BIM in New Zealand — an industry-wide view 2020

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

EBOSS

BIM ACCELERATION COMMITTEE

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
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BRANZ

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BIM benchmark survey foreword

This is the seventh 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. It's objective is to follow progress being made in accelerating the introduction of BIM into New Zealand.

This seven year series follows an industry control group of large and influential organisations in New Zealand's built environment, allowing developments in BIM's introduction to be monitored. This year the control group has been expanded to compensate for changes in the New Zealand Construction industry.

For the fifth year we have also carried out the client survey which focuses on asset owners and managers in order to better understand the progress of BIM use in facilities and asset management. A separate survey of BIM use by subcontractors has also been carried out.

The BIM Acceleration Committee has now completed two full three-year terms and is in the first year of the next term. During this period the overall proportion of industry projects using BIM in New Zealand has risen from 34% to 68%.

Once again the BIM Acceleration Committee (BAC) considers itself fortunate to have had the continuing support of BRANZ, a number of large private sector organisations and several Government Ministries, as we face challenging times with the onset of COVID-19 and all the uncertainty that has generated.

Our sincerest thanks go once again to our partner, EBOSS, for its investment in managing and sponsoring these surveys; and to those organisations forming the industry, subcontractor and client survey groups. These surveys are critical in allowing a very complete view to be formed of the progress being made in BIM's introduction and identifying barriers to its implementation.

Finally, should any reader of this report have any suggestions for improvement, please don't hesitate to e-mail BIMinNZ at **info@biminnz.co.nz**, or raise the issue at one of the regular BIM network meetings now taking place in Auckland, Wellington and Christchurch (see **www.biminnz.co.nz** for more details).

Kind regards

Andrew Reding

ANDREW REDING

Chair, BIM Acceleration Committee

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.

EBOSS

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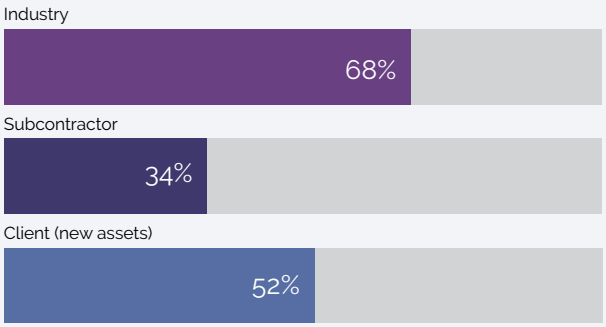
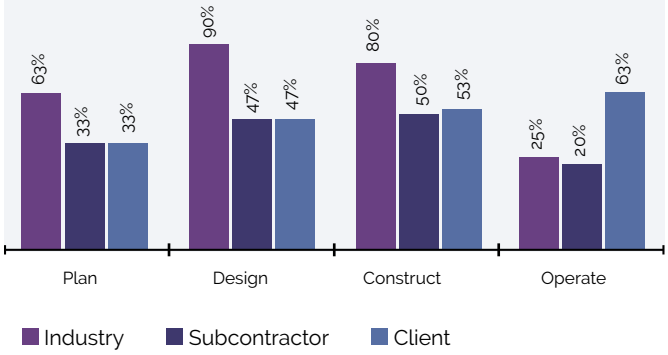
Uptake of BIM across the industry is improving, with strong agreement on the benefits it can offer:

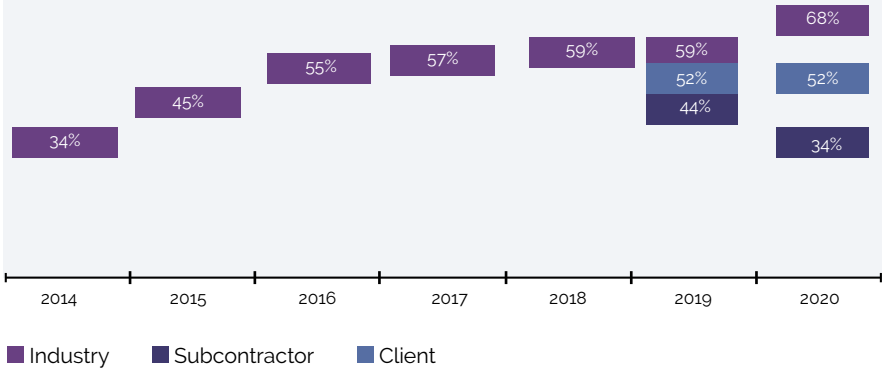
% of projects using BIM in 2020



Use of BIM across project lifecycle



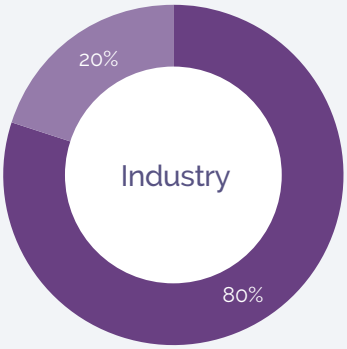
% of projects using BIM over time



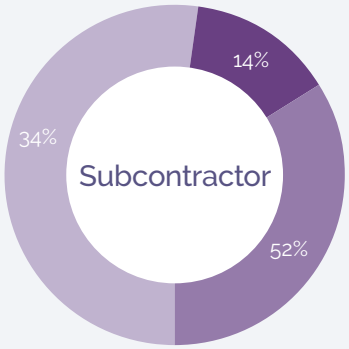
2X

From 2014 to 2020 the proportion of industry projects using BIM has doubled.

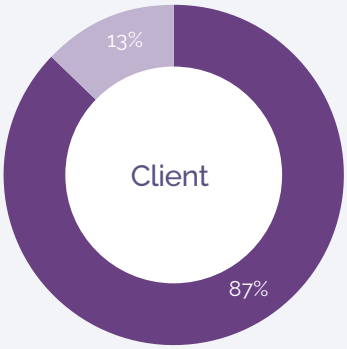
BIM is becoming more embedded across the industry



- Actively push for BIM use
- Use BIM well when it's available
- Tend not to/won't use BIM



The industry group is proactively pushing towards increased use of BIM, while subcontractors are at the very least open to BIM use. When used well, BIM offers real benefits to both industry and subcontractors.



% aware of integrating digital and spatial information

Clients are knowledgeable about BIM. Whether or not they use it comes down to a rational decision rather than a lack of understanding.

What industry and subcontractors see as the main benefits to BIM now:

Comments made on the benefit of using BIM

Better coordination

35% of industry

19% of subcontractors

Accuracy and clash detection

23% of industry

33% of subcontractors

Cost and workflow efficiency

20% of industry

24% of subcontractors

The use of BIM varies across the industry – in both saturation of BIM (% use) and how BIM is used (lifecycle, activities). Increasing uptake of BIM means addressing this gap.

What factors lie behind the gap?

Lack of alignment

"Not many understand the importance of the BIM briefing and Execution plan. Clients and Project Managers have little to no understanding of what can be offered or what the benefits on the FM side could be. Many consultants and subcontractors are still not using or not being contracted to provide BIM deliverables." (INDUSTRY)

"Lack of total adoption across the industry which means as a default it's easier not to do." (INDUSTRY)

"Consultant compliance. Misunderstanding of what is required/requested. Lack of skills within the industry." (CLIENT)

Siloed work – BIM is not designed with the whole supply chain in mind

57% of architects, designers, and engineers are sharing BIM externally

29% of subcontractors are sharing BIM externally

60% of subcontractors have to discard and remodel the design of the BIM model

27% of clients say they don't use BIM because their supply chains can't deliver

The points of misalignment:

Industry & subcontractor

23% of industry cite clients lack of understanding around BIM & its benefits as a barrier to BIM uptake

19% of subcontractors cite clients lack of BIM in procurement as a barrier to BIM uptake

"Externally, some clients still don't comprehend/appreciate the value add of BIM so we end up using BIM to save ourselves time and ultimately deliver, BIM-free deliverables." (INDUSTRY)

Client

27% of clients say they're not in a position to change from current systems and practices

18% of clients say the cost of BIM outweighs the benefits

"Affordability – we cannot afford within existing funding streams." (CLIENT)

"Lacking ICT support and they are unwilling to support such a system." (CLIENT)

Industry & client

33% of subcontractors can't or won't use BIM (or tend not to even when BIM is available)

43% of subcontractors say they don't collaborate with architects and designers on projects

"Subcontractors are not as familiar with BIM so during construction it is challenging to get them to work in a BIM environment." (CLIENT)

Subcontractor

24% of subcontractors say they're getting poor models and information from consultants

56% of subcontractors don't receive a BEP where BIM has been used

93% of subcontractors say the design BIM does not have sufficient detail

"Quality of design models are not good enough to use for producing fabrication models. Fabrication models are often rebuilt from scratch." (SUBCONTRACTOR)

Bringing this together:

Industry

- Not designing for the supply chain
- Not all working to the same level (uneven use and skillsets, different data environments and file types)

Subcontractor

- Lack of use and/or skill across the community
- BIM is not expected of subcontactors
- A lot of re-work required to use design models

Client

- Stuck in legacy systems
- Under-resourced and under-funded
- Don't see the value
- BIM not included in procurement

This difference in use may exacerbate some perceptions of BIM's value, as the "Design-Bid-Build" model means the major cost of using BIM (occurring in the design phase) is separated from the majority of benefit in the construct phase.

A lot of time and effort goes into producing a "single" project model which flows into an "As-Built" model. Given the small number of clients using BIM to populate their widely used legacy systems, is this actually a costly attempt to shoehorn everybody on a project into a "one-size-fits-all"? Given the myriad of needs and uses for a model on a project, would a better BEP realise 20:80 rule benefits (20% of the effort realises 80% of the benefits)?

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 2020, and make up a wide group of industry professionals. 33 of the original 46 organisations completed the survey in 2020. The 2020 survey checked whether the previously reported plateau in BIM use was industry wide, or a consequence of surveying the same group of early adopters. In 2020 an additional 12 businesses were included in the industry group sample, 7 of whom completed the survey. This gives us a final sample of n=40 industry participants.

The 2020 survey allows us to compare the 2014 through to 2020 data to see how BIM use has changed among industry in the last seven 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 industry survey is +/-15.5% 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
Where their businesses are based					*Location changed to multiple response		
Auckland	23	28	31	27	31	25	22
Bay of Plenty	1	1	1	1	3	3	5
Wellington	5	2	4	2	11	9	8
Canterbury	6	5	7	5	10	7	7
Otago/Southland	1	-	-	1	6	3	3
Other	3	1	-	-	5	10	17
Unspecified	7	3	-	4	-	-	-
The size of these businesses							
Conglomerate (30+ employees)	26	24	29	26	24	22	26
Large (10-30 employees)	8	10	10	8	9	7	7
Medium (5-9 employees)	4	-	1	-	0	-	1
Small (2-4 employees)	1	2	1	2	1	1	1
Unspecified	7	4	2	4	0	5	5
Profession of respondents							
Design/Engineer	13	12	14	14	16	10	16
BIM Professional	9	13	11	8	7	9	11
Project Manager	4	2	2	2	2	2	1
Quantity Surveyor	3	4	3	4	3	4	3
Construction	5	3	5	3	5	2	3
Other (incl. Government, model creation, etc.)	4	6	4	3	-	2	6
Unspecified	8	-	4	6	4	6	-
Total	**46**	**40**	**43**	**40**	**37**	**35**	**40**

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

The new additions to the industry group

A total of 7 out of the 40 businesses completing the 2020 industry group survey were new to the sample this year. This will have some impact on the results.

The new industry sample are more likely to be actively pushing for BIM and using BIM on a higher number and proportion of projects. They're also more likely to be BIM professionals – which likely explains the stronger use of BIM.

We see positive movements in the data this year, and at each point this will be interrogated as coming from the original or new sample (and thus whether there are changes in BIM use across a wider industry segment than identified in the previous surveys).

In particular:

	New industry sample (n=7)	Original industry sample (n=33)
Key measures of BIM use		
% who actively push for use of BIM on projects	86%	79%
Have used BIM in 2020	97%	100%
Plan to use BIM in 2021	88%	86%
Average % of projects that used BIM in 2020	84%	61%
Average number of projects using BIM in 2020	27%	20%
Profession		
Architect	14%	18%
Architectural Designer	14%	3%
Engineer	14%	18%
BIM Professional	43%	24%
Other	14%	36%

[1]The 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 survey. In 2020, 38 client organisations responded to the survey: a response rate of 86%.

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 2020, some differences in 2020 data may be driven by sample changes. The maximum margin of error for the client survey is +/-15.8% at the 95% confidence interval.

A little about the client group:

Number of sites in their portfolio	Actual 2016	Actual 2017	Actual 2018	Actual 2019	Actual 2020
1-20 sites	7	8	4	6	6
21-50 sites	6	2	-	0	2
51-100 sites	6	3	2	1	1
More than 100	6	7	1	4	4
Unspecified	8	6	10	22	24

Industry	2016	2017	2018	2019	2020
Local Government	7	3	1	6	4
Central Government	5	3	4	3	5
Property management	4	3	1	1	-
Property development	3	1	-	5	3
Infrastructure management	2	1	-	3	3
Maintenance	2	1	1	-	-
Utilities provider	2	1	-	1	2
Healthcare	1	3	2	4	5
Tertiary education	-	-	2	1	2
Procurement	-	-	1	-	-
Other	5	6	4	2	4
Not specified	2	4	1	9	10
Total	**33**	**26**	**17**	**35**	**38**

Role of respondents	2016	2017	2018	2019	2020
Asset management	12	8	3	5	5
Portfolio management	3	-	-	1	-
Project management	3	3	2	3	7
Data management	2	-	2	5	6
Facilities management	2	4	3	2	2
Property management	2	1	-	1	1
Other	7	5	6	9	7
Not specified	2	5	1	9	10
Total	**33**	**26**	**17**	**35**	**38**

[1]The 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 the University of Auckland, forming a new subcontractor group. The survey was repeated in 2020, and a total of 21 (a 65% 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.

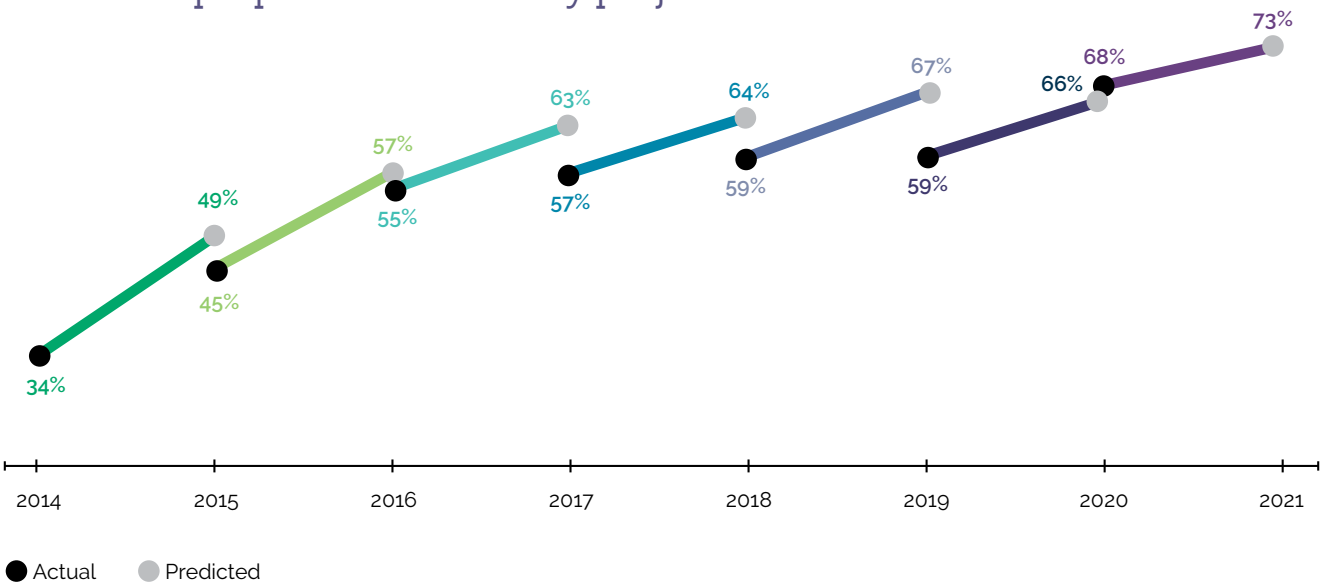
A little about the subcontractor group:

	2019	2020
Discipline		
Electrical contractor	8	4
Mechanical contractor	6	5
Modelling/Drafting specialist	3	-
BIM consultancy	2	-
Hydraulic/Plumbing contractors	2	2
BMS contractor	2	1
Fire protection contractor	1	3
Other	1	1
Unspecified	-	5
Number of employees		
One	0	0
Small (2 to 4 employees)	0	0
Medium (5 to 9 employees)	1	2
Large (10 to 30 employees)	3	1
Conglomerate (30+ employees)	22	18
Location		
Auckland	20	18
Not specified	6	-
Other	-	3
TOTAL	**26**	**21**

[1]The 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?

