

BIM in New Zealand — an industry-wide view 2021

Baseline information on the use
of BIM across the New Zealand
construction industry



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BIM benchmark survey foreword

This is the eighth survey in a series originally planned to total five, and is the longest longitudinal BIM use survey that we're aware of in the world. Its objective is to follow progress being made in the use of BIM in New Zealand.

This series follows an industry control group (industry) of large and influential organisations in New Zealand's built environment, allowing BIM's use in construction to be tracked; and for the last six years we have also carried out a client survey (client) which focuses on asset owners and managers to better understand the progress of BIM use in facilities and asset management. For the third year a survey of BIM use by subcontractors has also been carried out.

Our sincerest thanks go once again to our partner, EBOSS, for its investment in managing and sponsoring these surveys; to BRANZ for its continuing support of this survey; and to those organisations forming the industry, client and subcontractor survey groups. These surveys are critical in forming a comprehensive view of the progress of BIM's introduction and identifying barriers to its use, thereby also informing ongoing development of the BIM Handbook and other BAC responses.

These surveys have been carried out under the auspices of the BIM Acceleration Committee as part of its efforts to promote BIM use in New Zealand. After seven years we are now changing the way we approach this – the BAC will change its form with the bulk of its activities now being carried out under the BIMinNZ banner. These will include the BIM networks, the bi-annual BIMinNZ conference, any future surveys and maintaining and updating the BIM Handbook. Contact for BIMinNZ is via the existing **BIMinNZ website** and its Chair, Dennis Burns (**dennis@archaus.co.nz**). NZIOB are supporting this initiative.

In the meantime, efforts are being made to form the Committee for Digital Engineering in New Zealand (CoDENZ) which will take a broader approach to the use of digital construction techniques. Support is being sought from a variety of industry and Government sponsors, with a view to this being the lead organisation in formulating a digital strategy for New Zealand's built environment.

Looking back, the BIM Acceleration Committee is proud to have been involved in the widespread industry efforts that have seen BIM's use on projects grow from 34% in 2014, to 70% in 2021. A very pleasing statistic!

My wholehearted and sincerest thanks go to all those who've served on the BAC over the past seven years and without whose dedication and commitment nothing we've achieved would have been possible. At the risk of embarrassing these worthy individuals I have taken the liberty of including a list of them below.

In the meantime, keep safe and we hope you have found these surveys of use and interest over the years.

Kind regards



ANDREW REDING
Chair, BIM Acceleration Committee

Our sincerest thanks go to the following individuals and their employers whose generosity with their time and resource enabled the BIM Acceleration Committee to function.

Members of BAC since 2014:

Robert Amor, University of Auckland
Steve Appleby, AECOM
Greg Boyden, Jasmax and Boyden Associates
Dennis Burns, Archaus
Seth Campbell, MBIE – BSP
Richard Capie, BRANZ
Renee Clarke, Independent Contractor
Gary Davenport, University of Auckland
Steve Davis, Assemble
Andrew Field, RCP and BECA
Vicente Gonzalez, University of Auckland
Andrew Howie, MBIE – Government Procurement
Dave Hunter,
Fletcher Construction & Leigh Construction
Samantha Johnston, AECOM
Glen Jowett, BECA
Chris Kane, MBIE – BSP and LINZ
Andy Lyons, Kiwirail

Tara Malpass, BRANZ
Steve Ritchie, Hawkins Construction
Anne Ryan, RCP
David Sharp, BRANZ
Heather Staley, MBIE – BSP and NZ Defence Force
Ngaira Taylor-Dunn, Independent Contractor
Melanie Tristram, Jasmax
Fiona Westerkamp, Independent Contractor
Jon Williams, BECA

Survey Organisers:

Matthew Duder, EBOSS
Nancy Yin, EBOSS
Sarah Woollett, Independent Contractor

And special thanks go to BRANZ for the funding and support it showed the BAC during its years of operation.

Established in 2006, EBOSS hosts a comprehensive architectural product library, with an active audience of 30,000 architects, designers, main contractors and engineers. At EBOSS we are interested in improving the communication of BIM information through the construction value chain and appreciate the opportunity to partner with the BIM Acceleration Committee and sponsor this research initiative.



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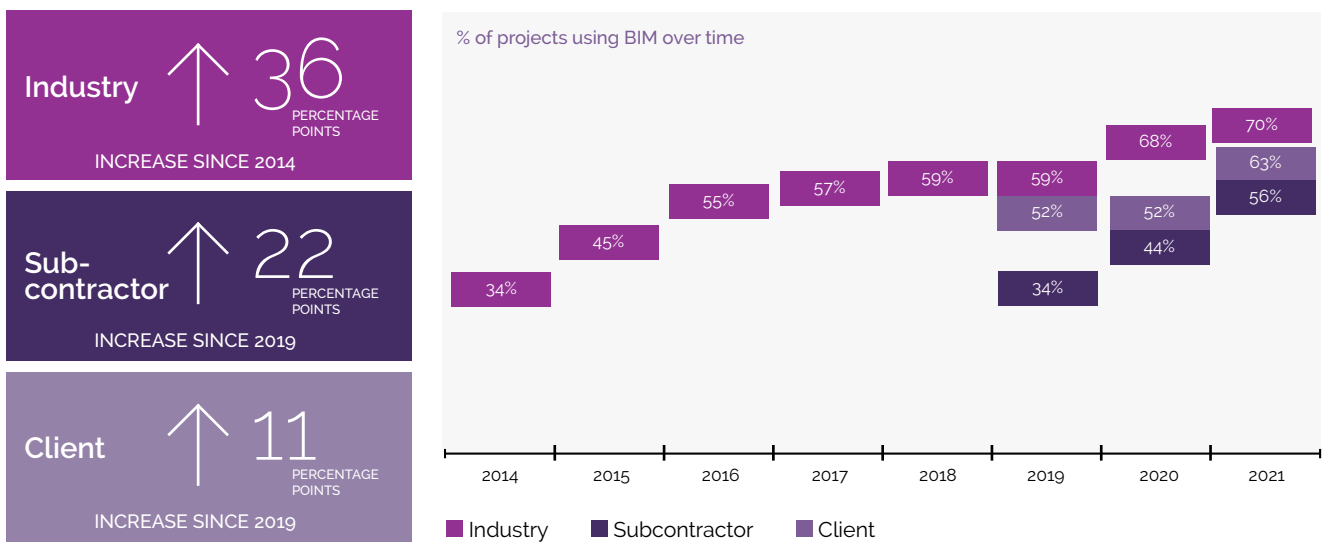
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We've seen some real shifts in BIM Adoption:

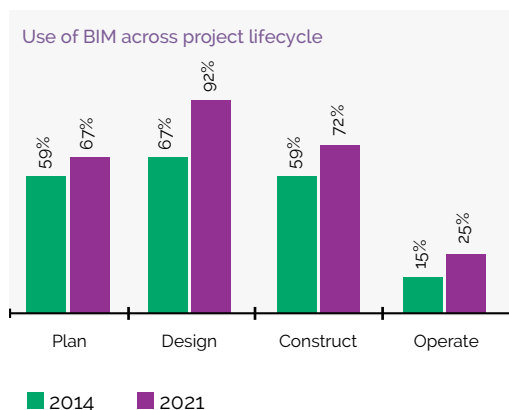
With the wrapping up of the BIM Acceleration Committee, it's timely to look back at how far we've come over the course of the surveys, and review the work still to be done in the BIM space.

In 2014 when we started this research with just the industry group, it felt like a long road ahead to take BIM from 34% of projects up to where it needed to be. Over those years BIM saturation has increased markedly. In fact at least half of all projects among this cohort now use BIM, rising to 70% for the industry group.

BIM Saturation has increased markedly:

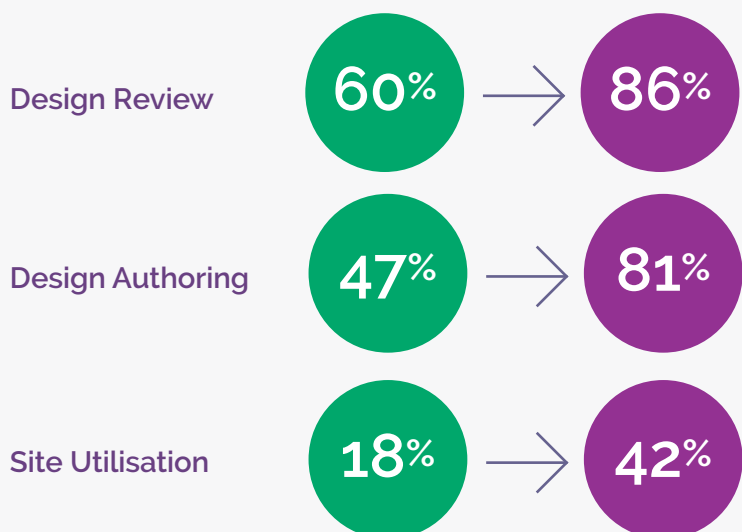


More specifically, BIM use has increased across all stages of the project lifecycle for the industry group (use of BIM across project lifecycle):



Note: This question was only asked of the client and subcontractor groups from 2019, longer term data is unavailable

The BIM uses that have seen the largest uplift in use among the industry group 2014-2021 are:



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Initiatives like the BIM handbook have been introduced to bring a more cohesive approach to how we use BIM across the industry:

89%

of the industry group
used the BIM handbook in 2021

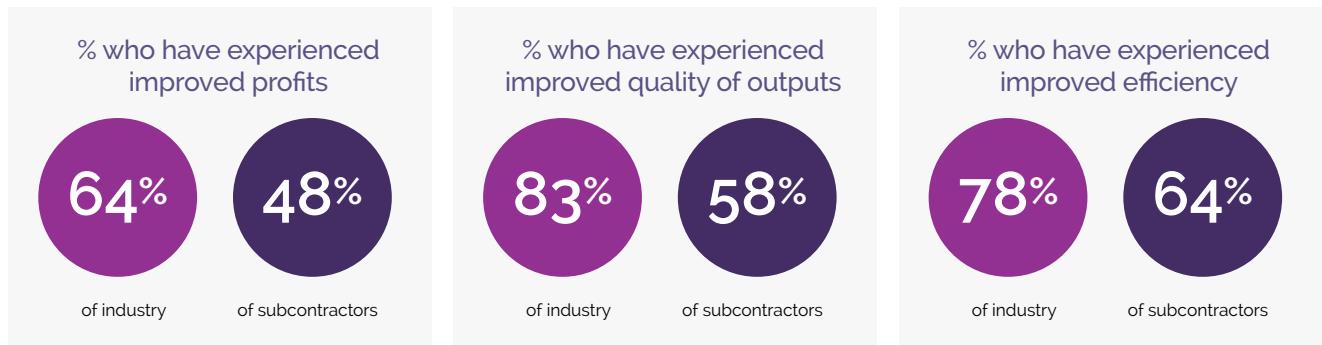
32%

of the subcontractor group
used the BIM handbook in 2021

This year we asked how the BIM Handbook might be improved. Three key themes emerged:

1. Alignment with ISO
2. More definition of processes
3. Broader focus beyond architects

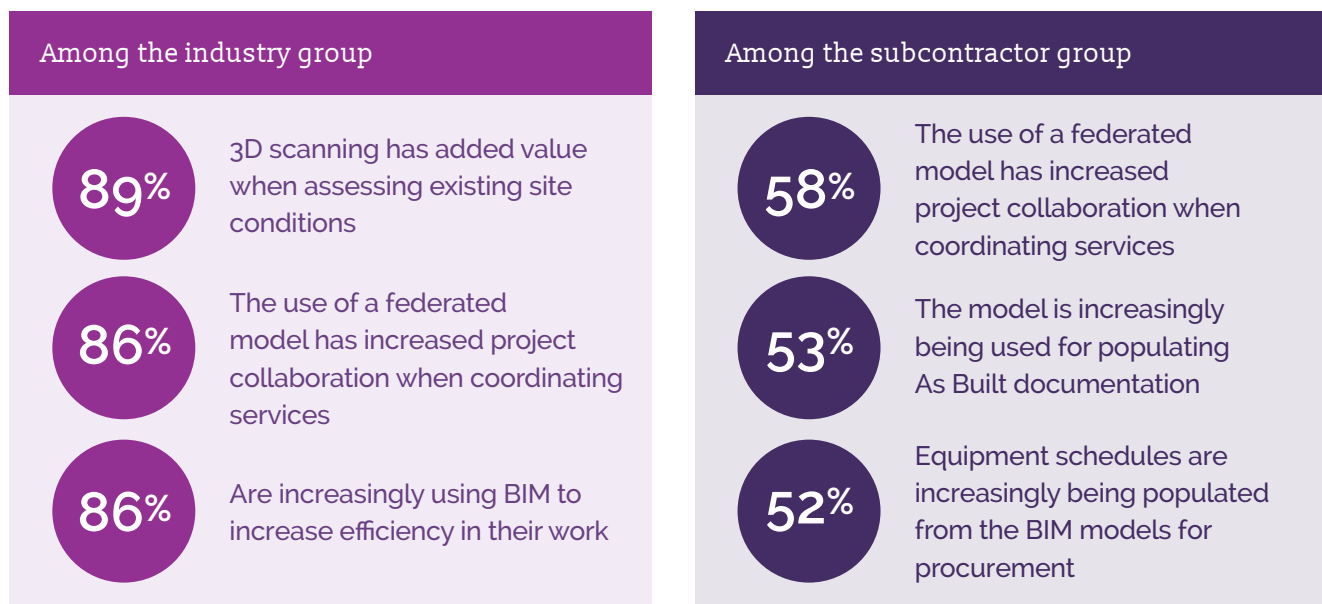
In 2021, the survey sought to quantify the benefits of using BIM:



When asked to describe the benefits of using BIM, both industry and subcontractors agreed on these key points: better coordination, clash detection, and cost and resource efficiency.

The most noticeable difference between the two is the nuance in the industry response. The industry group are able to see far more in the way of efficiency from BIM and across a wider range of activities. At present, the efficiencies are largely onsite for subcontractors, rather than in their own shop drawing or design process.

Beyond the business impacts, there are more detailed positive outcomes at a project level:



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However, clients are not increasing BIM use at the same rate and are yet to see that same value:

In 2016, 50% of clients surveyed said they used BIM for at least some sites. In 2021, 48% said they integrate asset or spatial information into their systems.

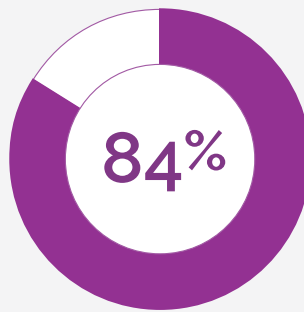
Each year, between 8%-29% of clients say they plan to start using BIM in the next 12 months, yet year-on-year the proportion actually using it remains relatively stable.

Effectively, we are maintaining a stable base of clients using BIM, without great movement in the last six years.

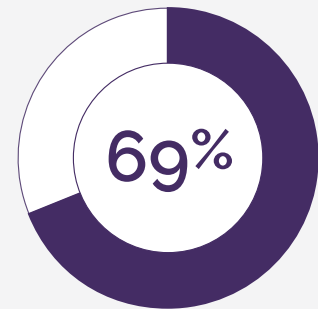
The number one factor stopping clients from integrating digital asset and spatial information is a perception of a poor cost to value ratio.

The use of disclaimers was explored in 2021:

While the vast majority of models come with a disclaimer on their use, industry and subcontractors alike have no choice but to use these models at their own risk.



% of models provided to industry with a disclaimer



% of models provided to subcontractors with a disclaimer

The barriers to using BIM:

The barriers to using BIM have become more nuanced over the last eight years. In 2014 the critical issues working as barriers to BIM uptake were:

- **Clients don't necessarily see the value of BIM or have not considered BIM within a project brief, so it is not costed for initial stages.**
- **There is a lack of knowledge/expertise to realise the full potential of BIM.**

In 2021, the main issue is a lack of alignment across the industry. Industry comment that clients lack preparedness, alignment, and knowledge around BIM.

Subcontractors agree on lack of alignment, which for them means both poor models from consultants (not designed for subcontractor use) and other subtrades not following the model.

For clients, that lack of alignment arises with a mismatch in internal and external capacity and preparedness for BIM, as well as the difficulty in demonstrating the benefits of BIM to the wider organisation and decision makers.

"We are often frustrated by the need to defend so-called 'uncoordinated' models, when in fact it is often unmodeled elements or late information added to the project that are the issue. Equally, the traditional subtrade attitude that design models are worthless only serves to justify their practice of deviating from a coordinated design." – INDUSTRY

INFOGRAPHIC:

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“We expect a coordinated LOD 250-300 model from consultants but what we get is opposite. The information on consultants’ drawings and model sometimes do not match. We have to spend a lot of time correcting and coordinating a model.”
– SUBCONTRACTOR

“Industry capability, particularly with smaller consultancies, and lower tier main contractors. They may be the best team to deliver the project – either best building design, most relevant previous projects, best price, but don't have the BIM capability or an understanding of how to get people on board to subcontract that work.” – CLIENT

The critical factors to enable increased use of BIM:

1.

Demonstrate the value of BIM for clients



2.

Industry needs to consider how BIM costs are covered



3.

BIM included at the procurement stage



4.

More collaboration on BIM across stakeholders



Who are the survey groups?

Who are the industry group?

The industry group is a sample of 46 businesses or individuals who are key users of BIM within the building and construction industry. These businesses completed the same survey on BIM use each year from 2014 to 2021, and make up a wide group of industry professionals. In 2020 and 2021 an additional 12 businesses were included in the industry control sample. In 2021 we had a total of 36 industry participants who completed the survey.

The 2021 survey allows us to compare the 2014 through to 2021 data to see how BIM use has changed among industry in the last eight years.

The industry survey was sponsored and managed by EBOSS on behalf of the BIM Acceleration Committee. It was analysed by an external researcher.¹

The maximum margin of error for the 2021 industry survey is +/-16.3% at the 95% confidence interval.

The chart numbers may not add to 100% due to rounding.

A little about the industry group:

	2014	2015	2016	2017	2018*	2019*	2020	2021
Where their businesses are based					*Location changed to multiple response in 2018			
Auckland	23	28	31	27	31	25	22	26
Bay of Plenty	1	1	1	1	3	3	5	3
Wellington	5	2	4	2	11	9	8	12
Canterbury	6	5	7	5	10	7	7	12
Otago/Southland	1	-	-	1	6	3	3	8
Other	3	1	-	-	5	10	17	24
Unspecified	7	3	-	4	-	-	-	-

The size of these businesses

Conglomerate (30+ employees)	26	24	29	26	24	22	26	25
Large (10-30 employees)	8	10	10	8	9	7	7	8
Medium (5-9 employees)	4	-	1	-	0	-	1	0
Small (2-4 employees)	1	2	1	2	1	1	1	2
Unspecified	7	4	2	4	0	5	5	1

Profession of respondents

Design/Engineer	13	12	14	14	16	10	16	13
BIM Professional	9	13	11	8	7	9	11	14
Project Manager	4	2	2	2	2	2	1	1
Quantity Surveyor	3	4	3	4	3	4	3	2
Construction	5	3	5	3	5	2	3	-
Other (incl. Government, model creation, etc.)	4	6	4	3	-	2	6	6
Unspecified	8	-	4	6	4	6	-	-
Total	46	40	43	40	37	35	40	36

¹The researcher is a member of the NZ Research Association and ESOMAR, bound by strict codes of research ethics and requirements

Who are the client group?

In 2016 we initiated the first survey of property/asset managers of organisations with medium to large portfolios of property or other constructed assets, focusing on their use and understanding of BIM. A total of 44 organisations agreed to participate in the programme. In 2021, 29 client organisations responded to the survey; a response rate of 66%.

The client survey was funded by BRANZ and managed by EBOSS on behalf of the BIM Acceleration Committee. It was analysed by an external researcher.

NOTE TO READING CLIENT DATA: Due to the variance in sample size and differences in role of respondents from 2016 through to 2021, some differences in 2021 data may be driven by sample changes. The maximum margin of error for the client survey is +/-18.2% at the 95% confidence interval.

The chart numbers may not add to 100% due to rounding.

A little about the client group:

Industry	2016	2017	2018	2019	2020	2021
Local Government	7	3	1	6	4	4
Central Government	5	3	4	3	5	3
Property management	4	3	1	1	-	-
Property development	3	1	-	5	3	6
Infrastructure management	2	1	-	3	3	2
Maintenance	2	1	1	-	-	1
Utilities provider	2	1	-	1	2	2
Healthcare	1	3	2	4	5	3
Tertiary education	-	-	2	1	2	3
Procurement	-	-	1	-	-	-
Other	5	6	4	2	4	2
Unspecified	2	4	1	9	10	3
Total	33	26	17	35	38	29

Role of respondents	2016	2017	2018	2019	2020	2021
Asset management	12	8	3	5	5	1
Portfolio management	3	-	-	1	-	1
Project management	3	3	2	3	7	5
Data management	2	-	2	5	6	5
Facilities management	2	4	3	2	2	2
Property management	2	1	-	1	1	-
Other	7	5	6	9	7	12
Unspecified	2	5	1	9	10	3
Total	33	26	17	35	38	29

¹The researcher is a member of the NZ Research Association and ESOMAR, bound by strict codes of research ethics and requirements

Who are the subcontractor group?

In 2019 an additional survey was included as part of the BIM industry and client research. This survey was sent to subcontractors identified by the BIM Acceleration Committee (BAC) and University of Auckland (UOA), forming a new subcontractor group. In 2021 a total of 19 (a 59% response rate) subcontractor companies responded.

The subcontractor survey was sponsored and managed by EBOSS on behalf of the BIM Acceleration Committee. It was analysed by an external researcher.

NOTE TO READING SUBCONTRACTOR DATA: Due to the variance in sample size and differences in role of respondents from 2019 through to 2021, some differences in 2021 data may be driven by sample changes. The maximum margin of error for the client survey is +/-22.5% at the 95% confidence interval.

