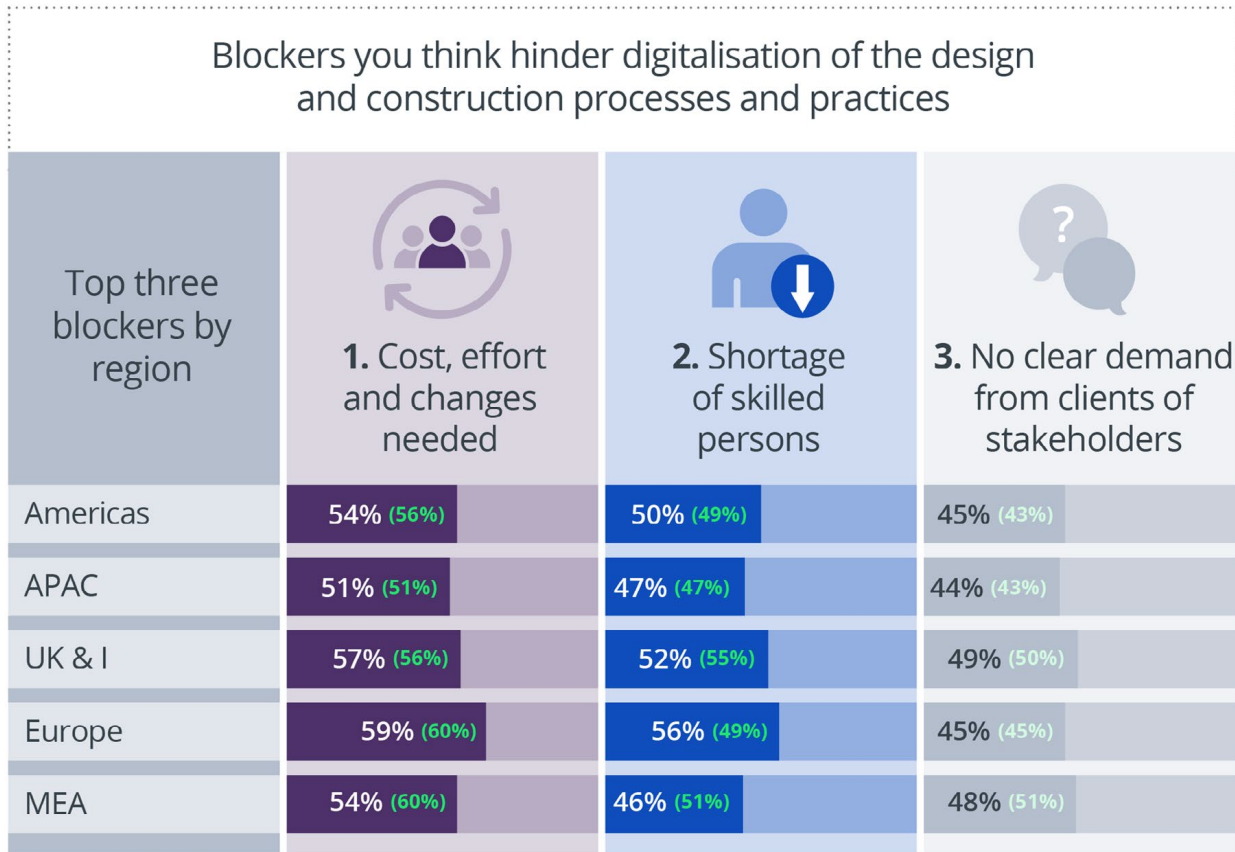


Figure 9: Blockers by function

Figure 10 shows the regional responses for the top three blockers. Over 56% of respondents ranked 'cost, effort and changes needed' as high on their list of blockers. Half of respondents (50.1%) ranked 'shortage of skilled persons' as high, and 46% did the same for 'no clear demand from clients or stakeholders'. Regional variations are insignificant in this assessment of blockers, although MEA appears to be taking a more positive view when compared to the previous survey.