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
Predicted: 2015 n=46, 2016 n=40, 2017 n=43, 2018 n=40, 2019 n=37, 2020 n=35, 2021 n=43

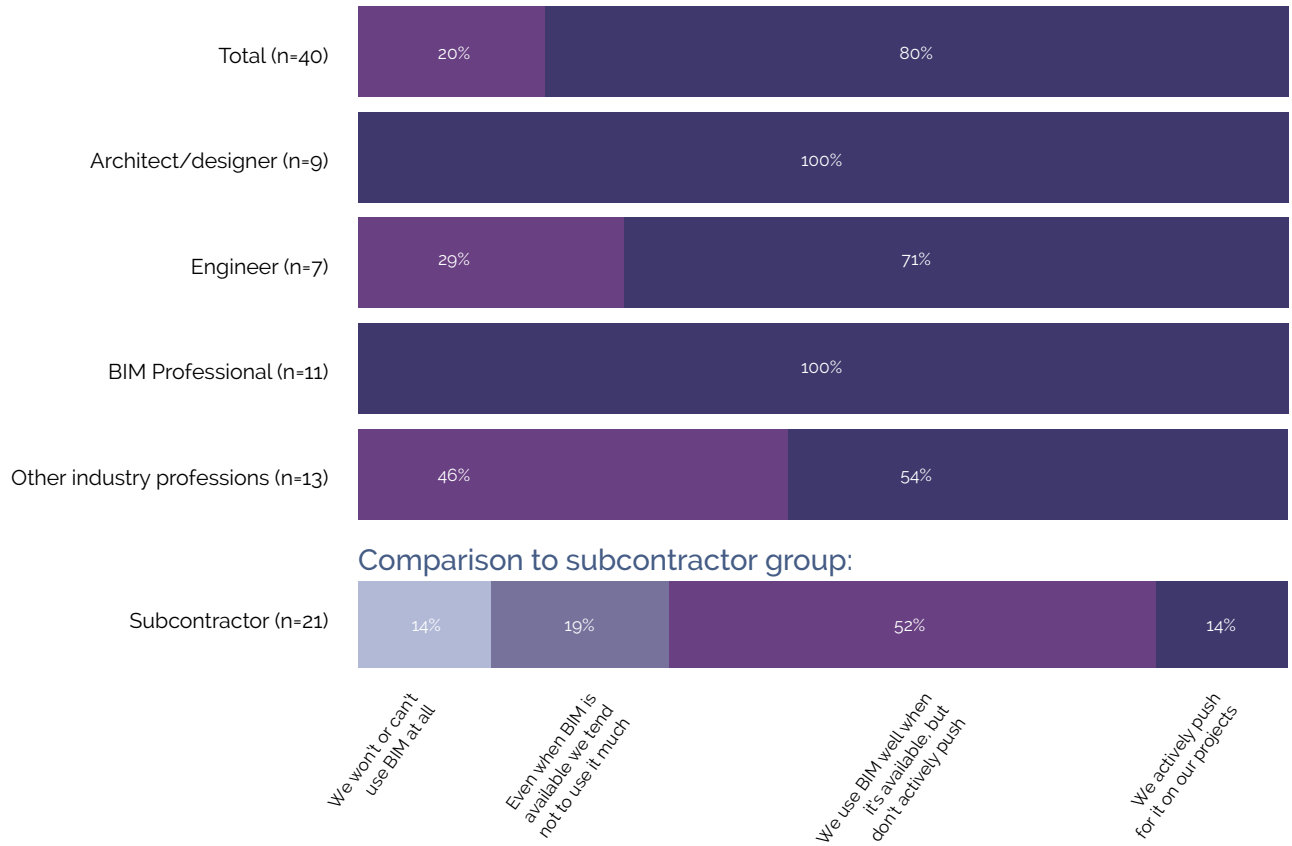
Use of BIM – industry and client groups

Both the industry and client groups were asked about their current use of BIM. Almost all those in the industry group have used BIM in the last 12 months (98%), and 88% plan on using BIM in the next 12 months, indicating that some who use BIM now do not plan to do so in 2020. Within the industry group, two thirds of all projects (68%) use BIM in some way.

In 2020 the industry group was asked how actively they used BIM. Eight in ten (80%) say they actively push for use of BIM on their projects, with a further 20% saying they use it but don't push for it. The new respondents to the survey are more actively pushing BIM (86%) than the original survey group (79%).

Subcontractors are less forceful in using BIM. 14% of subcontractors say that they actively push for BIM use, though 52% say they will use it if it is available.

How important is BIM to your company's business?



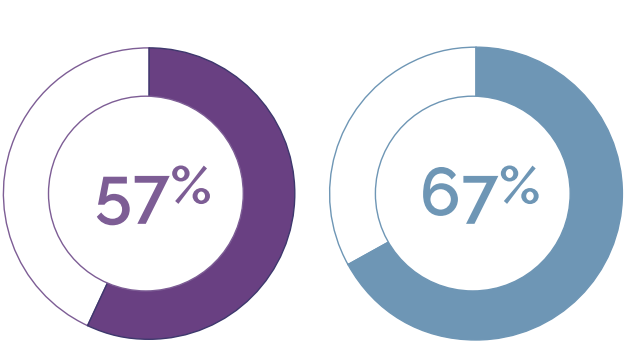
Base: 2020 Industry n=40, 2020 Subcontractor n=21

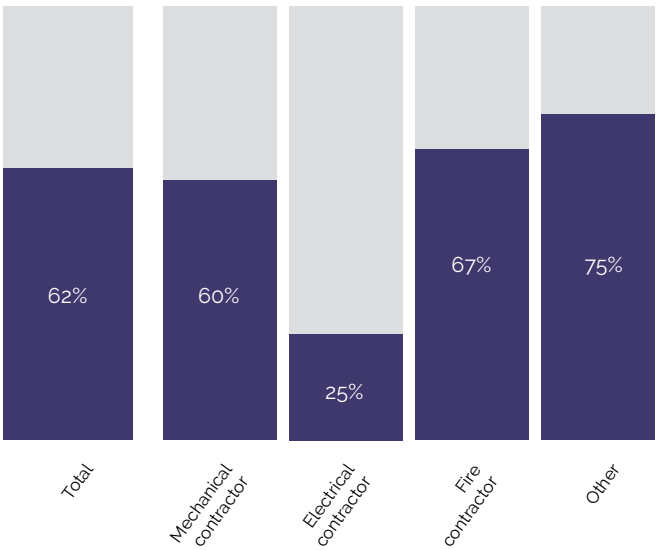
Q. Where would your company sit on the scale below when it comes to using BIM?

Use of BIM – subcontractor group

Over half of subcontractors have used BIM in 2020, and two thirds expect they'll use BIM in 2021. The highest use in 2020 came from the 'other' category – this includes plumbing, fabrication, and BMS subcontractors.

BIM use



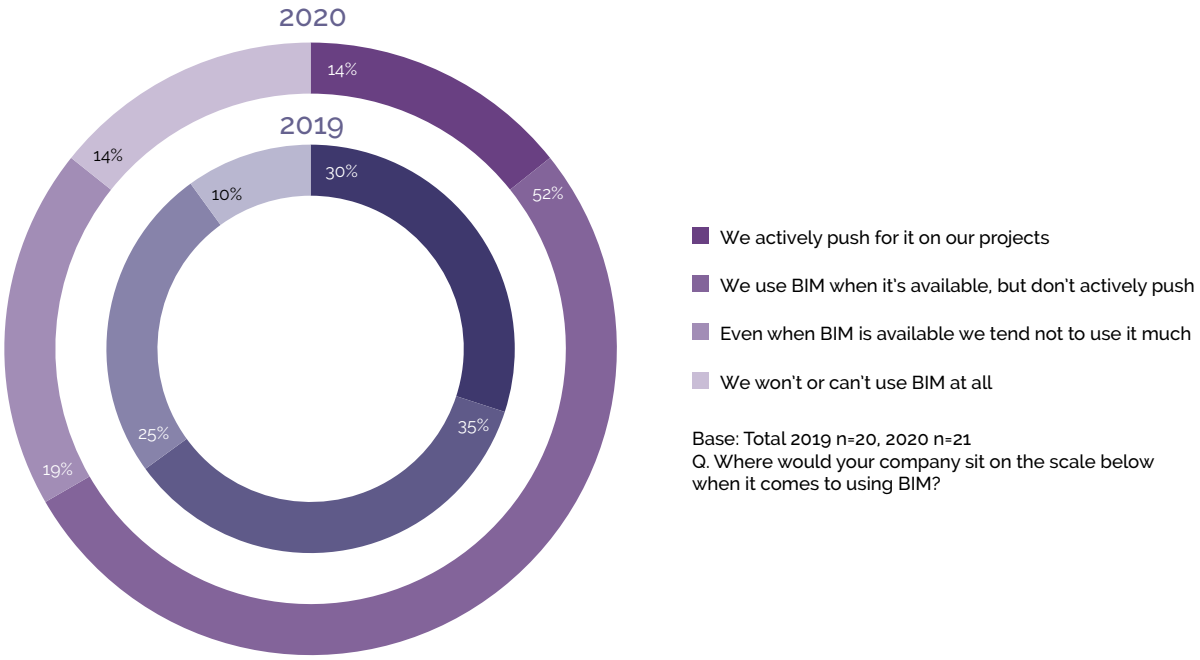


Base: Total answering this question. 2020: Total n=21, Mechanical contractor n=5, Electrical contractor n=4, Fire contractor n=3, other n=4

Q: Please indicate the use of BIM in your company on projects in 2020 and planned use in 2021.

One in seven subcontractors say they actively push for BIM on their projects. This is down from one in three (30%) in 2019. There is a commensurate increase in the proportion who say they will use BIM if it's available but won't push for it (52% of the sample in 2020 compared to 35% in 2019).

Attitude towards BIM



Base: Total 2019 n=20, 2020 n=21
Q. Where would your company sit on the scale below when it comes to using BIM?

BIM use levels – industry and subcontractor

Increasing BIM use is about two components – 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.

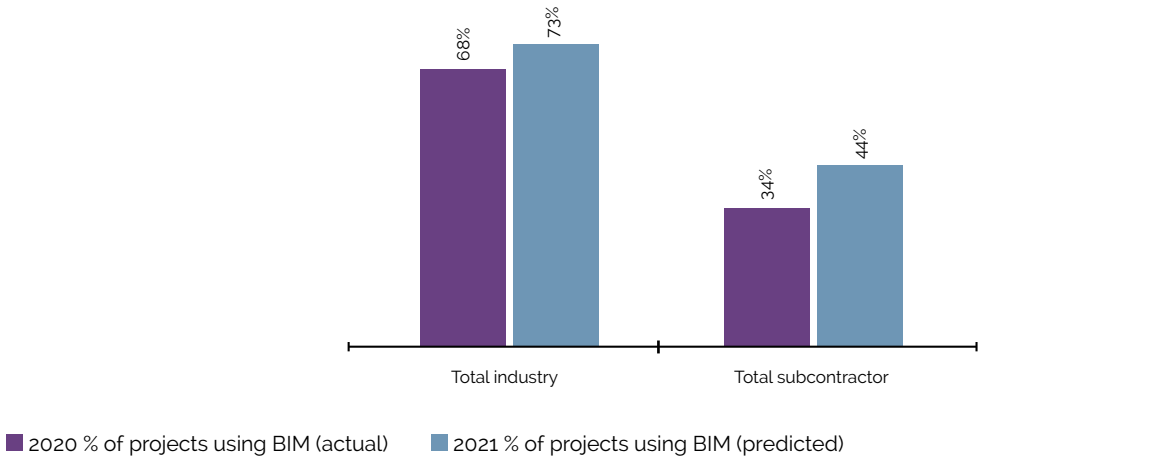
We asked industry and subcontractors to estimate the proportion of their projects that:

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 2020, and predicted in 2021. While two thirds of industry projects use BIM, only one third of subcontractor projects do so. BIM is far less mature in the subcontractor market. A section later in this report shows that it is a vicious cycle where main and other contractors are not using BIM, therefore these subcontractors are not using BIM.

Looking just at the industry group respondents, the overall proportion of projects which use some form of BIM has increased to 68% from the plateau of 59% reported in 2018 and 2019. This shift is largely driven by the new sample who have 84% of projects using BIM. By contrast the original sample shows a small increase to 61% of projects using BIM.

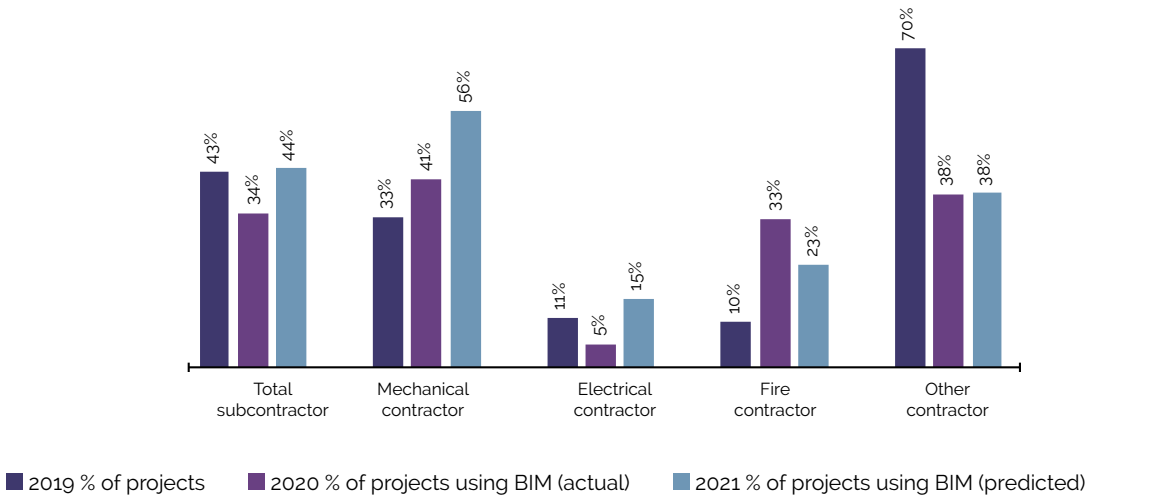
The average of projects using BIM – industry vs. subcontractor



Base: Use BIM/Plan to use BIM in the next year 2020: Industry n=40, Subcontractor n=16,
Q. Estimate what percentage of your projects in 2020 have used BIM. What percentage of projects in 2021 do you predict will use BIM?

Turning to subcontractors, the proportion of subcontractor projects using BIM has dropped to 34% in 2020 from 44% in 2019. Mechanical contractors show the strongest use of BIM in 2020 and 2021 – likely because they need to integrate with other services and provide a services plan in order to finalise structure details.

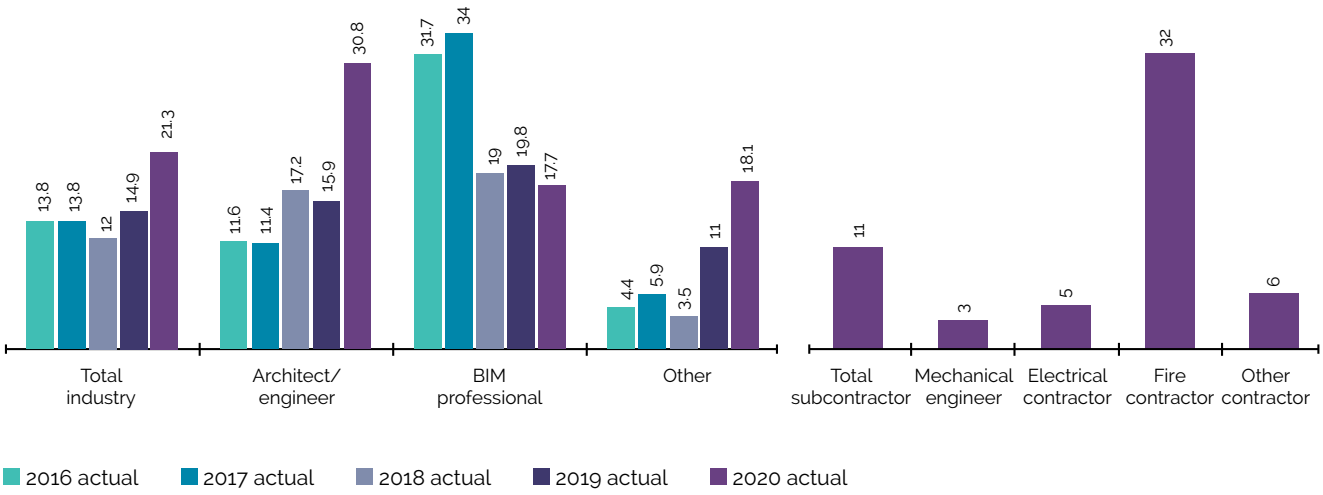
The average proportion of projects using BIM



Base: Use BIM/Plan to use BIM in the next year: Total 2019 n=20, 2020 n=16, Mechanical contractor 2019 n=6, 2020 n=4, Electrical contractor 2019 n=8, 2020 n=3, Fire contractor 2019 n=1, 2020 n=2 'other' 2019 n=10, 2020 n=4
Q. Estimate what percentage of your projects in 2020 have used BIM. What percentage of projects in 2021 do you predict will use BIM?

Among the industry group the average number of projects using a BIM execution plan currently sits at 21 projects. This has increased from 15 projects in 2019, with the increase largely driven by architects and engineers. Again the increase appears to be driven more by the new members of the industry group. Subcontractors were asked this question for the first time in 2020. On average, subcontractors have 11 projects using BIM, around half that of the industry group. Again, this points to the maturity level of BIM among subcontractors. At present it doesn't seem that there is an expectation that subcontractors will (or need to) use BIM.

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

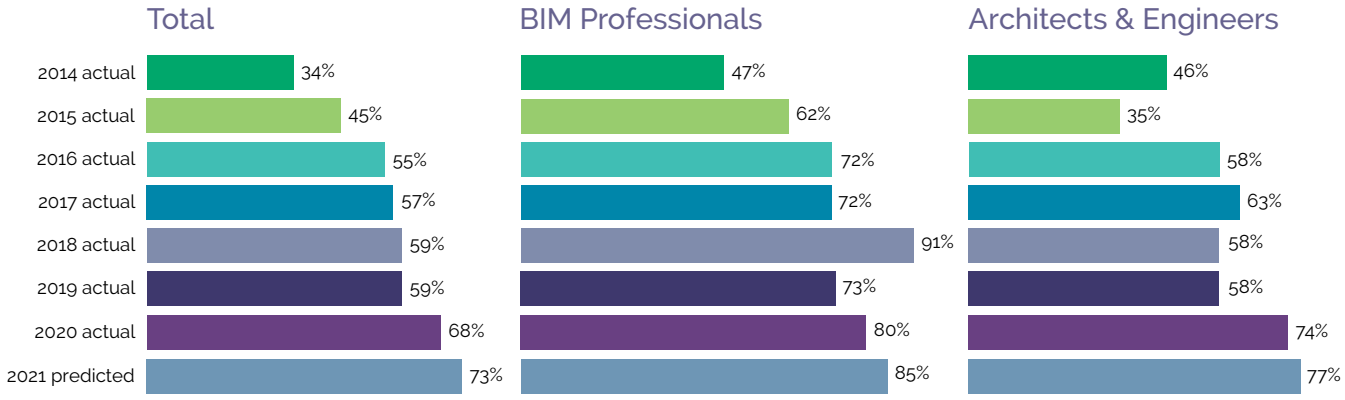


Base: Total 2016 n=43, 2017 n=40, 2018 n=37, 2019 n=35, 2020 n=40 (including not used BIM). BIM professionals 2016 n=11, 2017 n=8, 2018 n=7, 2019 n=9, 2020 n=11. Architects and engineers 2016 n=14, 2017 n=14, 2018 n=16, 2019 n=10, 2020 n=16. Other 2016 n=18, 2017 n=18, 2018 n=14, 2019 n=16, 2020 n=13. Subcontractor 2020 n=16, Mechanical contractor n=4, Electrical contractor n=3, Fire contractor n=2, 'other' n=4

Among the industry group, the number of projects using a BIM execution plan for BIM professionals has dropped from 34 projects in 2017 to 18 projects in 2020. Those in the 'other' category (including Project Managers and Quantity Surveyors) show a little more variability year-on-year in the number of projects using BIM. For the 'other' category, the average number of projects has increased from 11 in 2019 to 18 in 2020.

The chart below shows the proportion of projects within each profession that use BIM. This has increased from 2018/2019 to 68%. Some of the increase in both architect/engineer and BIM professionals is driven by new participants. However, there has been a small increase in the proportion of projects using BIM among original participants of both professions.

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. BIM professionals 2014 n=9, 2015 n=13, 2016 n=11, 2017 n=8, 2018 n=7, 2019 n=9, 2020 n=11. Architects and engineers 2014 n=13, 2015 n=12, 2016 n=14, 2017 n=14, 2018 n=16, 2019 n=10, 2020 n=16.