The chart numbers may not add to 100% due to rounding.

A little about the subcontractor group:

	2019	2020	2021
Discipline			
Electrical contractor	8	4	3
Mechanical contractor	6	5	3
Modelling/Drafting specialist	3	-	1
BIM consultancy	2	-	-
Hydraulic/Plumbing contractors	2	2	1
BMS contractor	2	1	1
Fire protection contractor	1	3	-
Other	1	1	-
Unspecified	-	5	10

Number of employees			
One	0	0	0
Small (2 to 4 employees)	0	0	0
Medium (5 to 9 employees)	1	2	2
Large (10 to 30 employees)	3	1	4
Conglomerate (30+ employees)	22	18	11
Unspecified	-	-	2

Location			
Auckland	20	18	17
Unspecified	6	-	-
Other	-	3	2
TOTAL	26	21	19

¹The researcher is a member of the NZ Research Association and ESOMAR, bound by strict codes of research ethics and requirements

Is BIM currently being used?

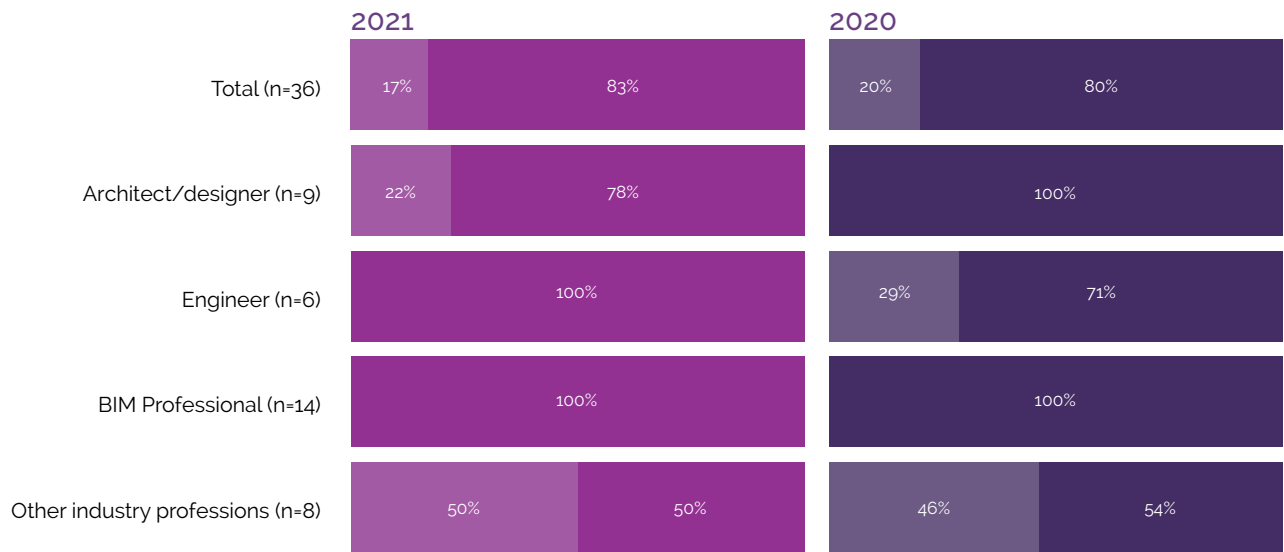
Use of BIM – industry and client groups

Both the industry and client groups were asked about their current use of BIM. Almost all of the industry group have used BIM in the last 12 months (97%), and 83% plan on using BIM in the next 12 months. This indicates that some who use BIM now do not plan to do so in 2022. Within the industry group seven in ten projects (70%) use BIM in some way.

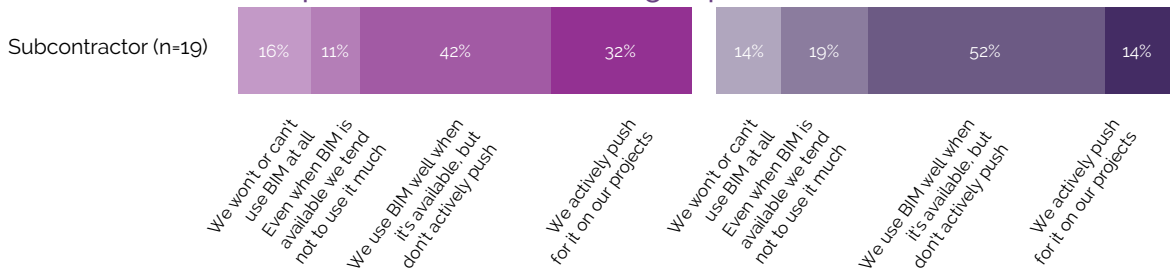
In 2021 the industry group was asked how actively they used BIM. Over eight in ten (83%) say they actively push for use of BIM on their projects, with a further 17% saying they use it but don't push for it.

Subcontractors are less actively pushing BIM. 32% of subcontractors said that they actively push for BIM use, this is up from 14% in 2020.

How important is BIM to your company's business?



Comparison to subcontractor group:



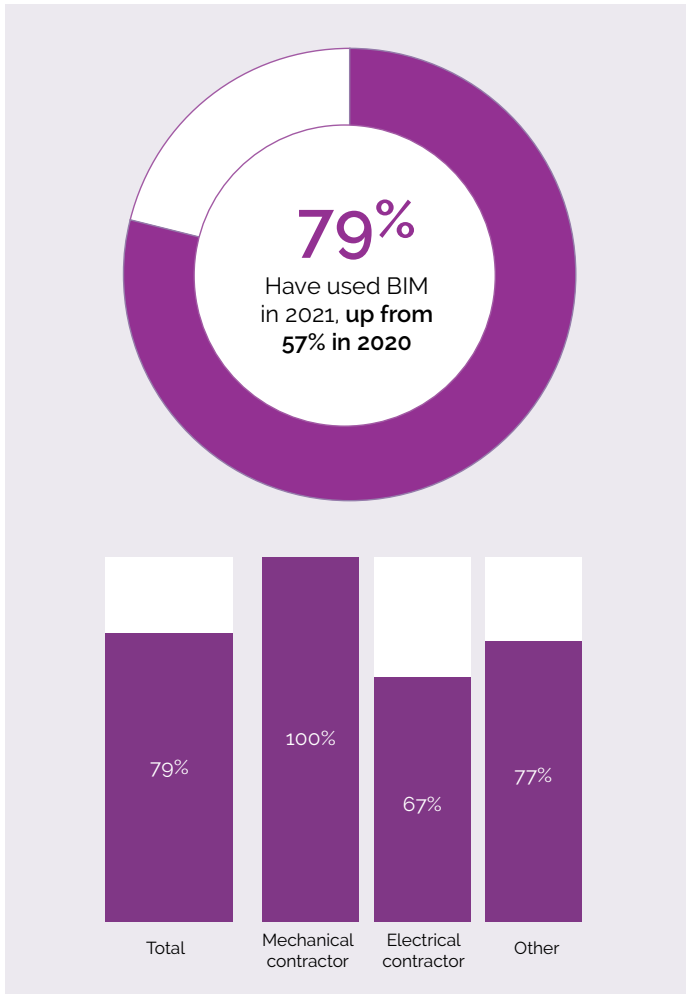
Base: 2021 Industry n=36, 2021 Subcontractor n=19

Q. Where would your company sit on the scale below when it comes to using BIM?

Use of BIM – subcontractor group

Almost four in five subcontractors have used BIM in 2021 (79%), up from 57% in 2020. Slightly fewer (74%) expect they'll use BIM in 2022. The highest use in 2021 came from mechanical contractors, with all saying they used BIM in 2021.

BIM use



Base: Total answering this question. 2021: Total n=19, Mechanical contractor n=3, Electrical contractor n=3, 'Other' n=13

Q. Please indicate the use of BIM in your company on projects in 2021 and planned use in 2022.

BIM use levels – industry and subcontractor

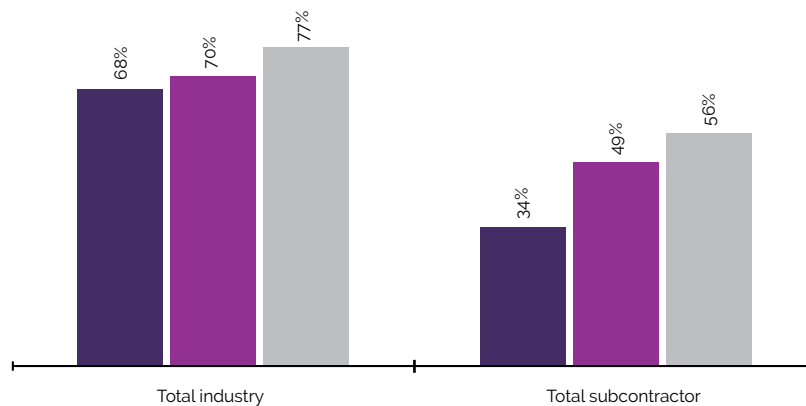
Increasing BIM use is about two factors – firstly, increasing the number of businesses that use BIM in their projects and secondly, increasing the proportion of projects that use BIM in each business. We also want to understand if there is any relationship between BIM use in the design and construction industry sector and how this might then cascade into subtrades.

We asked industry and subcontractors to estimate the proportion of their projects that:

- a) Have used BIM in the last 12 months; and
- b) Will use BIM in the next 12 months.

This gives us the proportion of projects using BIM (actual) in 2014 to 2021, and predicted in 2022. While seven in ten industry projects use BIM, only half of subcontractor projects do so. However, the proportion of subcontractor projects using BIM has increased from 34% in 2020.

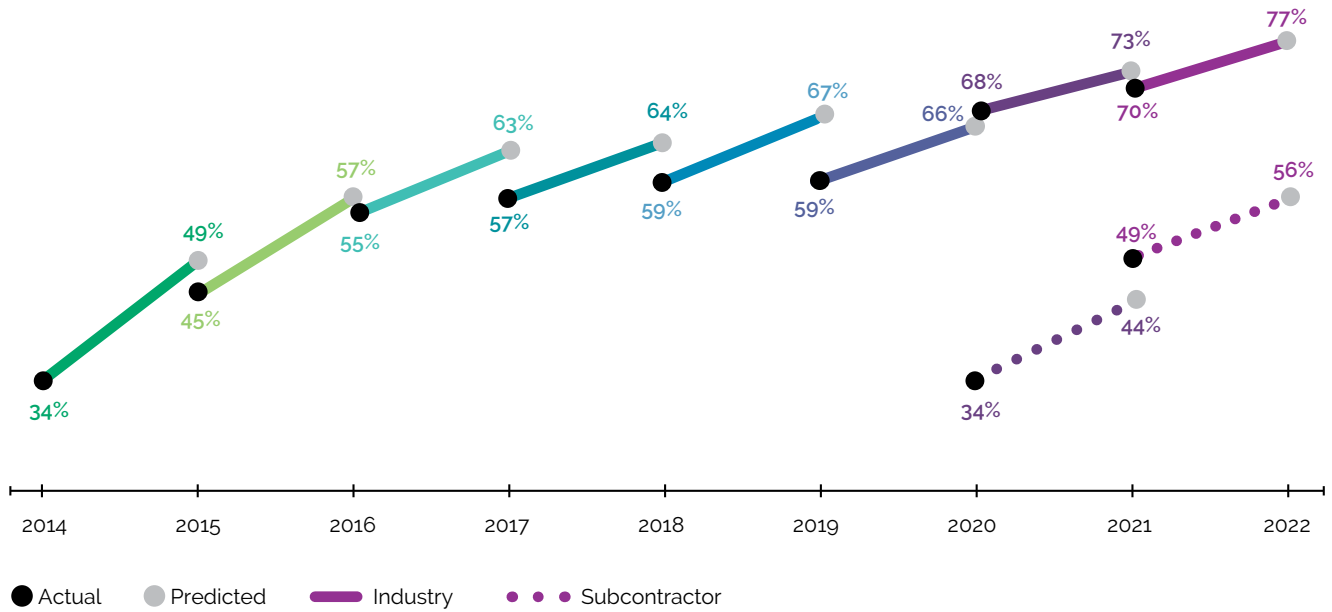
The average of projects using BIM – industry vs. subcontractor



■ 2020 % of projects using BIM (actual) ■ 2021 % of projects using BIM (actual) ■ 2022 % of projects using BIM (predicted)

Looking just at the industry group, the overall proportion of projects which use some form of BIM has increased to 70% from 68% reported in 2020.

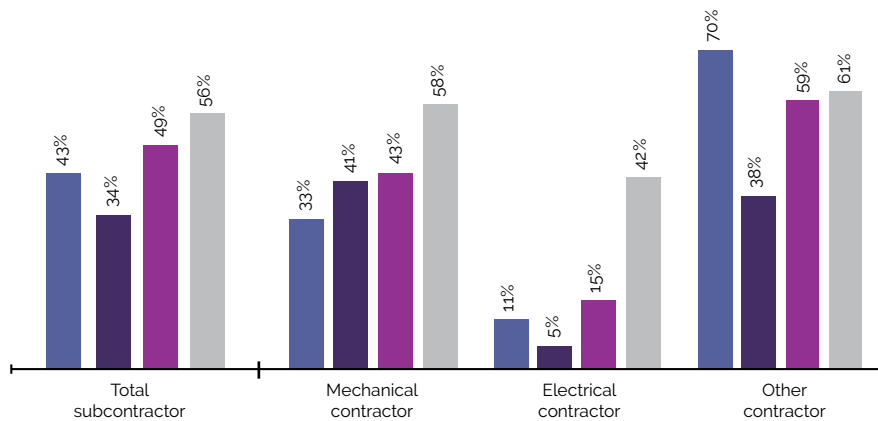
Estimated proportion of industry projects that use BIM



Base:
 Actual: 2014 n=46, 2015 n=40, 2016 n=43, 2017 n=40, 2018 n=37, 2019 n=35, 2020 n=40, 2021 n=36
 Predicted: 2015 n=46, 2016 n=40, 2017 n=43, 2018 n=40, 2019 n=37, 2020 n=35, 2021 n=43, 2022 n=36

Turning to subcontractors, the proportion of projects using BIM has recovered from a drop in 2020, now sitting just under half at 49%. Mechanical contractors remain stable, while those in the 'other' category (BMS, Modelling, Hydraulic contractors) show the strongest use of BIM in 2021 and predicted use in 2022.

The average proportion of projects using BIM



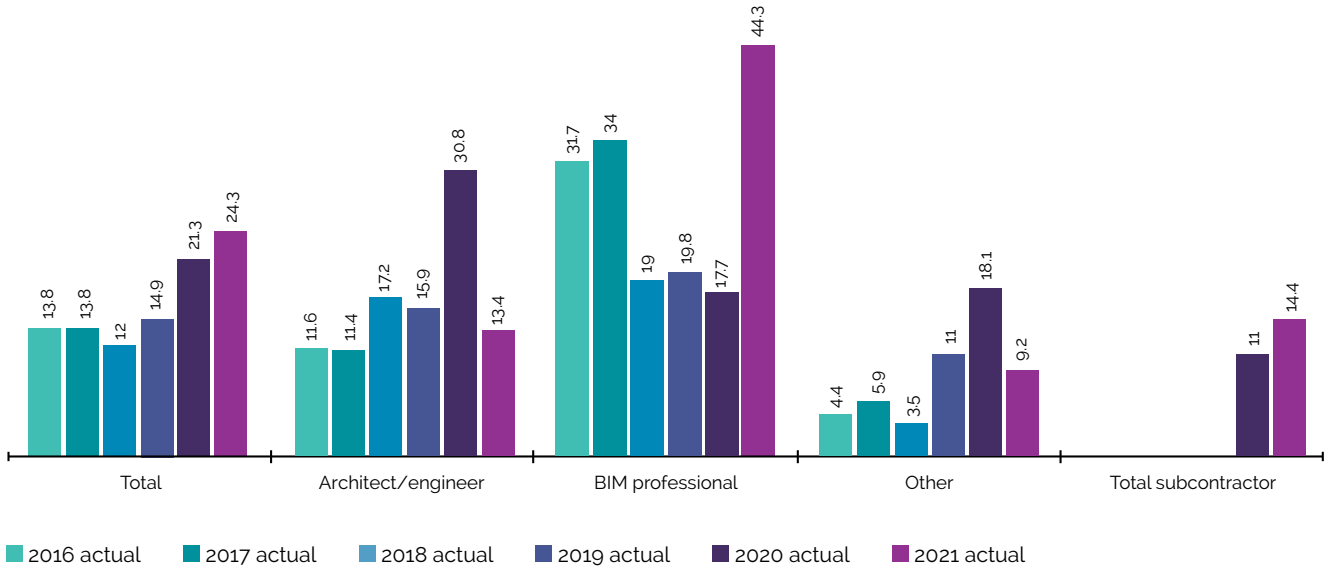
■ 2019 % of projects ■ 2020 % of projects using BIM (actual)
 ■ 2021 % of projects using BIM (actual) ■ 2022 % of projects using BIM (predicted)

Base: Use BIM/Plan to use BIM in the next year: Total 2019 n=20, 2020 n=16, 2021 n=15; Mechanical contractor 2019 n=6; 2020 n=4; 2021 n=3, Electrical contractor 2019 n=8; 2020 n=3; 2021 n=3, n=1; 2020 n=2 'Other' 2019 n=10; 2020 n=4; 2021 n=9

Q. Estimate what percentage of your projects in 2021 have used BIM. What percentage of projects in 2022 do you predict will use BIM?

A BIM execution plan (BEP) is an indicator of a consistent, defined approach to using BIM. Among the industry group the average number of projects using a BIM execution plan currently sits at 24 projects. This has increased from 21 projects in 2019, with the increase largely driven by BIM professionals. Subcontractors were asked this question for the first time in 2020. On average subcontractors have 14 projects using BIM, up from the 11 projects reported in 2020.

Average number of projects using a BIM execution plan (industry group)

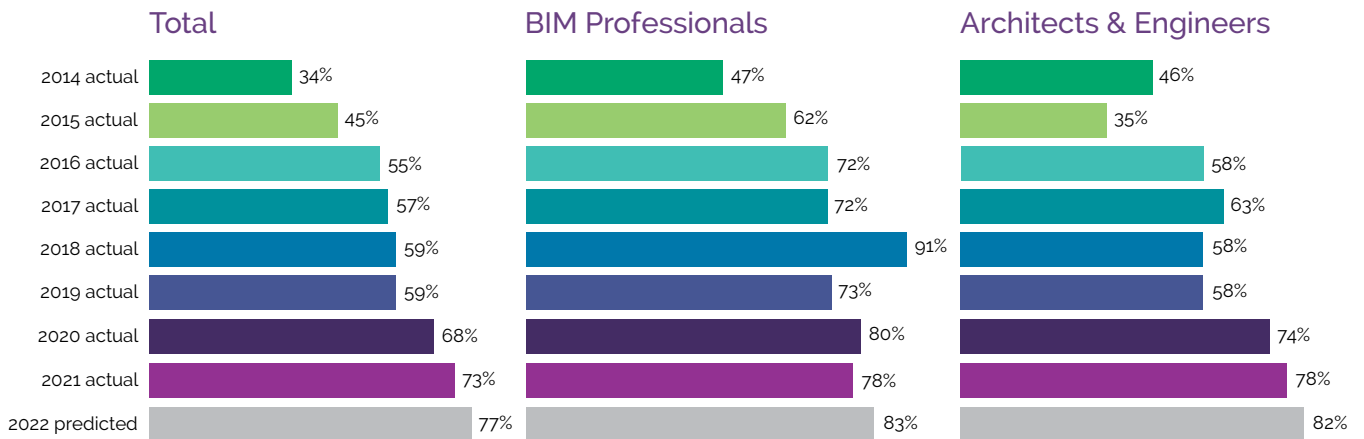


Base: Total 2016 n=43, 2017 n=40, 2018 n=37, 2019 n=35, 2020 n=40, 2021 n=36 (including not used BIM). BIM professionals 2016 n=11, 2017 n=8, 2018 n=7, 2019 n=9, 2020 n=11, 2021 n=14. Architects and Engineers 2016 n=14, 2017 n=14, 2018 n=16, 2019 n=10, 2020 n=16, 2021 n=9. Other 2016 n=18, 2017 n=18, 2018 n=14, 2019 n=16, 2020 n=13, 2021 n=13. Subcontractor 2020 n=16, 2021 n=15

Among the industry group, the large increase in the number of projects for BIM professionals could indicate that we have a slightly different subgroup answering in 2021, or that BIM professionals are now in a position to handle more projects in any single year.

The chart below shows the proportion of projects within each profession that use BIM. Looking at BIM professionals, the proportion of projects using BIM has remained stable from 2020. Thus they may simply be getting through more projects, demonstrating a productivity increase year on year.