● Figures from 2021

Figure 10: Top three blockers by region, based on the percentage of respondents who ranked them 'high'

## 6 Data and information sharing

A higher level of adoption of digitalisation by project team members should result in enhanced information exchange between those members. While this exchange is dependent on several factors, including interoperability, contractual arrangements and information management processes, an uptick can be attributed to the greater use of digital technology. To assess this topic, respondents were asked to provide their views on the degree of data and information sharing with other project team members ('provide and receive', 'provide only', 'receive only' or 'none') about materials, products and systems via digital models in their current projects.

Figure 11 shows regional responses ordered by global RII value, indicating the highest data and information sharing level for 'quantity take-off and cost estimating' and the lowest level for 'life cycle carbon emissions'. Figure 12 shows a summary of these responses arranged by function.

Data and information sharing by function using digital models  
(arranged low to high based on Relative Importance Index (RII))

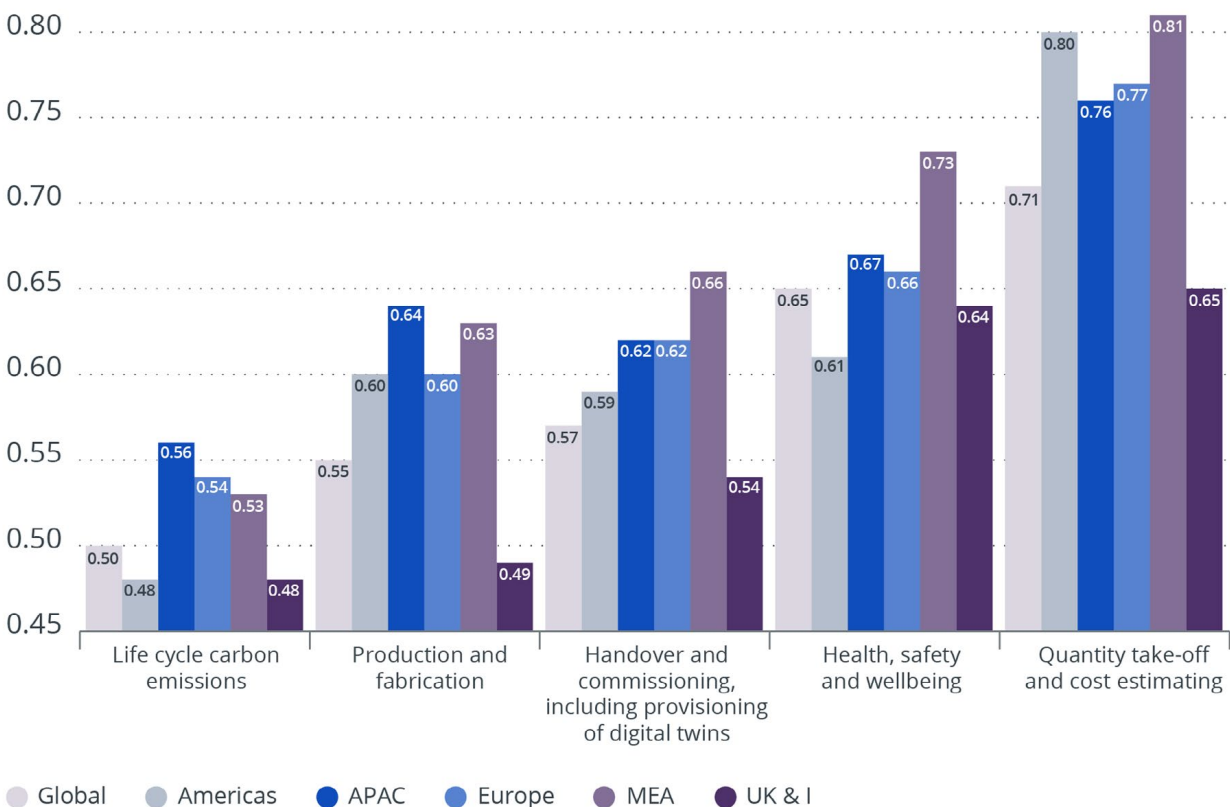


Figure 11: Regional ranking of data sharing by function

## Sharing data and information with other project team members about materials, products, and systems via digital models on your current projects