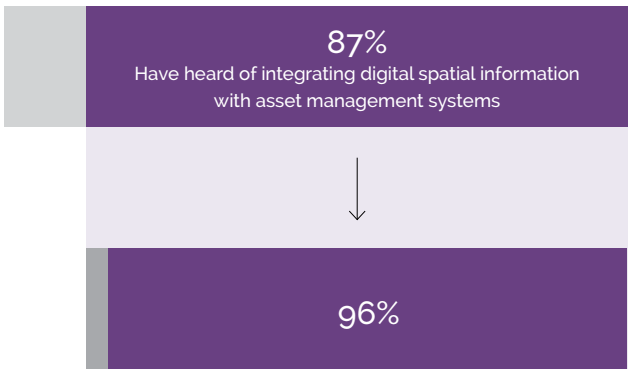
BIM use by clients

BIM is one of a number of information management tools that enable clients to integrate digital 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 group has been asked about integrating digital spatial asset information (which may include BIM processes) with asset, operations, or facilities management systems.

In 2020, 87% have heard of integrating digital spatial or asset information with asset management systems. Almost all who are aware of this type of integration are aware of BIM as one of the options for integrating information.

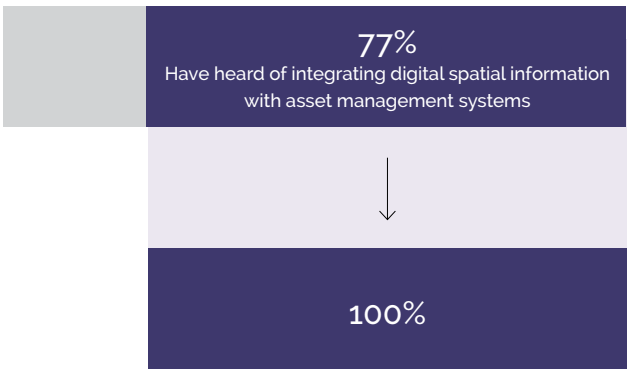
Client use and consideration of integrating digital asset or spatial information

2020



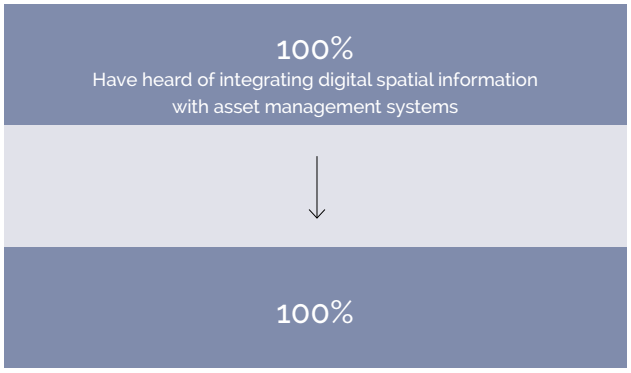
Have heard of BIM as one of the options for integrating digital spatial information with asset management systems

2019



Have heard of BIM as one of the options for integrating digital spatial information with asset management systems

2018



Have heard of BIM as one of the options for integrating digital spatial information with asset management systems

Base: All clients answering this question: 2018 n=17, 2019 n=33, 2020 n=31

Base: Have heard of integrating digital spatial information: 2018 n=17, 2019 n=25, 2020 n=27

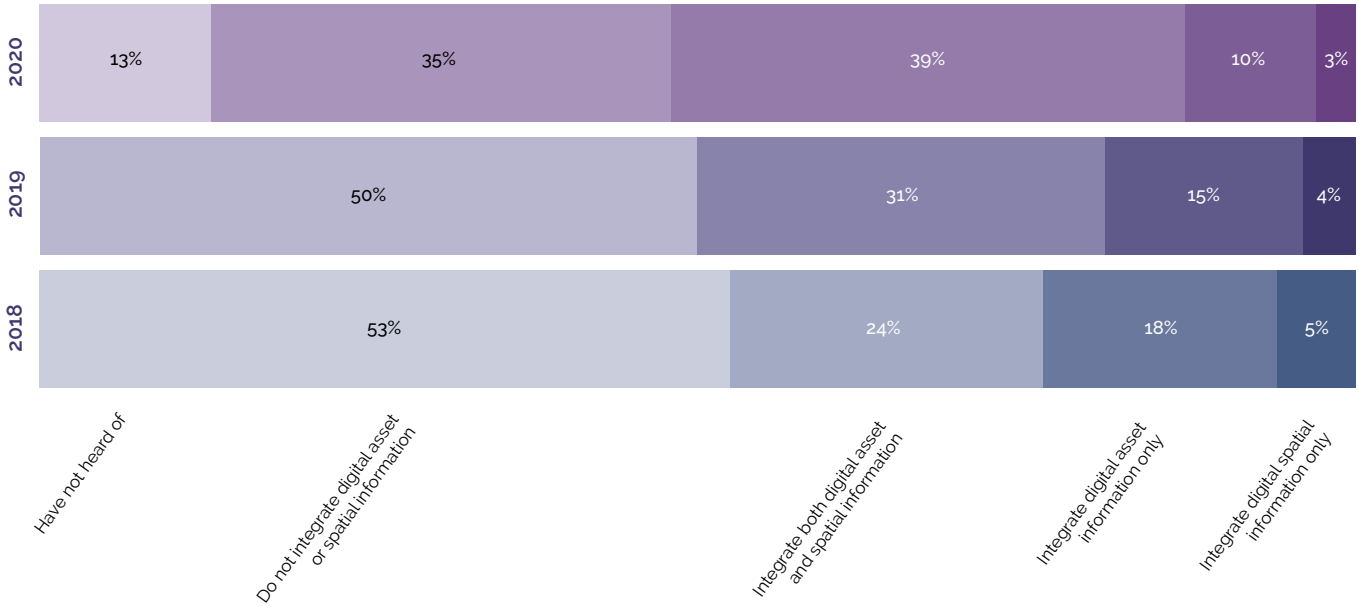
Q. Have you heard of integrating digital spatial information with asset management systems?

Q. Have you heard of BIM as one of the options for integrating digital spatial information with asset management systems?

Over the whole sample, almost two in five are integrating both digital spatial information with their asset management systems. This is an increase from 31% in 2019, and 24% in 2018.

Of those who are not currently integrating digital spatial information with their asset management systems, 18% plan to start doing so in the next 12 months (up from 8% in 2019). A further 55% are aware of the concept and may look at it in the future (but not in the next 12 months).

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)

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

BIM in the procurement process

Previous surveys have indicated that clients willingness to procure BIM was a barrier to increasing BIM use. The 2020 survey 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 2020, around half of all new assets (52%) and major upgrades (48%) have BIM specified at procurement. Whether models, data or both are procured by clients seems to be the same for either new assets or major upgrades.

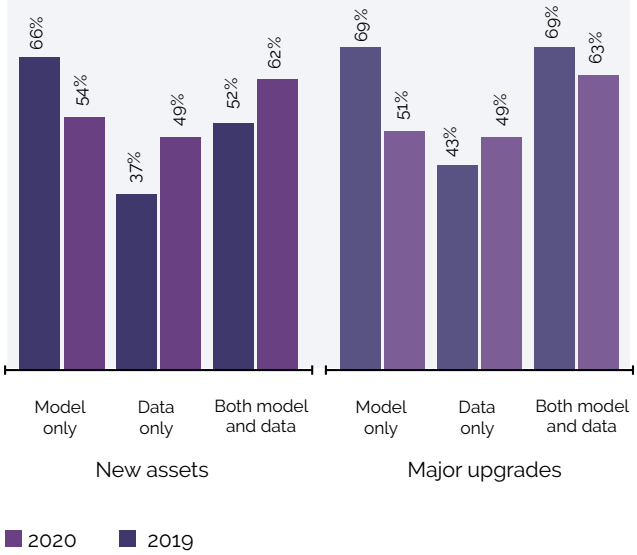
What proportion of projects specify the use of BIM in procurement?

% of projects that have BIM specified at procurement

Base: Responsible for new assets 2019 n=28, 2020 n=33, major upgrades 2019 n=26, 2020 n=28

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

Proportion that specify model, data, or both



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

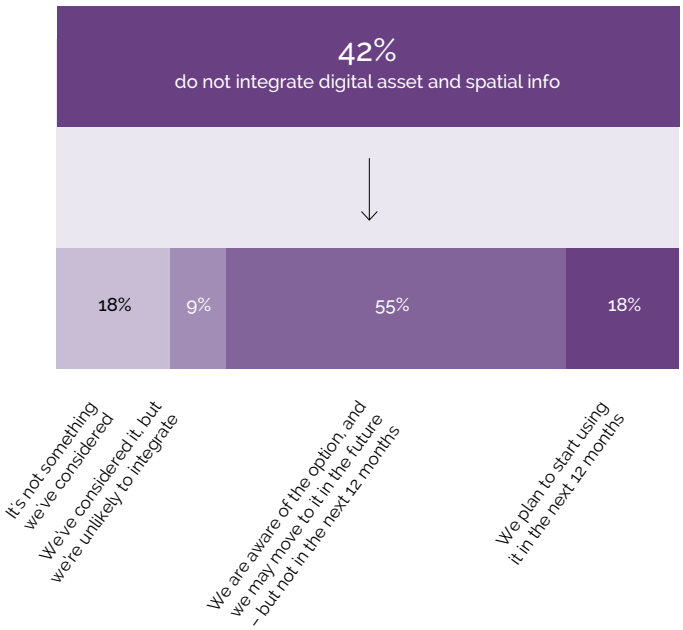
Q. If BIM is specified, what % require an "As-Built" model and/or asset data as part of project delivery?

Awareness and acceptance of BIM by clients

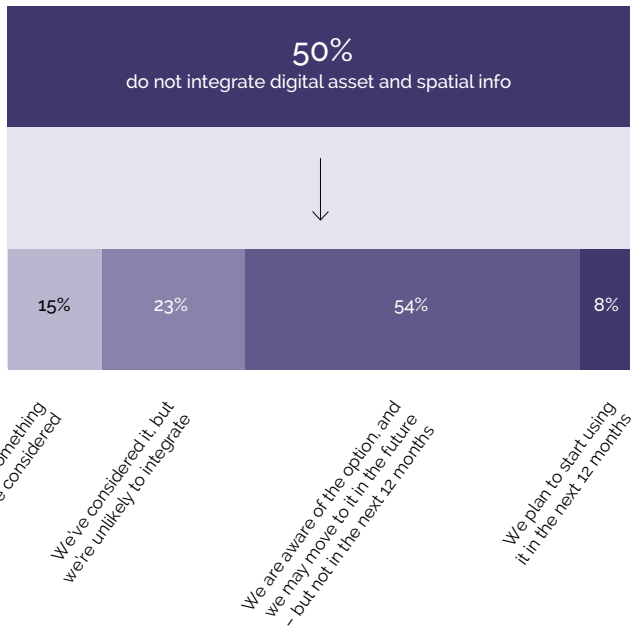
Clients who are aware of but not currently integrating digital spatial and asset information with their systems were asked to summarise their organisation's view on doing so. Fewer than one in five (18%) are planning to start integrating digital spatial and asset information in the next 12 months. 27% have either not considered doing so, or have considered it but are unlikely to do so. This has declined from 38% in 2019, suggesting that clients are more open to BIM in 2020.

Client use and consideration of integrating digital asset and spatial information

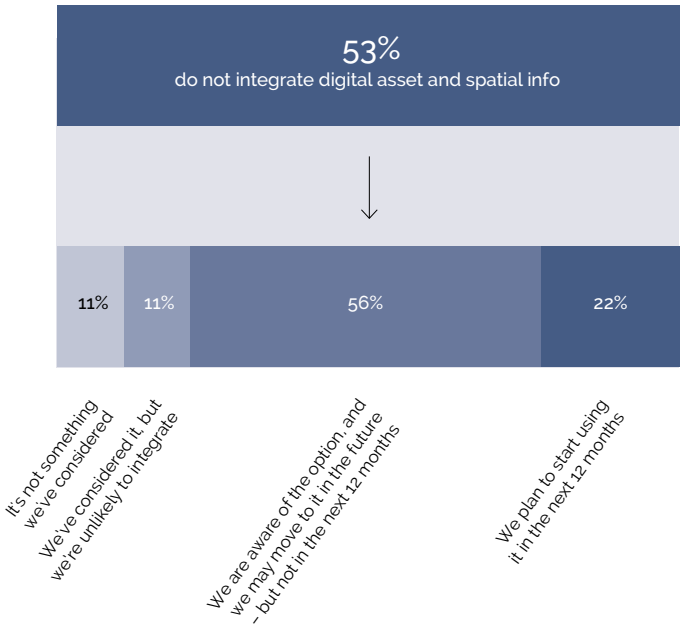
2020



2019



2018



Base: Have heard of integrating digital spatial information 2020 n=27

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

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

The inability to change from current practices is the main reason clients say they are not using or considering a shift to using integrated digital spatial asset information (27%). What is heartening is the significant reduction in the clients stating 'lack of knowledge' as a barrier – down from 54% in 2019 to 18% in 2020. Some clients commented further:

"Organisational maturity."

"Just too many initiatives in play."

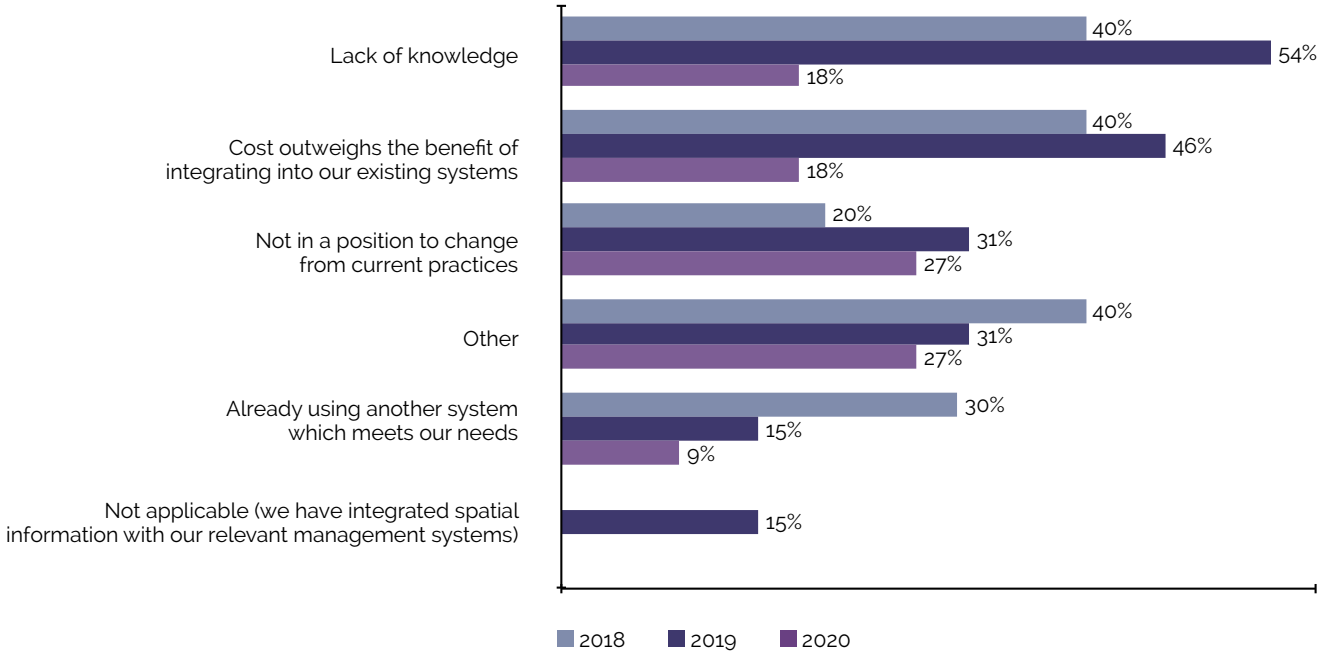
"Lacking ICT support and they are unwilling to support such a system."

"Cost/workload – insufficient resources to implement changeover."

"The organisation is not the operator of the buildings/assets and this is devolved to a 'tenant' as manager/operator."

"Proof of concept, benefits realisation. We are in the middle of a pilot to help form up a use case/business case."

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

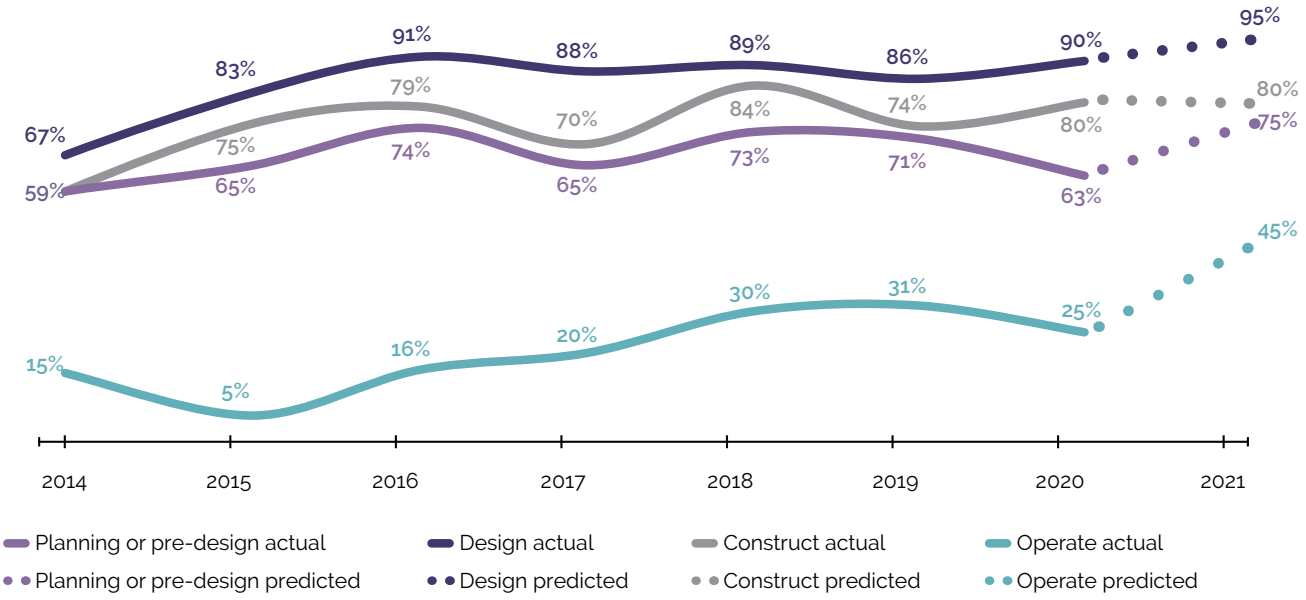
Q. What are the main reasons you have not considered or moved to integrate spatial and/or digital asset information into your asset/operations/facilities management system?

