

BIM in New Zealand — an industry-wide view 2019

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

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BIM benchmark survey foreword

This is the sixth 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 six 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.

For the fourth 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.

Once again the BIM Acceleration Committee (BAC) considers itself fortunate to have the continuing support of BRANZ, a number of large private sector organisations and several Government Ministries, as the committee nears the end of its second three-year term in its effort to accelerate BIM's introduction into New Zealand. Consideration is currently being given to extending the life of the BAC for a further three year term.

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 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

Chair, BIM Acceleration Committee

Established in 2006, EBOSS hosts a comprehensive architectural product library, with an active audience of 35,000 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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Executive summary

From an industry perspective, the number of projects using BIM has plateaued this year at 59% after only a slight increase in 2018. Among the client group 77% have heard of integrating digital spatial information with asset management systems, and of BIM processes as one of the ways to achieve that.

Among clients surveyed, 39% are integrating digital asset or spatial information with asset management systems, down from 47% in 2018. This shift might have more to do with changes in sample response (almost double the number of responses in 2019 from 2018) rather than a shift in behaviour across the client base.

Of those who are not currently integrating digital spatial information with their asset management systems, only 8% plan to start doing so in the next 12 months. A further 54% are aware of the concept and may look at it in the future (but not in the next 12 months). Across all clients surveyed, 19% say they're unlikely to begin integrating this information or that it's not something they're considering.

Across both the industry and client groups at least half of all projects use BIM or specify BIM in procurement.

For the industry group, enabling further use of BIM requires a mindset shift from both consultants and clients. Procurement needs to take a different approach to BIM, allowing for the cost involved and shifting away from competitive tender. As BIM creates a more dynamic way of design, current models of procurement and project management may not allow for this dynamic perspective.

Beyond the mindset shift, the industry group talked about barriers to BIM uptake as lack of knowledge, lack of coordination, and not all parties being onboard with BIM. Specifically, this year we have seen several comments on authoring and ownership, and the need to change the way consultants think about this.

Barriers to uptake of BIM among clients differs slightly between new assets or major upgrades. With new assets, clients tended to focus more on cost as a barrier, along with an inability to make the most of BIM models and data post-construction. For major upgrades the lack of a base model and existing conditions information can make adding BIM to major upgrades a costly exercise. Across both there is the issue of perceived value – the value equation of cost vs. benefit doesn't feel balanced for clients as yet. Capability internally, and from consultants, and subcontractors are also a barrier.

While barriers exist for both the industry and client groups, there are strong benefits as well. The industry group talked about the value of increased coordination and the flow on effects. Better relationships, better communication, increased transparency, and a more efficient process leading to both time and cost savings.

Among clients surveyed, 39% are integrating digital asset or spatial information with asset management systems, down from 47% in 2018.

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 2019, and make up a wide group of Industry professionals. 35 of the original 46 organisations completed the survey in 2019; a response rate of 76%.

The 2019 survey allows us to compare the 2014 through to 2019 data to see how BIM use has changed among industry in the last six 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 +/-16.5% at the 95% confidence interval.

A little about the industry group:

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

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

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

¹The researcher is a member of the NZ Research Association, ESOMAR, and Australian Market Research Society, 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 2019, 33 client organisations responded to the survey; a response rate of 75%.

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.²

NOTE TO READING CLIENT DATA: Due to the reduced sample size and differences in role of respondents from 2016 through to 2019, some difference in 2019 data may be driven by sample changes.

The maximum margin of error for the client survey is +/-17% at the 95% confidence interval.

“BIM is still not the status quo for undertaking construction projects. We have to weigh up the costs of BIM against the benefit of having the as-built data in model form. This is sometimes difficult to justify.”

A little about the client group:

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

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

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

²The researcher is a member of the NZ Research Association, ESOMAR, and Australian Market Research Society, bound by strict codes of research ethics and requirements.

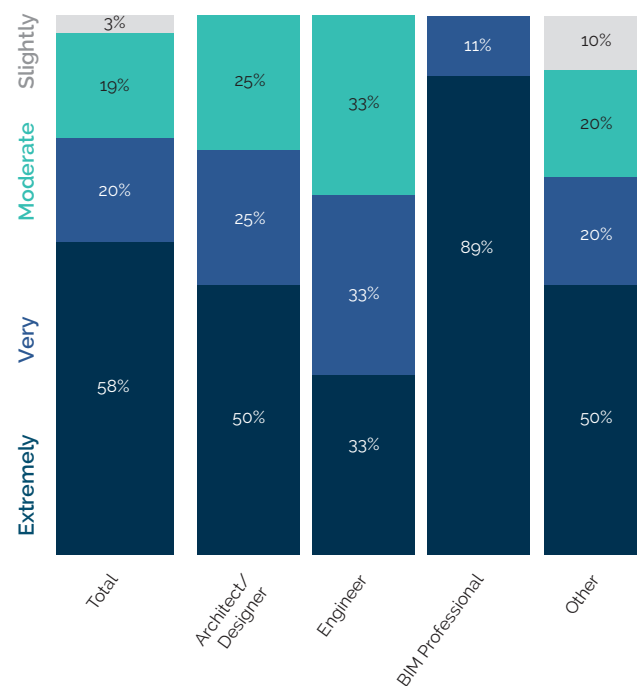
Is BIM currently being used?

Use of BIM – industry and client groups

Both the industry and client groups were asked about their current use of BIM. Almost all (97%) of the industry group have used BIM in the last 12 months, and 94% plan on using BIM in the next 12 months. Within the industry group over half of all projects (59%) use BIM in some way.

In 2019 the industry group was asked to rate how important BIM is to their business. Almost three in five (58%) rate BIM as extremely important, with a further 19% rating BIM as important.

How important is BIM to your company's business?



Base: Total n=31, Architects n=4, Engineers n=6, BIM professional n=9, Other n=10
 Q. How important is BIM to your company's business?

Within the client survey, 39% say they are integrating digital or spatial information with their assets, operations, or facilities management systems which may be by BIM or an equivalent tool. This compares against 47% in 2018 who said they were integrating digital spatial information with their assets, operations, or facilities management systems.

BIM use in the workflow – Industry

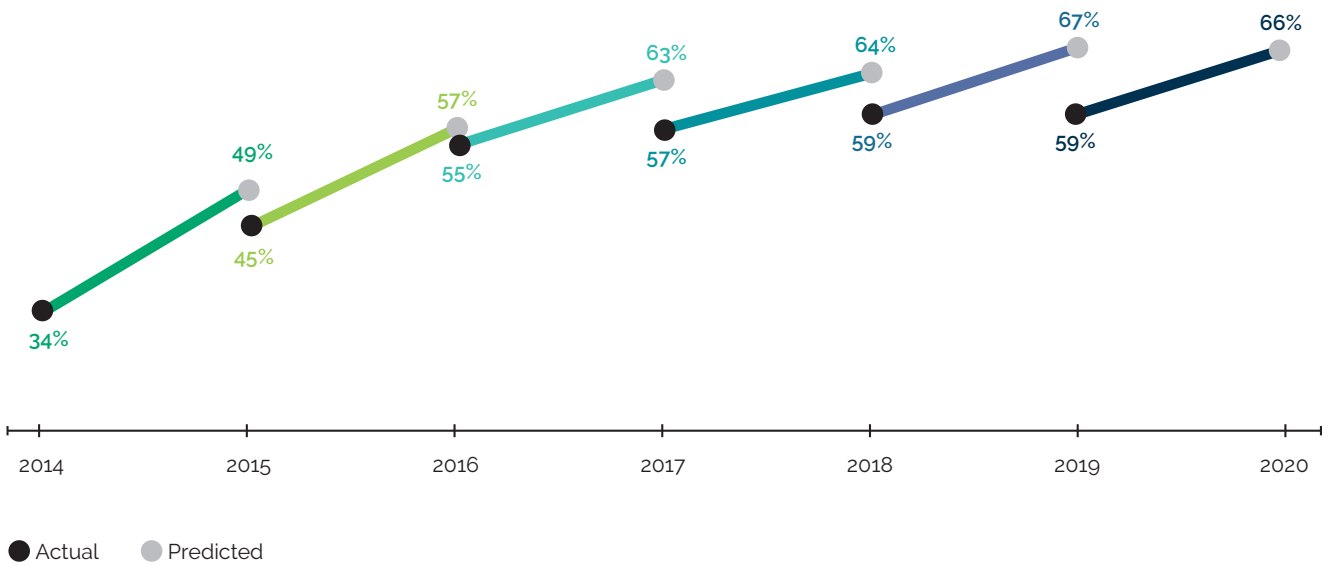
Increasing BIM use is about two things – firstly, increasing the number of businesses that use BIM in their projects and secondly, increasing the proportion of projects that use BIM in each business.