Proportion of industry projects that use BIM by profession



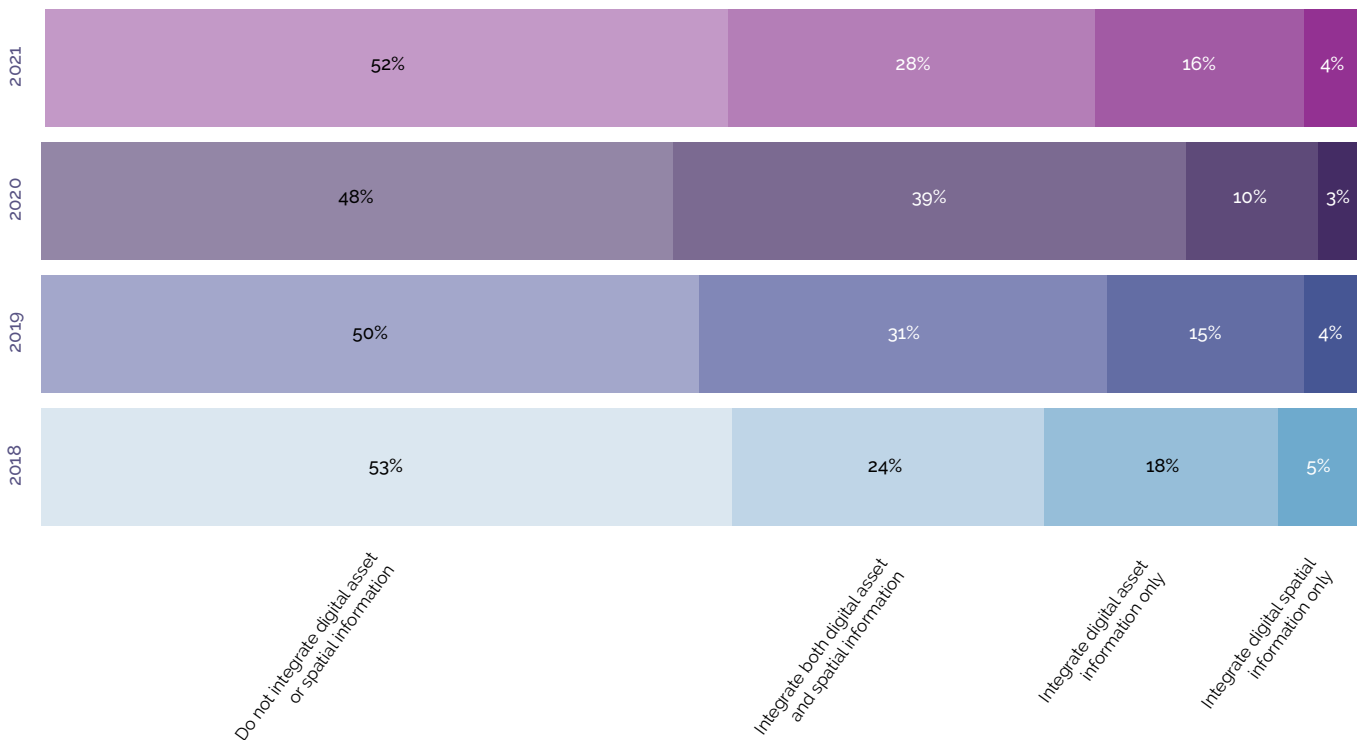
Base: Total 2014 n=46, 2015 n=40, 2016 n=43, 2017 n=40, 2018 n=37, 2019 n=35, 2020 n=40, 2021 n=36. BIM professionals 2014 n=9, 2015 n=13, 2016 n=11, 2017 n=8, 2018 n=7, 2019 n=9, 2020 n=11, 2021 n=14. Architects and Engineers 2014 n=13, 2015 n=12, 2016 n=14, 2017 n=14, 2018 n=16, 2019 n=10, 2020 n=16, 2021 n=9.

BIM use by clients

BIM is one of a number of information management tools that enable clients to integrate digital spatial information about assets with digital information about how these assets occupy space. This integration of asset and spatial information unlocks a greater range of analysis for asset management decision making. Since 2018, the client survey has asked about integrating digital spatial asset information (which may include BIM processes) with asset, operations, or facilities management systems.

Over the whole sample, 48% are integrating either digital asset or spatial information (or both) with their asset management systems. This is a slight decrease from 52% in 2020, though may be driven by sample factors.

Integrating digital spatial and asset information with management systems



Base: All clients surveyed 2018 n=17, 2019 n=26 (n=9 chose not to answer), 2020 n=31 (n=7 chose not to answer), 2021 n=25 (n=4 chose not to answer)

Q. Do you integrate digital asset information with your asset/operations/facilities management systems?

Q. Do you integrate digital spatial information with your asset/operations/facilities management systems?

NOTE: In 2020 only those who had heard of integrating digital asset/spatial information were asked this question. To provide a full sample comparison to 2019 we have added in "not heard of" as a new category for 2020.

Of those who are not currently integrating digital spatial information with their asset management systems, 29% plan to start doing so in the next 12 months (up from 18% in 2020). A further 36% are aware of the concept and may look at it in the future (but not in the next 12 months). Within each year of the survey there is between 8-29% who say they plan to start integrating digital spatial information in the next 12 months, yet the proportion actually doing so remains around the 50% mark. This suggests optimism bias in future plans to integrate digital spatial information.

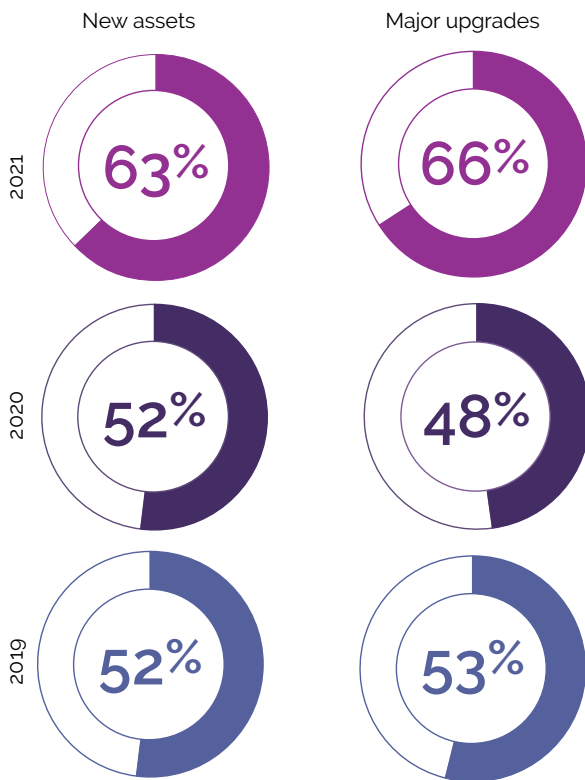
BIM in the procurement process

Previous industry surveys have indicated that clients' willingness to procure BIM was a barrier to increasing BIM use. The 2020 and 2021 surveys of clients explored this in more detail. These questions look at the proportion of projects that specify BIM in the procurement process and whether clients required a model, data, or both.

In 2021, over three in five of all new assets (63%) and major upgrades (66%) have BIM specified at procurement. Both represent an increase in the proportion of projects specifying BIM at procurement in 2020.

What proportion of projects specify the use of BIM in procurement?

% of projects that have BIM specified at procurement

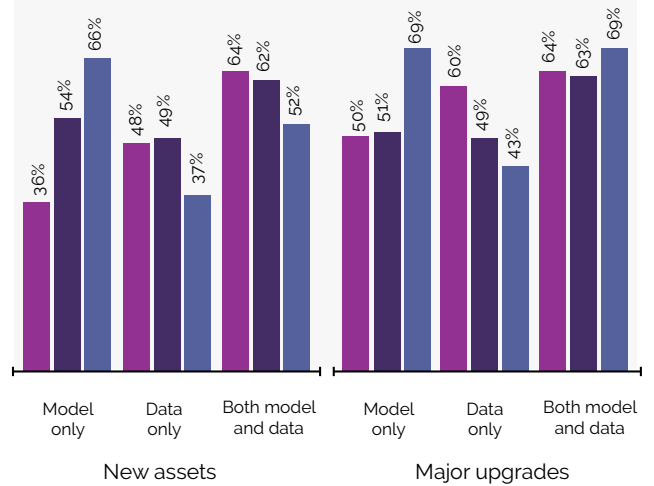


■ 2021 ■ 2020 ■ 2019

Responsible for new assets 2019 n=28; 2020 n=33; 2021 n=21; major upgrades 2019 n=26; 2020 n=28; 2021 n=23

Q. When procuring a project what % specify the use of BIM?

Proportion that specify model, data, or both



■ 2021 ■ 2020 ■ 2019

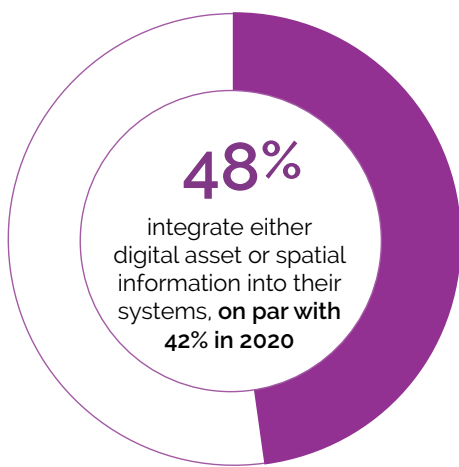
Base: Specify the use of BIM in procurement: new assets 2019 n=17; 2020 n=23; 2021 n=20; major upgrades 2019 n=16; 2020 n=18; 2021 n=21

Q. If BIM is specified, what % require an "As Built" model and/or asset data as part of project delivery?

Awareness and acceptance of BIM by clients

Clients who are aware of but not currently integrating digital spatial and asset information with their systems were asked to summarise their organisation's view on doing so. Three in ten (29%) are planning to start integrating digital spatial and asset information in the next 12 months. 36% have either not considered doing so, or have considered it but are unlikely to do so.

Client use and consideration of integrating digital asset and spatial information

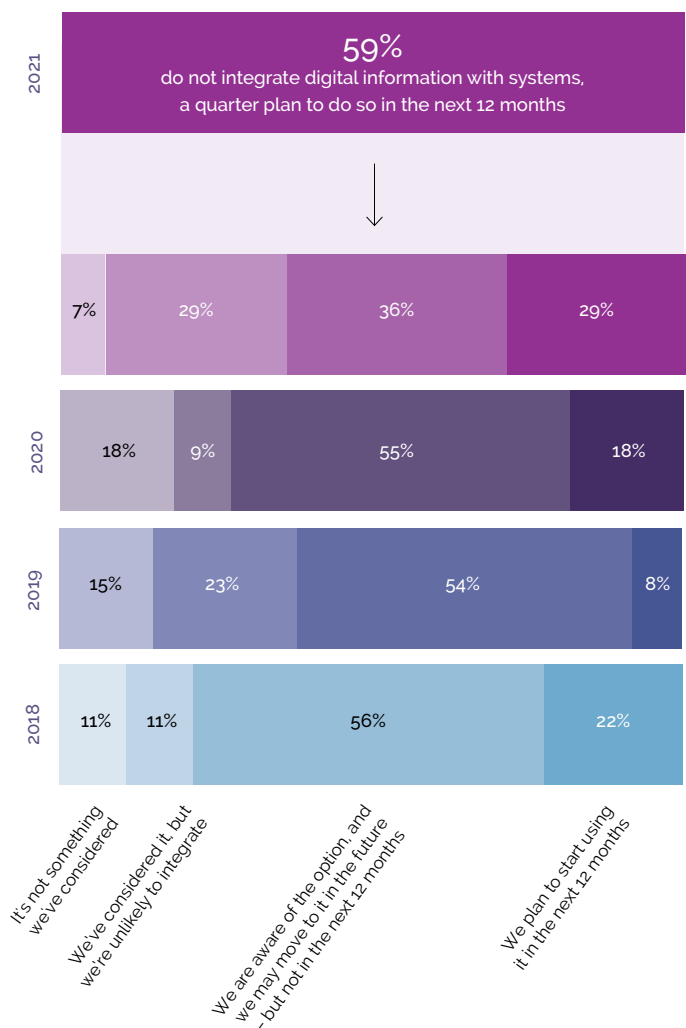


Base: Clients 2021 n=25

Q. Do you integrate digital asset/spatial information with your asset/operations/facilities management systems?

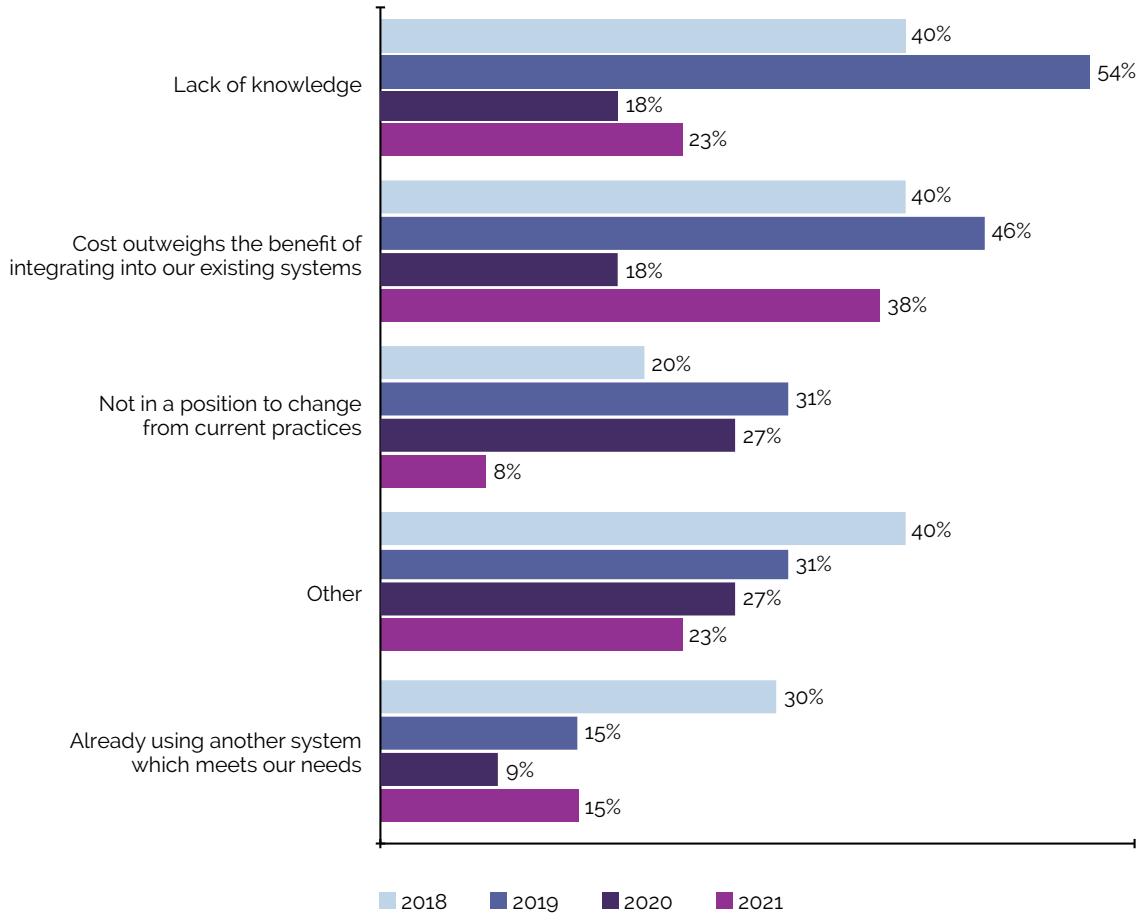
Base: Do not integrate digital spatial or asset information 2018 n=9, 2019 n=13, 2020 n=11, 2021 n=14

Q. Which of the following best describes your organisation's view on integrating spatial and/or digital asset information with information systems for asset/operations/facilities management? (This could include using BIM processes.)



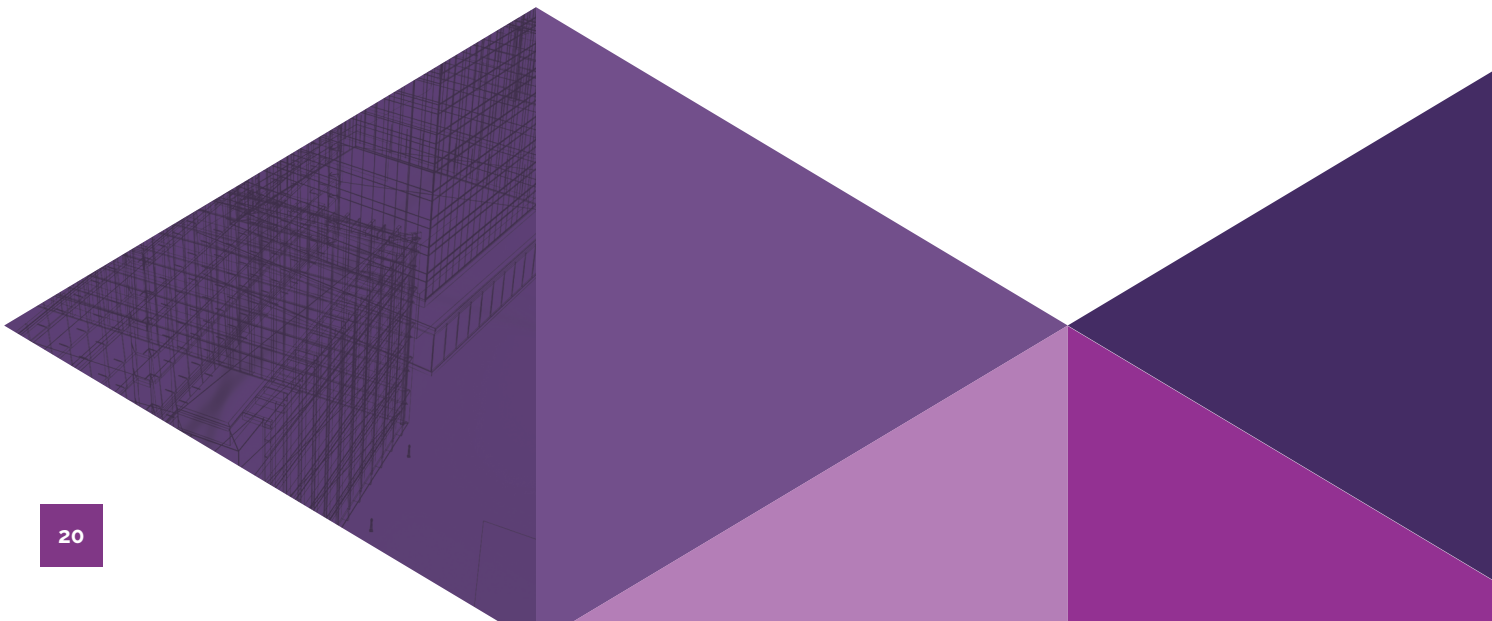
The high cost to benefit ratio is the main reason clients say they are not using, or considering a shift to using, integrated digital spatial asset information (38%). What is heartening is the significant reduction in the clients stating 'not in a position to change from current practices' as a barrier – down from 27% in 2020 to 8% in 2021. This may indicate change in organisational settings that has reduced barriers to adoption.

Understanding clients who don't integrate digital spatial and asset information with systems



Base: Client not integrating information now, not planning to do so in next 12 months 2018 n=9, 2019 n=13, 2020 n=11

Q. What are the main reasons you have not considered or moved to integrate spatial and/or digital asset information into your asset/operations/facilities management system?

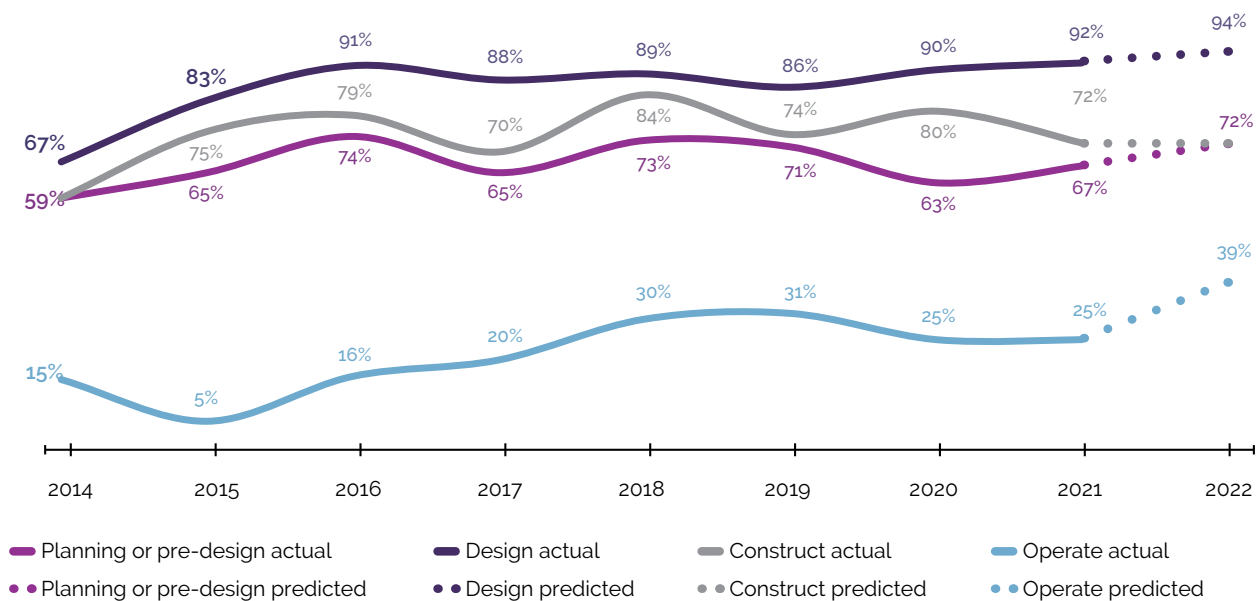


What is BIM being used for?

What are industry and subcontractors using BIM for?

The industry group were asked where in the project lifecycle they had used BIM in the last 12 months, or planned to use BIM in the next 12 months. The design phase is the most likely phase to see BIM use with nine in ten (92%) industry respondents using BIM at the design phase. Construction and planning stages sit at 72% and 67% respectively, however just 25% say they use BIM at the operate stage. The low level of use in asset and facilities management may reflect that much of the industry group operate in the design phase of a project.