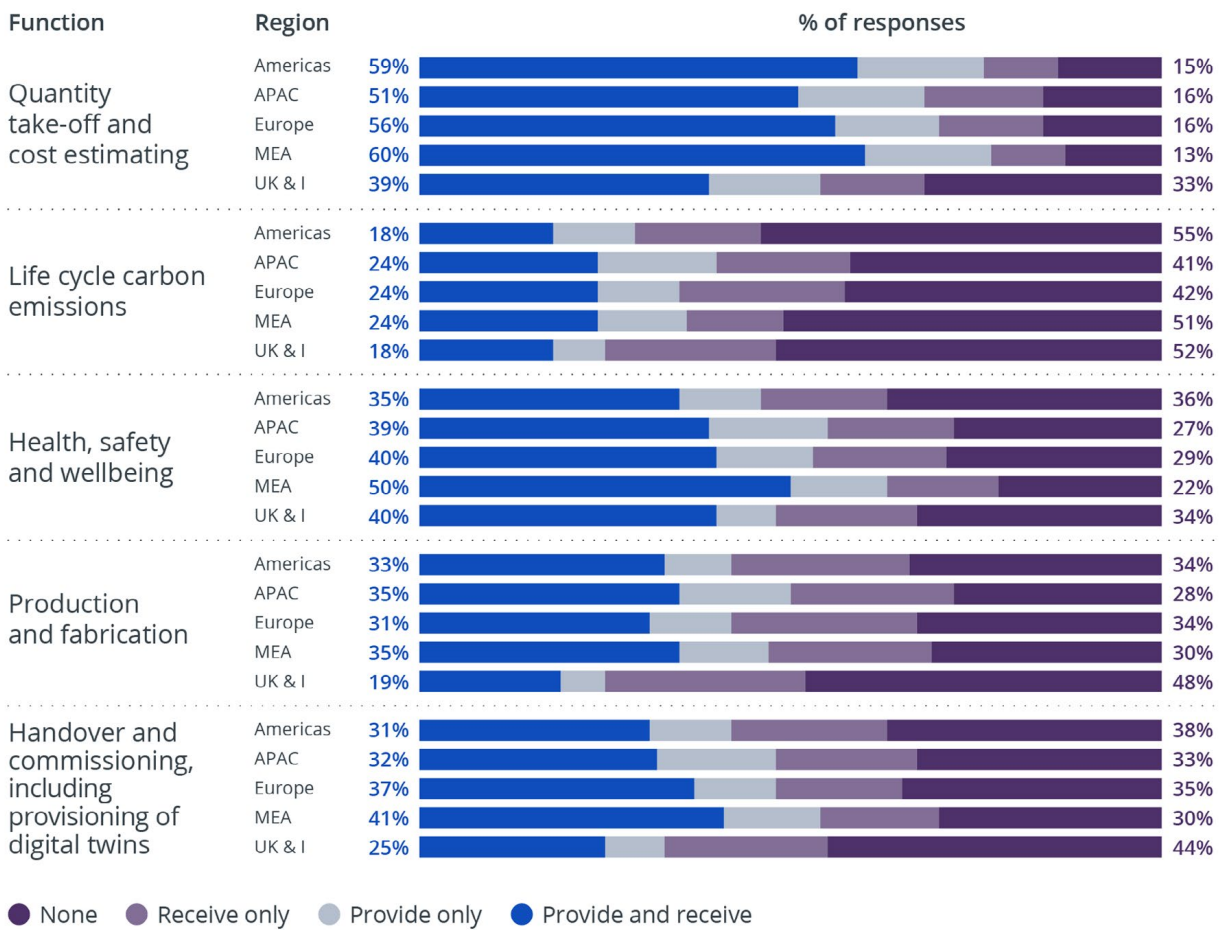
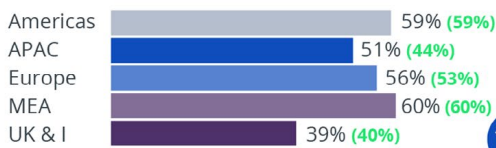


Figure 12: Data and information sharing by function and by region

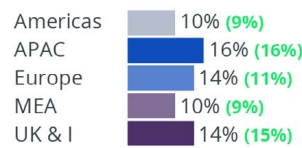
In the core function of 'quantity take-off and cost estimating,' approximately 53% of respondents (compared to 51% in the 2021 survey) reported that they provide and receive data and information via digital models. On average, 19% of respondents said they do not share data and information for this function. This has dropped from the previously reported level of 20%. The UK and Ireland continue to show the lowest level of information exchange (see Figure 13).