We asked industry 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.

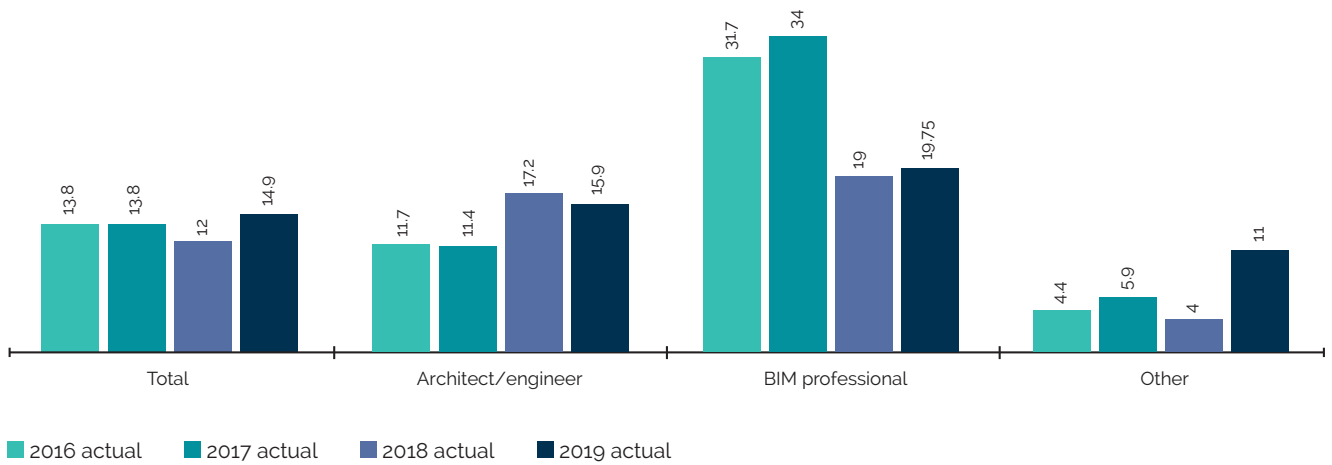
This gives us the proportion of projects using BIM (actual) in 2014 to 2019, and predicted in 2020. The overall proportion of projects which use some form of BIM has remained stable from 2018 at 59%. For the last four years industry has predicted a relatively large increase in the proportion of projects using BIM. However, since 2016 these large increases have not occurred, with BIM use now at something of a plateau.

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

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

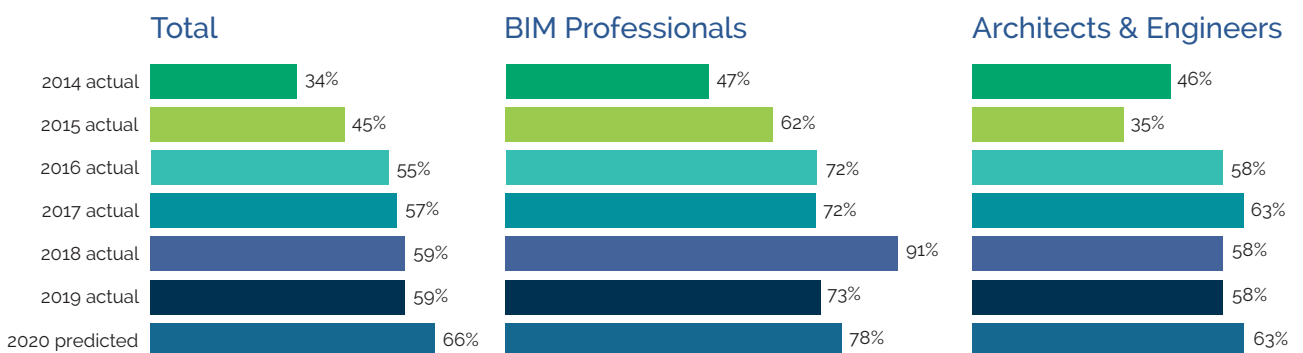


Base: Total 2016 n=43, 2017 n=40, 2018 n=37, 2019 n=35. BIM professionals 2016 n=11, 2017 n=8, 2018 n=7, 2019 n=9. Architects and engineers 2016 n=14, 2017 n=14, 2018 n=16, 2019 n=10. Other 2016 n=18, 2017 n=18, 2018 n=14, 2019 n=16.

The number of projects using a BIM execution plan for BIM professionals has dropped from 34 projects in 2017 to 19 projects in 2018. This has increased slightly to 19.75 in 2019. By contrast, those in the 'other' category (including Project Managers and Quantity Surveyors) have increased the number of projects using BIM execution plans. For the 'other' category the average number of projects has increased from 4 in 2018 to 11 in 2019.

The chart below shows the proportion of projects within each profession that use BIM. This has remained stable from 2018. BIM Professionals dropped back to 73%. Architects and engineers have maintained a stable proportion of projects using BIM.

Proportion of industry projects that use BIM by profession



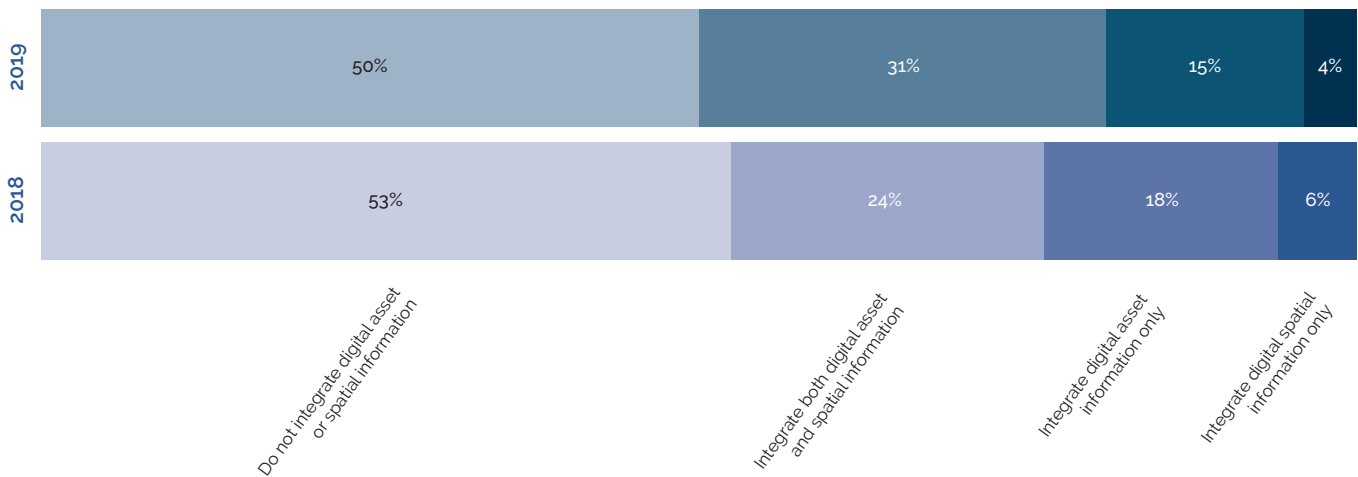
Base: Total 2014 n=46, total 2015 n=40, 2016 n=43, 2017 n=40, 2018 n=37, 2019 n=35. BIM professionals 2014 n=9, 2015 n=13, 2016 n=11, 2017 n=8, 2018 n=7, 2019 n=9. Architects and engineers 2014 n=13, 2015 n=12, 2016 n=14, 2017 n=14, 2018 n=16, 2019 n=10.

BIM use by clients

The questions asked of clients were changed in 2018. Instead of asking about BIM use clients were asked about integrating digital spatial asset information (which may include BIM processes) with asset, operations, or facilities management systems.

In 2018, all clients surveyed had heard of integrating digital and spatial assets with management systems. In 2019 this dropped to 77% of clients surveyed. Similarly, the proportion who heard of BIM processes as one of the options for integrating digital spatial information decreased – from 100% in 2018 to 77% in 2019.

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)

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?