Industry BIM use across project lifecycle

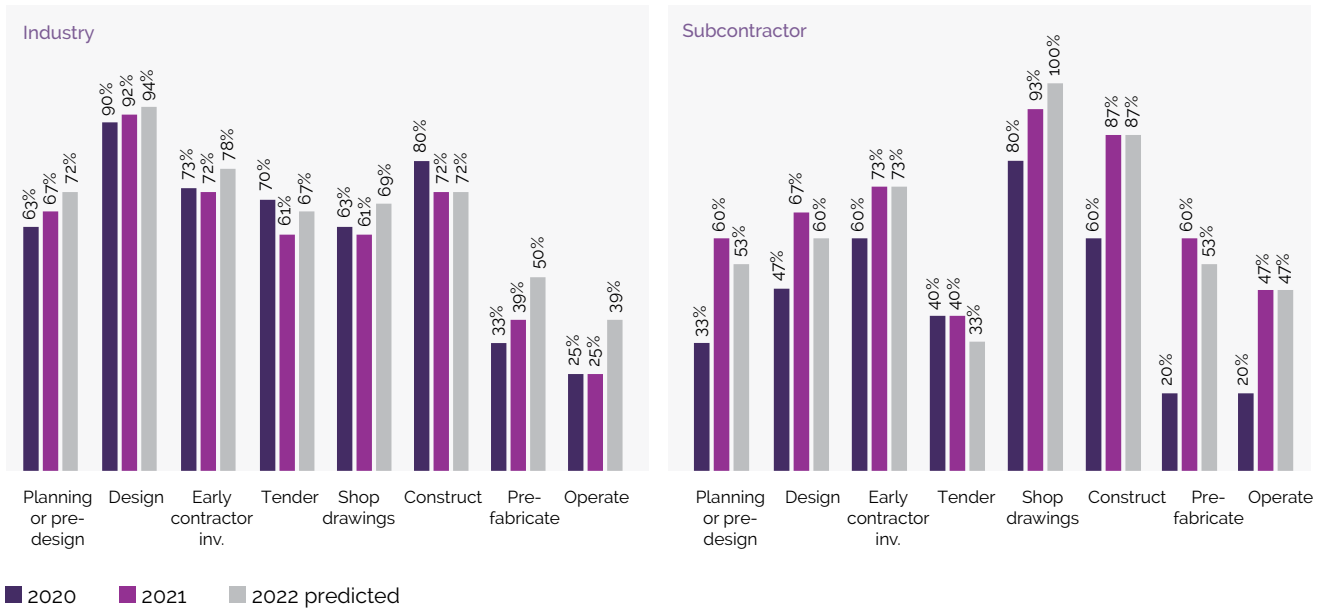


Base: All respondents 2014 n=46; 2015 n=40, 2016 n=43, 2017 n=40, 2018 n=37, 2019 n=35, 2020 n=40, 2021 n=36
 Q. For which project life cycle stages has/will BIM be used? Please select all that apply.

In 2020 this question was expanded to include other stages of the project lifecycle. At least 66% of respondents within the industry group use BIM for six out of eight stages within the project process.

By contrast, only three out of eight stages achieve over 66% use among subcontractors. This suggests that subcontractors have quite specific roles within the BIM process – early contractor involvement, shop drawings, and construction.

Expanded industry BIM use across project lifecycle

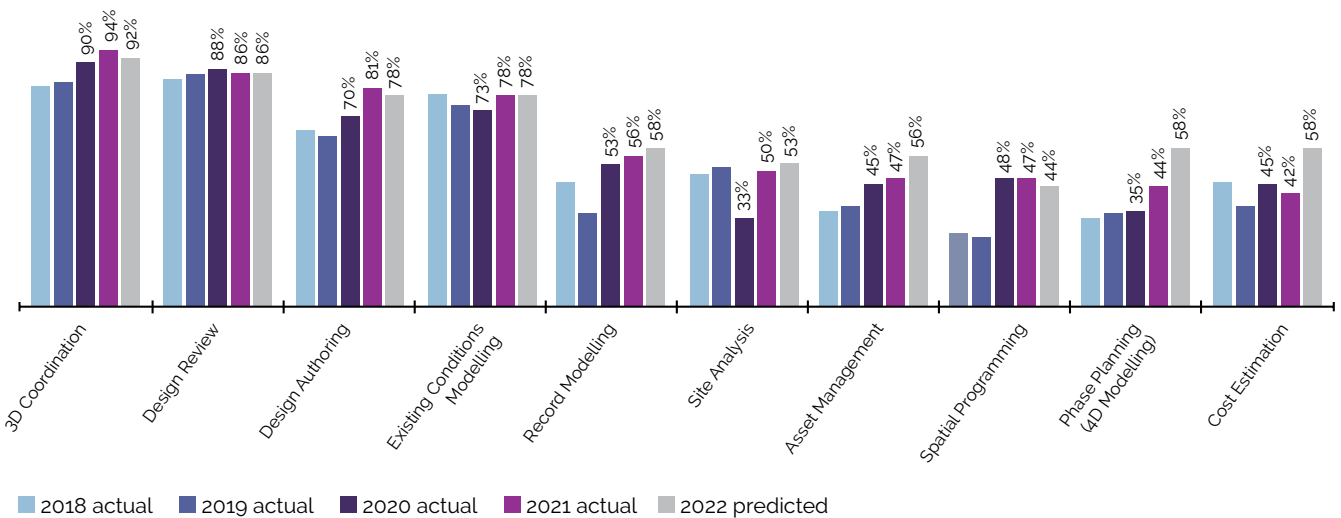


Base: Industry 2020 n=40, 2021 n=36, Subcontractor 2020 n=15, 2021 n=15
 Q. For which project life cycle stages has/will BIM be used? Please select all that apply.

Industry and subcontractor BIM uses

The top ten industry BIM uses remain similar to those in 2019 and 2020. The only two BIM uses that have historically been in the top 10 between 2014 and 2021 are engineering analysis (structural) and construction system design. Site analysis and design authoring are the two uses that have seen the largest increase in use from 2020 to 2021.

Industry's top ten BIM uses in the past 12 months



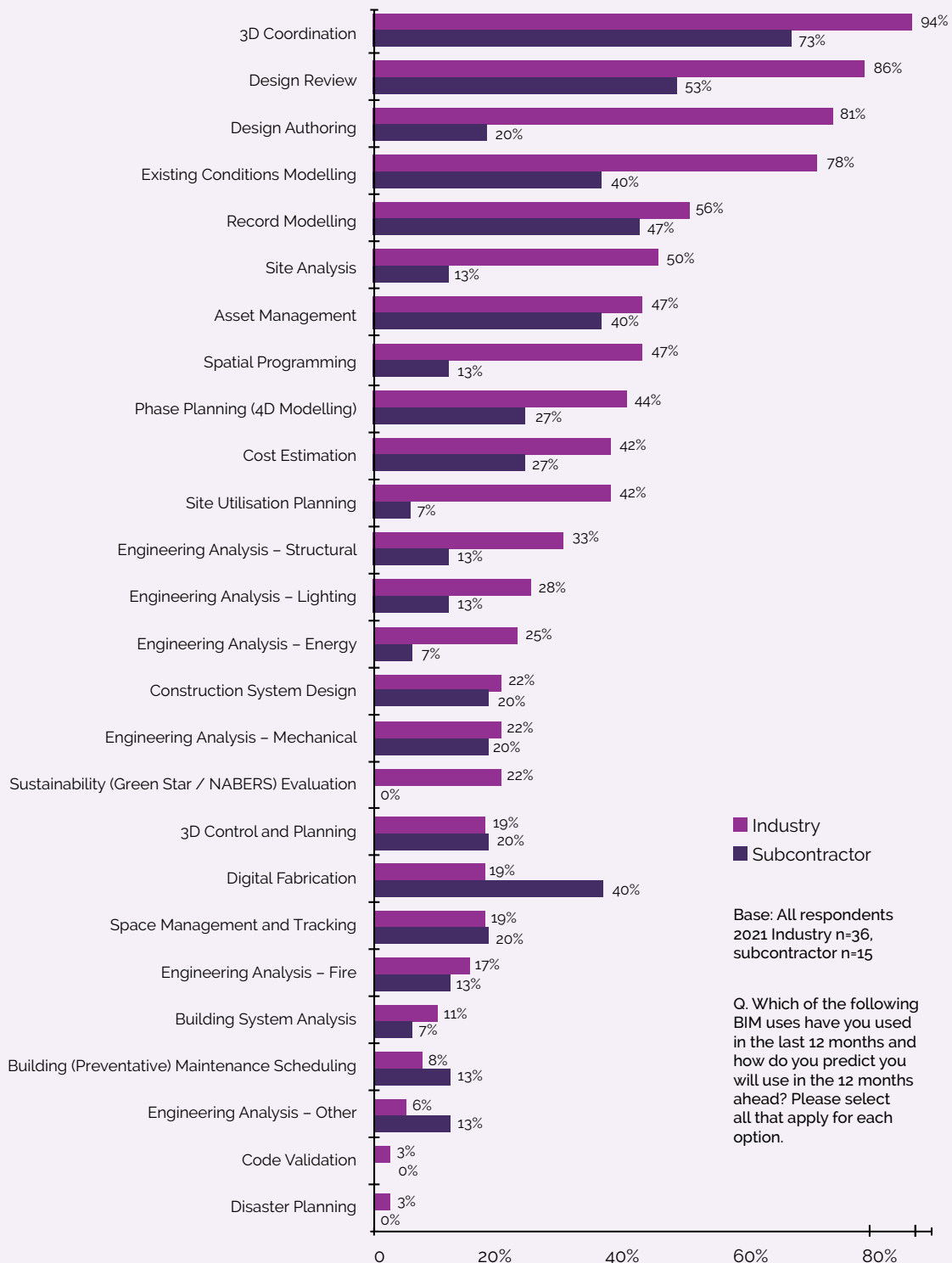
Base: All respondents 2014 n=46; 2015 n=40; 2016 n=43; 2017 n=40, 2018 n=37, 2019 n=35, 2020 n=40, 2021 n=36
 Q. Which of the following BIM uses have you used in the last 12 months and how do you predict you will use in the 12 months ahead? Please select all that apply for each option.

Comparing industry and subcontractor BIM use in detail, in general industry engages in a wider variety of use cases.

3D coordination continues to be the main use of BIM for both industry and subcontractors. Industry are more likely

to use BIM for almost all uses, but in particular, design review and authoring, existing conditions modelling, site analysis and spatial planning. Subcontractors are more likely than industry to use BIM for digital fabrication.

Industry vs. subcontractor BIM uses (2021)



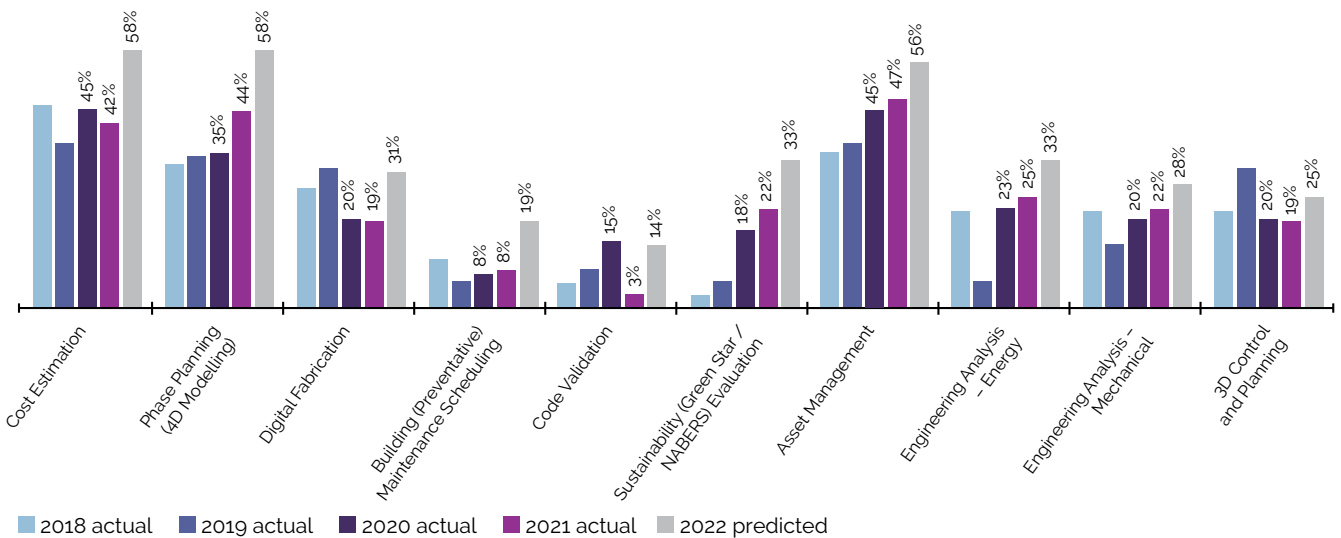
BIM uses most likely to grow in industry

Each year we see a high degree of optimism that various uses of BIM will increase, though few activities have managed to meet predictions. In 2021 several of the 26 uses are predicted to decline in the next 12 months:

- 3D Coordination
- Design Authoring
- Spatial Programming

Cost estimation and phase planning (4D modelling) are predicted to have the strongest uplift in 2022. In addition, asset management is predicted to grow substantially to 56% of all projects – in 2020 this was predicted to grow to 60% in 2021. While we have seen a slight increase (from 45% in 2020 to 47% in 2021), the predicted increases we see in every previous year have not been realised. Given that the sample for the industry group is largely consultants, this may be a tough one for them to predict.

Industry BIM uses most likely to grow



Base: All respondents 2014 n=46; 2015 n=40, 2016 n=43, 2017 n=40, 2018 n=37, 2019 n=35, 2020 n=40, 2021 n=36

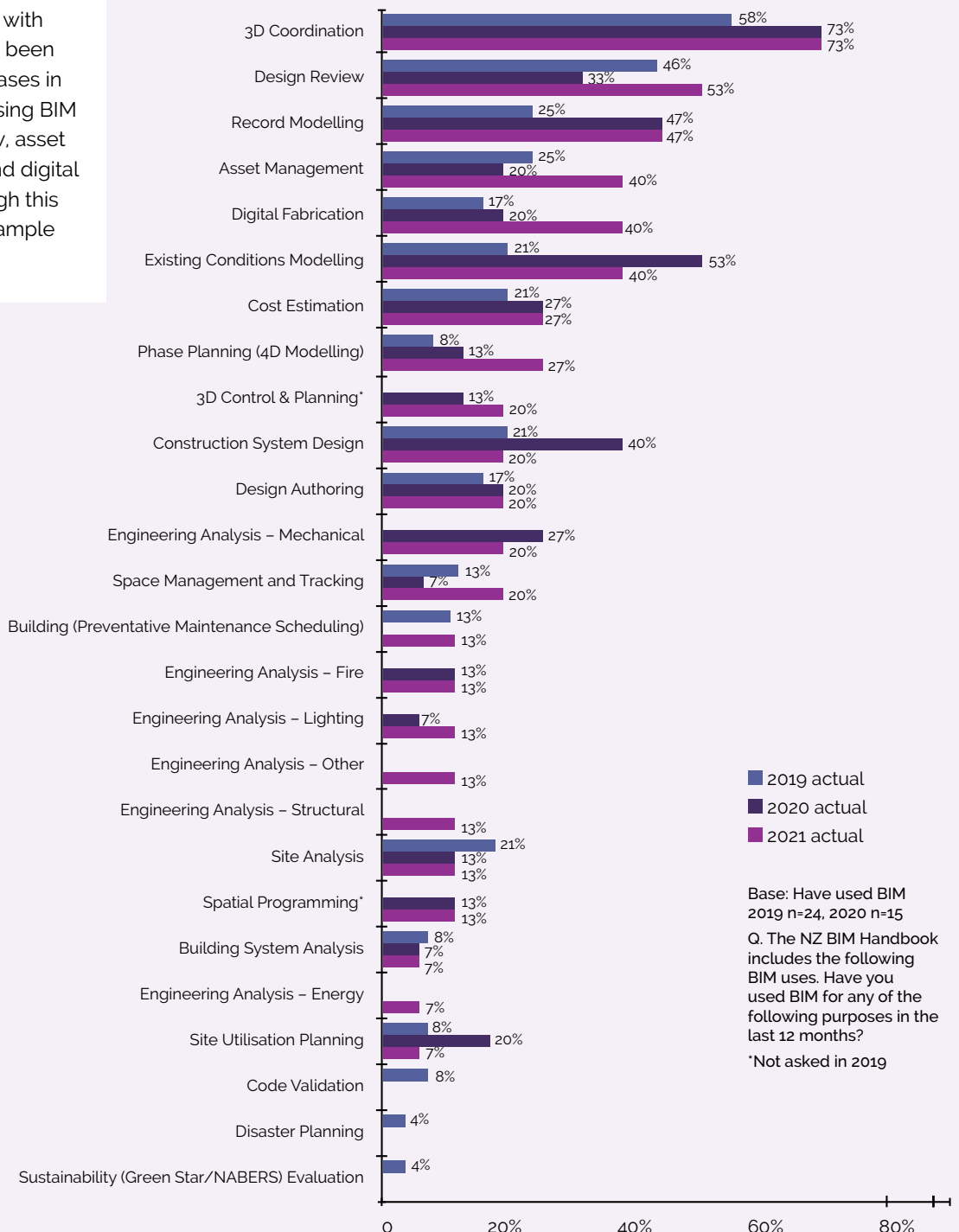
Q. Which of the following BIM uses have you used in the last 12 months and how do you predict you will use in the 12 months ahead? Please select all that apply for each option.

Subcontractor BIM use in detail

Looking at the details of BIM use, 3D coordination continues to be the main use of BIM for subcontractors in 2021. Construction uses (as defined in the BIM handbook) include cost estimation, phase planning, existing conditions modelling, design authoring, 3D coordination, site utilisation planning, construction system design, digital fabrication, 3D control and planning, and record modelling. In 2019, only one of these 10 construction uses was used by more than a quarter of subcontractors surveyed. In 2021 this has increased to seven out of the ten uses used by at least a quarter of subcontractors surveyed.

In particular, in 2021 when compared with 2020, there have been substantial increases in the proportion using BIM for design review, asset management, and digital fabrication, though this may be due to sample factors.

BIM uses in detail



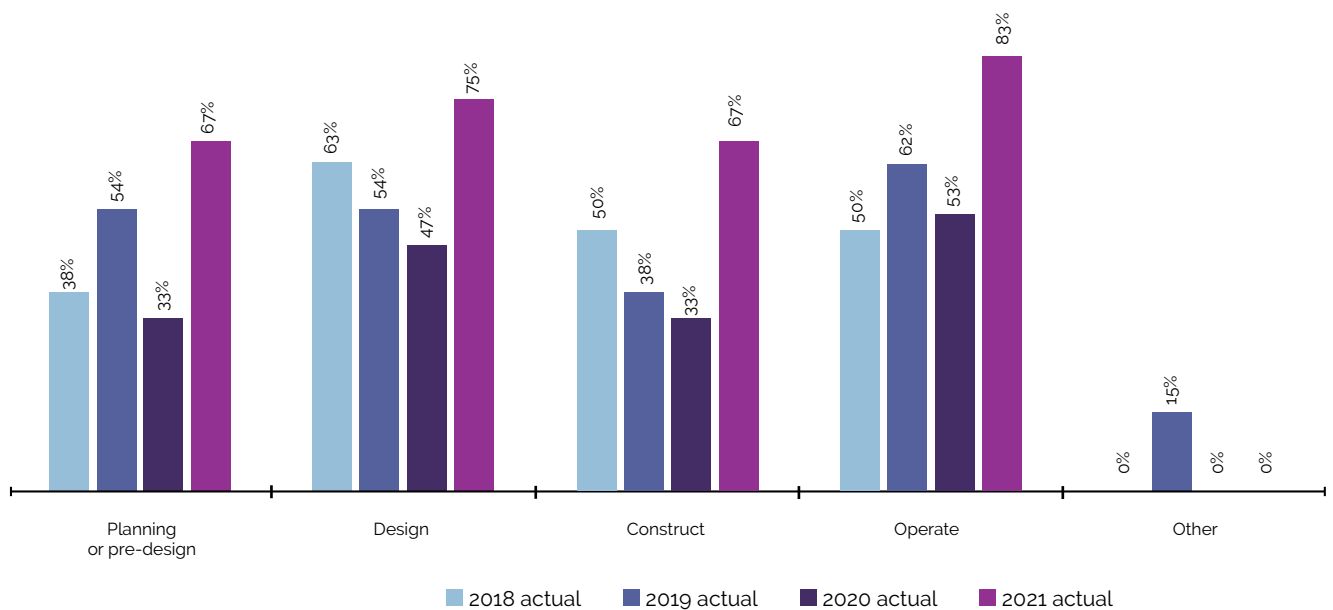
Base: Have used BIM
2019 n=24, 2020 n=15
Q. The NZ BIM Handbook includes the following BIM uses. Have you used BIM for any of the following purposes in the last 12 months?
*Not asked in 2019

What are clients using BIM and integrated information for?

The client group were asked at what stages in a project life cycle they are using integrated digital spatial and/or asset information.

In 2021, integration of digital spatial and/or asset information at all stages has increased, recovering from a decline seen in 2020, pushing past previously reported measures. 83% of those who integrate digital spatial or asset information say they are using this in the operate phase of a project. In fact, among those using BIM, at least two thirds are using it at each stage within a construction project, though again – the shifts we see here may be a function of sample shifts.

Client BIM use/integration of information across project lifecycle



Base: Clients integrating digital spatial and/or asset information now 2018 n=8, 2019 n=13, 2020 n=15, 2021 n=12

Q. At what stages in the investment, construction and operation of built assets are you using integrated spatial and/or digital asset information?