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. Use in the planning stage has declined from 71% in 2019 to 63% in 2020. Nine in ten (90%) industry respondents use BIM at the design phase, while eight in ten use BIM at the construction phases. Both these phases have increased from 2019. 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



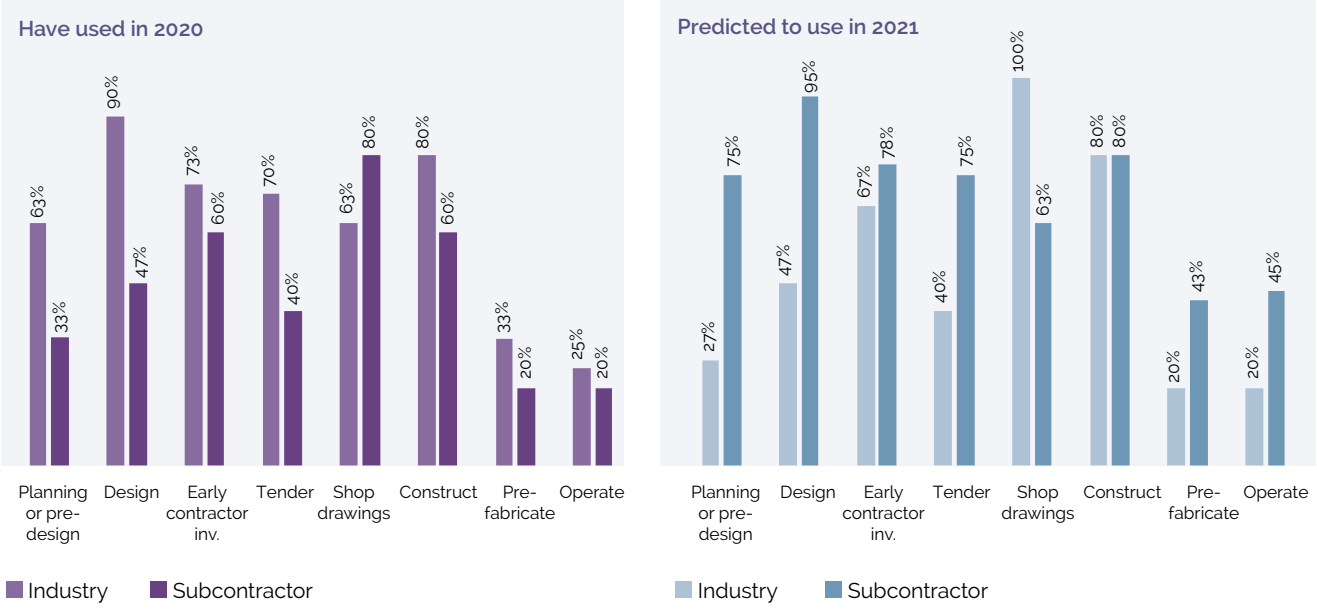
Base: All respondents 2014 n=46, 2015 n=40, 2016 n=43, 2017 n=40, 2018 n=37, 2019 n=35, 2020 n=40
Q. For which project life cycle stages has/will BIM be used? Please select all that apply.

In 2020 this question was expanded to include other stages of the project lifecycle. Seven in ten from the industry group are using BIM for early contractor involvement and at the tender phase (73% and 70% respectively), while six in ten are using BIM at the shop drawing phase (63%).

The subcontractor sample shows that among subcontractors in 2020:

- 43% use BIM at early contractor involvement phase;
- 57% use BIM for shop drawings; and
- 43% use BIM at construct phase.

Expanded industry BIM use across project lifecycle



Base: 2020 Industry n=40, Subcontractor 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. Construction system design and spatial programming made the top 10 in 2020, edging out site analysis and structural engineering analysis from the 2019 top ten list.

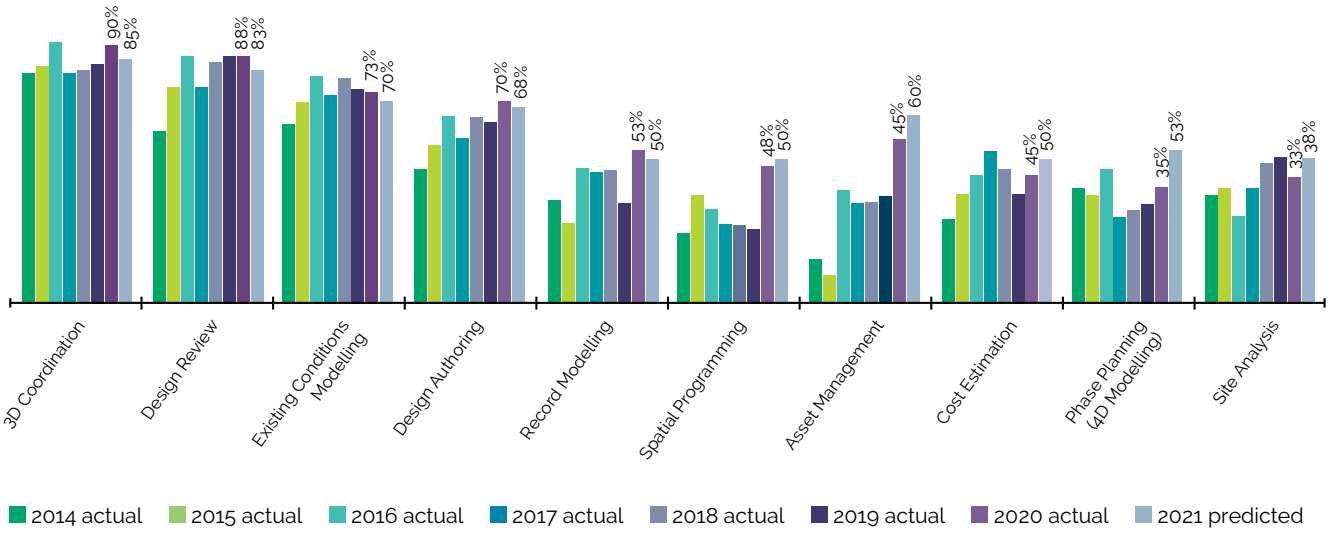
The new sample is more likely than the original sample to use BIM for:

- Code Validation
- Phase Planning (4D Modelling)
- Design Authoring
- Design Review
- Sustainability (Green Star/NABERS) Evaluation
- 3D Coordination
- 3D Control and Planning

By contrast the original sample is more likely than the new sample to use BIM for:

- Engineering Analysis – Energy
- Space Management and Tracking
- Engineering Analysis – Lighting
- Engineering Analysis – Fire
- Existing Conditions Modelling
- Engineering Analysis – Structural
- Asset Management
- Engineering Analysis – Other
- Record Modelling
- Cost Estimation

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



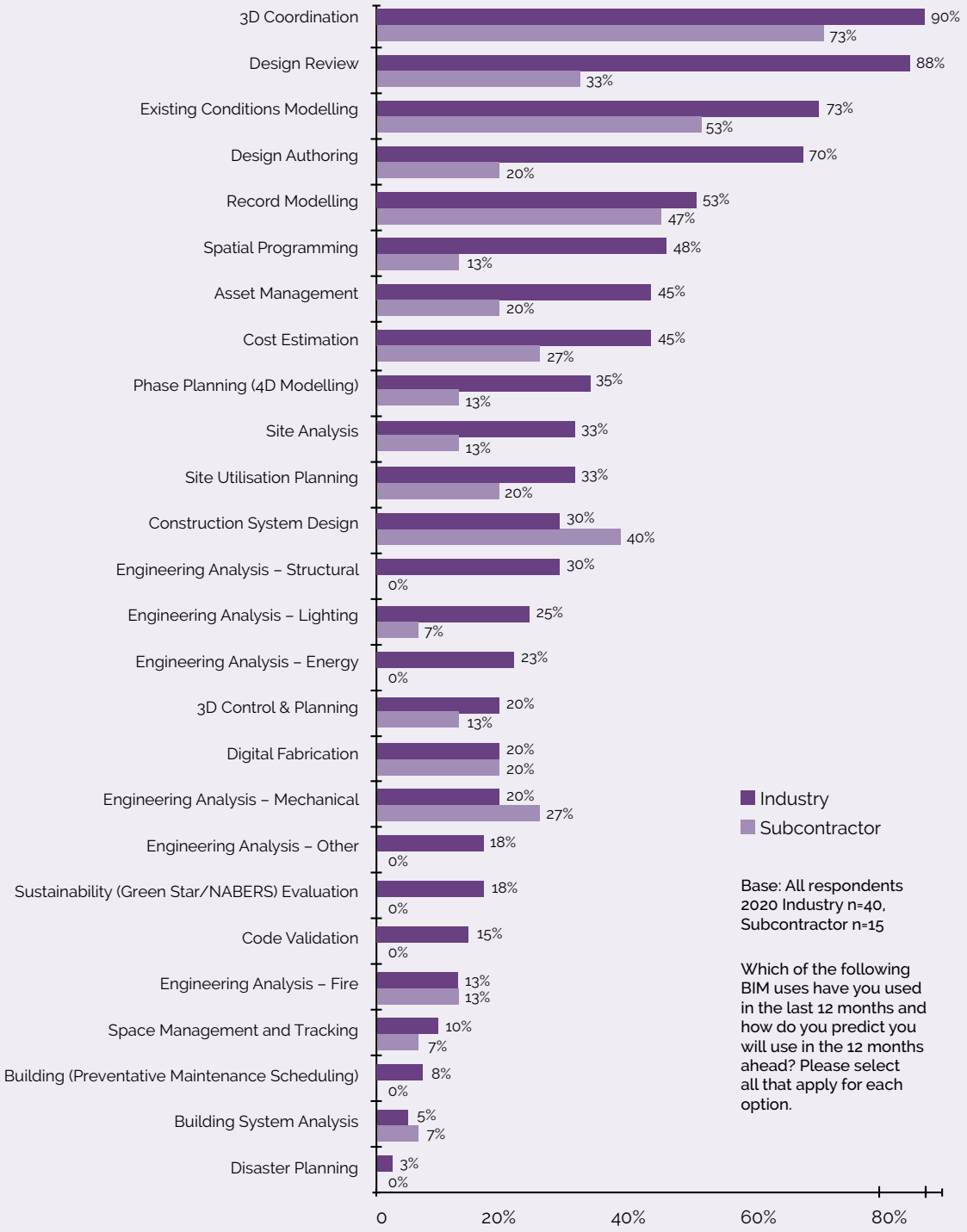
Base: All respondents 2014 n=46, 2015 n=40, 2016 n=43, 2017 n=40, 2018 n=37, 2019 n=35

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

3D coordination is the main use of BIM for both industry and subcontractors, with the industry group more likely to use BIM for design review and authoring, and existing conditions modelling. Both are equally likely to use BIM for record modelling. Subcontractors are more likely than industry to use BIM for construction system design and mechanical engineering analysis.

Industry vs. subcontractor BIM uses (2020)



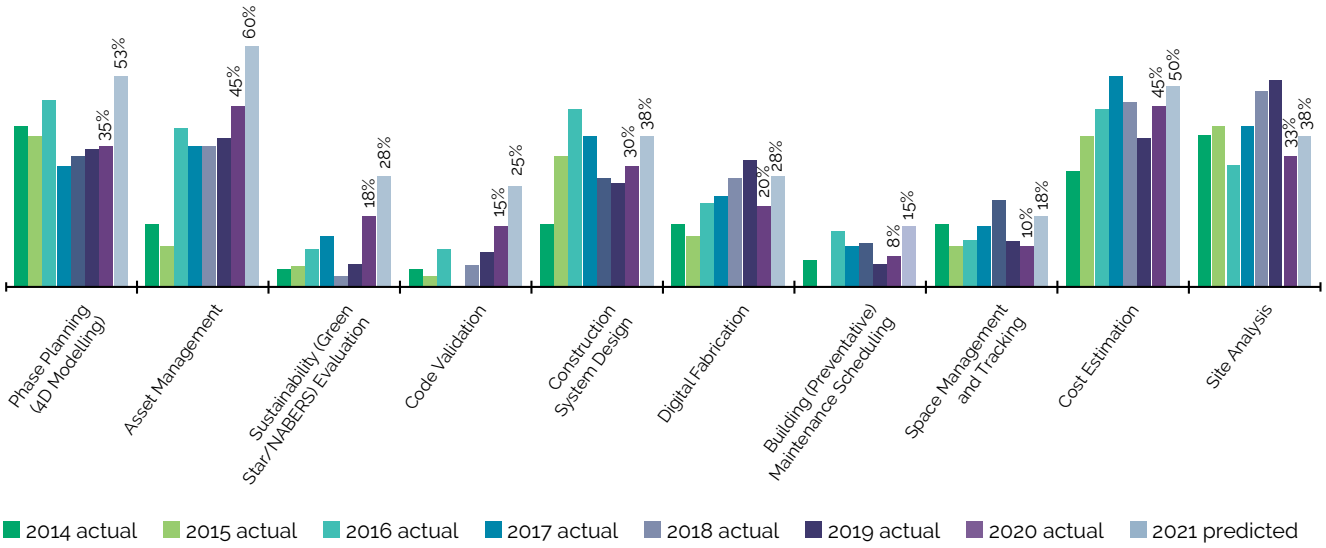
BIM uses most likely to grow in industry

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 2020 several of the 26 uses are predicted to decline in the next 12 months:

- 3D Coordination
- Design Review
- Existing Conditions Modelling
- Design Authoring
- Record Modelling

Phase planning (4D modelling) is predicted to have the strongest uplift in 2021. In addition, asset management is predicted to grow substantially to 60% of all projects. While we have seen a slight increase (from 37% in 2019 to 45% in 2020), 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

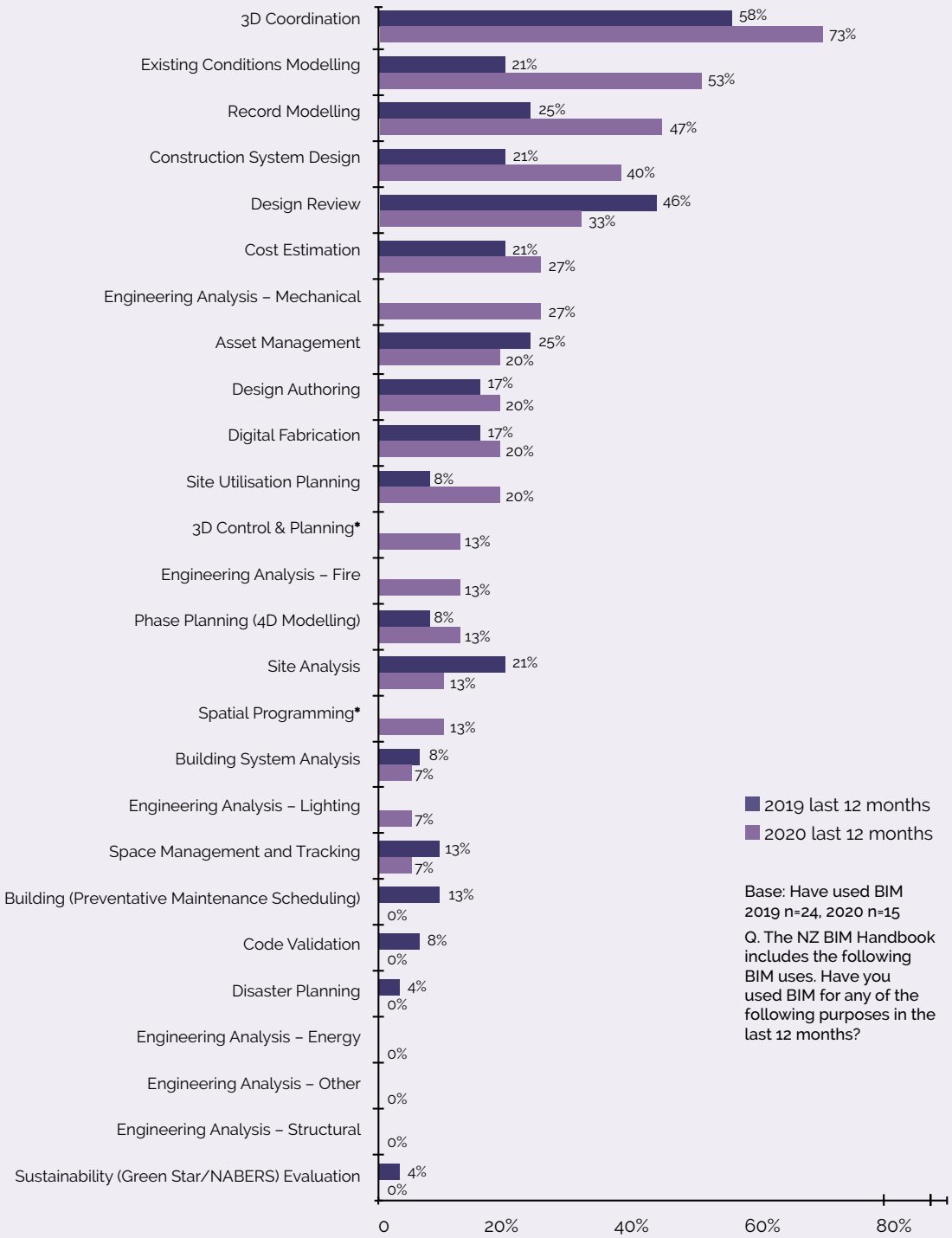
Q. Which of the following BIM uses have you used in the last 12 months and how do you predict you will use in the 12 months ahead? Please select all that apply for each option.

Subcontractor BIM use in detail

Looking at the details of BIM use, 3D coordination is the main use of BIM for subcontractors – both in 2020 and in 2019.

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 were used by more than a quarter of subcontractors surveyed. In 2020 this has increased to five out of the ten uses used by at least a quarter of subcontractors surveyed.