Your organisation in terms of sharing data and information with other project team members about materials, products and systems via digital models on your current projects:

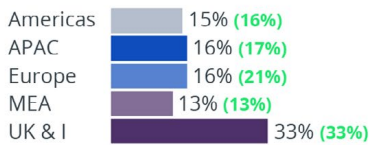
#### Provide and receive



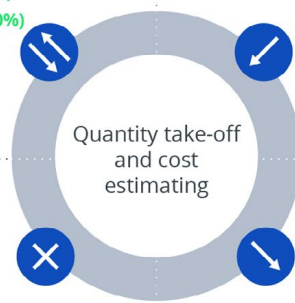
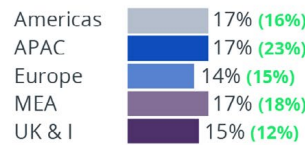
#### Receive only



#### No data and information sharing



#### Provide only



● Figures from 2021

Figure 13: Data sharing for quantity take-off and cost estimating

In line with the overall low level of adoption around carbon calculations, only approximately 22% of respondents (up from 19% in 2021) share data and information in both directions for this function, and approximately 48% do not share in any form, although this is down from the previously reported level of 52%.



Figure 14 shows the sharing of data and information for measuring and reporting 'life cycle carbon emissions'.

Your organisation in terms of sharing data and information with other project team members about materials, products and systems via digital models on your current projects:

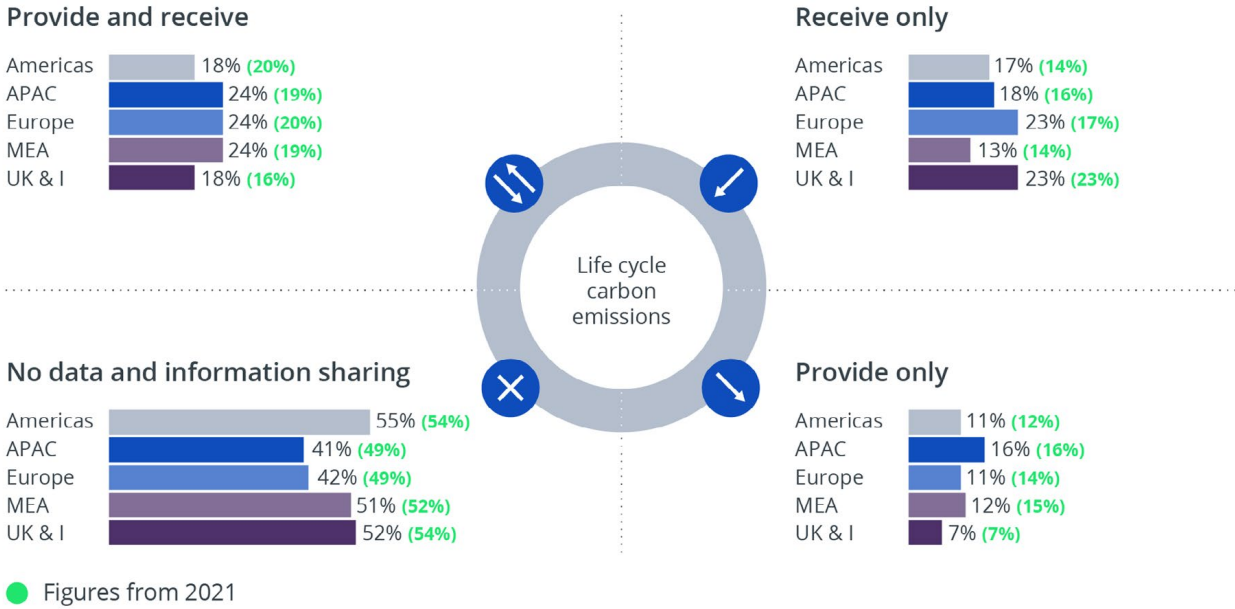


Figure 14: Data sharing for life cycle carbon emissions

The picture for 'health, safety and well-being' is broadly similar to 'quantity take-off and cost estimating', with no significant change from the 2021 survey (see Figure 15). For this function MEA is an outlier, with a high level of data and information sharing reported.