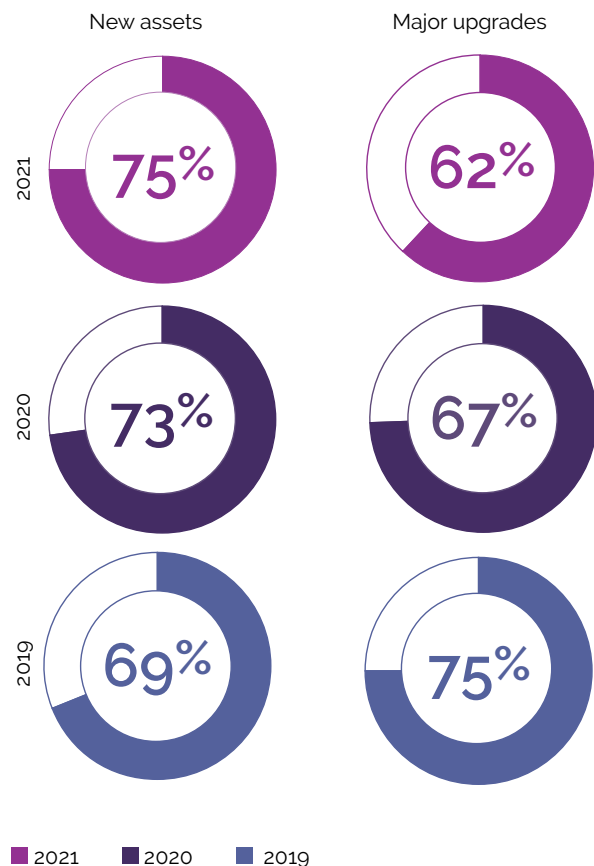
Client consideration of 'whole of life, whole of building' costings

Three quarters of new assets (75%) and three in five major upgrades (62%) have at least some consideration of whole of life, whole of building costs. There is less consideration of whole of life costs among major upgrades, and this has decreased in each of the last two years. By contrast, new assets show a slight increase in importance from 69% to 75% 2019-2021.

While two in five managing new assets believe that cost to construct is on a par with whole of life costs, a similar number believe it is less important than cost to construct, tipping the scales towards cost to construct. For major upgrades the balance is still in favour of cost to construct (41%), though 29% place more importance on whole of life costs.

What proportion of projects would have some consideration of "whole of building, whole of life" costings?

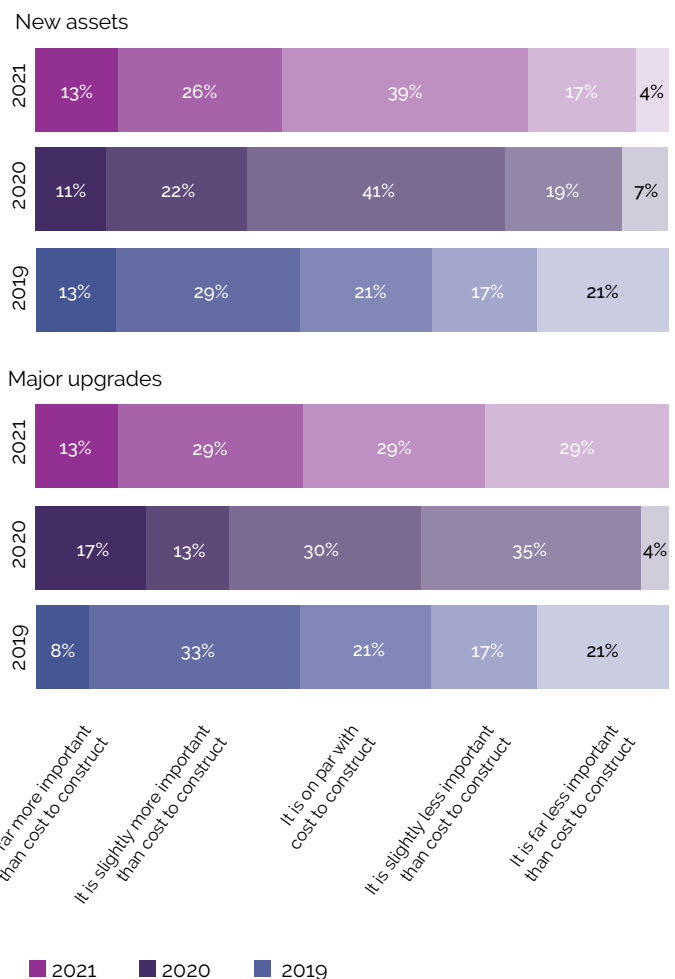
% of projects that have some consideration of 'whole of building, whole of life' costings



Base: Responsible for new assets 2019 n=28; 2020 n=33; 2021 n=21; major upgrades 2019 n=26; 2020 n=28; 2021 n=23

Q. When procuring a project (new or major upgrade) what % of projects would have at least some consideration of "whole of building, whole of life" costings to determine the most economic solution?

Importance of whole of life, whole of building



Base: Responsible for new assets 2019 n=28; 2020 n=33; 2021 n=21; major upgrades 2019 n=26; 2020 n=28; 2021 n=23

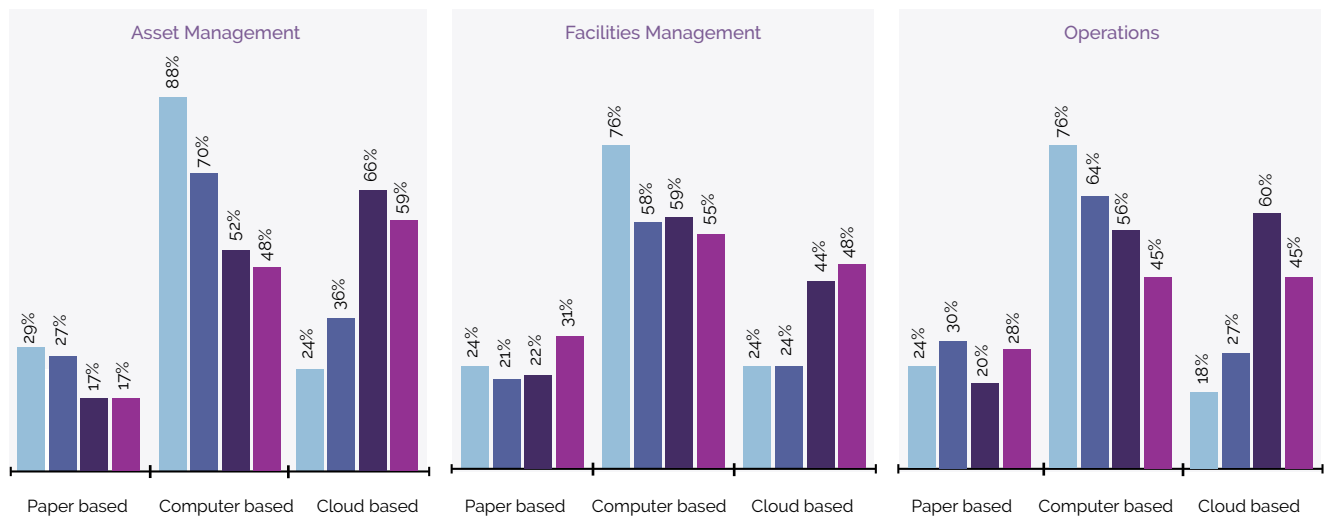
Q. On the projects where you consider "whole of building, whole of life" costings, how much impact does this have on the final decision (when compared against cost to construct)?

Client asset management

The client group were asked what types of systems they use for asset, facilities and operations management (paper, computer, or cloud-based).

The majority of clients use computer-based systems for each of asset, facility, and operations management, with cloud and local solutions evenly split across assets and facilities management and operations. The proportion with cloud-based systems has declined in 2021, however this may simply reflect sample differences from 2020 to 2021.

Systems used by clients for asset, facilities and operations management



■ 2018 actual ■ 2019 actual ■ 2020 actual ■ 2021 actual

Base: All clients surveyed; 2016 n=33, 2017 n=26, 2018 n=17, 2019 n=33, 2020 n=38, 2021 n=29

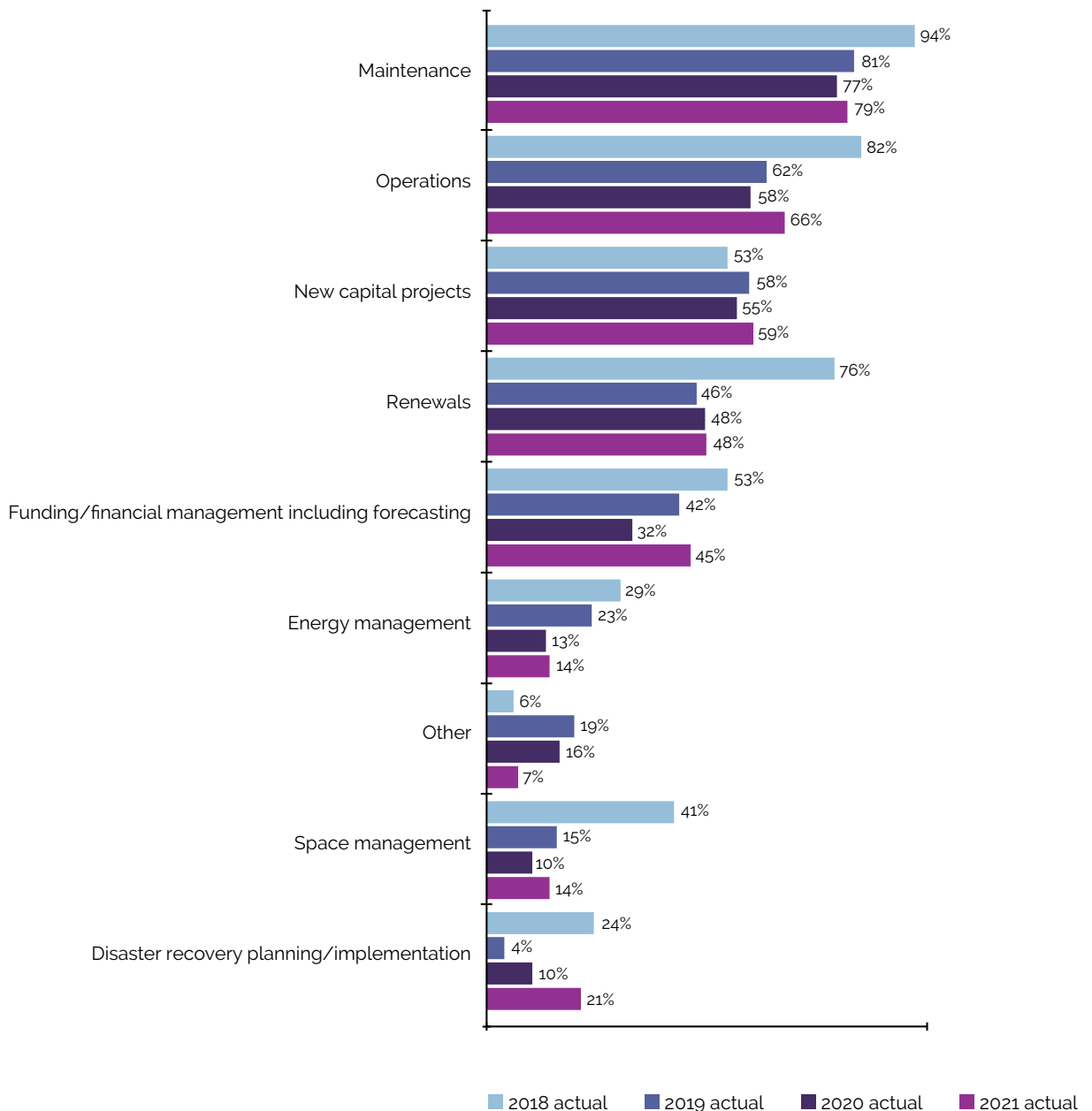
Q. What kind of information management processes or systems do you use for asset, operations and facilities management?

Note: Clients can use more than one type of system (and could be using all three).

Those clients who use computer or cloud-based systems were asked which ones they use. As in 2019, many businesses are using a blend of systems selected to suit their specific needs (rather than relying on just one or two). However, the key systems that several were using include IBM Maximo, SPM, BEIMs, BIM360, and Microsoft Office systems.

The client group were asked what their systems are being used for, regardless of the type of system. From the options given, the majority said that their systems are being used for maintenance. Operations and new capital projects are the next most frequent uses, followed by renewals and funding. This is in line with 2020 data.

What the systems are being used for



Base: All clients surveyed 2018 only n=17, 2019 n=33, 2020 n=31, 2021 n=29

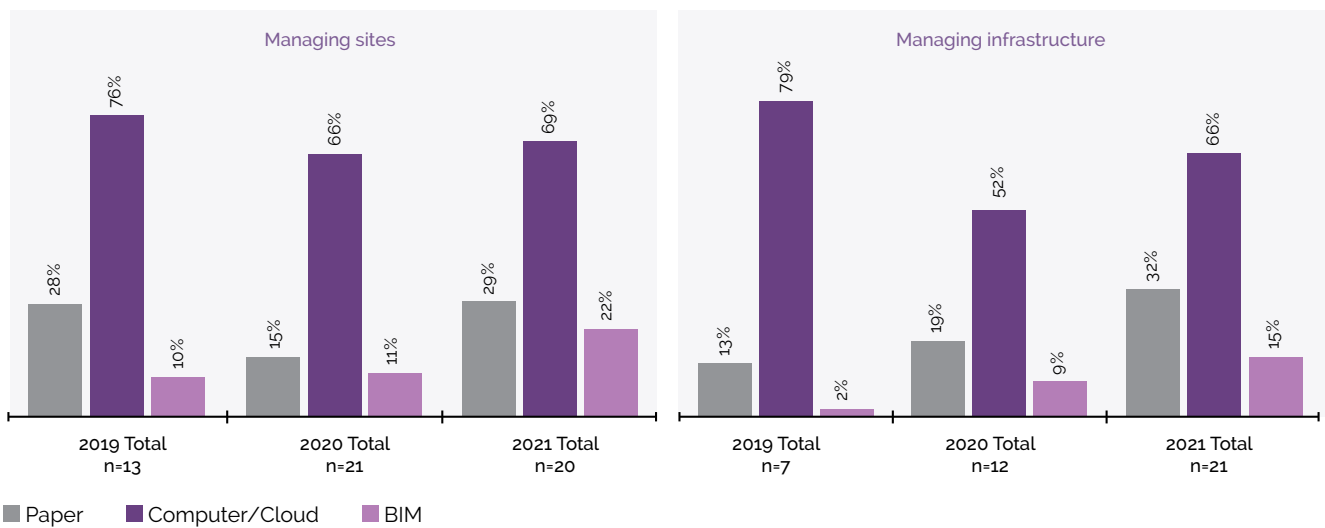
Q. What are you using these systems for?

The client group was asked to specify the proportion of their business systems used for managing constructed assets that are paper, computer, cloud, or BIM-based systems. This was split by building-focussed systems (sites) and horizontal infrastructure systems (infrastructure). Participants could specify more than 100% (as they may use multiple systems).

Both sites and infrastructure systems are largely computer or cloud-based, though the reliance on BIM increased in 2021 for each type of management. Sites using BIM increased from 11% in 2020 to 22% in 2021, while infrastructure using BIM increased from 9% in 2020 to 15% in 2021.

Please note – sample sizes are small and results are indicative only.

Proportion of business systems using paper, computer, cloud, or BIM-based systems



Base: Refer n=

Use any type of system for managing sites or horizontal infrastructure.

Q. What percentage of your business systems for managing constructed asset are paper, computer, cloud, or BIM-based systems?

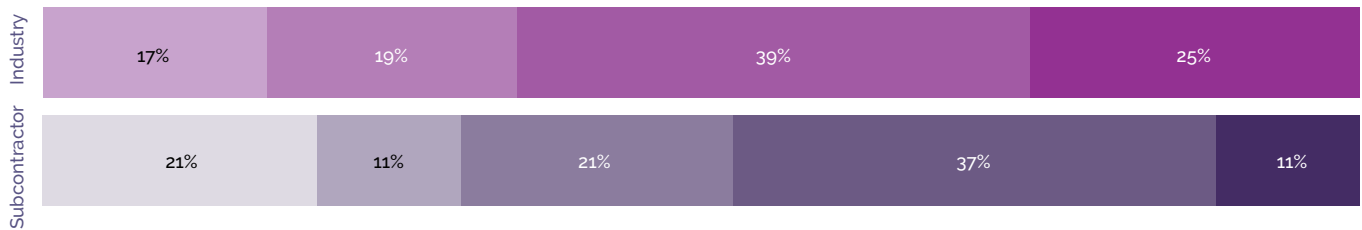
The positive impacts of BIM

A new set of questions were added in 2021 that look at the impact of BIM for both the industry and subcontractor groups.

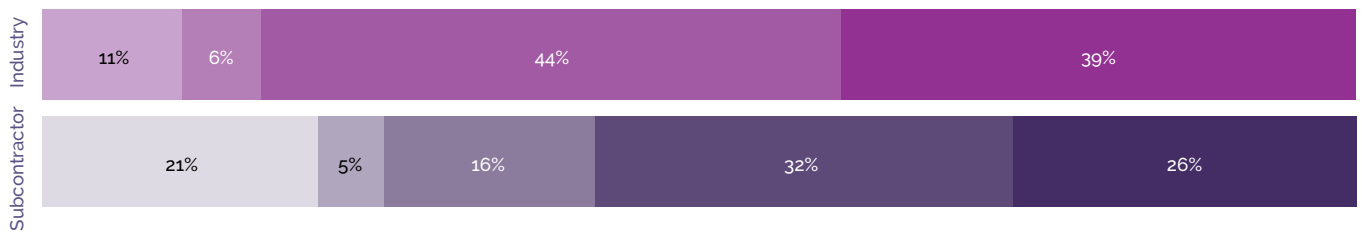
Both groups were asked to rate the impact of using BIM on their business profitability, the quality of outputs, and business efficiency. It is unsurprising that the industry group is more likely to see positive impacts across each of these three areas when compared with subcontractors, given the industry group's wider use of BIM as well as the fact that a third of the industry group are BIM professionals whose job it is to ensure efficient use of BIM. Among the industry group 64% have experienced a positive impact on profitability, 83% have improved outputs, and 78% have improved business efficiency. By contrast, 48% of subcontractors have seen improved profitability, 58% improved outputs, and 64% improved efficiency.

The impact of BIM

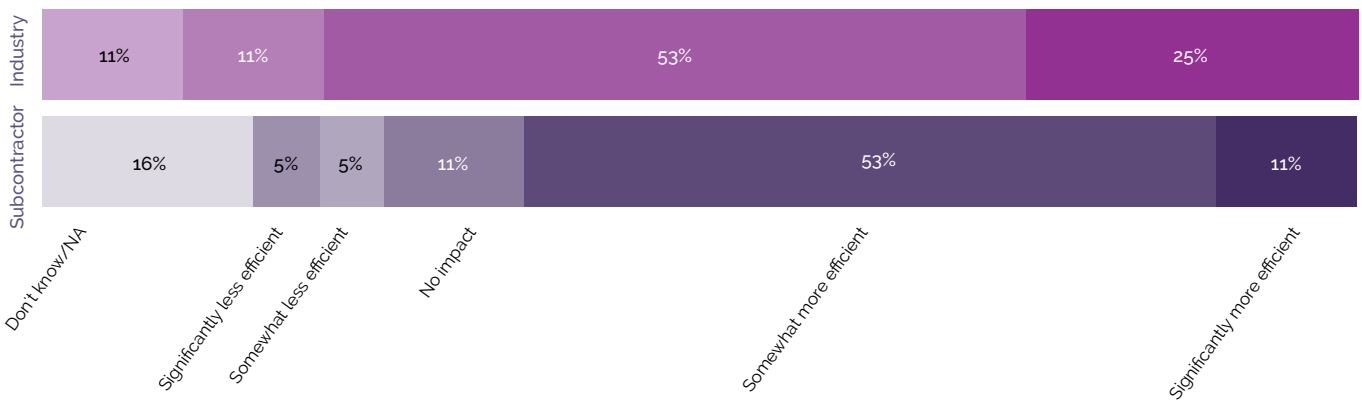
Business profitability



Quality of outputs



Business efficiency



Base: All respondents 2021 Industry n=36; 2021 Subcontractor n=19

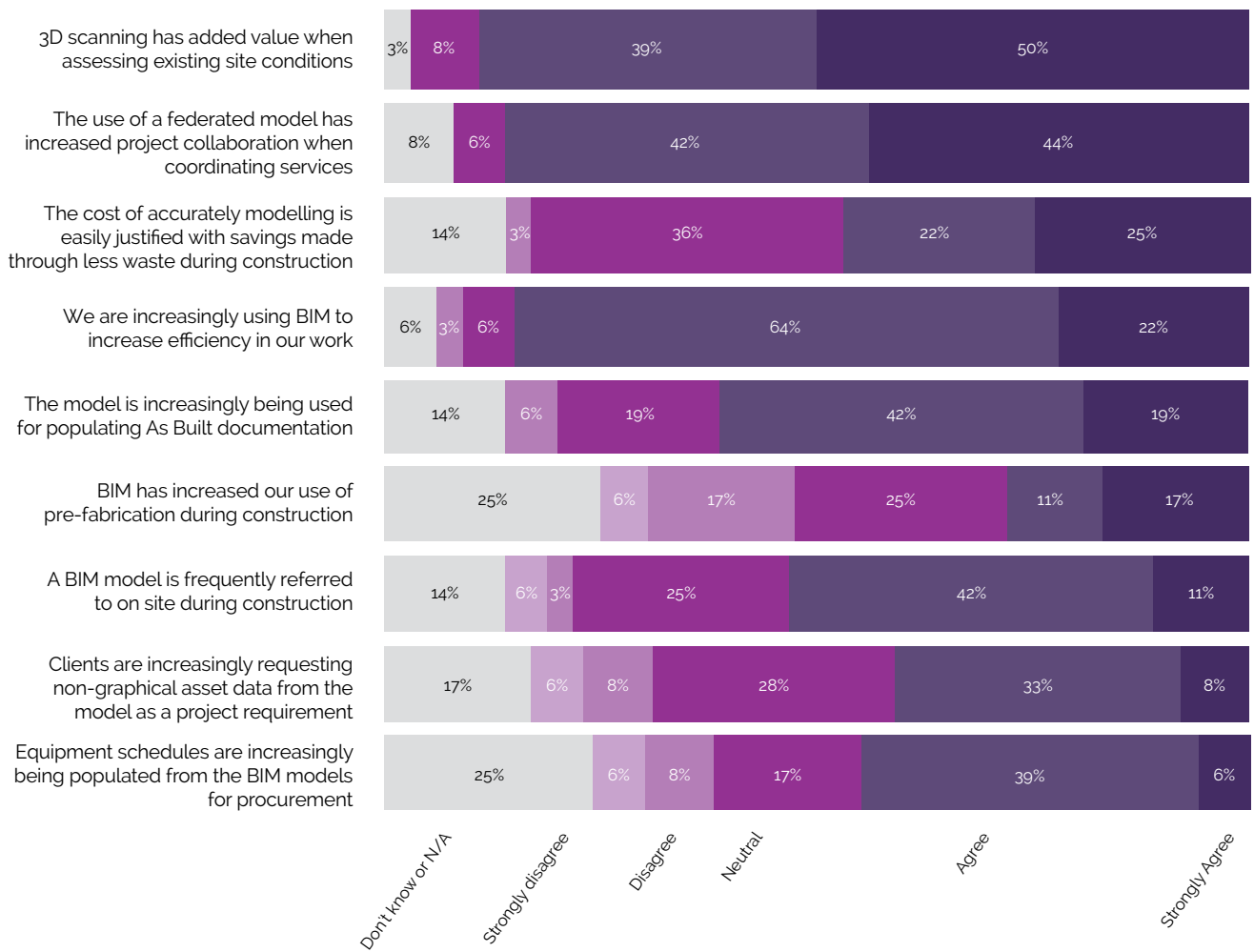
Q. How has BIM impacted your business profitability?