BIM uses in detail

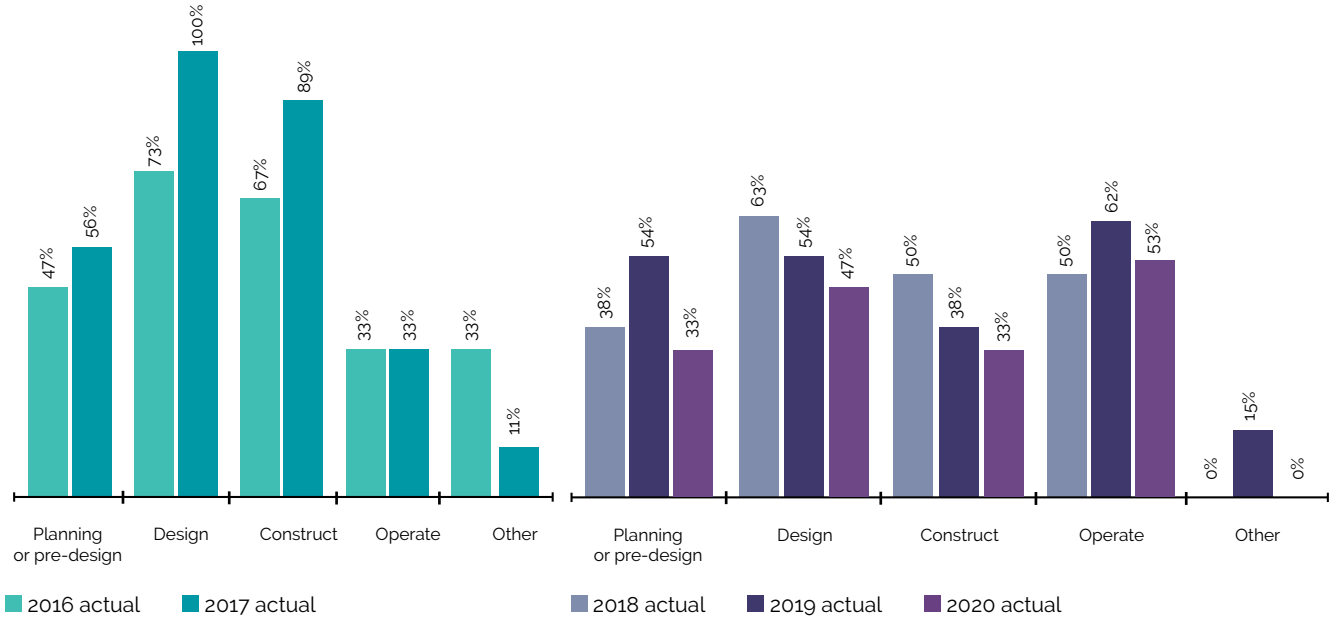


What are clients using BIM and integrated information for?

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

In 2020, integration of digital spatial and/or asset information at all stages has declined from that recorded in 2019. While this survey doesn't provide any hints as to why this might be, anecdotal evidence from talking to people in the industry could suggest that there is already a lot going on for asset owners at the moment with the investment uncertainty.

Client BIM use/ integration of information across project life cycle



Base: Clients using BIM now 2016 n=15, 2017 n=9
Q. At what stage are you currently using BIM for?

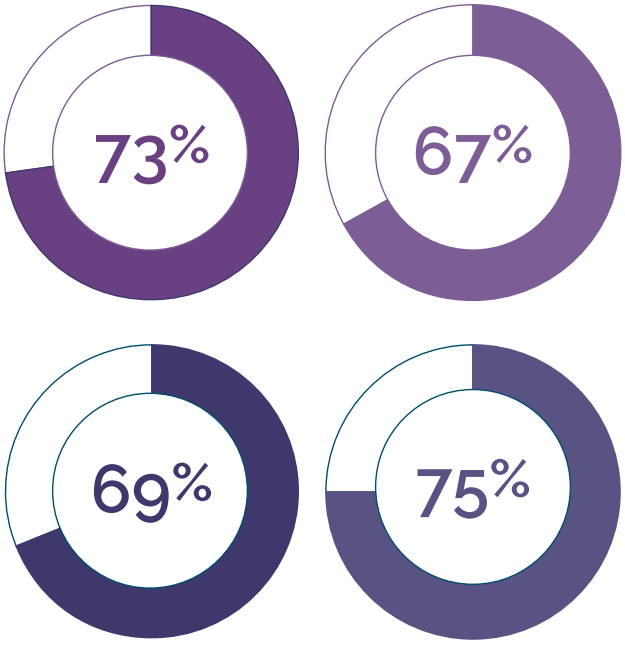
Base: Clients integrating digital spatial and/or asset information now 2018 n=8, 2019 n=13, 2020 n=15
Q. At what stages in the investment, construction and operation of built assets are you using integrated spatial and/or digital asset information?

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

Over seven in ten new assets (73%) and two thirds of major upgrades (67%) have at least some consideration of whole of life, whole of building costs. In 2019 there was quite a spread of attitude of cost to construct vs. 'whole of life, whole of building' costs. However, in 2020 we see more balanced attitudes with 41% of those constructing new assets saying the two are on a par (and 30% of those working on major upgrades).

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

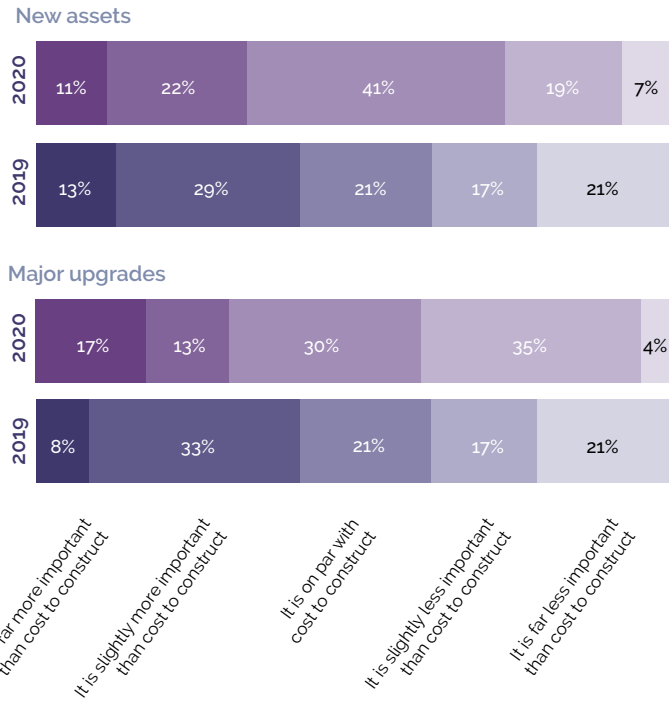
% of projects that have some consideration of 'whole of building, whole of life' costings



2020 2019

Base: Responsible for new assets 2019 n=28, 2020 n=33, major upgrades 2019 n=26, 2020 n=28

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



2020 2019

Base: Responsible for new assets 2019 n=28, 2020 n=33, major upgrades 2019 n=26, 2020 n=28

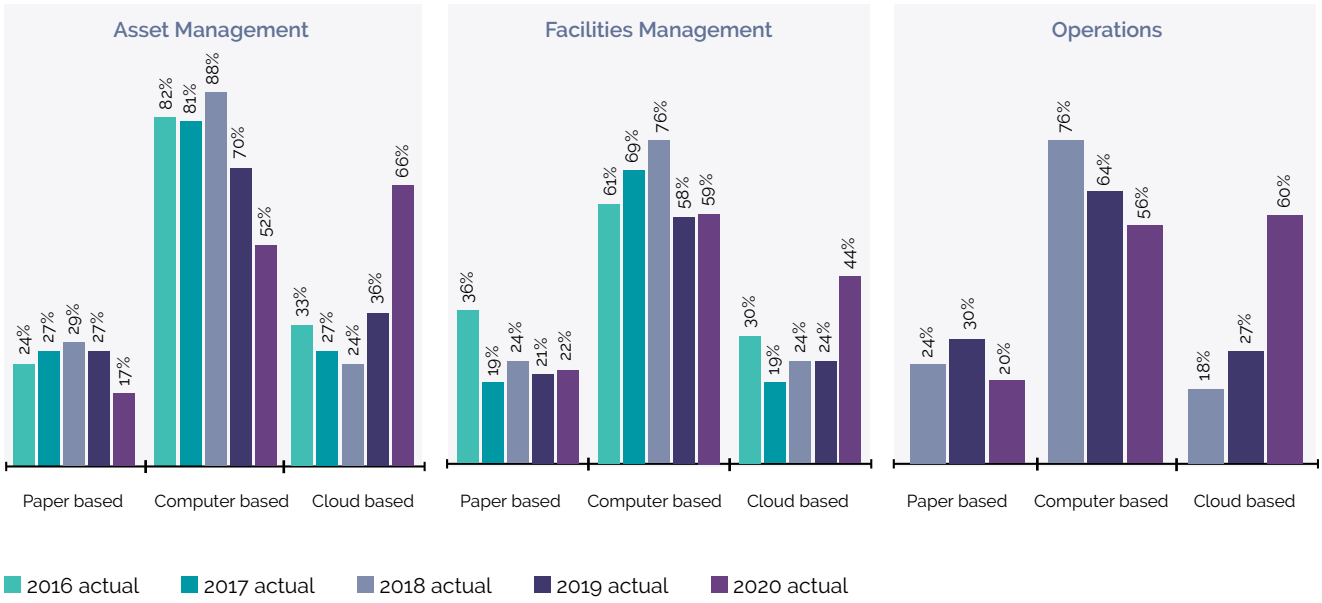
Q. On the projects where you consider "whole of building, whole of life" costings, how much impact does this have on the final decision (when compared against cost to construct)?

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. However, in 2020 there has been a major shift to cloud-based systems. This is to the point where asset management and operations systems are now more likely to be cloud than computer based.

Systems used by clients for asset, facilities and operations management



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

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

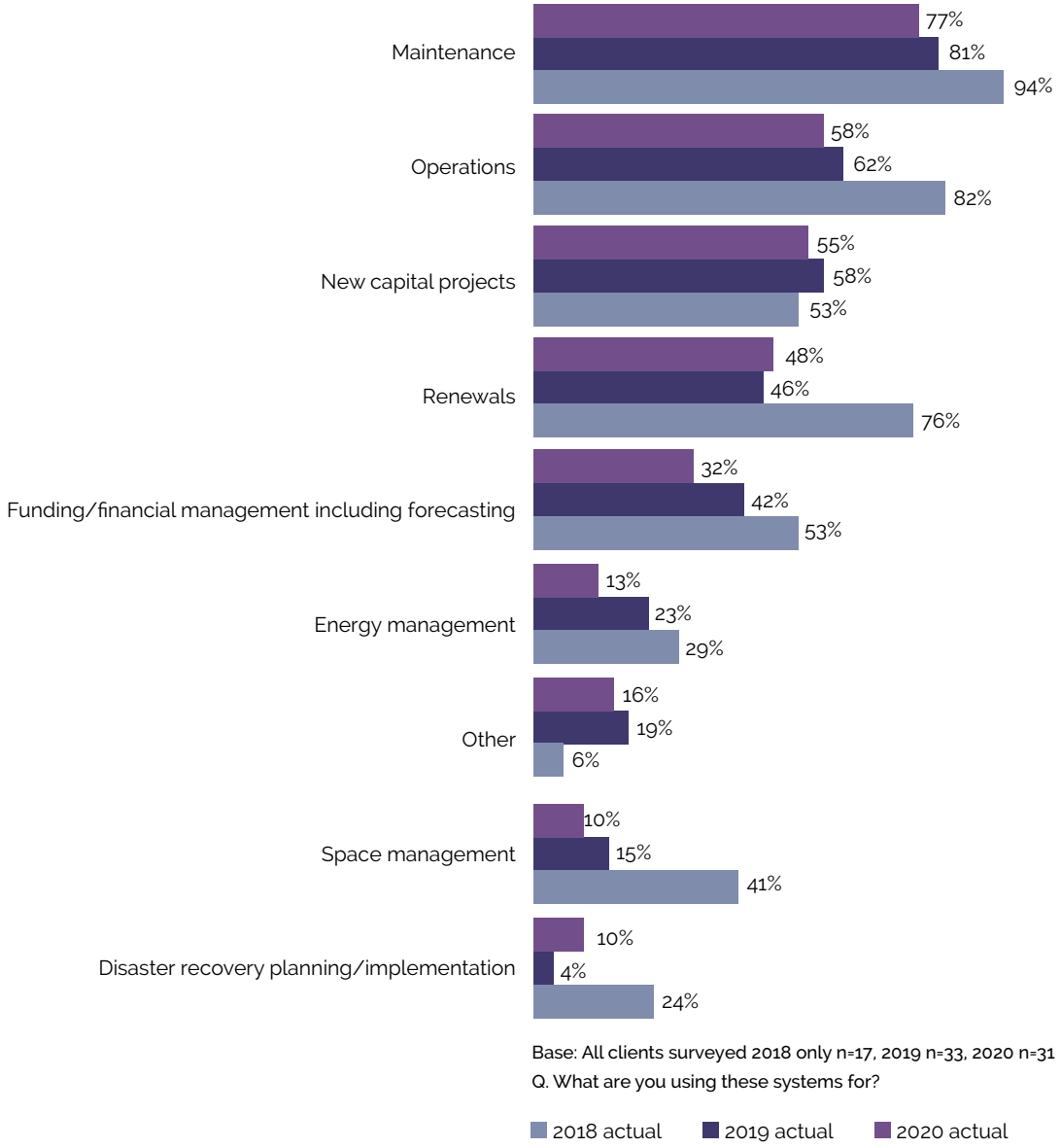
NOTE: Clients can use more than one type of system (and could be using all three)

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 SPM, SAP, and ESRI. Systems mentioned that were new to 2020 include:

- IBM Maximo – mentioned by 13%
- BEIMS – mentioned by 11%
- ArcGIS – mentioned by 8%
- Aconex – mentioned by 5%

The client group were asked what their systems are being used for, regardless of the type of system. From the list 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.

What the systems are being used for

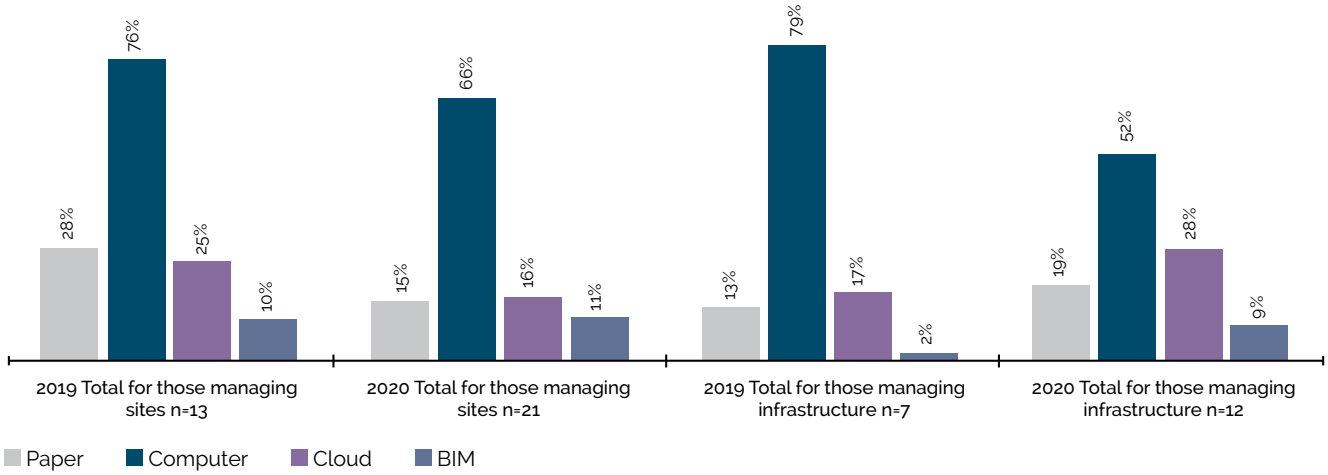


The client group was asked to specify the proportion of their business systems used for managing constructed assets that are paper, computer, cloud, or BIM-based systems. This was split by building-focussed systems (sites) and horizontal infrastructure systems (infrastructure). Participants could specify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

Both sites and infrastructure systems are largely computer-based, although the reliance on computer-based systems has declined from 2019. Horizontal infrastructure assets showed a strong increase in the use of cloud-based and BIM systems in 2020.

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 =

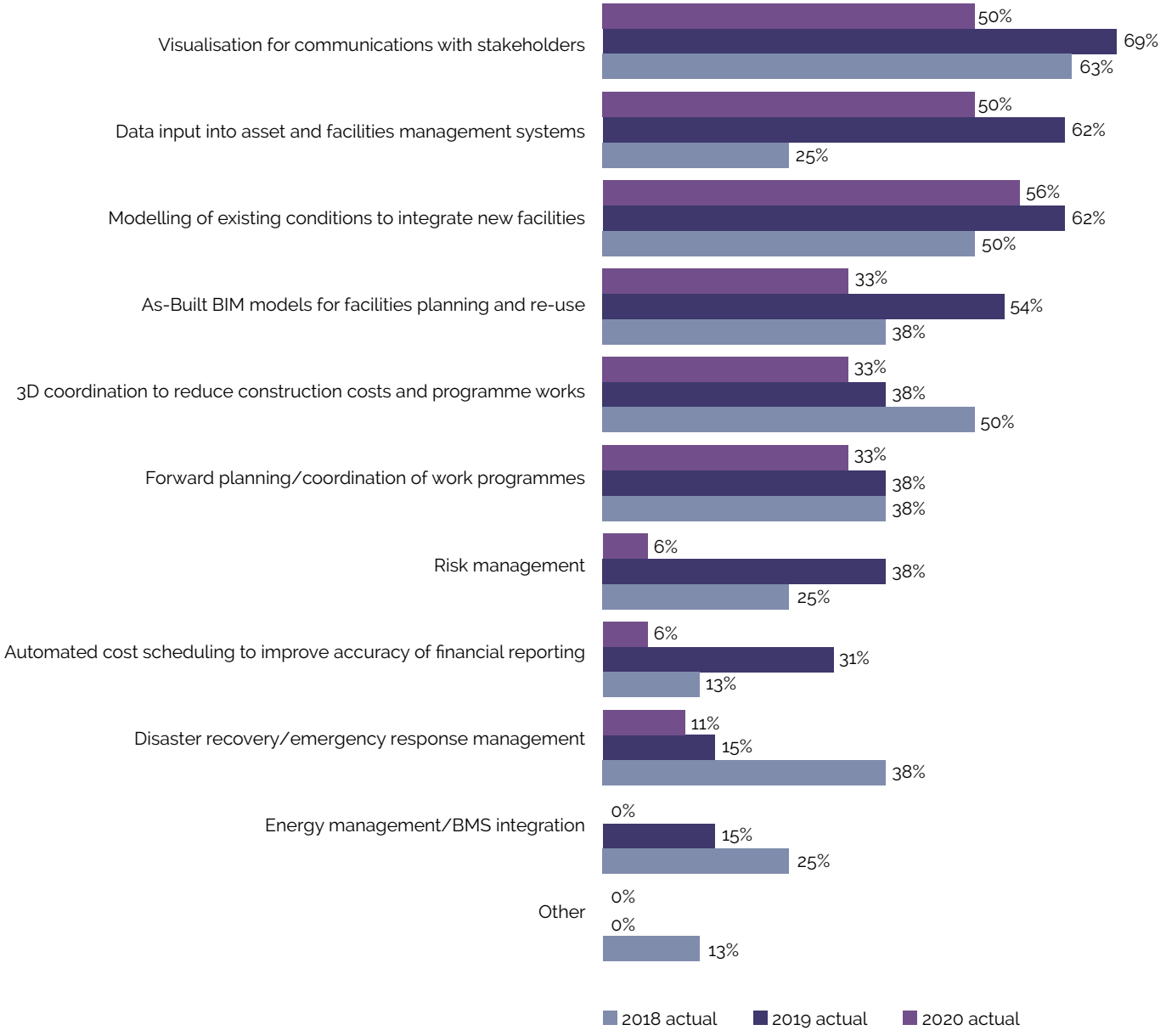
Use any type of system for managing sites or horizontal infrastructure.