Your organisation in terms of sharing data and information with other project team members about materials, products and systems via digital models on your current projects:

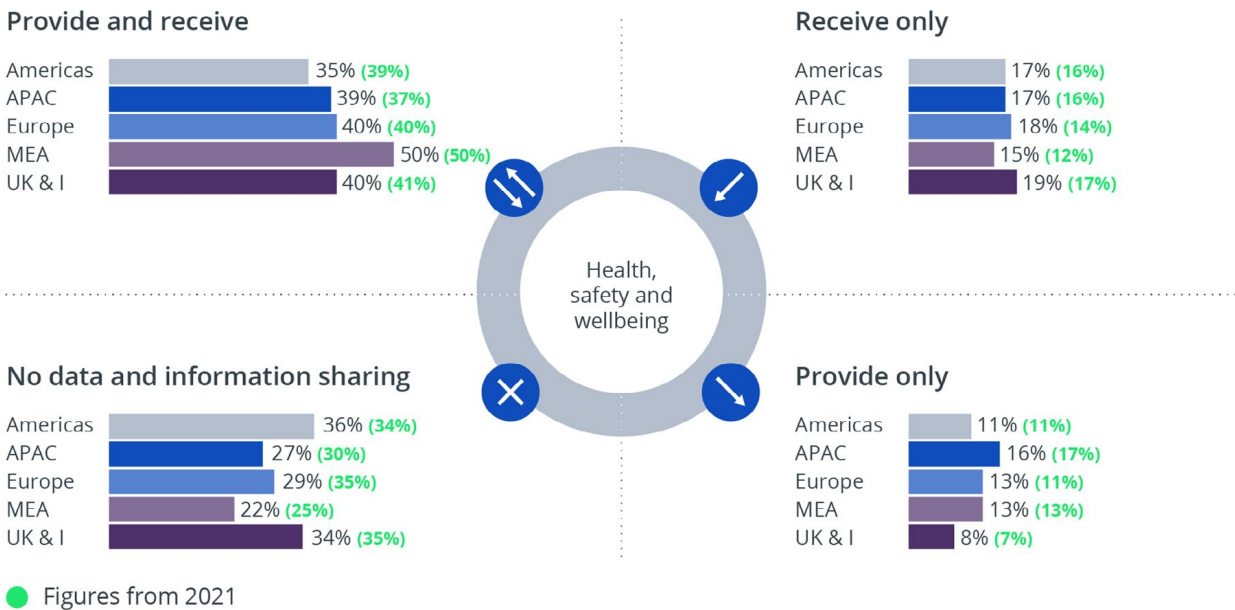


Figure 15: Data sharing for health, safety, and well-being



For production and fabrication, approximately 31% of respondents (up from 30% in the 2021 survey) provide and receive data and information, with the UK once again showing a disappointing result, with 48% not sharing data at all (see Figure 16). However, overall those not sharing data and information dropped from 37% in 2021 to 35% in 2022.

Your organisation in terms of sharing data and information with other project team members about materials, products and systems via digital models on your current projects:

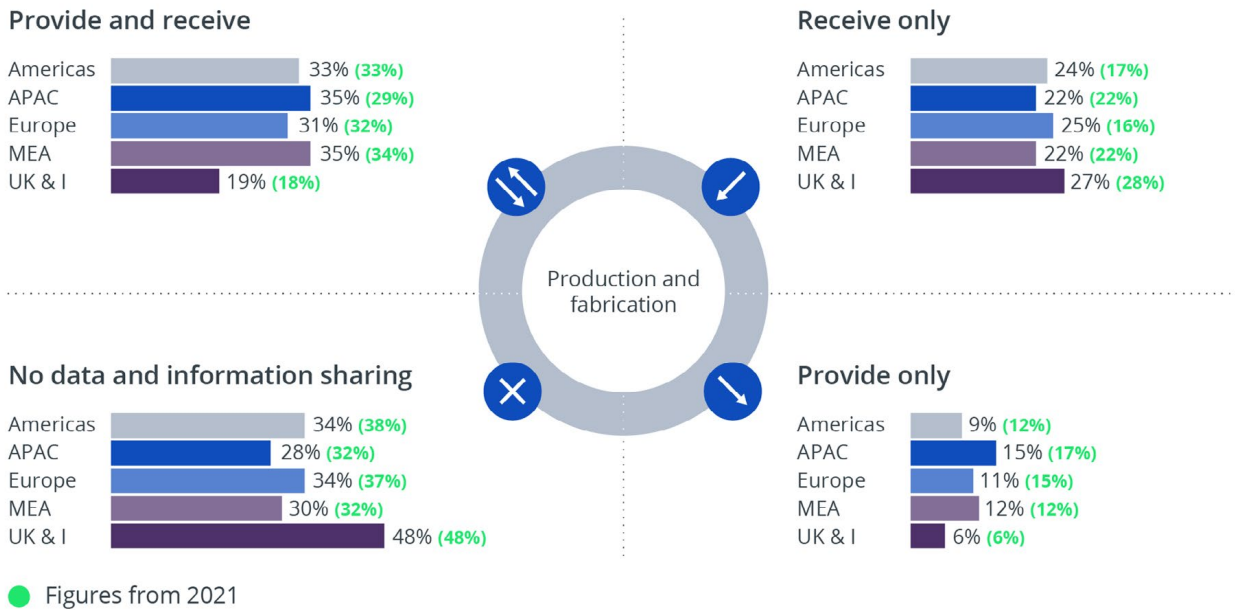


Figure 16: Data sharing for production and fabrication

The final question for data and information sharing – on ‘handover and commissioning, including provisioning of digital twins’ – is especially important because it is connected to whole-life and whole-asset thinking. It also supports successful soft landings, where a new or refurbished asset is handed over to the operation phase of the asset life cycle. For BIM to deliver on the promise of 6D (facilities management) and 7D (sustainability) over the asset’s entire life cycle, data transfer into a digital twin is an important precondition for success.

Figure 17 shows the state of data and information sharing for handover and commissioning, including the provisioning of digital twins. The UK appears once again to be a negative outlier, albeit with the highest score for receiving data. This might reflect respondents who are responsible for the operation phase receiving data on handover, with the UK government’s ‘Soft Landings’ policy driving adoption in this regard.

Your organisation in terms of sharing data and information with other project team members about materials, products and systems via digital models on your current projects:

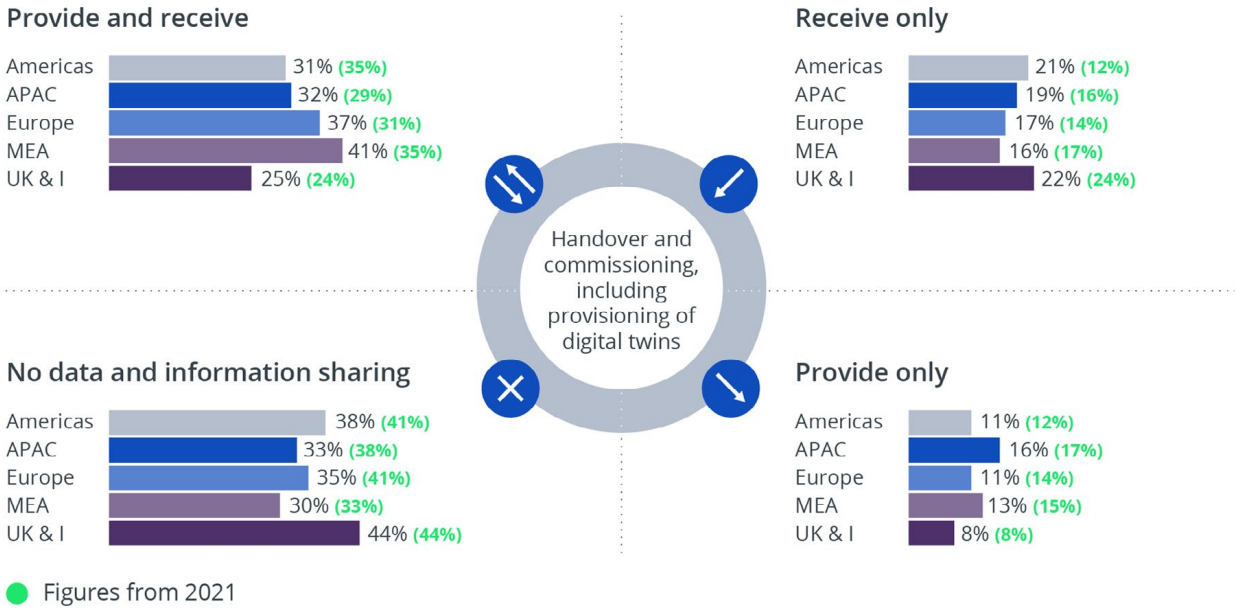


Figure 17: Data sharing for handover and commissioning

# 7 Summary and conclusions

The continued adoption of digital tools and approaches by the sector will be critical in delivering and retrofitting buildings and infrastructure assets that will provide social value, support the net-zero agenda and provide value for money for project sponsors, be they governmental, corporate or consumers. Regulatory and macroeconomic factors, coupled with a heightened awareness of the threat and costs of climate change, continue to accelerate the adoption of digital processes and practices. As a result, downstream construction processes, beyond design, continue to shift towards model-centric and data-driven workflows, and BIM and digital twins are in many projects now central to these downstream functions that project teams must perform. Therefore, it is critical to continue to monitor and measure the progress made by the sector in using these new tools and approaches. The 2023 report provides another snapshot to compare with the initial benchmarking set in the 2022 report. RICS plans to continue to survey the market in this way to chart the sector's progress.

The responses to the Q4 2022 GCM survey questions on digitalisation continue to show the highest use of digital technology across the traditional functions of 'cost estimation, prediction, planning and control' and 'enhancing progress monitoring and health, safety and well-being'. Emerging service areas relating to ESG, whole-life and whole-asset approaches, social value and carbon measurement still have relatively low usage levels. There is no noticeable improvement in overall adoption level.

A similar trend in contributor perceptions of the improvements in using digital technology is seen in the responses to the Q4 2022 survey. The respondents once again listed the 'cost estimation, prediction, planning and control' and 'enhancing progress monitoring and health, safety and well-being' as functions that saw the highest improvements from the use of digital tools. Once again, the findings show that 'carbon footprint calculation, benchmarking and reporting' ranked number four in the improvements ranking, as opposed to sixth when ranking actual current use of digital technology for this function.

In line with the findings in the recent RICS WBEF industry paper [Digital twins from design to handover of constructed assets](#), the responses show the following three highest-ranked obstacles to the use of digital technology in the sector:

- 1 'cost, effort and changes needed' (56% of respondents ranked 'high' in the 2022 and 2021 surveys)
- 2 'shortage of skilled persons' (51% of respondents ranked 'high' in the 2022 survey and 52% in the 2021 survey), and
- 3 'no clear demand from clients or stakeholders' (47% of respondents ranked high in the 2022 and 2021 surveys).

The data and information-sharing responses continue to show that the ranking of functions by usage, improvements and data sharing is consistent for the more established functions of 'quantity take-off and cost estimating' and 'health, safety and well-being'. The UK is still a negative outlier in three of the five process and practice areas, but this could be explained by the greater number of responses from the UK (an 86% increase in the number of responses from the 2021 survey). On the other hand, APAC saw a 10% drop in the number of responses from the 2021 survey, which may lead to a bias in the response rate towards users who have already embraced digitalisation.

It is envisioned that the uptake of modern methods of construction and prefabricated construction will drive greater data sharing across production and fabrication, and even stronger imperatives for net-zero and greenhouse gas emissions calculations, and whole-life thinking, will drive a similar uptake for life cycle carbon emissions. This survey continues to align with the [2022 RICS Sustainability Report](#) findings that environmental and sustainability issues are already beginning to influence the industry, albeit with significant implementation gaps remaining. As described in the previous report, the construction sector must explore interconnected solutions centred on information management processes to drive the adoption of digital technology for carbon measurement, ESG and whole-life and whole-asset approaches.