Q. How has BIM impacted the quality of your business outputs?

Q. How has BIM impacted the efficiency of your business?

Both groups were asked to rate the impact of BIM on more detailed outcomes for their business. The most strongly positive impacts for the industry group have been value added provided by 3D scanning when assessing site conditions (50% strongly agree), and the increased project collaboration afforded by the use of a federated model (44% strongly agree). The latter factor was also strongly rated by subcontractors (32% strongly agree that they have increased project collaboration thanks to a federated model). In addition, subcontractors more strongly agreed that they are using BIM to increase work efficiency (32% strongly agree).

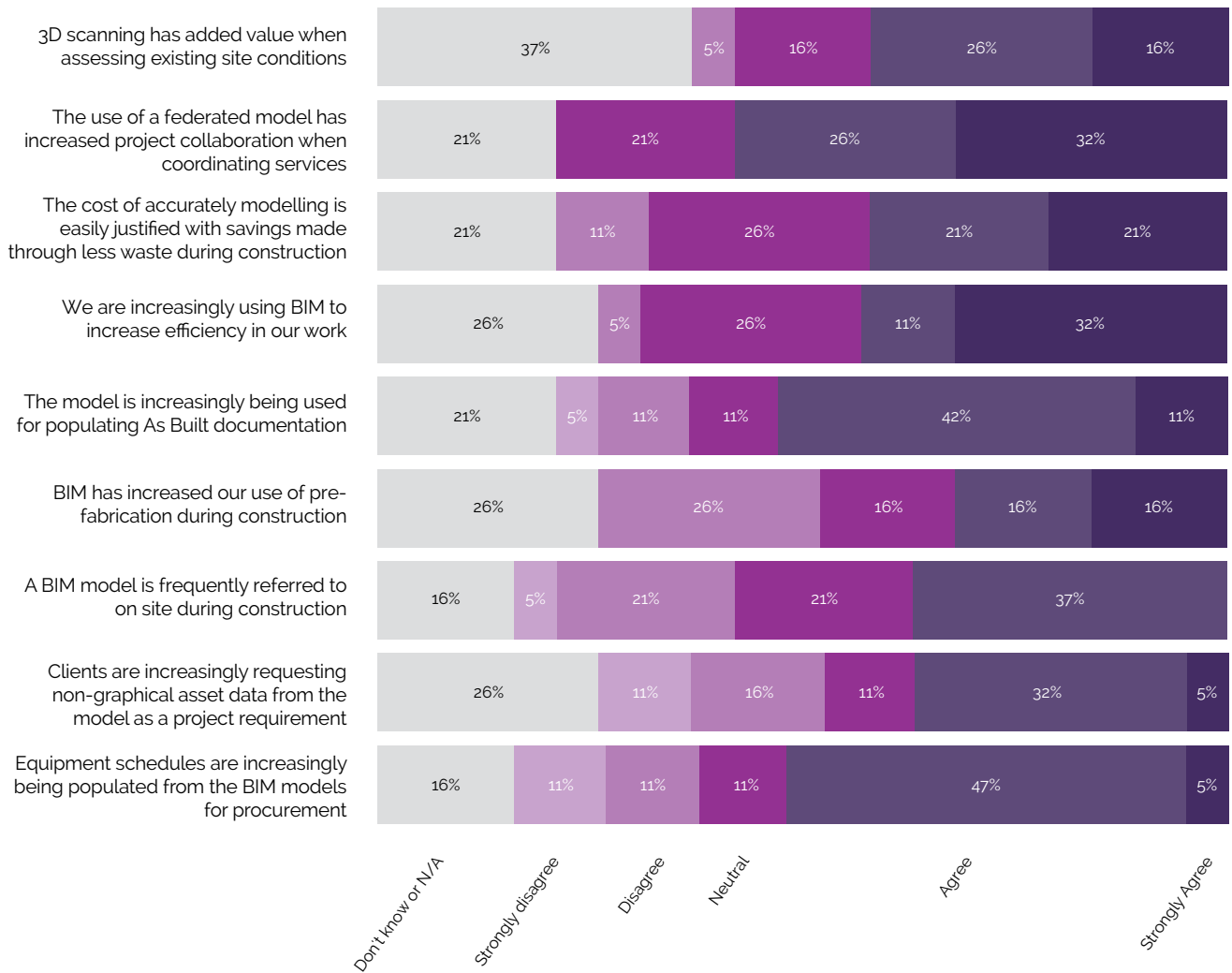
Industry: The value of implementing BIM



Base: 2021 Industry n=36

Q. The following statements relate to the value of implementing BIM on a project and the use of BIM in the production of project completion documentation. Please rate how strongly you agree or disagree with each statement.

Subcontractors: The value of implementing BIM



Base: 2021 Subcontractors n=19

Q. The following statements relate to the value of implementing BIM on a project and the use of BIM in the production of project completion documentation. Please rate how strongly you agree or disagree with each statement.

The positive impacts of BIM

Industry

Industry respondents reported the positive impacts of BIM centred on:

- Streamlining time, costs, and workflows (mentioned by 28%)
- Better coordination (mentioned by 25%)

Streamlining time, cost, and workflows:

“BIM expertise inhouse has allowed us to show our clients better ways to work, one client said he saved 200 hours of time by using scanning and modelling prior to prefabrication of steel on his site. It has allowed us to build really strong enduring relationships based on trust and working more collaboratively, meaning our involvement with clients is much deeper than just providing information.”

“Ability to work remotely across several projects/clients simultaneously.”

“A more integrated design-analysis-document workflow. Easier automation of repetitive tasks. People having pride in higher quality outputs. New 'information management' roles.”

“Less queries from site, higher level of engagement from the draughting team, better collaboration and communication with other project partners.”

“Great value in efficiency and removing the duplication of effort. Better project outcomes.”

Better coordination, which is related to better understanding and clash detection, but also includes on site coordination and coordination between consultants:

“BIM helps make complex information easier to understand for people typically not working in the AEC industry. It is a game changer for stakeholder engagement and leaves little open for misinterpretation.”

“BIM has allowed us to better coordinate our designs with our project partners, meaning the end result is a better set of documents for the contractor to build from.”

“Visualisation, coordination and speed for the most part. Through introduction of additional tools and CDE multi location collaboration has been vastly improved also.”

“Much better coordination of the multiple disciplines involved in documenting our buildings, particularly large scale projects.”

“Reduction in the number of on site variations as drawings are better coordinated.”

Identifying issues or clashes before they get to site – saving money and time as a result:

“We can benefit greatly by receiving accurate 3D models. Design documentation is consistently declining and we find if a job has been modelled the majority of issues would have been picked up prior to us getting underway. Also there is the opportunity of converting into our system, but at this stage it is very dangerous due to inaccuracies.”

“Reduction in the number of on site variations as drawings are better coordinated.”

“Coordinating issues which otherwise almost always would have come back to us as RFIs during the construction process.”

“The utilisation of BIM on site, viewing on tablets has led to increased understanding of the design and reduces installation risks, H&S improvements through site planning and reality capture and removal of risk elements such as secondary steel (facade and services) by quantification and coordination.”

Improved revenue or winning better/bigger projects
(for some their whole business hinges on BIM):

"We are 100% BIM Professionals. Without BIM we would not have a business."

"We seem to win large projects."

"The use of BIM concepts underpins the operation and viability of our business and has done so over the last 25 years."

"Revenue."

"BIM has enabled us to become a BIM consultancy company. We provide BIM services to design, construction and operations of an asset."

"Bigger and better projects."

Better outcomes – for the project, the client, or
downstream stakeholders:

"We continue to be a respected practitioner within industry, both amongst our peers and downstream collaborators."

"Expands what value we can add as Project Managers and Design Managers."

"Improved design communication."

The positive impacts of BIM

Subcontractors

Comments from the subcontractors centred on coordination, as well as accuracy and efficiency – of cost, time, and resources. Within this, several mentioned using BIM as a way to offer more value to the client and be seen to be more professional or at the forefront of industry trends.

- Coordination and collaboration improvements (mentioned by 32%)
- Cost and resource efficiency (mentioned by 21%)

A good portion of comments centred on coordination and collaboration improvements:

“It helps coordinate when the space is really tight. It helps in engineering checks and produces automatic scheduling that helps in early engagement contracts.”

“BIM in design helps to coordinate services and improve planning of routes.”

“The main factor is that during Covid disruptions we are all able to work and collaborate on all our projects from home or satellite offices.”

Accuracy and clash detection was the main factor mentioned by subcontractors. This leads to efficiency, saving cost, time, and resource:

“The ability to import modelled duct straight into fabrication has greatly reduced timeframes and improved accuracy.”

Some specifically mention cost and resource efficiency as a result of using BIM:

“It saves a lot of time on site when a fully coordinated model is presented. We are also able to provide fabrication drawings to our workshop from the BIM model which is really cost effective.”

“It helps with planning the job from start to finish and coordination onsite. It’s very useful when working through issues where I can be on the model in the office talking to my Plumber onsite also viewing the model and working through the issue.”

“The main advantage for us is through the build process. Quite often as the Mechanical Contractor and the most complex trade we tend to lead the coordination process and can drive the outcomes on site. Although this is more work on our part there is less rework due to coordination issues. The checking of scheduling and now taking schedules direct from the BIM model enables more accurate ordering and less waste on site. The As Built process is more seamless as the model is updated throughout the project. A higher level of detail and understanding is provided for the installer and the ability to view the model on site enables onsite solutions to be drawn in real time and sent for manufacture.”

Comparing industry and subcontractor on the positives of BIM

Comparing responses from both industry and subcontractor groups, there is agreement on most of the positives of BIM – better coordination, clash detection, and cost and resource efficiency. The most noticeable difference between the two is the nuance in the industry response. They are able to see far more in the way of efficiency from BIM, across a wider range of activities. At present for subcontractors the efficiencies are largely onsite, rather than in their own shop drawing or design process.

Barriers to BIM uptake

Industry

Not all parties being on board or aligned is the main issue identified by the industry group. This lack of alignment refers to how well construction stakeholders agree and match on deliverables, skills, expectations, and engagement with BIM. In addition, client preparedness and understanding of (and willingness to use) BIM was mentioned by more than a quarter of survey those in the industry group. At a smaller scale, there were a number of comments around the training and experience of staff – both internal and external consultant staff, and issues with platforms and file types.

- Not all parties aligned, on board, or at the same level (mentioned by 36% of participants)
- Client preparedness, alignment, and knowledge (mentioned by 28% of participants)
- Training and experience of staff (mentioned by 16% of participants)
- Platform and file type issues (mentioned by 14% of participants)

Client preparedness, alignment, and knowledge:

“Clients not understanding what they require. Not always having the budget on the project to fully utilise BIM. ‘Old school’ engineers/ PMs being dismissive of BIM”

“Client’s inability to understand benefits.”

“Almost all of the frustration arises with the contract – as an unworkable process is signed off on at tender and the BIM/digital staffing doesn’t occur until ground has been broken. There is a fundamental lack of status in the pre-contract phase of design (and therefore BIM).”

“Being procured correctly upfront by the client so the model can be developed for their needs from day one.”

“BIM not being a requirement from the outset by clients/designers either due to cost implications or appears to be lack of knowledge to commit to fully BIM the process.”

“Lack of understanding and readiness by clients, and lack of defined client BIM standards.”

“Our Engineers do a lot of horizontal construction, so there is a disconnect between Civil Engineering and BIM – our clients often struggle to understand the LOD Scale as it relates to the NZ BIM Handbook, many still believe the higher the LOD, the more it should look like reality.”

“Resistance to change.”

Not all parties aligned, on board, or at the same level:

“Pretty simple one – design and delivery teams naming of information. It’s all over the show and challenging for clients at handover. Software licensing for teams on projects. Companies are still holding off as long as possible before they start modelling (mainly services).”

“We still have those that see BIM as an extension of creating drawing sheets, and will only focus the accuracy within those detailed areas – leaving the rest of the model potentially inaccurate.”

“We still struggle to get all consultants to fully understand global coordinates and the majority of the time have to spend time repositioning the various trade models to match.”

“We don’t have a dedicated BIM manager. We have no formal BIM strategy or execution plan template/s. Directors don’t fully appreciate the BIM universe – still thinking in a CAD mindset.”

“Scope gap, “digital silos”, disclaimers, procurement understanding and scoping.”

“Integration of information varies, some smaller consultants are still using 2D CAD, as are construction contractors.”

“We are often frustrated by the need to defend so-called ‘uncoordinated’ models, when in fact it is often unmodelled elements or late information added to the project that are the issue. Equally, the traditional subtrade attitude that design models are worthless only serves to justify their practice of deviating from a coordinated design.”

“The cost estimation side of BIM has not been fully utilised by the industry and until it does our use of BIM is limited to what the consultants decide to provide as part of their design packages.”

“The frequent inability of architects/ structural engineers to work within a real world coordinate system. Constant use of -999 as an elevation for non 3D data by Surveyors. Consistently not being involved in early stages of the BEP drafting process. An expectation that we attend coordination meetings where 80% of discussion sits within the building envelope.”

Training and experience of staff – including how they value and promote that experience:

“Lack of suitable training to use software.”

“Doubling handling of work to produce the BIM, lack of general knowledge of BIM procedures and software have been the main issues.”

“Staff training and engagement, Architects use BIM daily but get landed with many pieces of work ie: adding metadata which is not their interest area, therefore buy in to completing BIM to a deeper level can be difficult.”

Platform and file type issues. Comments included issues with access to platforms, how they work, and how file types work across platforms:

“The main obstacle I find is the lack of a rigorously defined and used common project data foundation for the project.”

“Lack of knowledge in house and in the wider ‘ecosystem’ of BIM techniques. Difficult interoperability between platforms ie GIS, Revit, 12D, Civil3D, ArchiCAD.”

“File compatibility behind different practices and disciplines.”

“No real standards, mostly a tenant so get models as is (from owner) and little if any common standards.”

“Compatibility issues between ArchiCAD and Revit. All parties are not using the same software (typically Civil/Arch).”

Barriers to BIM uptake

Subcontractors

Subcontractor group respondents were asked what they see as the barriers to using BIM. Responses were grouped into main themes:

1. Poor models, information, and platform interoperability – mentioned by 24% of participants
2. Other trades don't follow the model – mentioned by 16% of participants
3. Cost and resource demand – mentioned by 26% of participants.

Some comments from subcontractors illustrating these main themes are outlined below.

Poor models, information, and platform interoperability:

"Lack of understanding of our requirements."

"We expect a coordinated LOD 250-300 model from consultants but what we get is opposite. The information on the consultants drawings and model sometimes do not match. We have to spend a lot of time correcting and coordinating a model."

"Poor quality models that are not up to date."

"On many jobs we use BIM information to price and produce shop drawings and As Built information, however don't do any coordination other than structural. On those jobs we are tasked with real coordination, a BIM manager who has some real world experience, an understanding of the trades and the construction process are often missing from the chain and the result is a process with too many road blocks and boxes to tick to efficiently deliver the true benefits to the project. Instead the project can see either steep costs or resistant contractors when important things are actually on the line."

Other trades don't follow the model:

"Contractors on site are not doing according to the model. Therefore modeling and coordination time is wasted."

"The biggest issue we have is if other trades don't follow the model which can happen if they don't buy into the process."

"As the electrical subcontractor we are usually last in the site coordination process. We go after the mechanical, fire and hydraulic trades and usually little time is left for us to coordinate anything of value. Also we go last in the site installation after those same trades and often any BIM modelling that has been done is not followed on site."

Cost and resources demand:

"Lack of requirement/knowledge from clients makes it hard to allow time and cost for BIM professionals."

"The overall cost for subcontractors."

"Resources to drive it in the country."

"Time consuming in the beginning."

Barriers to BIM uptake

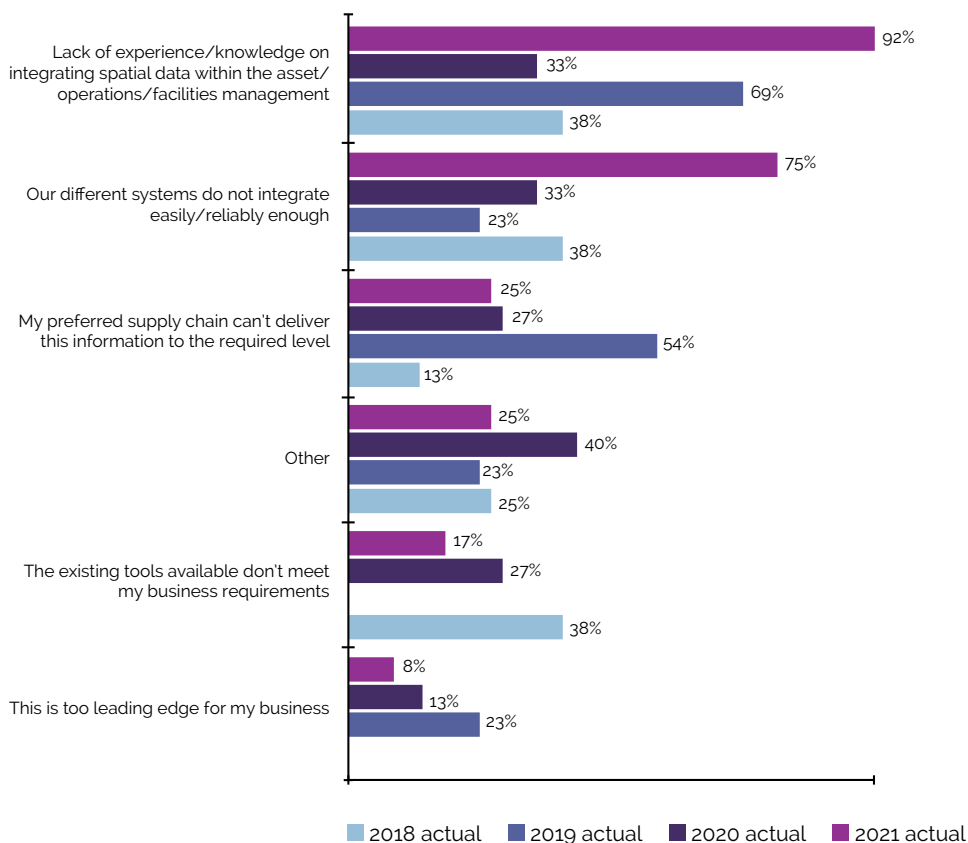
Clients

Those clients who are not integrating digital spatial or asset information cite a lack of knowledge (92%) and different systems not integrating easily (75%) as key challenges to reasons for not considering integration. Both of these have increased markedly on 2020, however, the smaller subgroup sample size may mean this is driven by sample differences. When we compare this to the companies not integrating digital and spatial information, the main barrier to starting to do so is the cost outweighing the benefit to do so (see page 20 for more on this).

The comments from clients around the barriers to using BIM centred on three main issues:

- Internal capability (mentioned by 31% of clients)
- External capability (mentioned by 34% of clients)
- Cost and perceived value of BIM (mentioned by 24% of clients)

Client benefits and challenges using BIM or integrating information



Base: Clients integrating digital spatial and/or asset information now 2018 n=8, 2019 n=13, 2020 n=15
 Q. What challenges have you experienced in integrating spatial and/or digital asset information with other asset information?

Note: this question and the responses were changed in 2018.

Internal capability was a key issue (including both knowledge/understanding and skills) as well as organisational alignment on the use and value of BIM:

“The perceived absence of benefits in a redevelopment context. Perceived significant costs to define current asset information e.g. 3D scan of existing. Lack of in-house understanding that BIM is not just a model.”

“Organisations management’s understanding of BIM is not present and there is no interest either. All moves into adapting BIM are coming from below and against management decisions.”

“Resource to specify requirements, understanding of scaled requirements for the very different complexities of construction we undertake, understanding of how different aspects of BIM will return value to the organisation in the long run. In short, we want it, but challenge the associated cost and resource required, so we struggle to allocate resources to specify and justify what we need and associated cost.”

“Capability at the Project Manager level both in DE (information management) and procurement in general.”

External capacity was also raised as a key issue – including the skills, knowledge, desire, and maturity of consultants and contractors in using BIM:

“Downstream supply chain maturity (subtrades) especially when it comes to data.”

“Industry capability, particularly with smaller consultancies, and lower tier main contractors. They may be the best team to deliver the project – best building design, or most relevant previous projects, or best price, but don’t have the BIM capability or an understanding of how to get people on board to subcontract that work.”