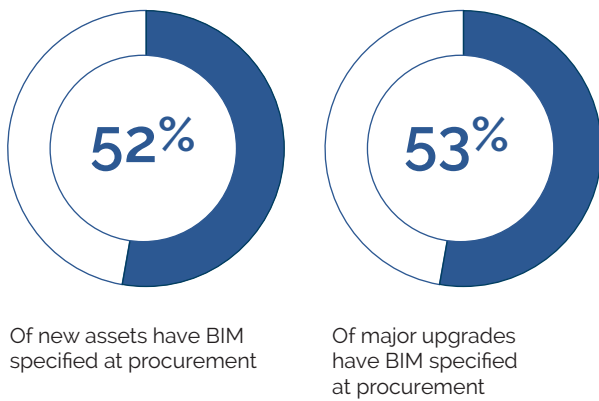
Of those who are not currently integrating digital spatial information with their asset management systems, only 8% plan to start doing so in the next 12 months. A further 54% are aware of the concept and may look at it in the future (but not in the next 12 months).

BIM in the procurement process

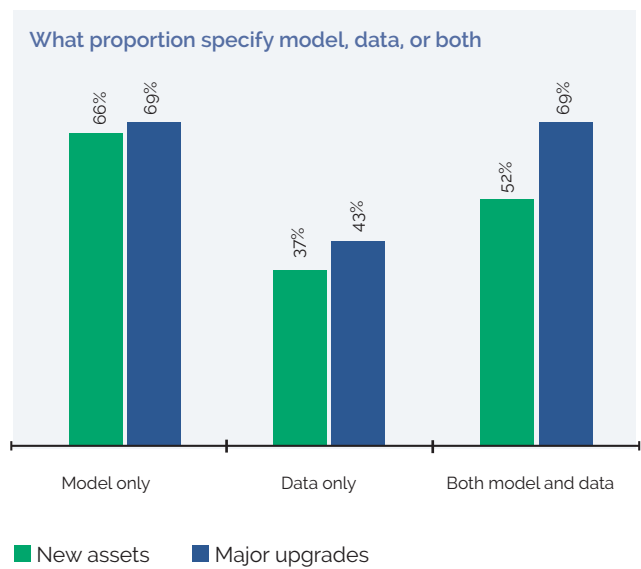
A new set of questions was added to the client survey in 2019 – we wondered if procurement practices were slowing down the use of BIM. These questions look at the proportion of projects that specify BIM in the procurement process and whether clients required a model, data, or both.

Over half of all new assets (52%) and major upgrades (53%) have BIM specified at procurement.

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



Base: Responsible for new assets n=28; major upgrades n=26
Q. When procuring a project what % specify the use of BIM?

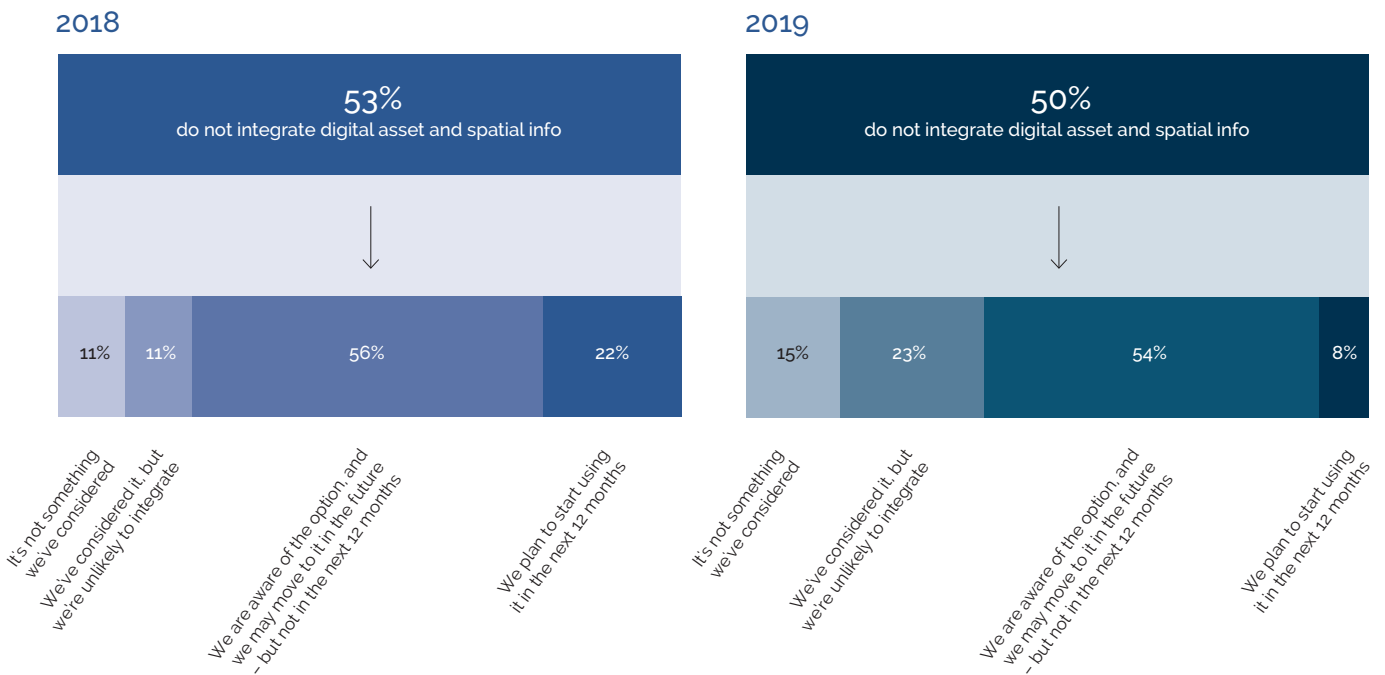


Base: Clients integrating digital spatial and/or asset information now 2018 n=8, 2019 n=13
Q. At what stages in the investment, construction and operation of built assets are you using integrated spatial and/ or digital asset information?

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. Less than one in ten (8%) are planning to start integrating digital spatial and asset information in the next 12 months. Almost two in five (38%) 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: All clients surveyed 2018 n=17, 2019 n=26 (n=9 chose not to answer)

Q. Do you integrate digital asset information with your asset / operations / facilities management systems? (This could include using BIM processes.)

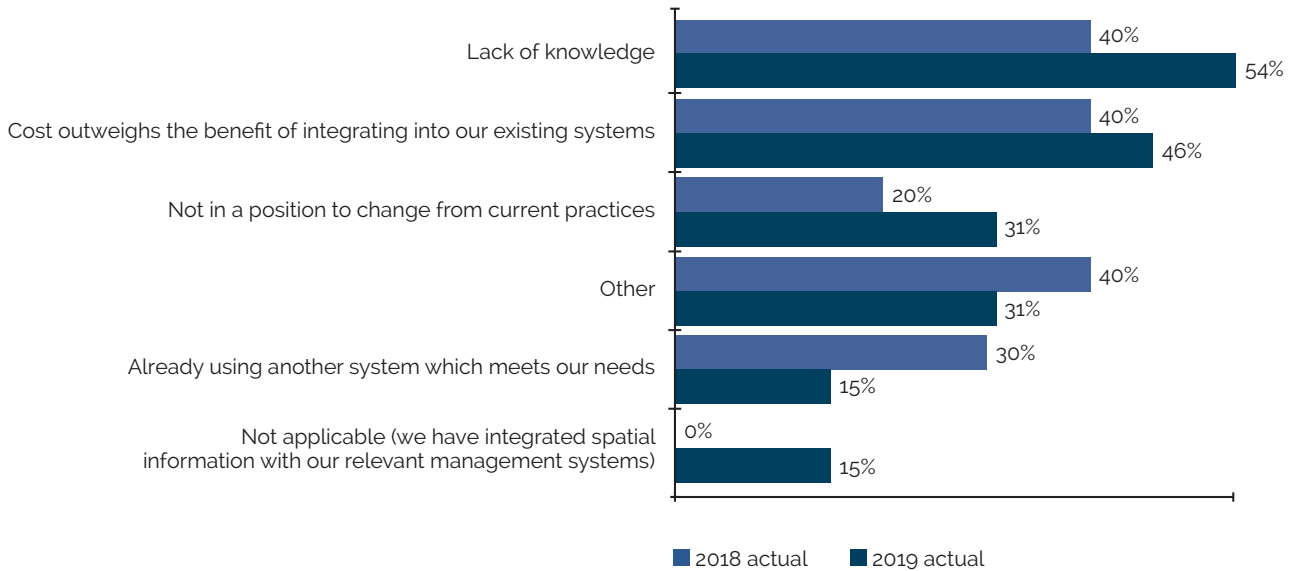
The main reason for not using, or considering a shift to, integration of digital spatial and asset information is the lack of knowledge. Beyond that, costs are seen as outweighing the benefits or the organisation is not in a position to change. Some clients commented further:

“Asset and operational management is devolved to the “tenant”. The owner is funder only and thus this model limits applicability of the asset information.”