## 7.1 Carbon footprint calculation, benchmarking, and reporting

Globally, over half of respondents (53% in the 2022 survey and 54% in the 2021 survey) agreed that net-zero carbon initiatives could benefit from the use of digitalisation, but 47% in the 2022 survey and 46% in the 2021 survey reported not using them on their projects. This is in line with the findings of the 2022 RICS Sustainability Report, where around half of respondents stated they do not measure embodied carbon on their projects. However, greater perceived benefits are also reflected in the recent increase in uptake of standards such as the latest version of the [International Cost Management Standard \(ICMS\)](#) designed to integrate the measurement, recording, analysis, presentation and comparison of life cycle costs and carbon emissions of built assets. With the support of the [RICS Data Standard](#), the soon-to-be-operational [Built Environment Carbon Database](#), and the upcoming 2nd edition of RICS' *Whole-life carbon assessment* standard, the combination of consistent and structured data and digital tools will strengthen this integration.

## 7.2 Implementing whole-life and whole-asset thinking

Digitalisation will be critical in supporting whole-life and whole-asset thinking, and will require the industry to embrace value-driven procurement and enhanced levels of collaboration across the asset life cycle. In the 2022 survey, 41% of respondents said they do not use digital tools to support this function, but 57% agree that digital tools can improve it. This use of data-driven approaches, combining the [International Building Operation Standard \(IBOS\)](#) with ICMS to measure and manage how built assets perform, will drive adoption and benefit realisation, and demonstrate clear returns on investment. Integrating BIM and digital twins will support the implementation of whole-life and whole-asset thinking for both new and retrofitted assets.

## 7.3 Designing and measuring social value

As the sector shifts to a performance and outcomes-centric regime, consistency of metrics and data will be essential in designing and measuring the social value of constructed assets. As reported by RICS in [Measuring social value in infrastructure projects: lessons from the public sector](#), digitalisation can enhance access to databases that provide historical information on social impacts for recording, comparing and benchmarking social value. Yet 46% of respondents (45% in the Q4 2021 survey) do not use digital tools for designing and measuring social value.

## 7.4 Incorporating ESG principles

ESG reporting is becoming important for projects and assets. With many measurement and reporting frameworks available today, digital tools can help the sector efficiently gather data for these measurements and reports. However, only 11% of respondents in the Q4 2022 survey reported using digital tools for this function on all their projects. By using digital tools, ESG principles can be integrated into asset design, construction, management and end of life to support circularity. Therefore, 45% of respondents (down from 49% in the Q4 2021 survey) strongly agree or agree that the use of digital tools can improve ESG outcomes.

## 7.5 Overcoming the blockers

Consistency in the responses to the ranking of blockers in the Q4 2022 and Q4 2021 surveys shows that these blockers point to systemic issues within the sector. A partnership between industry, government and academia can help overcome these blockers. RICS members and member firms can continue to play a significant role in promoting digital working methods. The [Tech Partner Programme](#) has gained momentum over 2022 and now acts as an ecosystem for technology providers and end users to address these blockers to adoption.

RICS continues to recommend the following high-level measures to promote digitalisation in construction:

- mandating data-driven processes and systems for projects and built assets to deliver social, environmental, and economic outcomes
- focusing on information management practices to underpin data-driven processes and systems
- using digitalisation to drive horizontal (across disciplines), vertical (across project and asset phases) and longitudinal (across projects and assets) integration in projects and organisations
- investing in skills and competency frameworks for people with diverse backgrounds and career aspirations
- promoting whole-life, whole-asset and whole-industry thinking, and
- adopting and adapting digital technologies after carefully considering use cases and cost-benefit analyses.

## Delivering confidence

We are RICS. Everything we do is designed to effect positive change in the built and natural environments. Through our respected global standards, leading professional progression and our trusted data and insight, we promote and enforce the highest professional standards in the development and management of land, real estate, construction and infrastructure. Our work with others provides a foundation for confident markets, pioneers better places to live and work and is a force for positive social impact.

Americas, Europe, Middle East & Africa  
**[aemea@rics.org](mailto:aemea@rics.org)**

Asia Pacific  
**[apac@rics.org](mailto:apac@rics.org)**

United Kingdom & Ireland  
**[contactrics@rics.org](mailto:contactrics@rics.org)**



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