“Some consultants use Revit, others don’t. Experience finds changes and revisions in Revit can be time consuming and expensive. Final tender and construction documentation are not as good quality as 2D.”

“Capability of partners we have no influence over ie. a tenant in wider development.”

“Smaller contractors do not have BIM capacity.”

“Supply chain BIM maturity. Supply chain competitiveness. Project management buy in.”

“The significant misunderstanding in the NZ industry around BIM is a major hurdle that requires re-education of our supply chain. Change management is also a challenge, benefits realisation a challenge. In the medium term we can see renewed interest in BIM from many asset owners due to the release of ISO 19650 that provides clarity on how the process is established and driven from the client’s perspective, which will support better understanding of BIM by wider industry.”

Cost and perceived value of BIM:

“On smaller projects the cost of BIM is difficult to justify.”

“On upgrade projects the base build BIM model does not often exist. This will make the cost of modelling unfeasible.”

Lack of understanding:

“Not knowing what we need to specify, how to specify requirements and how to ensure that we get the relevant information in the correct format that adds value and can be used.”

“Challenges with collective understanding of LOD for construct vs LOD for As Built with O&M manuals, warranties etc.”

“Clients & contractors are unsure how to use BIM.”

Comparing the barriers to BIM uptake across industry, subcontractors, and clients

The main issues for industry in uptake of BIM are that not all parties are aligned, and that clients lack preparedness, alignment, and knowledge around BIM. That lack of alignment manifests for subcontractors as both poor models from consultants (not designed for subcontractor use) and other subtrades not following the model. Effectively all parties are acting in a siloed way from the subcontractor perspective. For clients, that lack of alignment comes in with internal and external capacity and preparedness for BIM, as well as the difficulty in demonstrating the benefits of BIM to the wider organisation and decision makers.

What is required for greater use of BIM?

Enabling increased use of BIM within an industry and subcontractor practice – industry

Industry group respondents were asked what would need to change for their company to use BIM more often. In 2021, 22% of participants said nothing – they were already using BIM on all projects now. This represents a decrease from 35% saying so in 2020.

Beyond this, the main points raised in 2021 included comments centred more on client acceptance – especially around the cost involved to get good outcomes (and understanding the value of those outcomes). The lack of skilled workers or experience were also an issue – there’s a need for increased training as more activities are undertaken in a BIM environment. In addition, as in 2019 there were comments around common standards and file types, as well as more consultant and contractor use and engagement.

Client acceptance and specification of BIM (28% of participants mention this):

“An appetite at the highest level to scope the digital workflow prior to tender.”

“Clients accepting higher fee costs for 3D work/coordination.”

“Clients committing to it and seeing its value.”

“Cost side of BIM needs to be adopted across the wider industry.”

“More owners modelling existing conditions. 95% of buildings we occupy are not new (as in last decade).”

“We are a BIM professional. For us to use it more there needs to be steadily increasing demand that we stay at the forefront of, and continue to develop our skill and knowledge base.”

“We only use BIM, the issue is getting higher quality LOD and getting paid to deliver it.”

“We use BIM internally to improve our process, but are not often exposed to the client as they don’t ask for it or are willing to pay for it.”

More skilled workers and training (16% of participants mention this):

“Educating the industry and design professionals developing skills to easily provide BIM and construction professionals through the supply chain to use what is created in collaboration with the project team and designer. Clients need to be educated on the benefits and use of BIM. Ideally it should be government led to ensure industry.”

“Hire more experienced staff and more training of staff.”

“If BIM was a critical skill it would make it much easier to get that person with 10 years’ experience in BIM and other digital areas such as scanning and lidar. NZ cannot produce these people as we don’t have the expanse of work yet.”

Better quality and more alignment of files and platforms (11% of participants mention this):

“More widespread adoption of open standards and less push from certain players in the supply chain to push everything towards Autodesk. The current approach is unsustainable and adds significant cost for adoption and is not always the best solution to the problems organizations want to solve. There needs to be acceptance that one solution doesn’t solve all problems.”

“The use and application of a rigorously defined and used common project data foundation for the project. An example is the utilisation of a CAD-based 3D datum cage that is able to be utilised by all BIM and CAD software used across the project.”

“Total compatibility of data between CAD platforms.”

More consultants and contractors open to and using BIM (14% of participants mention this):

“A greater focus on BIM related to Civil Engineering among the design team – our survey team currently gets everything it requires from BIM.”

“Having consultants modelling at earlier stages within projects would be appreciated.”

“Engineers are better geared to providing models. More suppliers providing model content.”

“In house we already do as much as possible but getting others on board is a slow process.”

“More involvement from Civil/Landscape in the planning around BIM execution. More acknowledgement/celebration of the lower rate of RFIs at the construction stage on BIM projects.”

Enabling increased use of BIM among subcontractors

Industry group respondents were asked what would need to change for their company to use BIM more often. This was asked as an open-ended question.

The main themes of the comments were centred around getting more of the industry on board and collaborating, working from the same place – from clients to contractors to consultants. The comments provided included:

More contractors using BIM, particularly main contractors, and more collaboration among stakeholders (37% of subcontractors mention this):

“More collaboration with other project parties and more product BIM families.”

“We would need more disciplines to use BIM and to have open access to the project BIM model and setup project collaboration through the build phase.”

“Hydraulics is generally not a design build trade so therefore the design is normally done before we are engaged. We generally use BIM when the client or main contractor is using it.”

“Better planning and execution from mechanical contractors to involve all parties.”

“The BIM As Builts needs to start filtering down into the maintenance sphere. One benefit of this is we would have a record of every cable in the building for ongoing works. Another would be being able to have a common document to say how many Type A BMS peripherals are in the building and when did they get checked last.”

“All our projects are BIM driven because it is being implemented by clients and main contractors. So as long as clients and consultants are driving BIM at an early stage, we will continue to do so during installation.”

More resource, time, or money to utilise BIM (21% of subcontractors mention this):

“More time between project award and on site works starting.”

“Clients willing to allow time and money for this purpose.”

“Longer lead times, valued in contract at tender.”

Overview: Enabling increased use of BIM uptake across industry and subcontractors

Industry respondents talk about client acceptance and skilled workers, whereas subcontractors tend to focus on collaboration between stakeholders – from client to design, to contractors.

Both have a strong through line of client acceptance, including client understanding and allowance of the costs involved in using BIM – this indicates there may be an expectation that clients take the cost of using BIM on rather than making it an operational cost.

Collaboration between industry parties using BIM – industry

Comments from the industry group in prior surveys indicate respondents believe collaboration between parties in the construction process is critical to increasing the acceptance and use of BIM across the industry.

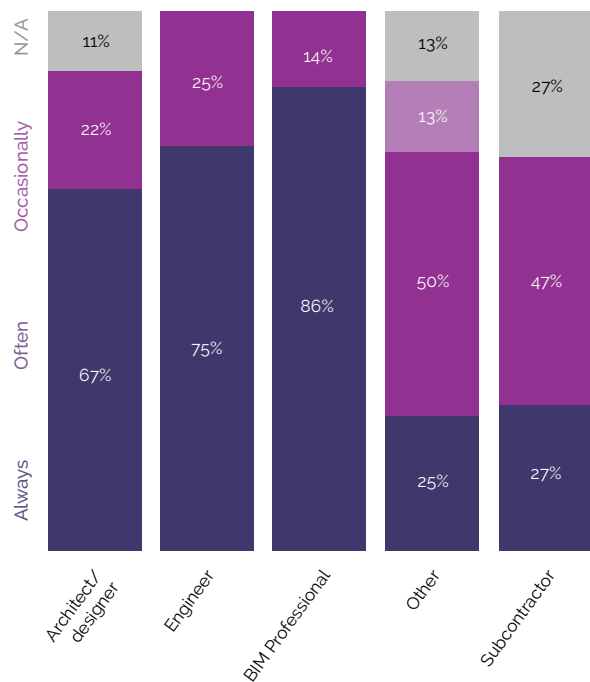
Industry and subcontractor group participants were asked how often they share BIM models with other professions and other businesses involved in a project.

There is a strong level of sharing internally – with at least two thirds of architects, engineers, and BIM professionals always sharing internally – consistent with 2020. This drops when it comes to sharing externally – 33% of architects, 25% of engineers, and 57% of BIM professionals always share externally.

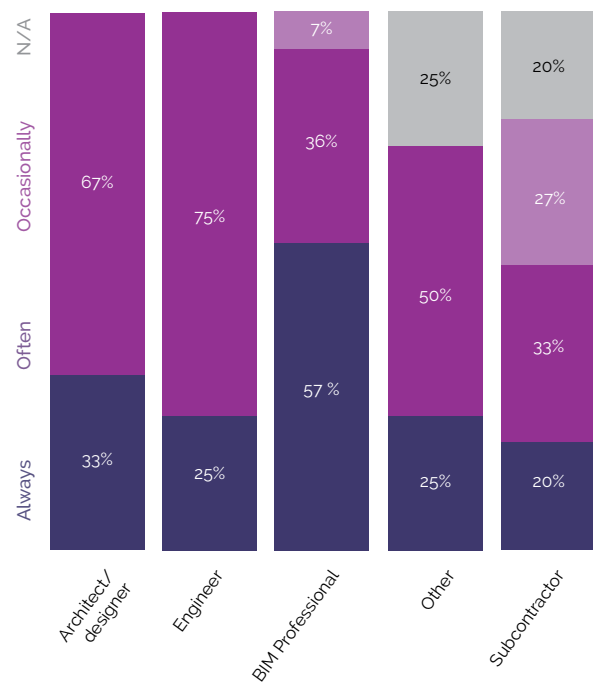
Note: the 'other' category here includes Project Managers, Quantity Surveyors, etc.

Industry sharing BIM Models

How often they share BIM models with other professionals internally



How often they share BIM models with other professionals externally



Base: Clients integrating digital spatial and/or asset information now 2018 n=8, 2019 n=13, 2020 n=15, 2021 n=12

Q. What challenges have you experienced in integrating spatial and/or digital asset information with other asset information?

As in previous years, enabling increased sharing of models comes down to consistency, standards, and common environments that allow for collaboration. Comments made by the industry group on the need for consistency, common data environments, and collaboration include:

“More cloud based projects. Better integration of common Civil formats in CDEs.”

.....

“More consistent platforms (tenants often don’t have a choice) or more reliable model translation (IFC limited).”

.....

“NZ’s preferred standard would enable easier flow of information.”

.....

“Common data exchange protocols for use in our market ie: .ifc files in x format with x mapping.”

“A consistent way for consultants to share models. At present this happens through multiple different platforms: BIM360, Dropbox, Onedrive, Aconex, Email. This leads to inefficiencies and inconsistencies, a single common industry wide platform would help with this.”

.....

“More common standards for BIM parameters and simpler division of elements and systems for export/sharing would allow establishment of more standardised workflows and tools for interrogating and packaging up models for distribution and receipt.”

In addition, a number of industry participants talked about permissions and disclaimers as being an issue in collaboration:

“Removal of “for information only” to a “Permissions for use” statement (in line with contracted scope of works).”

.....

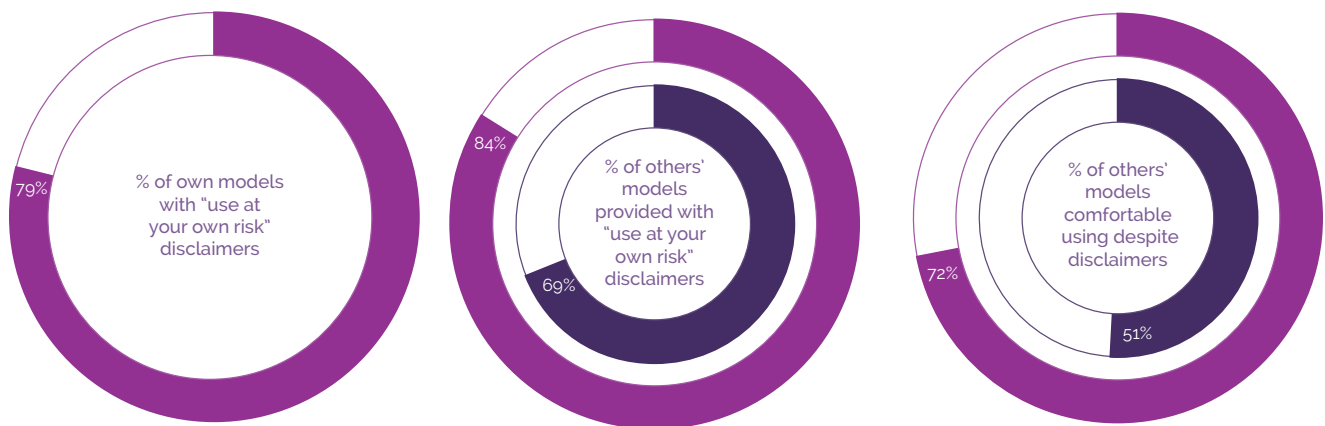
“Assurance that the models are not being used beyond their intended use as defined by the originator.”

“We don’t have a problem with sharing our models with other professions/businesses as long as we all understand why the model has been developed, for what purpose.”

In 2021 a question was added that looks specifically at the issue of disclaimers in models. Four in five models shared by the industry group include an 'at your own risk' disclaimer. The majority of models received by both industry and subcontractor groups have a disclaimer applied to them (84% for industry, 69% for subcontractors). However, even with these disclaimers, industry say they feel comfortable using 72% of models they're provided (despite any disclaimer), while subcontractors say they feel comfortable using 51% of models provided.

BIM Disclaimers

BIM Disclaimers



■ Industry ■ Subcontractors

Base: 2021 Industry n=36; Subcontractor NA

Q. What proportion of BIM models you create have a "use at your own risk" type of disclaimer for other consultants or subcontractors?

Base: 2021 Industry n=36; Subcontractor n=11

Q. What proportion of BIM models you have been provided by other consultant or contractors have a "use at your own risk" type of disclaimer?

Base: 2021 Industry n=36; Subcontractor n=10

Q. What proportion of BIM models provided to you from other consultants or contractors would you say you are comfortable using, despite any disclaimer?

Some respondents added comments around these disclaimers. There is a sense from subcontractors that there is little alternative but to use models, even with disclaimers:

"We have no choice but to use them."

"Maybe not comfortable but what alternative is there? For structural steel drawings in particular, people still ask us if we have checked the drawing and don't understand that the drawings are generated from the model. Very frustrating."

For the industry group several mentioned the need to define limitations of, or permissions, for use:

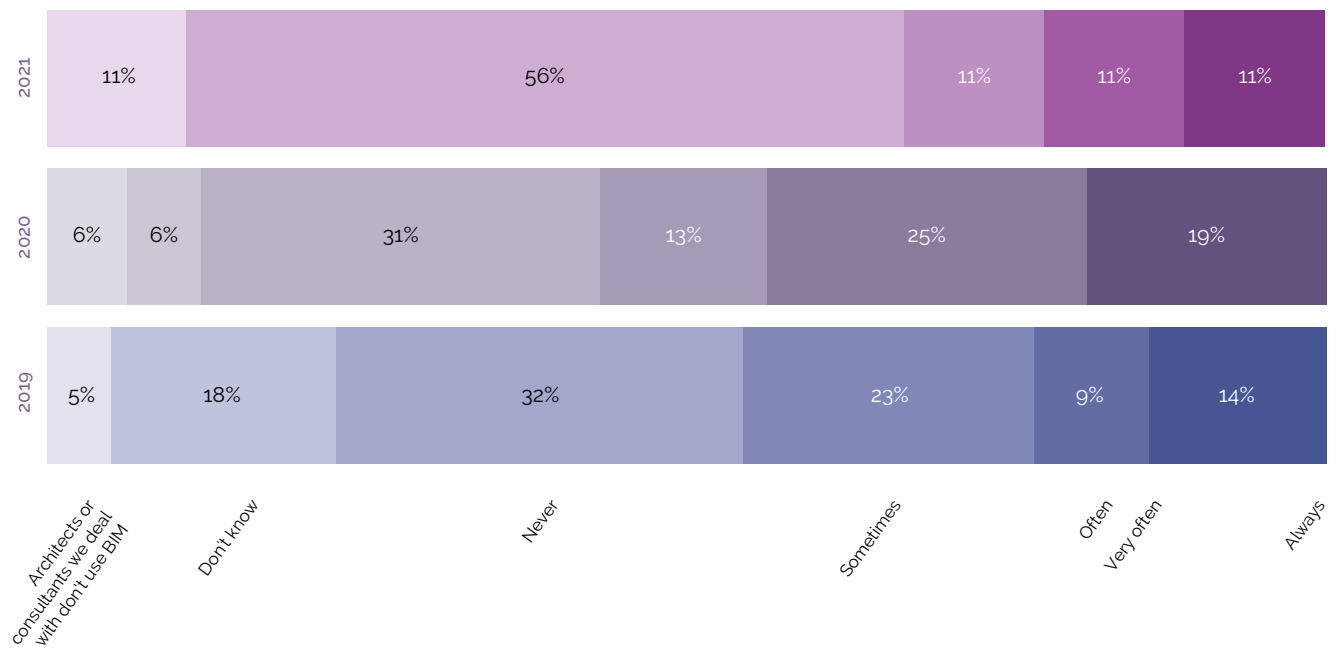
"From a commercial perspective if you wanted to use "disclaimer" models you would need to verify they are fit for purpose; this can take as long or longer than recreating them from scratch. A "Permissions for use" statement at each project phase in line with the contracted works would be a fair and reasonable approach to mitigating this risk and cost."

"We would be happy to use them so long as we understood their limitations of use so that we can pass these on to other parties with respect to how we've used the data."

Sharing of BIM Execution Plans (BEPs)

In 2019, fewer than half (46%) of subcontractors surveyed were getting BEPs at least sometimes on the projects where consultants have used BIM. In 2021 this has increased to 89%, though only 22% say they always or very often receive a BEP where BIM is used.

Sharing of BIM execution plans

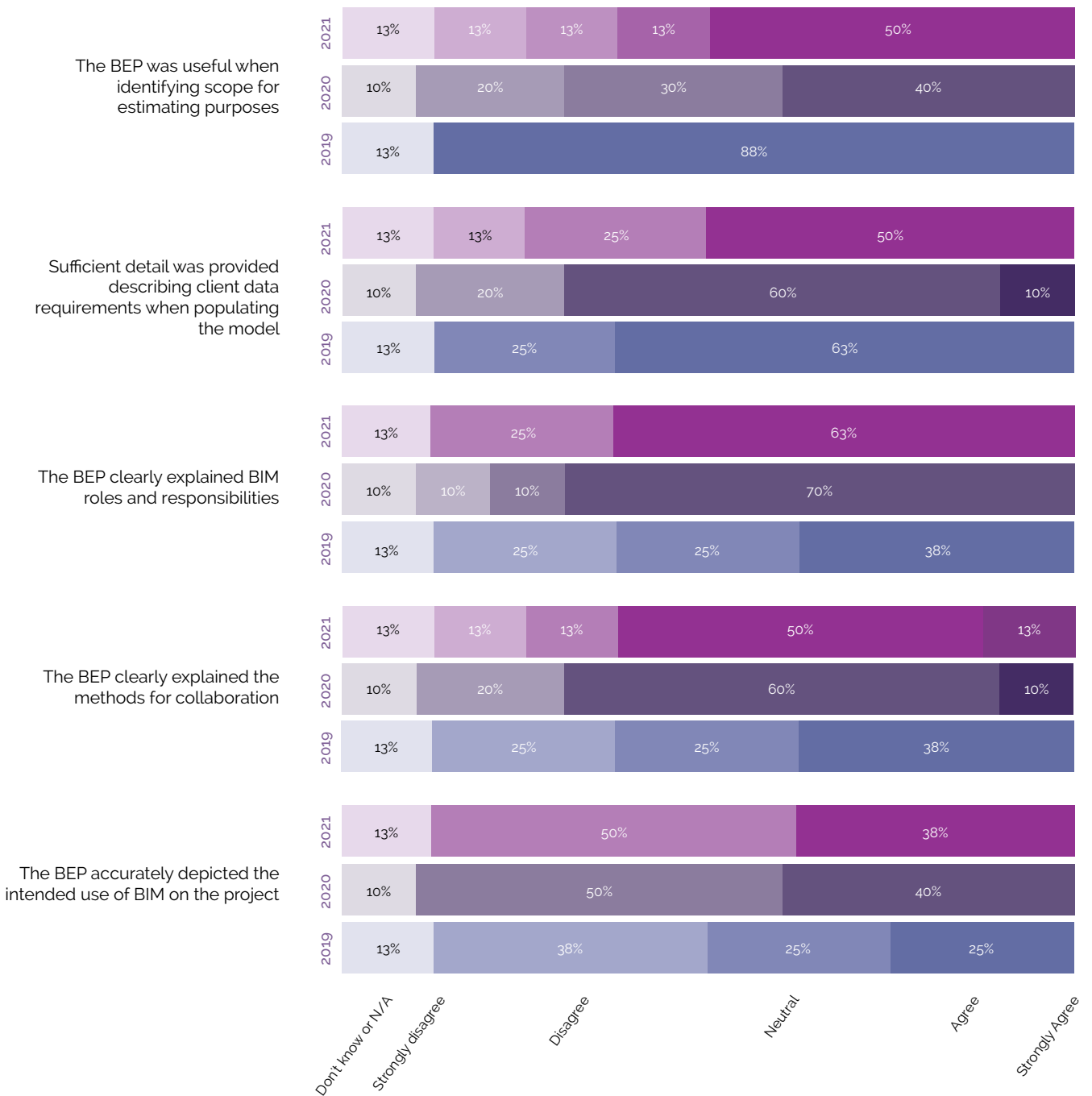


Base: Have used BIM/Plan to use BIM in the next year 2019 n=22; 2020 n=16, 2021 n=9

Q. On the projects where the architect or consultants have used BIM, how often are you issued a BIM Execution Plan (BEP) describing the intended purpose of BIM on projects?