“Funding restraints despite identified benefits.”

“The ability to find a workable feasible solution.”

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

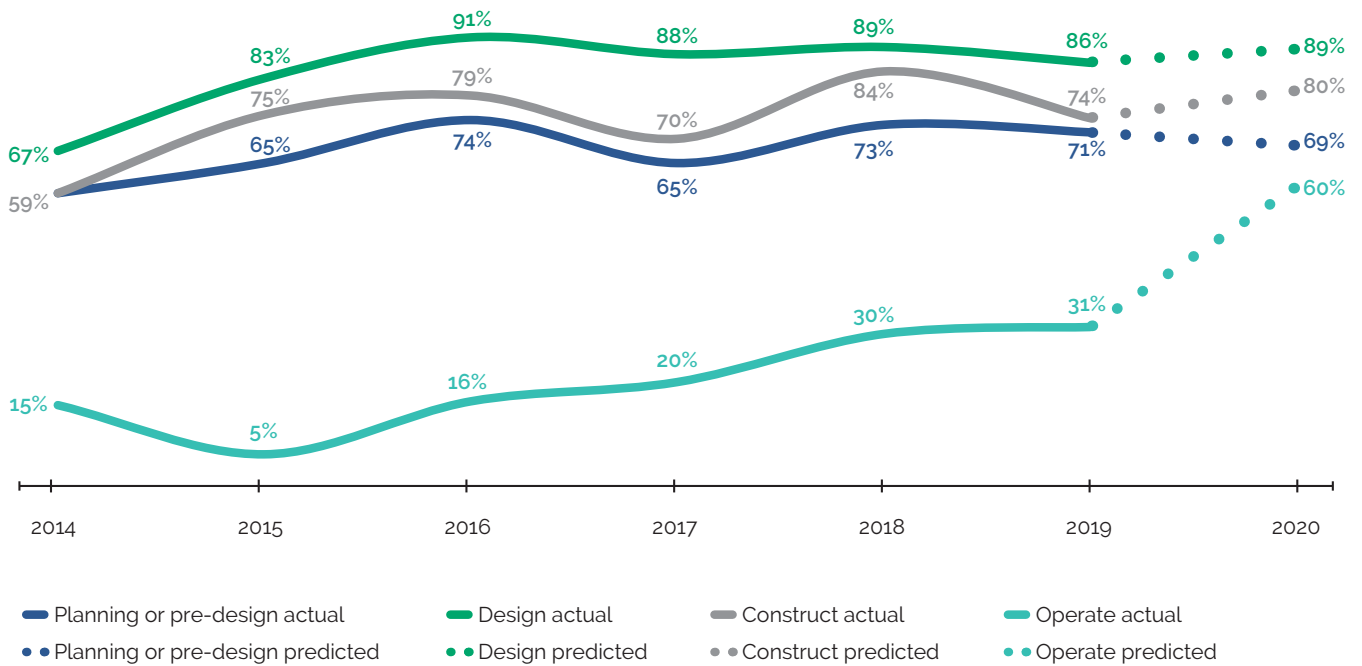


Base: Client not integrating information now, not planning to do so in next 12 months 2018 n=9, 2019 n=13
 Q. What are the main reasons you have not considered or moved to integrate spatial and/ or digital asset information into your asset / operations / facilities management system?

What is industry 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 slight changes in use from 2018 to 2019 are not significant. Over four in five (86%) industry respondents use BIM at the design phase, while over seven in ten use BIM at the planning and construction phases. Use of BIM for asset and facilities management (the operate phase) increased in 2018 to 30% and this has remained stable in 2019.

Industry BIM use across project lifecycle



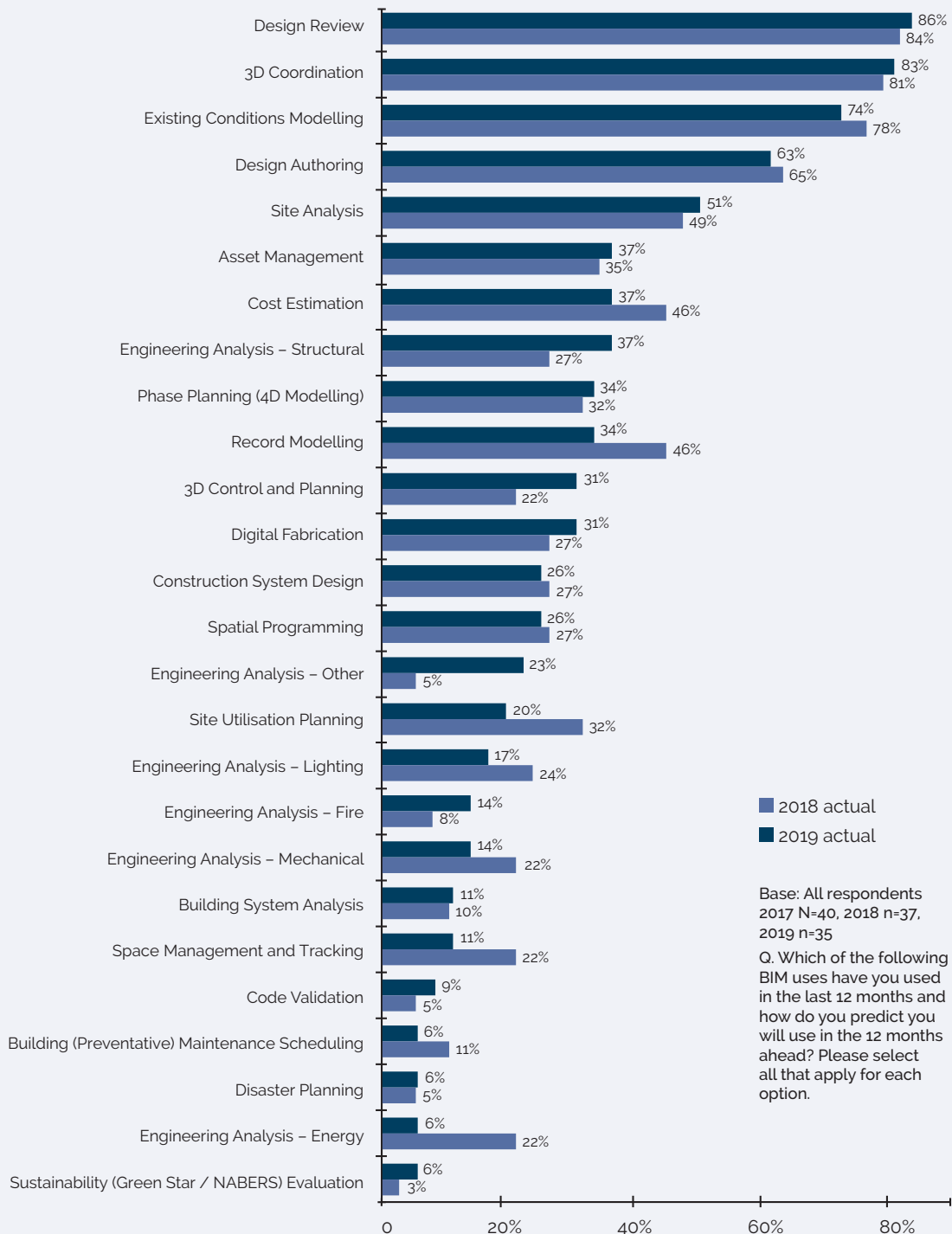
Base: All respondents 2014 n=46; 2015 n=40, 2016 n=43, 2017 N=40, 2018 n=37, 2019 n=35
 Q. For which project life cycle stages has/will BIM be used? Please select all that apply.

Each year the control group predicts a sharp rise in use for asset and facility management in the following year. As yet those predicted gains have not materialised.

Industry BIM uses in detail

Several activities show volatility in use from 2018. This includes engineering analysis – energy, site utilisation planning, space management and tracking, and 3D control and planning (among others).