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

Note: % for each activity adds to more than 100% as they may be using multiple systems for each activity

Clients who already use integrated digital spatial and asset information were asked what decisions are informed using this information. In 2020 modelling of existing conditions has come to the fore, overtaking visualisation for stakeholders. Visualisation for communication with stakeholders continues to be important, as is data input using digital spatial or asset information.

The decisions informed using integrated digital spatial asset information



Base: Use integrated information now 2018 only n=8, 2019 n=13, 2020 n=18

Q. What decisions are informed using integrated spatial and/or digital asset information (including BIM processes)?

The positive impacts of BIM

Industry

Industry respondents reported the positive impacts of BIM centred on:

- Better coordination (mentioned by 35%)
- Identifying issues or clashes before they get to site (mentioned by 23%)
- Streamlining time, costs, and workflows (mentioned by 20%)
- Better understanding of the projects, what's required, and design decisions (mentioned by 13%)
- Building better relationships (mentioned by 10%)

"The projects that are embracing BIM tend to be better coordinated and those involved a better understanding of the project, which leads to better outcomes. For us managing process requires visibility and experience. BIM is a tool that has the ability to enhance that understanding. A goal for the industry must be to gain efficiency, decrease build costs and improve quality. BIM has the ability to do all of this and needs to find a way to get there."

"Clarity. Better harmony on the project team."

"A 3D model is a very quick way to coordinate all the different trades, and pass onto others to clarify how construction is intended to take place."

"Collaboration. Connected thinking. Transparency of activities."

"Better coordination and the ability to keep up with market trends."

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

"BIM allows us to resolve items digitally before and visually with stakeholders that are less graphically literate."

"Less issues arise on site particularly between services and structure. With our history of the use of BIM in our office it has definitely helped win projects."

"3D coordination allows some level of digital twinning to find and overcome clashes and problems before they get tendered or onto site. Live rendering software allows clients to visualise the project early-on while decisions are being made."

Streamlining time, cost, and workflows:

"Automation through BIM has made way for us to streamline several of our more mundane tasks. Through BIM we also have a far better understanding of what's required at the end of our process and who's responsible for what within the models."

"Being at the forefront of BIM implementation we have been able to not only deliver landmark projects for our clients but we have developed new workflows within BIM to assist in exceeding our clients expectations. Developing new workflows is all part of what the industry is doing and if we all keep moving in the same direction it can only benefit us all together."

"Allowed us to use our expertise to move in to other sectors of the design construct workflow.

"Digital engineering is a significant step change similar to evolving from hand drawn drawings to computer aided drafting (CAD). Better design coordination and more efficient development of designs and the ability to visualize these."

"We are continually reviewing the way in which we document and deliver our projects, BIM processes and workflows are allowing us to leverage and expand this more."

Better understanding of the projects, what's required, and design decisions:

"BIM increased design control and awareness on design decisions (e.g. specification)."

"Staff who are capable of utilizing BIM models on our projects often have a far better understanding of the project – this helps us better understand constructability/ constraints and more readily identify potential issues before they happen."

Building better relationships:

"BIM has improved internal outcomes & collaboration, allowed us to be more agile and build better relationships with our clients through better understanding of what product they are buying."

"Specific to our clients, and working hand in hand with some of our other technology offerings, they are starting to see the value of a good quality 3D BIM, but also are finding new ways to engage with it."

"Our business has the equipment, software and potential to be part of the collaboration process and we are actively promoting use of BIM in all of our RFP submissions. We would like to think this assists in our selection but the choice of the BIM path for consultants needs to be prior at the outset of a project."

"We have much closer relationships with our design partners as a result of BIM than we have had in the past."

The positive impacts of BIM

Subcontractors

Comments from the subcontractors centred on accuracy and efficiency – of cost, time, and resources, as well as improved coordination. Within this though, 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 the industry trends.

- Accuracy & clash detection (mentioned by 33%)
- Cost and resource efficiency (mentioned by 24%
- Coordination improvements (mentioned by 19%)

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

> "We are producing better working drawings with less rework. We tend to lead the coordination and others follow which our business look more professional and up to date with modern construction methods."

> "Accuracy and confidence in pricing, ease of coordination and accuracy of shop drawings."

> "As we use BIM more and our staff become familiar with it, it has many positive outcomes particularly in correct setting out, clash control, solving design issues and inevitable client variations."

> "Manufacturing directly from models into fabrication software has cut drawing time and reduced errors in fabrication. Installation times and accuracy have been greatly improved also."

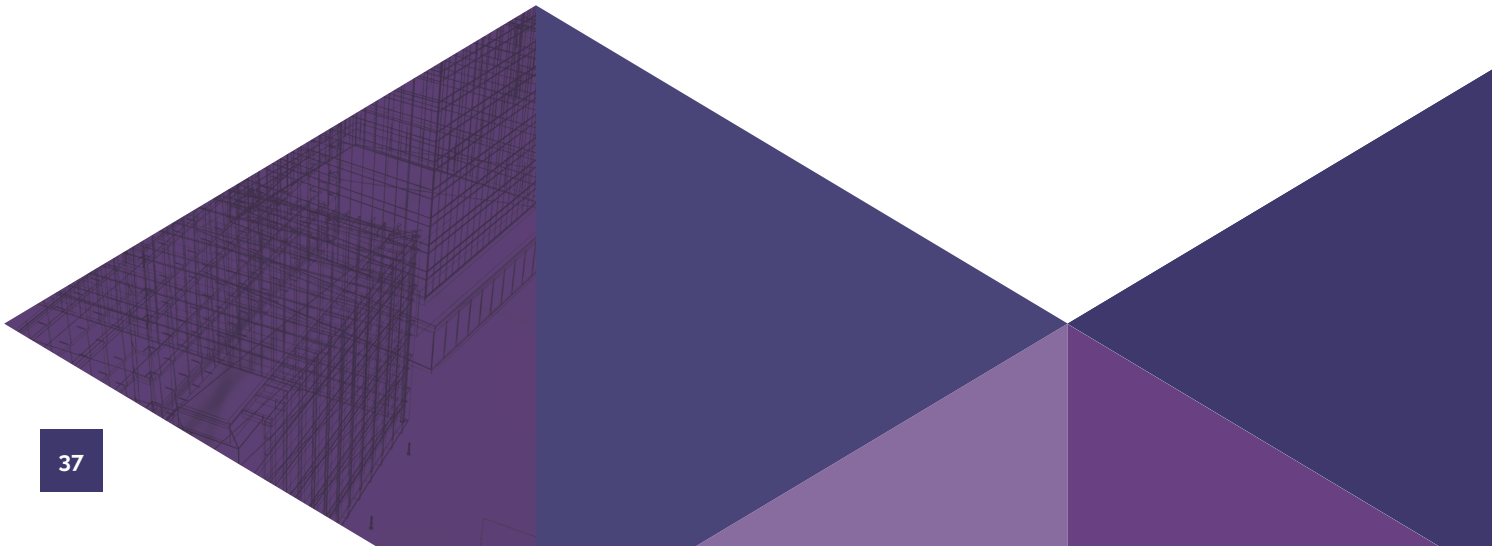
Some specifically mention cost and resource efficiency as a result of using BIM:

> "It has made estimating jobs more complete when we have a good design model."

> "The biggest benefit has been more efficient use of labour employed to deliver the same or better outcome. Our engineers are trained alongside the draftsman so that they can access and work in the model on the non-graphical data. This is particularly useful for scheduling and meta data input and frees up drafting resources for work on other projects. We are also looking to start using the 3D model for engineering applications as well. We look for opportunities to work with our subcontractors where we can use BIM models to make better decisions for onsite coordination. Where available, BIM model information is used for duct fabrication which helps to reduce errors and material waste that can occur using 2D CAD or PDF drawings."

Comparing industry and subcontractor on the positives of BIM

Comparing responses from the 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 group response. They are able to expound on the impacts of that efficiency or coordination, whereas subcontractors are more likely to simply state the outcomes but not what it means down the track. There might be potential to take subcontractor awareness of the benefits to the next level so that BIM becomes more embedded in what they do. It's not just about accuracy, it's accuracy that then has certain impacts on the subcontractor business.



Barriers to BIM uptake

Industry

Not all parties being on board or aligned is the main issue. In 2020, there were a number of comments around the training and experience of staff issues with platforms and file types, client preparedness and alignment, and cost/value perceptions.

- Not all parties aligned, on board, or at the same level (mentioned by 28% of participants)
- Client preparedness, alignment, and knowledge (mentioned by 23% of participants)
- Training and experience of staff (mentioned by 20% of participants)
- Platform and file type issues (mentioned by 15% of participants)
- Cost and value perceptions around using BIM (mentioned by 10% of participants)

Client preparedness, alignment, and knowledge:

"Client procurement of the full range of consultants and contractors doesn't always align – they often haven't engaged the design consultants with the same "BIM" deliverables in mind as they do us as a contractor."

"Clients & other stakeholders not understanding the BIM process and the benefits it can bring the project."

"A lack of understanding (from commercial managers) that BIM is a process & therefore contractual in nature."

"Internal uptake of BIM has been uneven – we're a big multi-disciplinary. Externally, some clients still don't comprehend/ appreciate the value add of BIM so we end up using BIM to save ourselves time and ultimately deliver BIM-free deliverables, that on occasion have lead to the assumption that a BIM has not yet been created."

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

"Not many understand the importance of the BIM briefing and Execution plan. Clients and Project Managers have little to no understanding of what can be offered or what the benefits on the FM side could be. Many consultants and subcontractors are still not using or not being contracted to provide BIM deliverables."

"Not having visibility of how the rest of the delivery team have been procured, what their deliverables are before we agree to our contract and deliverables. Other delivery team partners not being as collaborative as they could be with timely updating of model information. Having the clients objectives clearly defined at the outset of the project ensuring that our scope does not change when the contractor is procured."

"Lack of understanding about LOD. What other parties are required to deliver at a stage. The programming of who does what when is a challenge."

"For a lot of engineers coming from a AUTOCAD, the extra responsibility of coordination can frustrate them when it comes to "Just getting the drawing out"

"The industry sometimes thinks landscape architects are not ready to use BIM or don't see the value of us doing the project in BIM. There's definitely a value to make BIM for the landscape to understand and see what's happening outside our buildings and also make good decisions on time, but sometimes the fees are small for this exercise."

"We find the lack of BIM knowledge and understanding among the smaller firms in the AEC industry is a real problem. We typically deal with and collaborate with the 'tier 1' firms, but when we have to work with smaller firms getting them to understand the benefits and workflows of BIM can be time consuming and frustrating."

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

"Lack of human resource with right mix of construction experience and technical/ computer/"BIM" skills. You can't teach experience!"

"Training, mainly of senior staff. Getting agreement on right level of detail to produce."

"Strategy & person in role for implementation of BIM not even visible."

"There is also a reticence to promote BIM persons in roles of commercial responsibility in order to manage high-level conversations regarding design."

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

"Cloud Based Platforms not being located in NZ. This is a tricky one. NZ as a whole needs a local solution. Currently BIM360 is based in America or Europe. Revizto is based in Australia. This is hampering the industry wide progress being made in BIM. Any project requiring confidentiality (no data leaving the country) means cloud-based platforms cannot be used. While we can still deliver these projects to a high standard it does impact project collaboration & coordination workflows."

"Proliferation of file formats and software platforms being pushed onto project by external parties, requiring multiple skillsets, increased software costs and doubling or tripling of work to output deliverable."

"A lot of the smaller Architectural firms are still not using Revit, so this also adds a layer of complexity to the collaboration/ coordination process."

"Limitations in BIM authoring software (e.g. limitations in modelling functions)."

Cost and value perceptions around using BIM:

"Lack of understanding of the value at client level. The cost of implementing is seen as double dipping by clients for works that should already be allowed for. Lack of total adoption across the industry means as a default it's easier not to do. The end outputs need to be lower building costs and greater quality – this is yet to be reinforced by the BIM community."

"Cost of constantly changing drawings, cost of additional calculations. Not enough time allowed for structural drawings to catch up with architectural changes. The architect will change design and structure is always playing catch up to meet a deadline which leads to rushed jobs, long hours and errors."

"Traditional fee agreements are still not tailored to BIM production programmes. Consultants do not allocate the BIM resource(s) early enough in the work-stages."

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. The need for wider uptake and better industry understanding of BIM (and how to make it work for other parties) – mentioned by 33% of participants
2. Poor models, information, and platform interoperability – mentioned by 24% of participants
3. A lack of training and expertise (or access) – mentioned by 18% of participants.

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

The need for wider uptake and better industry understanding of BIM (and how to make it work for other parties):

"BIM modelling needs to be fully adopted by the client with all parties being involved to the same standard and LOD levels. If not it can be counterproductive and a huge distraction."

"Other trades do not use it or the architectural and structural models become out of date."

"Main mechanical contractors are not interested in involving subcontractors to be part of BIM and only a small amount actually use BIM."

"Having enough uptake to be worthwhile. Having access to the appropriate files if not an official subcontractor BIM project despite existing."

"The main obstacle is that not all trades are using BIM modelling all the way through to construction, with plumbing and electrical/ data in particular. We find that for existing buildings the BIM model is not accurate and not all consultants use a convertible format or won't convert for us."

"Often a client specifies BIM without knowing the full spectrum encompassed by the term."

Poor models, information, and platform interoperability:

"Broken information flow due to contract requirements. i.e. there is a requirement for services to provide detailed models for coordination, but architectural and structural elements are not modelled well enough to undertake good coordination. The quality of design models are not good enough to use for producing fabrication models. Fabrication models are often rebuilt from scratch."

"Consultants using wrong families and inserting wrong equipment. The true equipment ECI has space issues."

"Seismic details and fixing systems are not shown on the model. Variations are not added to the model."

"No Hydraulic calculations for Fire Trade in NZ."

A lack of training and expertise (or access):

"Limited experience with revit, clash detection has not always been done and falls on contractor to resolve."

"We have had hardly any exposure to BIM and our lack of knowledge and experience makes it hard to comment on obstacles or issues."

"Staff and access to viewing and editing/ commenting software."

Barriers to BIM uptake

Clients

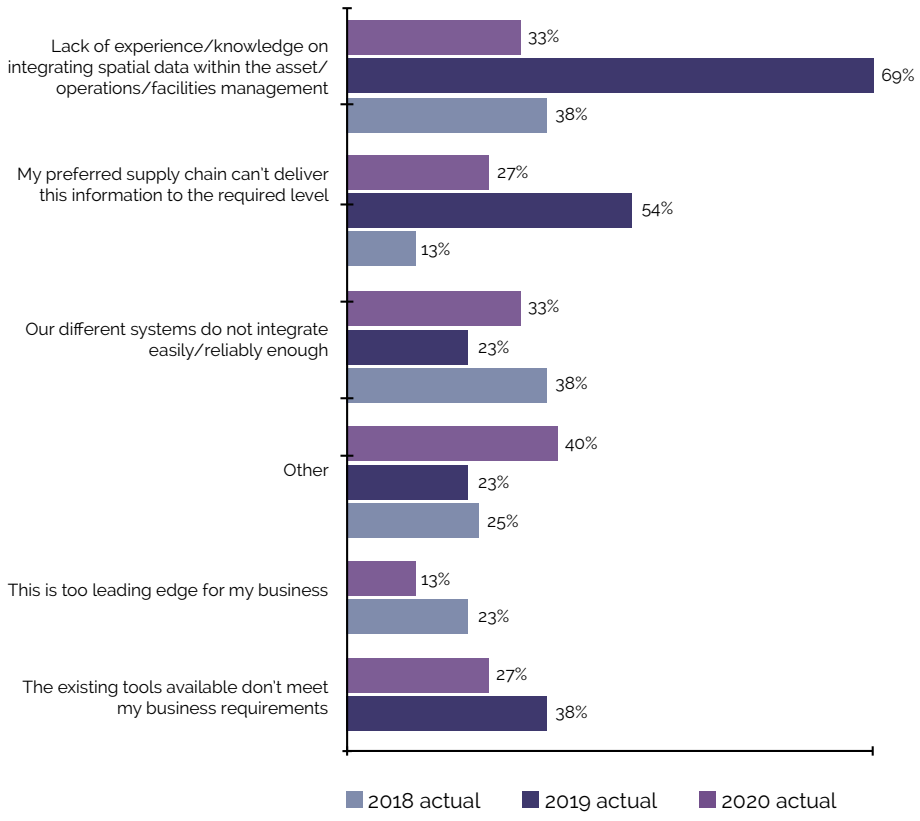
Those clients who are not integrating digital spatial or asset information cite a lack of knowledge (33%) and different systems not integrating easily (33%) as key reasons for not considering integration. It would appear that awareness is reducing as a barrier to adoption,

Far fewer clients mention lack of knowledge, inability of the preferred supply chain, or this being too leading edge as challenges to integrating information or using BIM.

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

- Internal capability (mentioned by 43% of clients)
- External capability (mentioned by 26% 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:

"Organisation familiarisation with BIM as a tool. Convincing stakeholders that investing in BIM is advantageous to the business. Understanding the end use of BIM – will we use for asset management vs. just for design and construction."

"Internal capability; standardised internal process; perceived cost."

"Lack of understanding by project leaders about how to utilise BIM. BIM tends to be driven mostly from the bottom up."

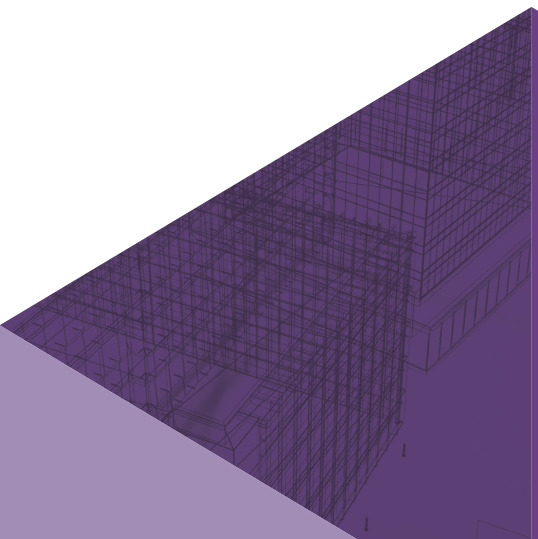
External capacity was also raised as a key issue – including the skills, knowledge, desire, and maturity of consultants and contractors in using BIM:

"Most consultants now use BIM in their documentation. Subcontractors are not as familiar with BIM so during construction it is challenging to get them to work in a BIM environment."

"Contractors understanding of asset metadata required at handover."

"Consultant compliance. Misunderstanding of what is required/requested. Lack of skills within the industry. Cost increase based on difference from traditional methods. Resistance to change and innovation."

"Technical competencies/understanding of the supply chain including designers and contractors and as a result costs to execute."