Subcontractors who were receiving BEPs were asked to rate the BEPs they were receiving on several factors. Three in five (63%) agree that the BEP clearly explained roles and responsibilities and clearly explained methods for collaboration. However only half (50%) agree that the BEP provided sufficient detail or was useful in identifying scope. Furthermore, fewer than two in five (38%) agree that the BEP accurately depicts the intended use of BIM on the project.

The quality of BEPS provided to subcontractors



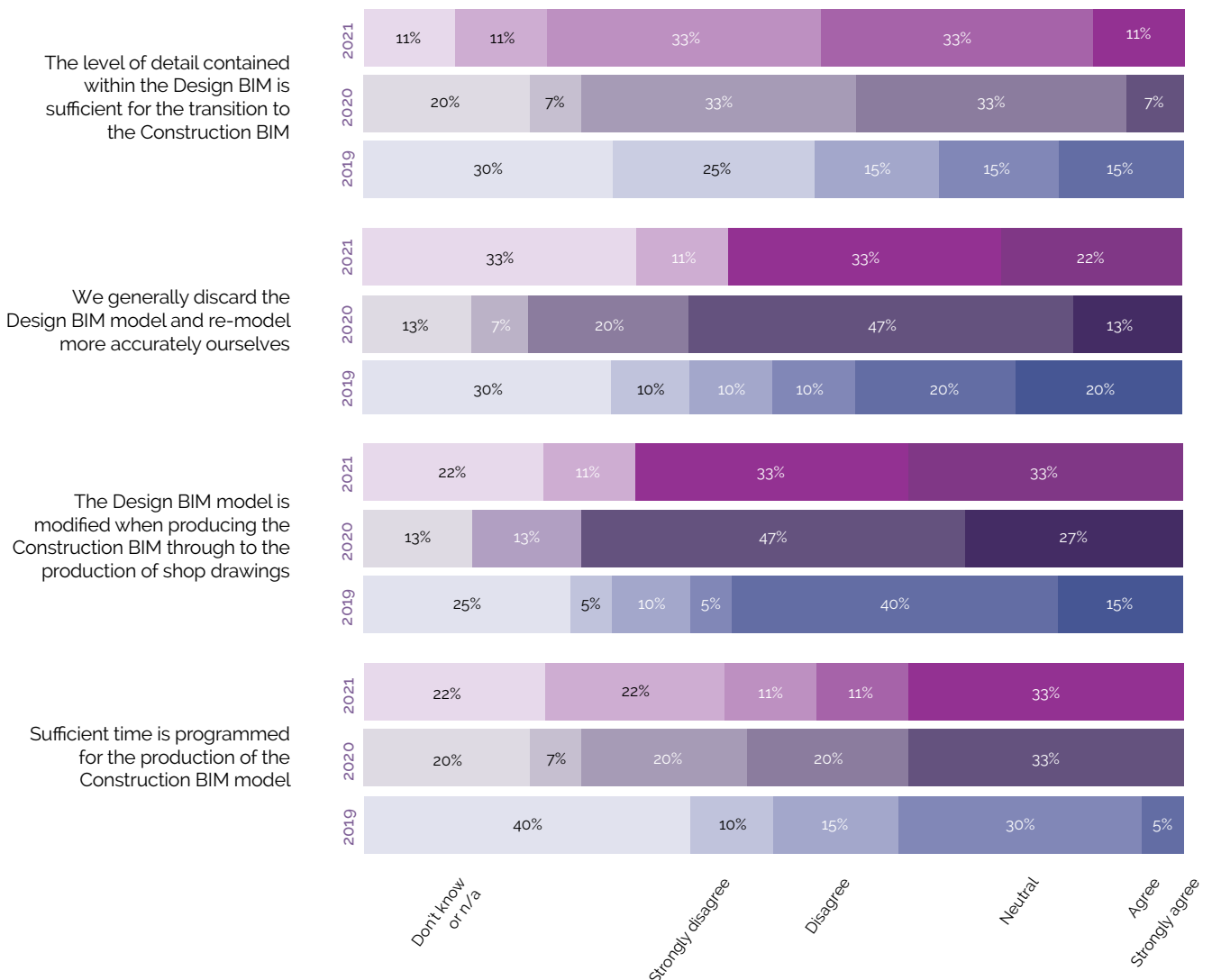
Base: Have received a BEP from a consultant 2019 n=8; 2020 n=10, 2021 n=8
 Q. Across all of the BEPs you receive, please rate how strongly you agree or disagree with the statements below in general.

The transition from the Design BIM to the Construction BIM

The subcontractor group were asked to rate several factors in relation to the transition from the Design BIM to the Construction BIM. Over half (55%) agree they generally discard the design BIM model to remodel more accurately themselves. This has declined slightly from 60% in 2020. 66% of subcontractors using BIM agree that the design BIM model is modified when producing the construction BIM model through to the production of shop drawings. This has also declined slightly from 74% in 2020. 44% of subcontractors using BIM agree that the level of detail in the design BIM is sufficient (up from 7% in 2020).

The general sense from this data is that while there may have been some improvements in the BIM model being developed with construction in mind, there is still quite some way to go to achieve real efficiencies between different parties and trades.

The transition from the design BIM model to the construction BIM model



Base: Total answering the question 2019 n=20; 2020 n=15, 2021 n=9

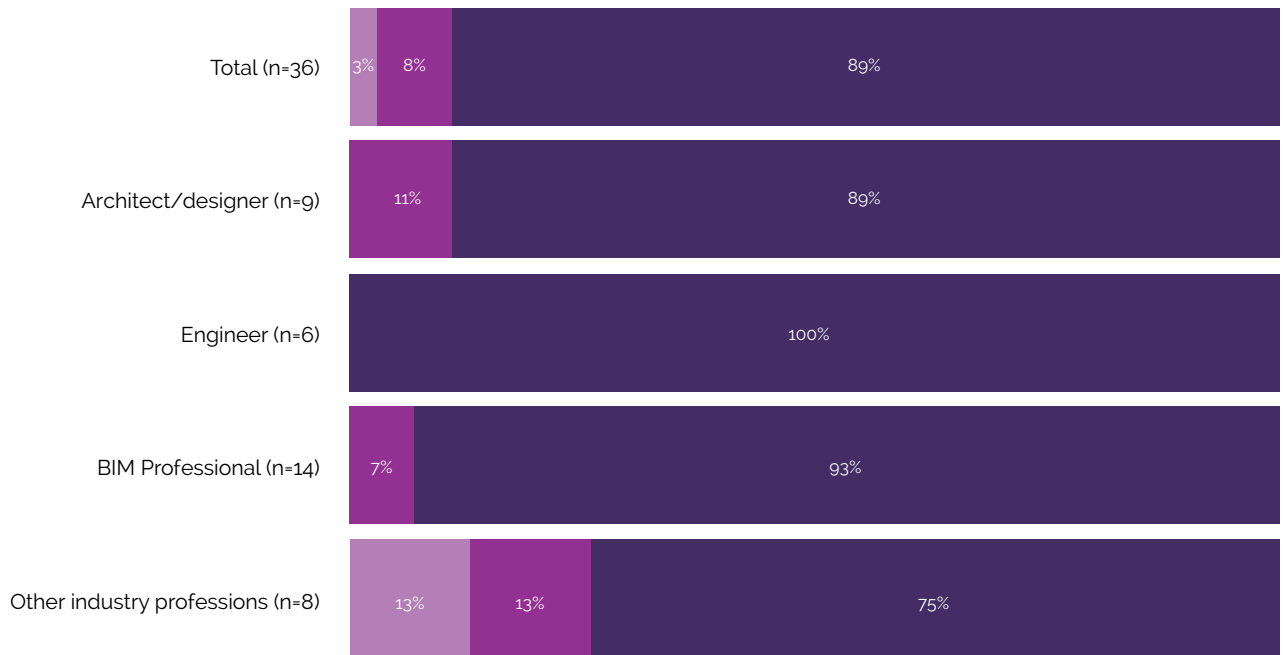
Q. The following statements relate to the value of implementing BIM on a project and the use of BIM in the production of project completion documentation. Please rate how strongly you agree or disagree with each statement.

BIM Handbook

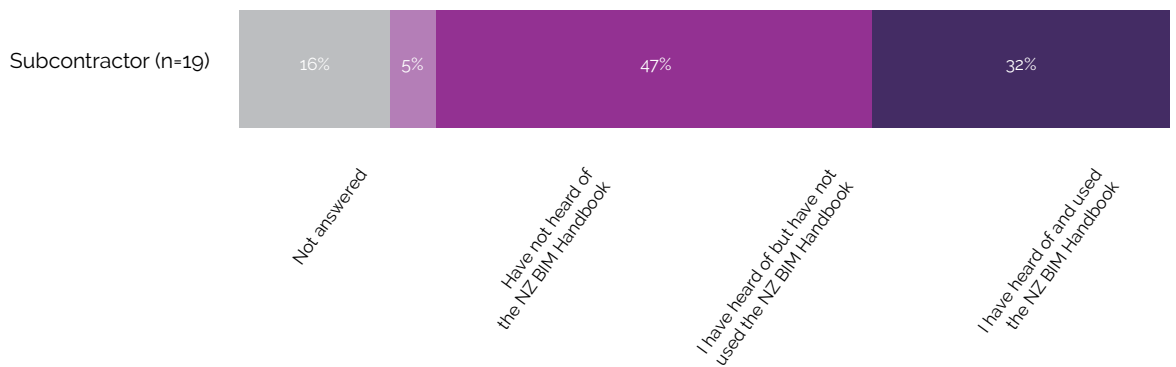
This question looked at awareness and use of the NZ BIM Handbook. Over four in five of the industry group are both aware of and have used the NZ BIM Handbook. This rises to 100% for engineers. Those classified as 'other' (Project Managers, QS, etc.) have a lower use of the Handbook.

One third of subcontractors (32%) are aware of and have used the NZ BIM Handbook, up from 19% in 2020.

BIM handbook



Comparison to subcontractor group:



Base: 2021 Industry n=36, 2021 Subcontractor n=19

Q. Before today, had you heard of and used the NZ BIM Handbook?

In 2021, both the industry and subcontractor groups were asked how the handbook might be improved or updated. The responses centred on three key issues:

Alignment with ISO (mentioned by 26%):

“It needs to come into line with ISO19650. There are areas in the NZ BIM Handbook which are almost in direct contradiction to ISO19650.”

“Create a ISO19659 appendix to outline the requirements and benefits in more detail than section 1.7.”

“Ensure alignment of the term LOD with current ISO standards (19650) and not with the AIA as it currently sits. There is a subtle but important difference.”

More definition of processes (mentioned by 21%):

“Address the client’s BIM requirements and explain the process rather than just provide templates and standards.”

“The MEA schedule could do with a few updates. A little more information about asset information. If we could create a national standard for drawing series naming that would be great for clients.”

“Add more info about the BIM process for each project and the client needs to be specific to it as to ensure the desired type and amount of detail is gained from it. Integrations of BIM into a project need to be specific to it and the client. Including the BIP would be useful.”

Broader focus beyond architects (mentioned by 17%):

“Currently very ‘Architectural-centric’. In particular MEA schedules should reflect alternative workflows ie. infrastructure (piping-plants) & horizontal. MIPD template missing – this should be the key document to it all.”

“Give it broader focus across more peripheral Construction users.”

“There is a need to expand on BIM use in the contractor and subcontractor space. More guidance on BIM use or procurement of BIM for clients.”

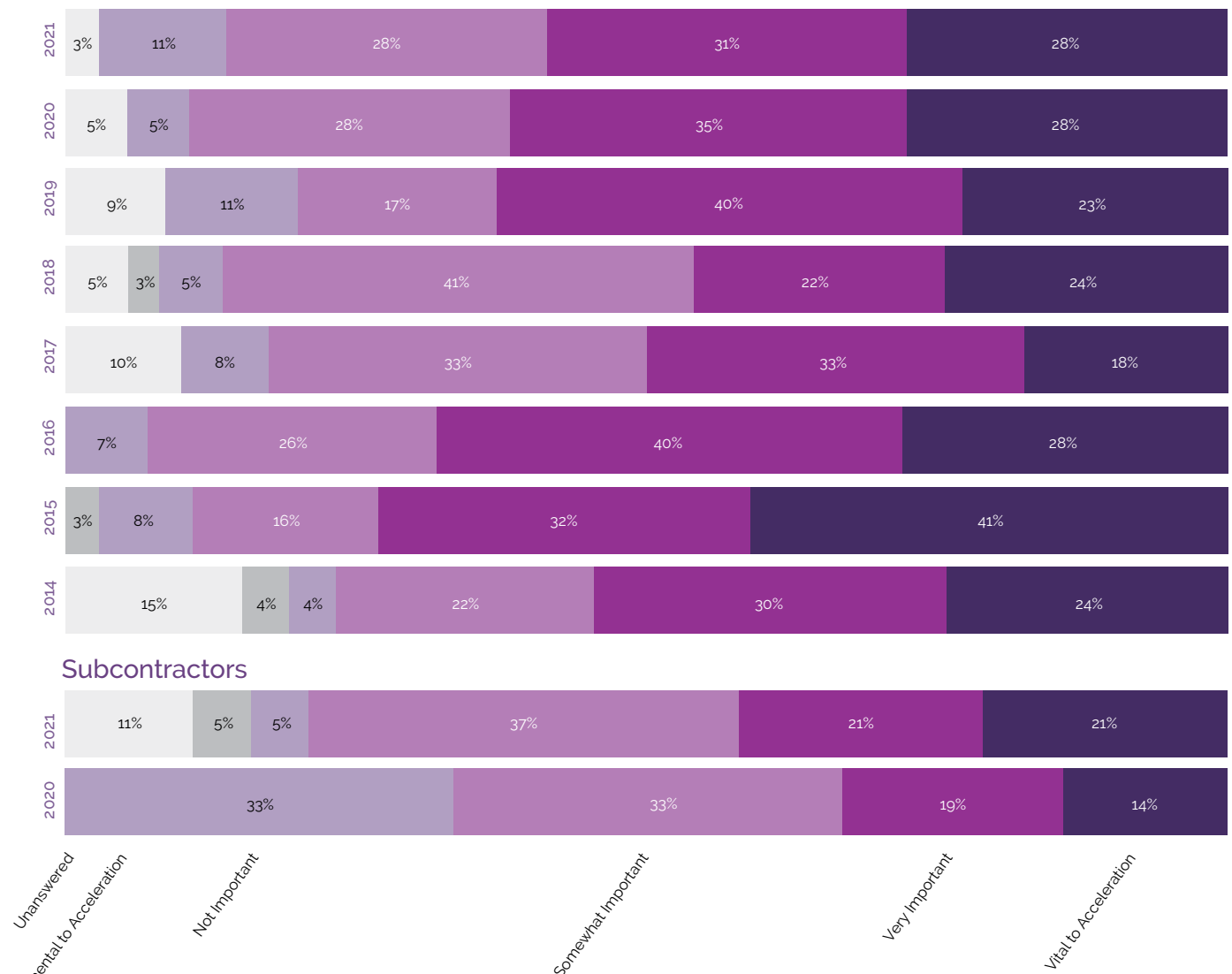
“Do more in general to acknowledge the involvement of Landscape Architects/Civil Engineers & “Horizontal” construction modelling.”

Industry and subcontractors' view on government's role as a client

Industry group respondents were asked about the importance of government's role as a client in accelerating the development and use of BIM in New Zealand. Three in five (59%) say the government's role as a client is at least 'very important', this is stable from 2020

Among subcontractors, 41% say that the government's role as a client is at least very important to BIM acceleration, up from 34% in 2020. Over the longer term, since 2019 the industry group saw the government role as more important to BIM acceleration when compared with 2017 and 2018.

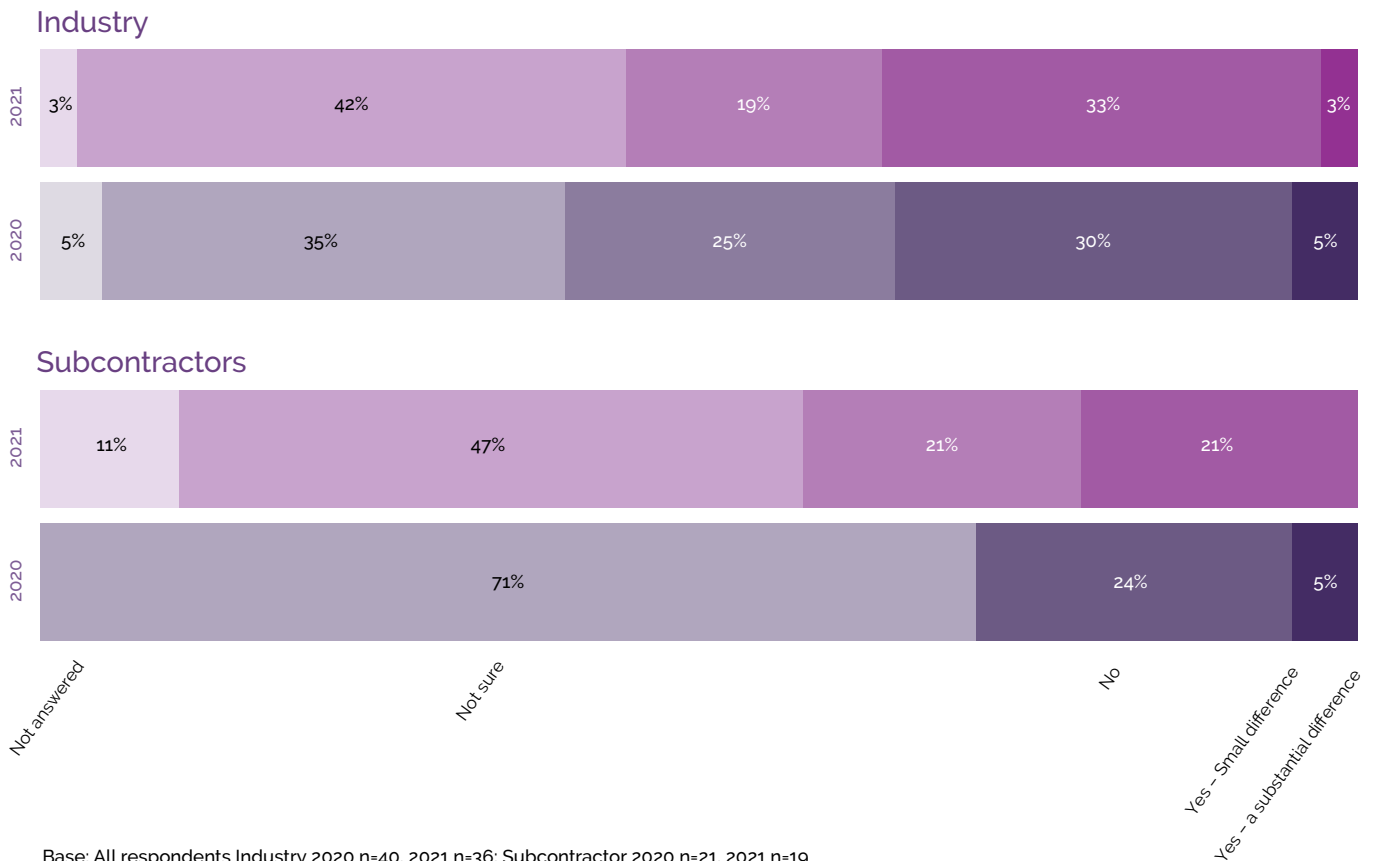
The importance of the government's role as a client in accelerating the development and use of BIM within New Zealand



Base: Industry: 2014 n=46; 2015 n=40, 2016 n=43, 2017 n=40, 2018 n=37, 2019 n=35, 2020 n=40, 2021 n=36; Subcontractors 2020 n=21, 2021 n=19
 Q. Do you consider Government's role as a client to be an important factor in accelerating the development and use of BIM within New Zealand?

A new question was added in 2020 asking whether the changes in government procurement rules had made a difference to the acceptance and use of BIM in the industry. In 2021, only 3% of industry said that it had made a substantial difference, and a further 33% said it had made a small difference. This is largely similar to 2020 results. However, subcontractors show a lift in the proportion who believe government procurement rules make at least some difference to acceptance of BIM. For this group, 21% say it has at least some impact, compared to just 5% in 2020.

Impact of Government Procurement Rules



Control Group Organisations

Industry group organisations include:	
AECOM	Ignite
Archaus	Jasmax
Architectus	Jensen Steel Fabricators
asBUILT	KTA Ltd
Assemble	Maltbys Ltd
Auckland Airport	Patterson Associates Ltd
BECA	Peddle Thorp Aitken Limited
BGT Structures	RevitContractServices
Boffa Miskell	Stantec
Construction Workshop	Structex
CPB Contractors	The Warehouse Group
Envivo	WSP
Holmes Consulting	WT Partnership

Client group organisations include:	
Auckland District Health Board	Summerset
Callaghan Innovation	The Warehouse Group
Dunedin City Council	Transpower
Fulton Hogan Ltd	University of Auckland
KiwiRail	Waka Kotahi NZ Transport Agency
Ministry of Education	

Subcontractors group organisations include:	
Air Action Systems Ltd	Chenery Plumbing Ltd
Aquaheat NZ Ltd	Express Sheetmetals NZ Ltd
Bassett Plumbing & Drainage Ltd	Heatwave Mechanical Services
Building Technologies Ltd	M&E Cad Design Limited
Caldwell Levesque	Nola Electrical Ltd
Callander Electrics Ltd. & Callander Control Ltd.	

All control groups are made up of organisations that have been identified as key users of BIM, or likely to use BIM to manage a portfolio of property or other constructed assets.

Each year, the same organisations are invited to take part in the survey, to see how BIM use and acceptance has changed over time.

Some organisations in all groups wished to remain anonymous and we have not published their names in this report.