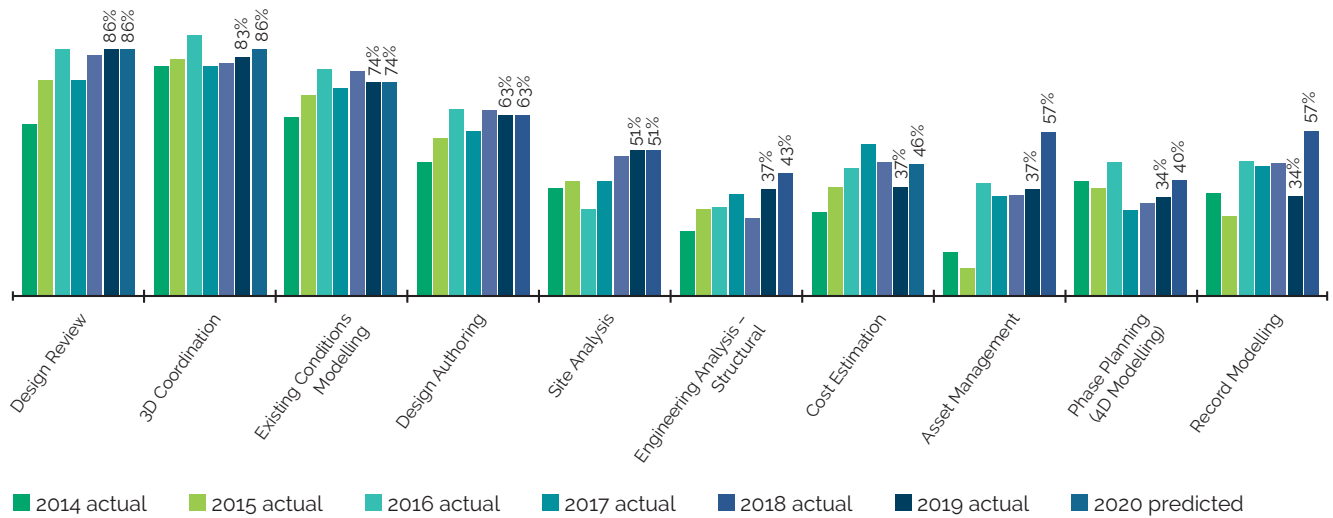
Industry's BIM uses (actual only) 2018-2019



Industry's most popular BIM uses

The top ten industry BIM uses remain similar to those in 2018. Site utilisation planning has dropped out of the top 10, to be replaced by engineering analysis – structural.

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.

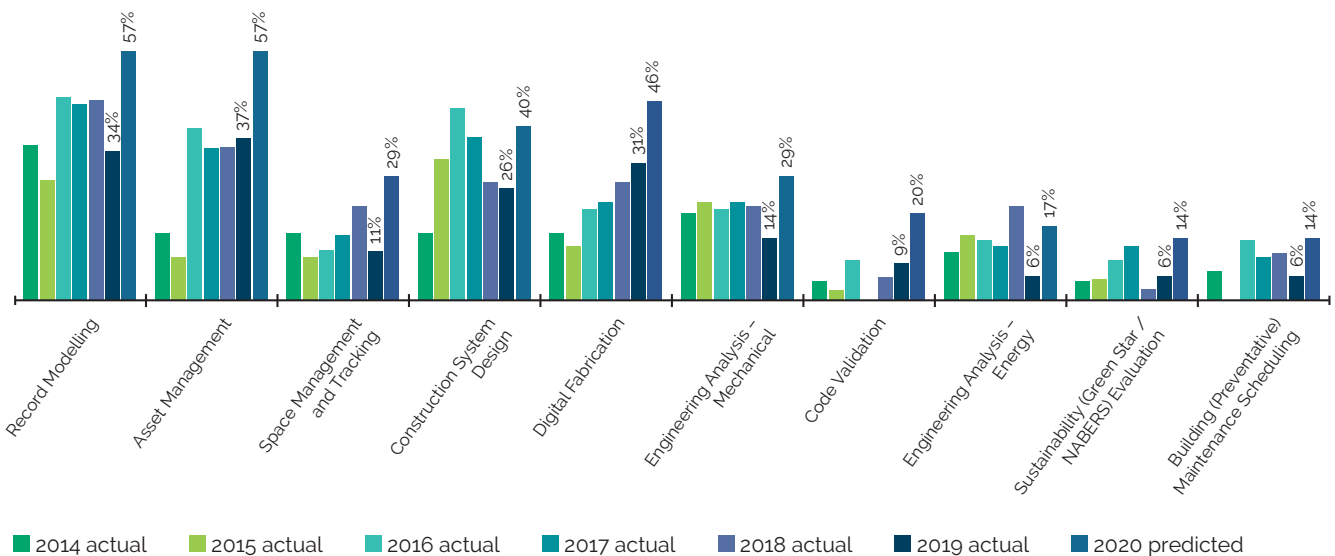
BIM uses most likely to grow in industry

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 2019 only one of the 26 uses is predicted to decline in the next 12 months – disaster planning. Six uses are predicted to remain stable in 2020, these are:

- Design Review
- Existing Conditions Modelling
- Design Authoring
- Site Analysis
- Engineering Analysis – Other
- Building System Analysis

As in 2017 and 2018, asset management is predicted to grow substantially to 57% of all projects. While we have seen a slight increase (from 35% in 2018 to 37% in 2019), the predicted increases have not been realised.

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
 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.

What are clients using BIM and integrated information for?

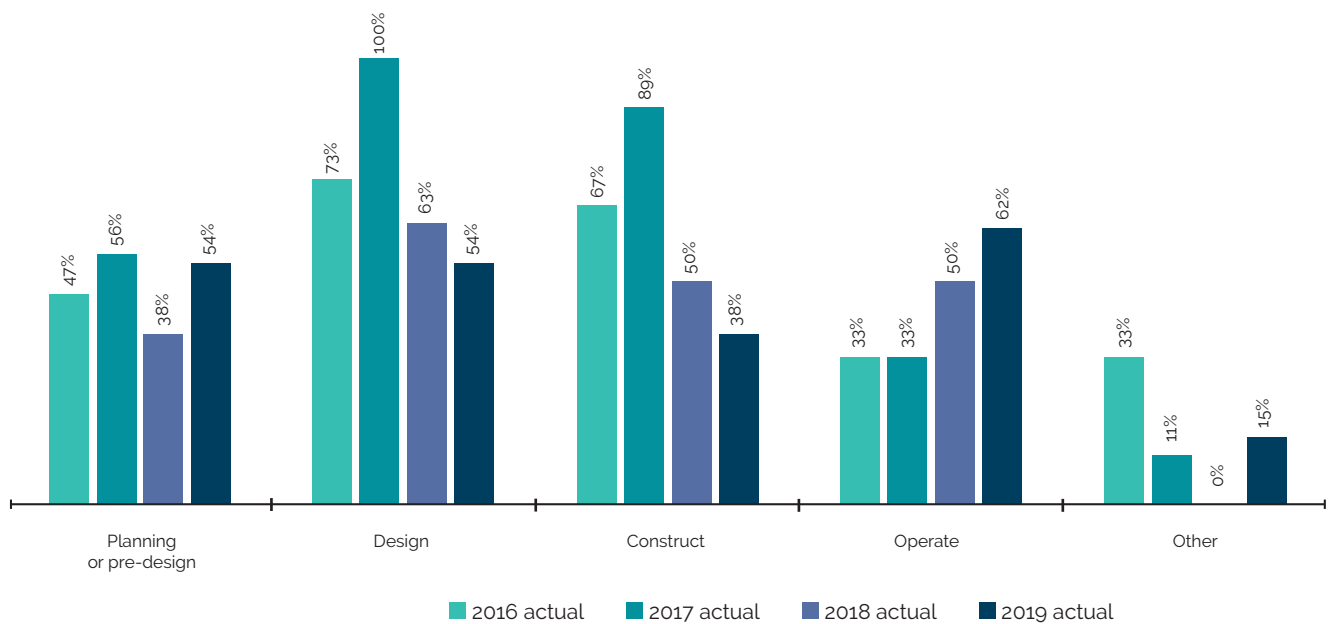
The client group were asked at what stages in a project life cycle they are using integrated digital spatial and/or asset information. This differed slightly to the question in 2016 and 2017 – which referred specifically to BIM.

In 2019, at least half who are integrating digital spatial and/or asset information use integrated information at the planning, design, and operate stages. Fewer do so at the construct phase. 'Other' was selected by two out of thirteen participants, the other stages identified being:

“Planning, environmental and airspace management.”

“Retrospectively scanning and modelling existing assets, and capturing metadata on critical items.”