The other main area of discussion was cost and perceived value of BIM:

"Budget and existing information (scan or model)."

"Complicated, expensive to procure and maintain."

"BIM methods used to increase fees without skills to follow through."

"Cost and ability to utilise the data with existing department software."

"Cost of "retrospective BIM" on existing assets being affected by upgrade."

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. The lack of alignment is evident in comments from both subcontractors and clients, but verbalised in slightly different ways. For industry, the alignment issues were around deliverables and willingness to collaborate. From the subcontractor perspective, alignment was more about uptake – there is uneven uptake across the industry and even within subtrades. For clients, the lack of alignment was more about consultant alignment and understanding of what is required to deliver something clients can use beyond the construct phase. The general sense from across all is that of unevenness – BIM is unevenly distributed, unevenly used, and unevenly understood. To create more productive use of BIM we need to be looking to bring all parties to the same level of knowledge and use (and use platforms that allow for interoperability).

What is required for greater use of BIM by the industry & client groups?

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 2020, 35% of participants said nothing – they were already using BIM on all projects now. This represents a strong increase from 23% saying so in 2019.

Beyond this, the main points raised in 2019 included comments on creating a shift in how we think about deliverables and procurement, more skilled workers, and government leadership. In 2020 the comments centred more on client acceptance especially around the cost involved to get good outcomes and understanding the value of those outcomes. Better quality and more aligned files and platforms were also an issue – with misalignment adding to the cost of BIM. In addition, as in 2019 there were comments around training/upskilling staff, as well as more consultant and contractor use and engagement.

More skilled workers and training (15% of participants mention this):

"Internal upskilling of construction staff to make best use of "BIM" as applicable to their role."

"Better client and project manager education to encourage buy-in to the process. Educating everyone generally on the way iterative 3D coordination should happen."

"Internally it needs to become second nature, and our team need to become comfortable that it can improve the outcomes of their work."

"More training and access to software."

More consultants and contractors open to and using BIM (10% of participants mention this):

"If civil engineers engage more with BIM it would be easier for us, sometimes civil is the missing link between us and a BIM project."

"Supply chain upskilling at subtrade level. Subcontractors typically have no inhouse capability & therefore do not pertain to the process."

Client acceptance and specification of BIM (18% of participants mention this):

"We are trying to get clients to engage with us to do all the services and building details (structural components connections) within a federated 3D environment to iron out those later problems on site of clashes or site modifications due to incorrect details between trades. We have found it extremely difficult to get clients to accept that they either pay money up front of the project to solve these inherent problems within the 3D virtual environment or pay later as we see on a daily basis when coordination has not been done. Then when we say it will save them money in the long term that is a very hard nut to crack. Our last couple of major projects where we have been the services coordinators and details have been highly successful."

"We need to ensure the conversations can be had up front with the client on their expectations around BIM processes and/or deliverables for their project to allow us to set the project up for success from the outset."

"Clients acceptance of this is not the future, but the present."

"Clients gaining a better understanding of how they will make use of any "BIM" deliverables – this must be driven be a suitable qualified/ experienced individual/team within the client organisation, not simply a consultant 'expert'. If the client doesn't buy in, they won't get any value from the process."

"Greater visibility of tangible value that it adds, leading to greater understanding by clients. We use it predominantly on large complex projects, by association that is because it is perceived as difficult, complex and costly to implement and only of value at projects of scale. Simplified messaging or stripped down processes that would assist with smaller projects and be cost effective to implement would be valuable."

Better quality and more alignment of files and platforms (18% of participants mention this):

"Designers to produce files BIM prepared with object suitably prepared and populated with data to allow quantity extraction as BIM process intended."

"More alignment across the AEC industry on deliverables, platforms."

"Revit to work as one with Etabs similar to Robot."

"Standard model types eg IFC."

"Not all sectors use the same platform, if only we use a BIM model to build the project all have to comply."

"We push for BIM on all projects. We tailor the solution to suit the clients requirements each time. The only immediate way we could utilise BIM more than we already do is if there was a solution provided by one of the cloud based platforms to eliminate any concerns our clients have about data integrity & offshoring data."

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 – from clients to contractors to consultants. The comments provided included:

More contractors using BIM, particularly main contractors, and more collaboration between trades (33% of subcontractors mention this):

"Mechanical contractors need to involve subcontractors more."

"More collaboration between other trades."

"We have found benefits where main contractors are BIM enabled and see BIM as a construction tool rather than just a 3D model for producing 2D drawings. More main contractors that are engaged with BIM will see more BIM use and greater diversity of applications. We also see that clients that request As-Built BIM models with asset information embedded don't know what to do with it. The current asset information requested is often a duplication of what goes into the O&M manuals. This limits BIM to only what was installed. Better understanding of what information is required could be more useful by feeding into planning and preventative maintenance systems."

"More early subcontractor involvement in design."

"Only that more jobs use it, and make it available for use early enough to be helpful."

"ECI and all trades onboard."

More consideration of BIM in procurement and use by clients beyond construction (19% of subcontractors mention this):

"There would need to be a BIM model handed down to the facility management team for us to use as part of ongoing service/energy management/green star related activities."

"Education to the industry of procurement methods."

"BIM gets more precedence and driven and managed from design into construction to completion and beyond."

"It needs to be specified at the tender stage and all trades to collaborate on the model during construction. This needs to be enforced."

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

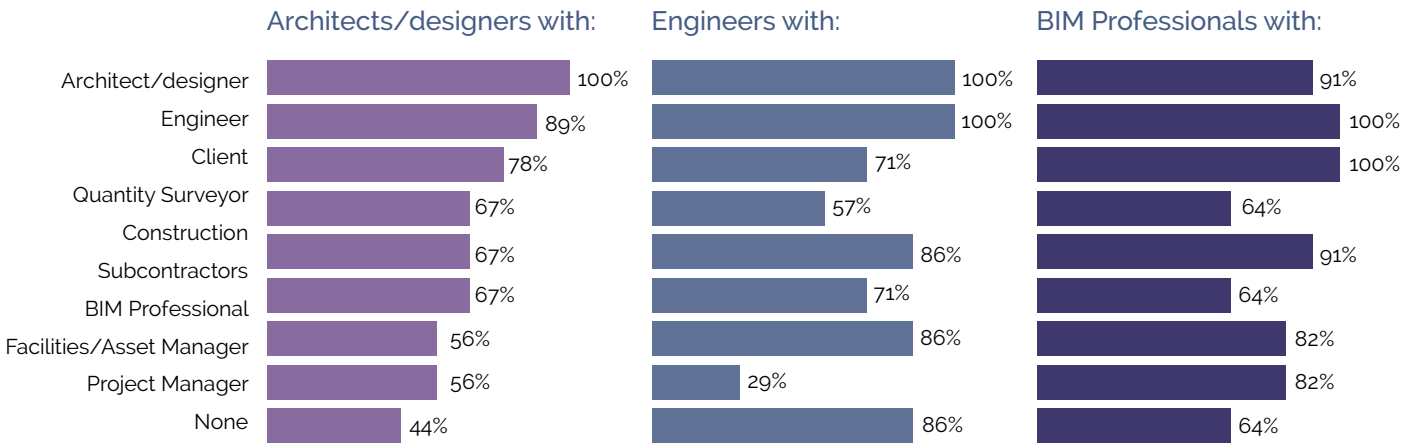
Industry group respondents talk about client acceptance and the interoperability of platforms and files, whereas subcontractors tend to focus on increasing the numbers of contractors using BIM and client procurement. Effectively, subcontractors now focus on areas that were of importance to industry four years ago. This suggests that subcontractors are currently 3-4 years behind industry in the adoption curve (unless we do something to accelerate adoption among subcontractors).

Collaboration between industry parties using BIM – industry

The industry group comments 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 group respondents were asked which professions they collaborate, or share information with on projects (not BIM specific information – collaboration in general). The chart below shows the networks of collaboration. (Note the low subgroup sample size).

Industry collaboration with other parties



Base: Architects/designers 2020 n=9, Engineers 2020 n=7, BIM professional 2020 n=11
Q. Which professions do you collaborate with or share information with on projects?

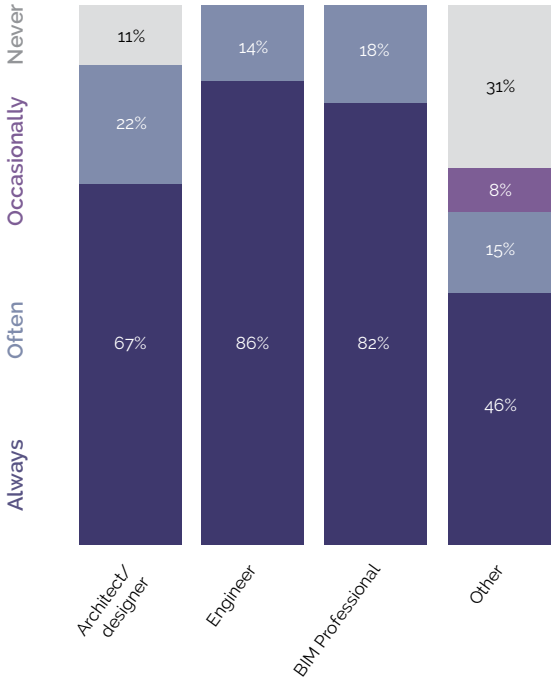
Industry group respondents were also asked how often they share BIM models with other professions and other businesses involved in a project. This question was changed in 2020 to explicitly ask about who they shared with internally (within their organisation) and externally (outside of their organisation).

There is a strong level of sharing internally – with at least two thirds of architects, engineers, and BIM professionals always sharing internally. This drops when it comes to sharing externally – 56% of architects, 57% of engineers, and 45% of BIM professionals always share externally.

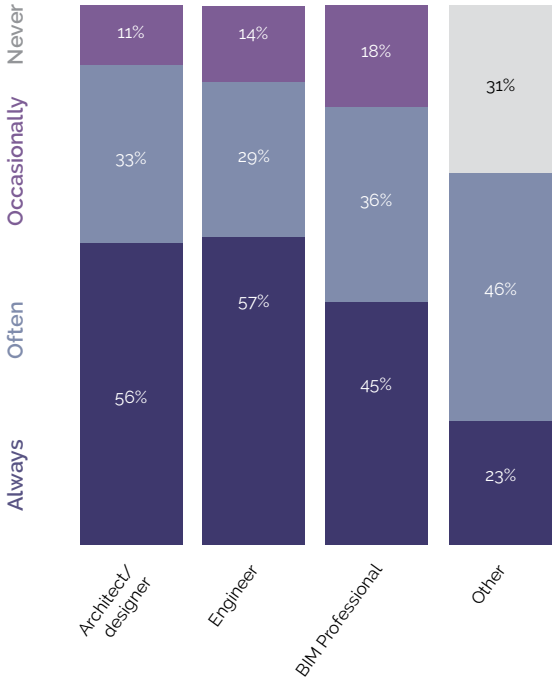
Note: the 'other' category in here includes Project Managers, Quantity Surveyors, etc.

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: Total n=40, Architects/designers n=9, Engineer n=7, BIM professional n=11, Other n=13

Q. Thinking across projects that use BIM, how often do you share BIM models with other professions involved on a project – both those internal to your business, and those external to your business?

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:

"A national standard."

"A single CDE and all consultant using the same authoring program."

"Common agreement on collaboration platforms."

"Common data platforms."

"Common standard type of model such as IFC."

"Everyone using Revit and BIM360."

"Consistent file format that allows easier interchange of information between software used."

"Having the whole team working within the same CDE with a mapped out flow of data for the various model uses.."

"Onedrive/ sharepoint platforms that both internal and external parties have access to."

In addition, a number of other comments were made that didn't fit into any one category but still highlight important points. These include:

"Better industry understanding on internal coordinates vs shared (shared only works for Autodesk products and causes issues when working with others)."

"Better internal model export presets. Adopting cloud-based CDE."

"Cheaper licenses for CDE (e.g. BIM 360) Better support of IFC by authoring software (Revit)."

"Cloud Based Platforms with the server located in NZ. We're currently restricted in our use of BIM on some confidential projects."

"Remove stupid disclaimers."

"For them to engage in collaboration, too much reluctance from others."

"It's pretty easy to share models at the moment. There are still issues with contractor and QS BIM interactions, but nothing that a disclaimer doesn't cover."

"Stakeholders being aware we have created a BIM Model in the first place."

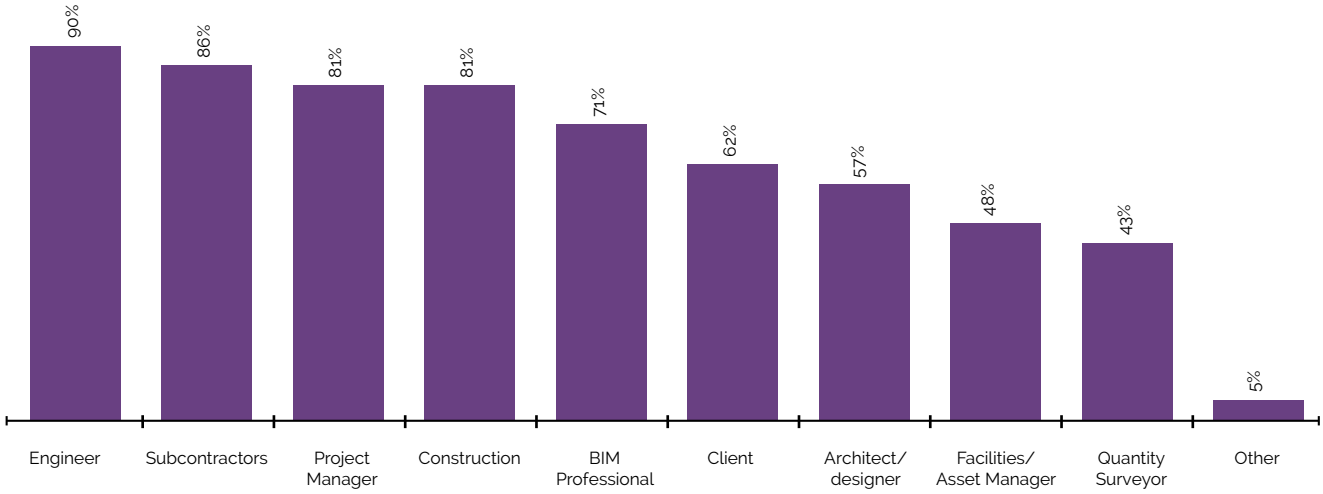
"There is a big disconnect between designers and the construction site. Autodesk Plangrid / BIM360 and Procore is trying to address this but is not widely adopted."

Collaboration between industry parties using BIM – subcontractor

Subcontractors tend to be collaborating more with parties at the construction end of the spectrum – other subcontractors, project managers as well as with engineers. At least four in five subcontractors say they collaborate with each of these parties.

Within the industry survey, 71% of engineers said they collaborate with subcontractors on projects – the highest of the industry professions. Subcontractors place engineers as the most frequently collaborative profession. While two thirds of architects and designers say they collaborate with subtrades, 57% of subtrades say they collaborate with architects and designers. Potentially architects and designers might collaborate with only specific subtrades, not all of them.

BIM collaboration

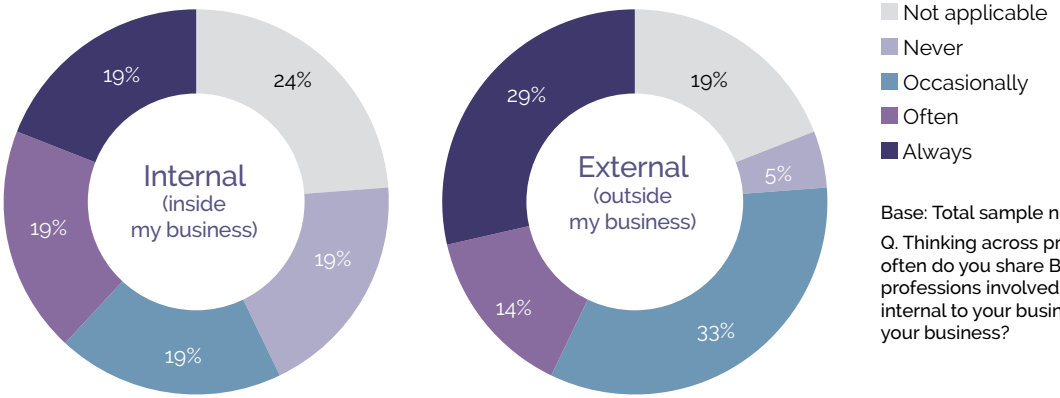


Base: Total sample n=21

Q. Which professions do you collaborate with or share information with on projects?

Three in ten (29%) subcontractors say they always share BIM models with parties outside of their business, a further 14% do so often. Sharing BIM models inside their business is a less frequent occurrence, with one in five saying this always happens.

Sharing BIM models – internal & external sharing



Base: Total sample n=21

Q. Thinking across projects that use BIM, how often do you share BIM models with other professions involved on a project – both those internal to your business, and those external to your business?

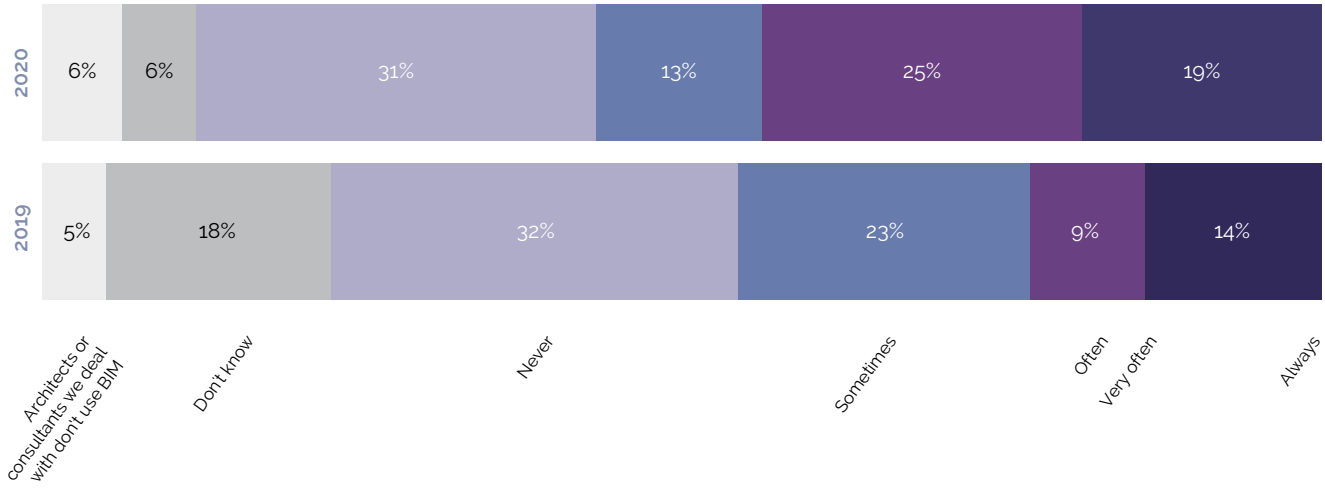
Sharing of BIM Execution Plans (BEPs)

In 2019, fewer than half (46%) of subcontractors surveyed were getting BEPs at least sometimes on the projects where consultants have used BIM. In 2020 this has increased to 57%, though none said they 'always' get a BEP where a consultant used BIM (this was 14% in 2019).