Client BIM use/ integration of information across project lifecycle



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

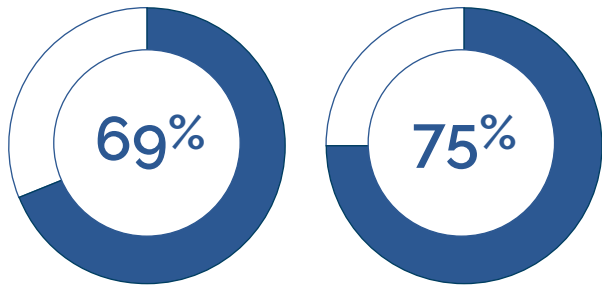
Base: Clients integrating digital spatial and/or asset information now 2018 n=8, 2019 n=13
Q. At what stages in the investment, construction and operation of built assets are you using integrated spatial and/ or digital asset information?

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

A new question was added to the 2019 client survey to understand how important are 'whole of life, whole of building' costings in the procurement process.

Almost seven in ten new assets (69%) and three quarters of major upgrades (75%) have some consideration of whole of life, whole of building. The level of that consideration may vary however. 21% say 'whole of life, whole of building' is far more important than cost to construct, and a further 17% say it is slightly more important.

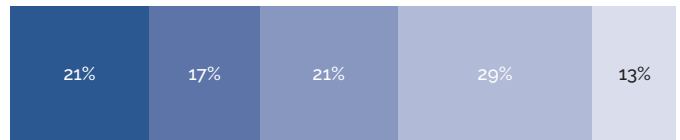
What proportion of projects would have some consideration of "whole of building, whole of life" costings?



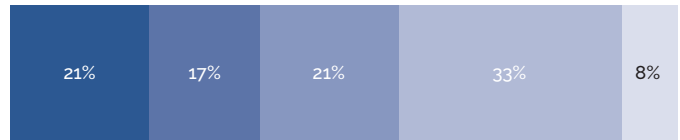
Of new assets have some consideration of 'whole of building, whole of life' costings

Of major upgrades have some consideration of 'whole of building, whole of life' costings

New assets



Major upgrades



It is far more important than cost to construct
 It is slightly more important than cost to construct
 It is on a par with cost to construct
 It is slightly less important than cost to construct
 It is far less important than cost to construct

Base: Responsible for new assets n=28; major upgrades n=26

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?

Base: Responsible for new assets n=28; major upgrades n=26

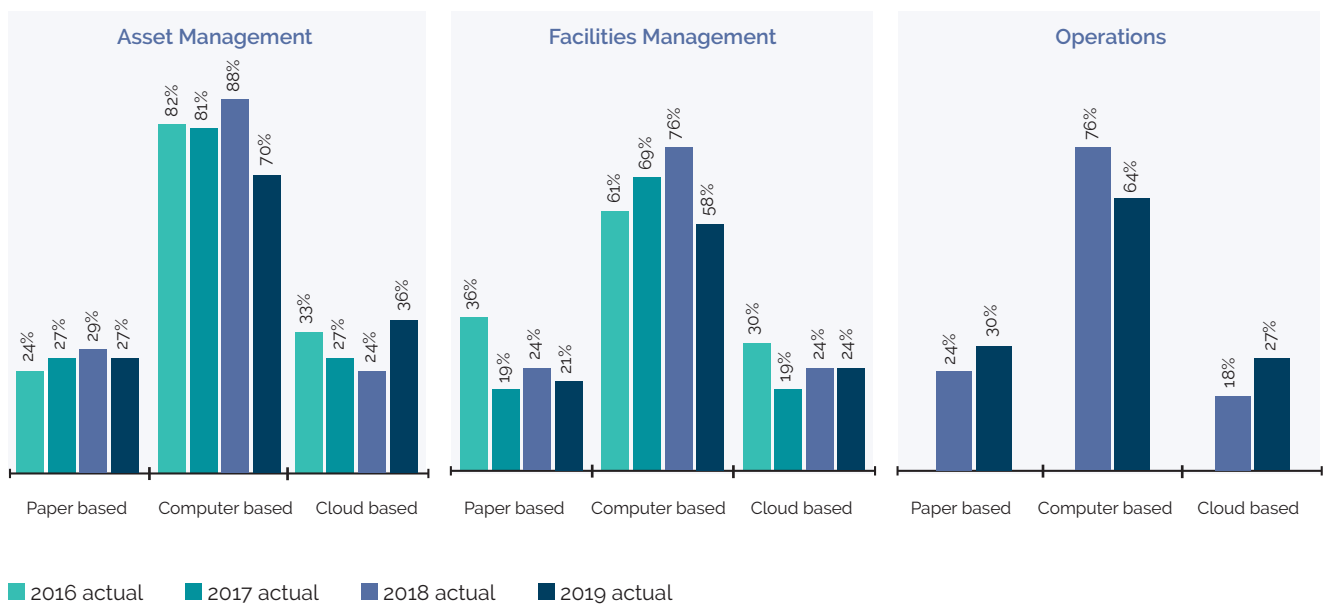
Q. On the projects where you consider "whole of building, whole of life" costings, how much impact does this have on the final decision (when compared against cost to construct)?

Clients' asset management

The client group was asked what types of systems they use for asset, facilities and operations management (paper, computer, or cloud-based, the latter added in 2018).

The majority of clients use computer-based systems for each of asset, facility, and operations management. There has been a slight shift to cloud based systems. In 2019 asset management and operations are both slightly more likely to use cloud based systems and slightly less likely to use computer based systems.

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

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

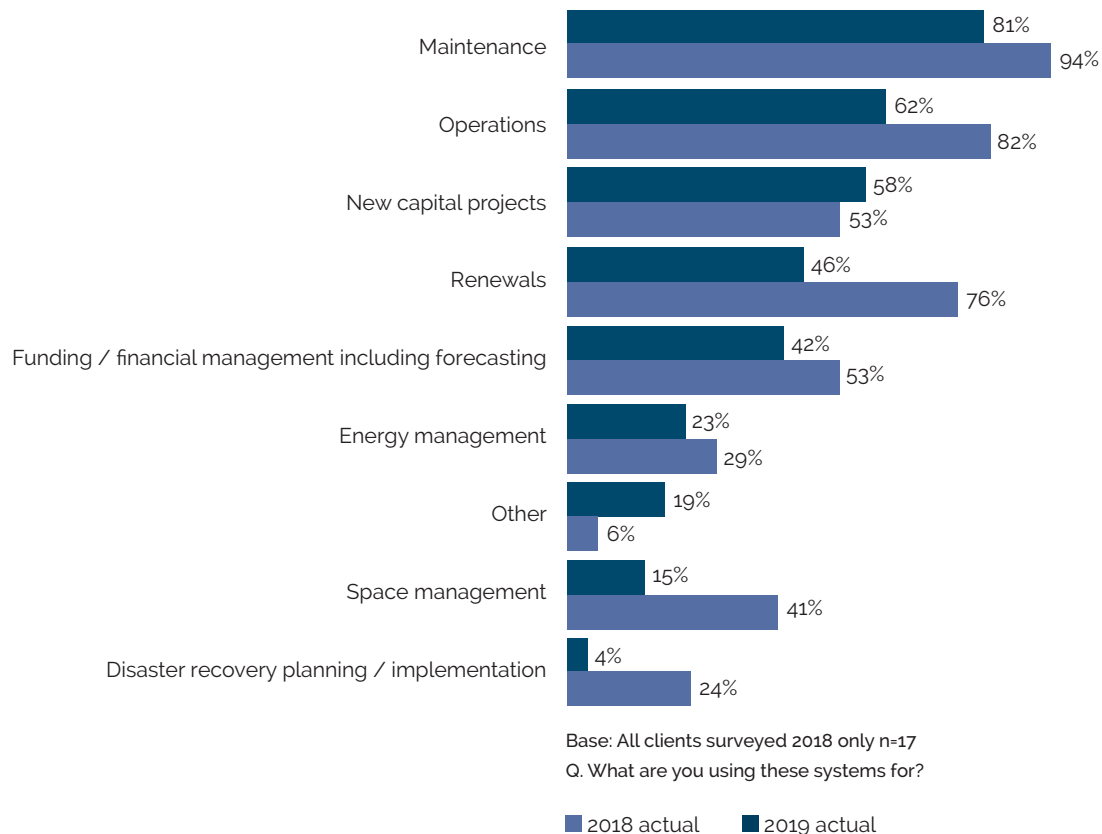
Note: Clients can use more than one type of system (and could be using all three)

Note: Operations not asked 2016 or 2017

Those clients who use computer or cloud-based systems were asked which ones they use. As in 2017, 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.

The client group was 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 and funding.

What the systems are being used for

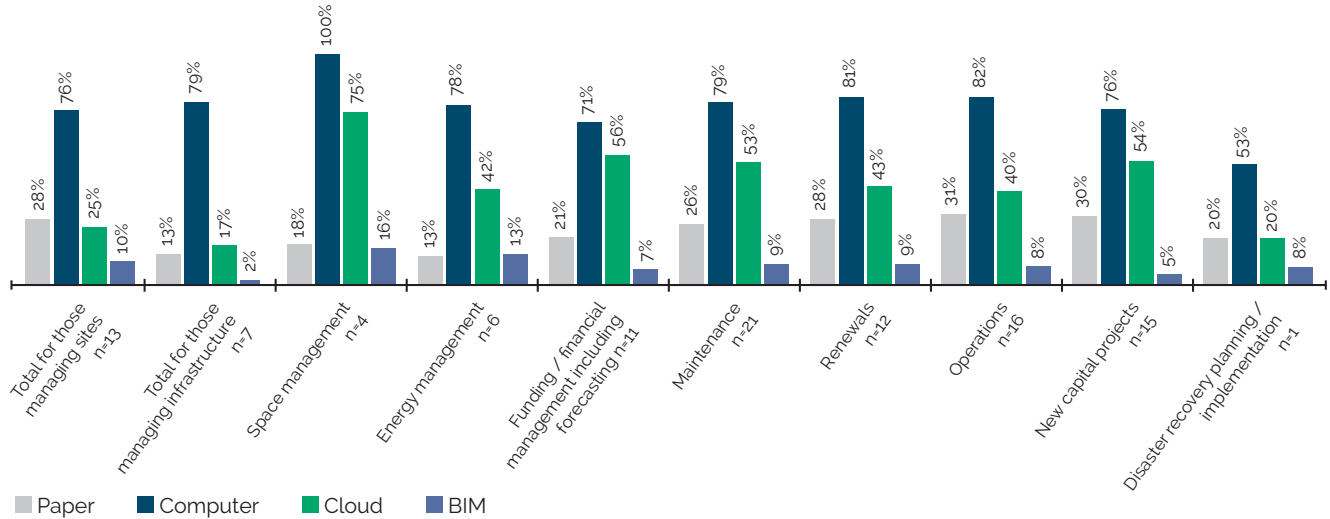


The client group was asked to specify the proportion of their business systems that are used for managing constructed assets that are paper, computer, cloud, or BIM-based systems. This was split by building-focused systems (sites) and horizontal infrastructure systems (infrastructure). Participants could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

Both sites and infrastructure systems are largely computer-based (at least three quarters of the systems used – higher than in 2018). On average, only 10% of sites are managed with BIM-based systems, and only 2% of the infrastructure systems were BIM-based.

BIM-based systems form more of the management system for those focussed on space management, and energy management. Please note – sample sizes are small and results are indicative only.

What proportion of business systems use paper, computer, cloud, or BIM-based systems



Base: refer n =

Q. What are you using these systems for?

Q. What percentage of your business systems for managing constructed asset are paper, computer, cloud, or BIM -based systems? (combines building sites and infrastructure)

Note: Based on proportion using asset, operations, or facilities management systems for each reason.

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. Visualisation for communication with stakeholders continues to be the main response selected (69%). In 2019 62% are informing both modelling of existing conditions and 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

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

The benefits in increased use of BIM to the industry group

Comments from the industry group around the benefits of BIM in 2018 centred on:

- Increased coordination between parties,
- Enabling businesses to be more competitive and profitable,
- Better outcomes,
- Faster processes, and
- Happier, more engaged staff.

In 2019 the increased coordination remains a main benefit from using BIM, alongside creating a more efficient process, enabling better transparency, and financial benefits.

Increased coordination means that relationships between the different parties are closer, with more transparency and better communication than without BIM. 29% of participants mention this:

“The ability to articulate very easily to clients quickly and clearly our sequence, as not all clients can either a) visualize or b) have the time to read and understand screeds of information on sequence. The ability to articulate to the subcontractors how things will happen on site – QS’ can use models to ascertain schedule (if models are constructed right) making cost comparison between possible solutions a lot faster and more transparent.”

“A closer relationship with our other design team partners.”

“Quality of outputs has increased.”

“Saves time in resolution of drawing conflicts during construction. Coordinated design avoids variations.”

“We are more adept at digital coordination and design integration. We are also able to experience and share designs using modelling and 3D visualisation tools at much earlier stages of the project than historically – it has simply become our ‘normal’.”

“Coordination with consultants prior to projects getting to site and having contractor involvement has been hugely beneficial.”

“Better design coordination across the design teams. Better visibility to all the stakeholders.”

The increased coordination in turn helps to create a more efficient process – including fewer issues or clashes and reduce time to complete a project (mentioned by 17% of participants):

“We have seen successful early completion of some projects, mitigation of potential coordination risks, built positive relationships with project stakeholders.”

“Design to Construct on complex projects. Reduced risks and reduced time to complete projects.”

“Lessened issues with clashes between disciplines and faster transfer of information between consultants.”

Transparency is a benefit tied in to better coordination. All parties using BIM on a project have a better understanding of the project (mentioned by 11% of participants):

“Much greater understanding of what exists and what is coming in the future. More transparent information flow.”

“The ability to enable project transparency.”

“Data exchange and understanding internally and with others.”

One of the benefits is financial – whether through decreased cost (due to fewer variations or issues) or ability to win more work using BIM (mentioned by 6% of participants):

“Better resolution of design, working towards less cost variations, less RFIs on site from contractors.”

“BIM has been very positive for us as it has allowed us to become real leaders in the collection, holding and utilising of 3D digital information. We have won a lot of work by being able to work this way and it has had huge benefits for our clients as they can design with a much higher level of certainty in terms of spatial matters.”

Barriers to BIM uptake

Industry

The 2018 survey found the obstacles to using BIM included factors lack of knowledge and coordination between parties, perception of costs, and subcontractors re-working BIM models.

In 2019 there are some similar issues. Lack of knowledge remains the main issue. This includes a lack of understanding of what BIM enables and what is being asked for (causing issues down the track), as well as a lack of understanding among other parties within a project. Not having all parties on board with the same understanding adds cost to a project, and the cost and perceived value are an issue for uptake.

A lack of knowledge and experience (mentioned by 29% of participants):

“The biggest obstacle is the misconceptions surrounding what BIM is and isn’t. It is such a broad term yet the consulting industry has a particular focus on a limited range of tools and tends to narrow the focus to BIM equals anything produced with a particular software. This greatly inflates the cost of doing BIM and is also having a negative impact on wider adoption.”

“One of the main issues for us is dealing with other consultants who are not as experienced in BIM practices as we are. This means we often have to educate/convince them on the benefits of BIM at the start of a project, which cost us time and money.”

“Design consultants signing up to BIM uses and not fully understanding their obligations for their delivery and how they need to collaborate with others for them to achieve their deliverables.”

Lack of coordination or collaboration. There were several comments this year around authoring and ownership in particular (17% of participants mentioned this):

“BEP acceptance/adoption is still seen as “optional”. These documents are becoming more and more complex (with obvious company preferences rather than client project requirements) which results in a lack of adoption/adherence. Model Element Authoring is also an issue. The basic list in the BIM Handbook is just that – basic. Structurally we need several of the Categories split/expanded to capture the element usage and hence the real element owner. We still have structural slabs and walls still owned/ authored by the architect at the Detailed Design stage which should be owned by the structural engineer to ensure structural requirements are met in the final design. Hosting of elements such as doors and windows in structural walls then causes another ownership issue – which we are currently working through a process with an architectural firm to find a working solution for both parties.”

“Late engagement from building architects/ engineers – we operate in the civil engineering space, we need to be involved earlier not later.”

“Changes made in the model by consultants and not notified at the time of model drop. Coordination between services and structure is always an issue with services being a moving target sometimes up to 50% detailed design.”

“Compatibility of software used by various consultants. Revit vs Archicad. IFC integration is improving but still “clunky”, smooth integration still seems a way off. There is also a reluctance for users of one platform to make life easier for the use of the model with other platforms. A ‘use ours or we don’t care’ mentality especially from the Autodesk product users.”