Both the industry and client groups raise a lack of collaboration with trades. This data confirms that BIM information is not being shared consistently across all parties involved in a project.

Subcontractors who were receiving BEPs were asked to rate the BEPs they were receiving on several factors. The majority agree that the BEP clearly explained roles and responsibilities, clearly explained methods for collaboration, and provided sufficient detail.

Sharing of BIM execution plans

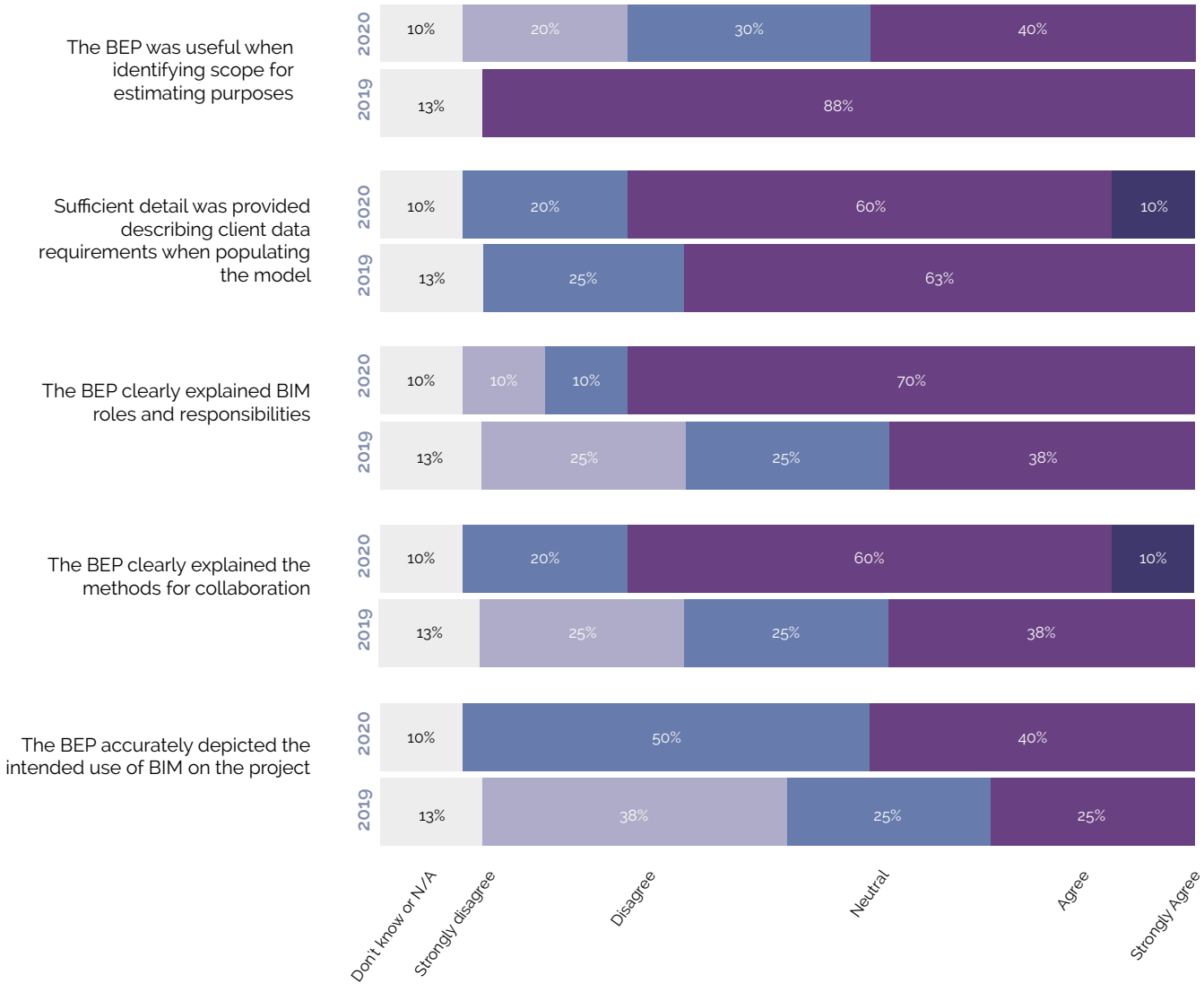


Base: Have used BIM/plan to use BIM in the next year 2019 n=22, 2020 n=16

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?

There is less agreement that the BEP was useful in identifying scope or that it accurately depicted the use of BIM on the project. Only four in ten agreed with each of these statements.

The quality of BEPS provided to subcontractors



Base: Have received a BEP from a consultant 2019 n=8, 2020 n=10

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

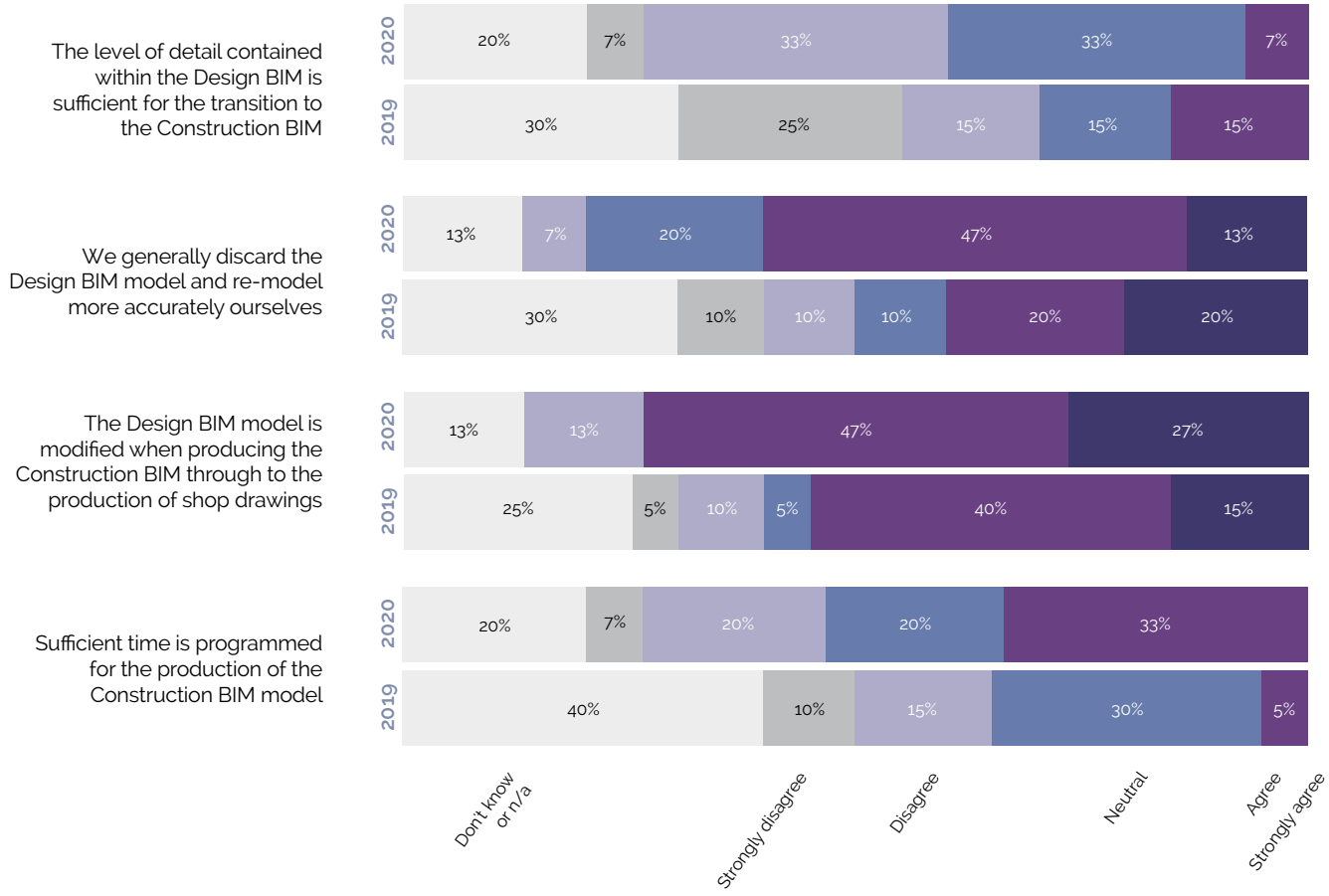
The subcontractor group were asked to rate several factors in relation to the transition from the Design BIM to the Construction BIM.

Six in ten (60%) agree they generally discard the design BIM model to remodel more accurately themselves. This has increased from 40% in 2019.

Furthermore, three quarters 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 increased from just over half (55%) in 2019.

Only 7% of subcontractors using BIM agree that the level of detail in the design BIM is sufficient (down from 15% in 2019).

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



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

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 architects/designers and engineers. Those classified as 'other' (project managers, quantity surveyors, etc.) have a lower use of the Handbook.

Subcontractors reported that 19% of them are aware of and have used the NZ BIM Handbook.

Base: 2020 industry n=40, 2020 subcontractor n=21

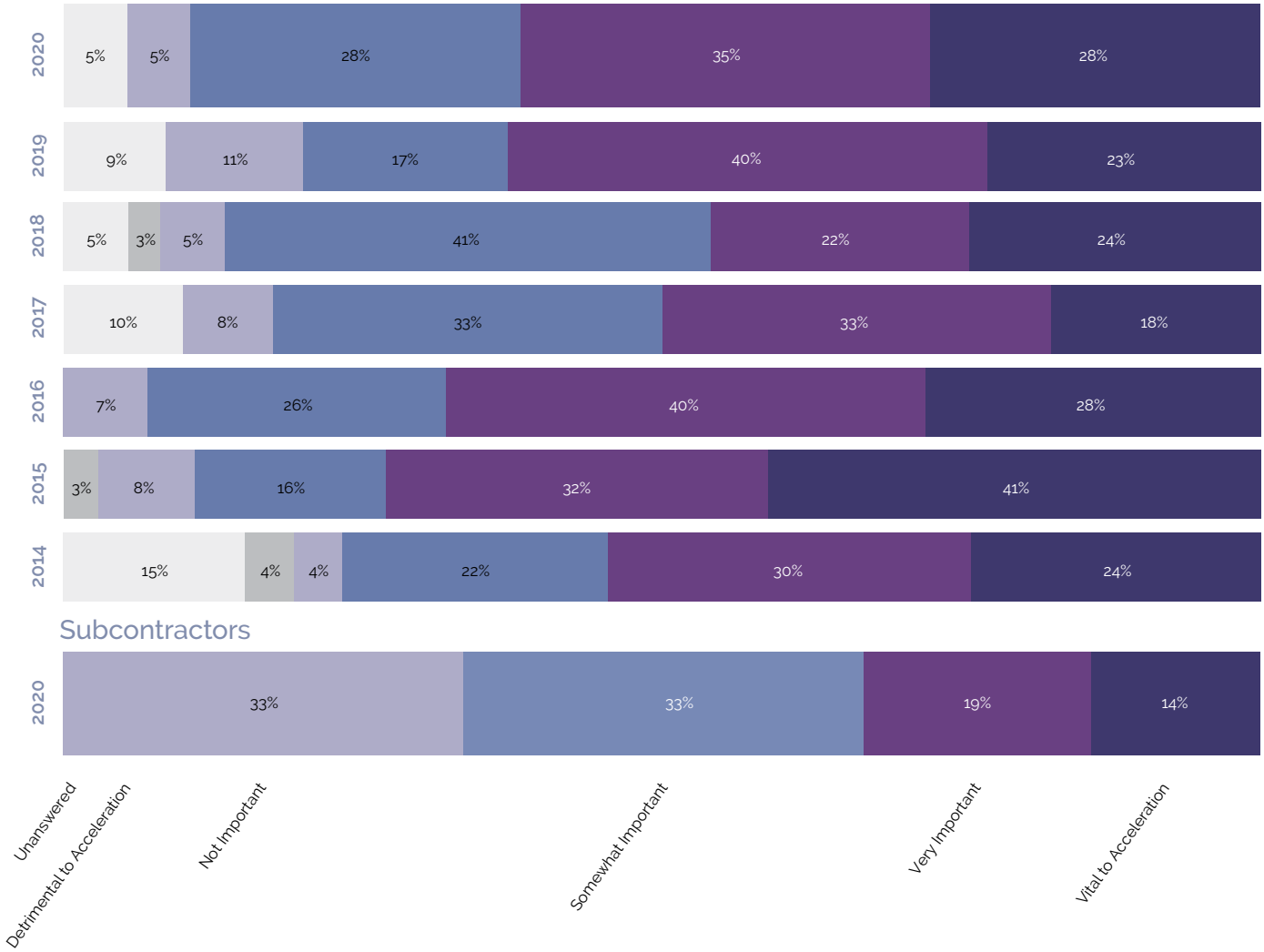
Q. Before today, had you heard of and used the NZ BIM Handbook?

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. Over three in five (63%) in 2020 say the government's role as a client is at least 'very important'. This is stable from 2019, though in 2020 we see a higher proportion saying government involvement is 'vital'.

Among subcontractors, only 14% say that the government's role as a client is vital to BIM acceleration. In fact, 33% say it is detrimental to use and acceptance of BIM. This suggests that industry and subcontractors have a very different experience of government use of BIM.

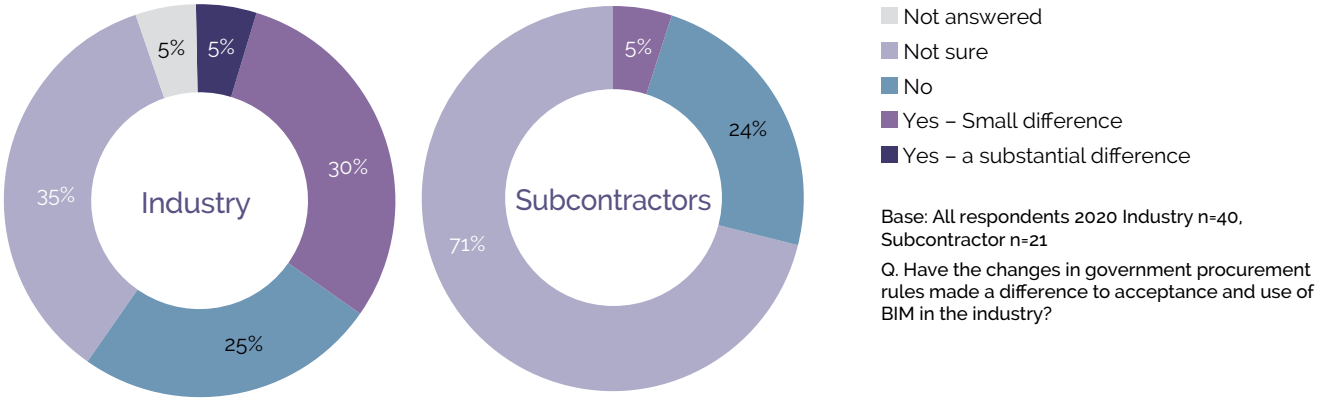
The importance of the government's role as a client in accelerating the development and use of BIM within New Zealand



Base: All respondents Industry: 2014 n=46, 2015 n=40, 2016 n=43, 2017 n=40, 2018 n=37, 2019 n=35, 2020 n=40; All respondents Subcontractor 2020 n=21
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. 5% of industry said that it had made a substantial difference, and a further 30% said it had made a small difference. The impact for subcontractors is far less – with only 5% saying it made a small difference. The majority of subcontractors said they weren't sure what difference it had made which is unsurprising given the lower incidence of BIM among subcontractors, and the fact that they're another step or two removed from the design process.

Impact of Government Procurement Rules



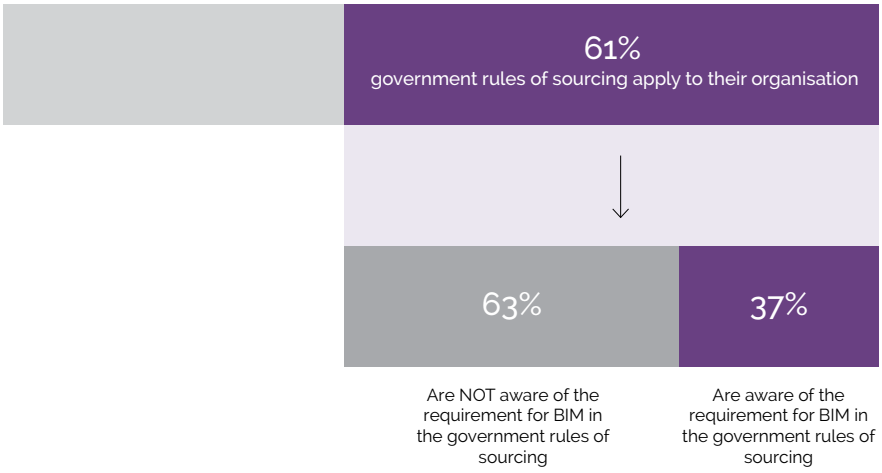
Base: All respondents 2020 Industry n=40, Subcontractor n=21

Q. Have the changes in government procurement rules made a difference to acceptance and use of BIM in the industry?

Client view on government's rules of sourcing

Of the three in five to whom government rules of sourcing applied, 37% were aware of the requirement for BIM within these rules. This suggests that communication is required to ensure those impacted by the rules fully understand what they mean.

Government rules of sourcing



Base: Total sample answering this question n=31

Q. Do the government rules of sourcing apply to your organisation?

Q. Are you aware of the requirement for BIM in the government rules of sourcing?

Base: Aware of government rules of sourcing n=19

Control Group Organisations

Industry group organisations include:	
22 Degrees Ltd	Ignite Architects
AECOM	Jasmax
Archaus	KTA Ltd
asBUILT Digital Ltd	Maltbys Ltd
Assemble	MSC Consulting Group Ltd
Auckland Airport	Patterson Associates Ltd
Barnes Beagley Doherr Limited	Peddle Thorp
Beca	Structex
BGT Structures	University of Auckland
Envivo	Wellington City Council
Hawkins	WT Partnership

Client group organisations include:	
Auckland Council	Ministry of Education
Dunedin City Council	Russell Property Group
KiwiRail	The Warehouse Limited

Subcontractors group organisations include:	
Allendale Electrical Ltd	Express sheetmetals NZ Ltd
Aquaheat NZ Ltd	Fonko
Axis Plumbing	Heatwave Mechanical
Building Technologies Ltd	M&E Caddesign Limited
Callander Electrics Ltd	Numecon Contracting
Chenery Technologies Ltd	

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

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.