“Ease for non-tech based people to view models. Consultants being too scared to share a model as it represents a WIP, that they normally keep to themselves until complete. For us onsite everybody sees our work as a WIP until PC whereas designers up till now have only released their work once complete, so this requires a paradigm shift in the way they think and act. Model becoming a contract document so that it can be relied on. Early issue of models so that they can be used in tenders for visual explanation of sequence, set up and H&S.”

Not all parties are on board with BIM – specifically subcontractors, but also other consultants. This means either bringing other parties up to speed, or forgoing BIM processes (mentioned by 20% of participants):

“Downstream: level of capability and understanding within our subcontractor supply chain. Many do not have an adequate understanding of “BIM”, nor suitable capability. Many subcontractors are also missing a collaborative mindset, needs of a culture change.”

“A lack of experienced operators at sub-trade level and a lack of understanding from project management.”

“Consultants not delivering in BIM i.e. 2D only. Consultants unwilling or unable to upskill into BIM.”

The cost and perception of value is mentioned by 14% of participants. Comments included the perceived value, the understanding of value, and how costs are apportioned throughout the process:

“Cost – we provide a fixed fee at the start of a project. We find that using the BIM workflow if architects/project managers/clients want more detailed information earlier on then more design takes place which leads to rework. Add in early contractor engagement and we end up spending more money on design and documentation than our initial fee allowed. We have traditionally separated LOD300 and LOD350/400 between design and fabricator detailing as they are paid for that time and risk where we wouldn't be paid for developing a model to that LOD.”

“There is not an unlimited budget for BIM, so clients can't be expected to adopt whatever tools consultants suggest in order to use the models they have paid for. Additionally, BIM is often seen as a 3D model with some attributes. However, to fully benefit from BIM we need to separate the Data Management from the Model Authoring tool in order to truly capture all of the useful data associated with a building.”

“The value of BIM processes is not appropriately recognised during the correct project work stages. This is a reflection of both poor uptake from the design team and lack of understanding from clients.”

Barriers to BIM uptake

Clients

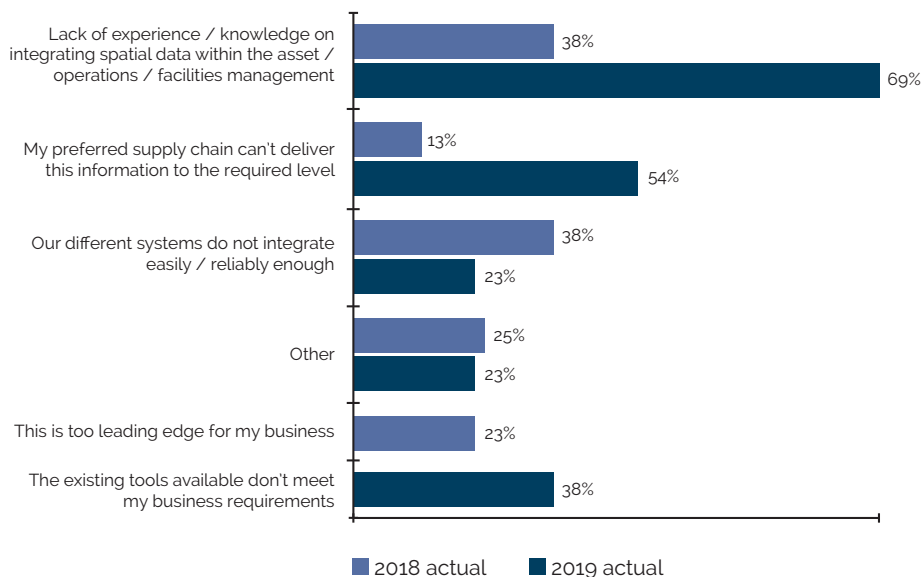
Those clients who are not integrating digital spatial or asset information cite a lack of knowledge and the cost outweighing the benefits as key reasons for not considering integration.

Among those who are integrating information, some of the challenges they have experienced have been a lack of experience or knowledge integrating data, difficulty integrating different systems, and that their preferred supply chain cannot deliver to the desired level.

Both lack of knowledge and existing systems present definite barriers to BIM uptake. As seen in previous sections, clients often have multi-layered systems, frequently customised to their requirements. It is not a smooth process to integrate information across these, and hard to do so without the experience or knowledge having done it before.

The lack of knowledge has been highlighted as an issue for the industry group as well – the levels of knowledge and experience across the industry are seen as a barrier to BIM uptake.

Clients' benefits and challenges using BIM or integrating information



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

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

In 2019 a new question was added for clients specifically asking what they see as the barriers to BIM uptake for new assets and for major upgrades.

Some participants manage both new assets and major upgrades, and provided the same comment for both. These comments talk about capability (both internal and consultant capability), cost, and a lack of understanding of the benefits of BIM:

“The ability of project participants to execute and the lack of consistency within the industry.”

“Ownership by operations teams and cost.”

“Relative cost of BIM in relation to overall project capital cost.”

“Capability in the construction sector and ranging level of BIM maturity across our consultant base and internal team.”

“Internal organisational knowledge of cost, process, benefits. Internal process not yet defined to allow it to be specified. Lack of individual expertise.”

“Technology know how, initial cost, unknown benefits.”

Comments for new assets specifically focus more so on the cost. The comments suggest that the cost vs. benefit equation just doesn't balance – with a lack of skills or ability to make the most of BIM post-construction. Industry capability is also an issue – including lack of knowledge among contractors & lack of collaboration between parties:

“BIM is still not the status quo for undertaking construction projects. We have to weigh up the costs of BIM against the benefit of having the as-built data in model form. This is sometimes difficult to justify.”

“Cost, lack of skills to produce decent design documentation, skills to use the model post completion and money to ensure software up to date etc.”

“BIM skills shortage in supply chain, particularly second-tier contractors and subcontractors. Limited experience and understanding in supply chain (design through to operations) on BIM's integration into asset and facilities management.”

“Lack of industry knowledge in sharing information between BIM consultant modelling tools and interface with client information models. Lack of technical consultant expertise or consultation in how to best incorporate client model information.”

Establishing the base model and the lack of existing conditions information make adding BIM to major upgrades a costly exercise:

“Cost of establishing baseline data for existing assets prior to commencing. Lack of company systems & IT infrastructure to support outputs.”

“Lack of existing conditions information in BIM format make it more difficult. Supply chain BIM capability can also be an issue.”

“Scanning the infrastructure.”

“Upgrading documentation from older platforms into BIM.”

“Generally need to generate from legacy or reality as most facilities do not have construction BIM.”

“There is a BIM skills shortage in supply chain, particularly second tier contractors and subcontractors. Limited experience and understanding in supply chain (design through to operations) on BIM’s integration into asset and facilities management.”

“The premium applied by some services subcontractors for BIM deliverables. Also consultants promising far more than they can realistically deliver.”

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

Enabling increased use of BIM within an industry practice

Industry group respondents were asked what would need to change for their company to use BIM more often. The main points raised in 2018 included wider industry acceptance, more training around BIM, and better client education and procurement. In 2019 there are similar comments, though the focus is more on shifting thinking when it comes to industry acceptance and procurement. There is a need to recognise that BIM changes the traditional workflow and creates a more dynamic process. At present, the sense is that the construction industry is more in the traditional "gate-based" world of project management.

A shift in how we think about deliverables. This means moving to a more dynamic deliverable model (11% of participants mention this):

"A complete change in the culture of how a project is delivered and an emphasis on the model as an information source with integrity rather than a hacked model to drive the production of documents (paper)."

"An understanding that even if BIM is used on a project there is a finite amount of money and time allocated in our fee and we can't constantly evolve our design all through the design process. We want to prevent errors and clashes and errors in the digital format before it gets to site but the fluid nature of a BIM workflow eats up our fees and time and we always seem to be rushing to meet a deadline when the architect, client or subcontractor have used up time to finesse the design leaving us with not enough time to engineer and document the designs in a timely fashion."

More skilled workers and training (9% of participants mention this):

"Employ BIM users who can operate system."

"If a project has professionals geared up to use BIM there is nothing stopping us but this is often not the case on medium to large jobs."

"More internal training."

A shift in how we think about procurement – specifically changing the nature of contracts and moving away from competitive tender (9% of participants mention this):

“BIM included as a clearly defined deliverable in contracts. BIM Brief & BEP becoming contractual documents. Consultants buy in to the collaborative environment.”

“Broader understanding of how technology can greatly benefit information management across the entire life-cycle of a project. BIM currently has too narrow a focus on building design & construction, so the value doesn’t always accrue to the client as efficiency gains benefit the designers and contractors. This is largely due to the way projects are procured and the conditions of the contract. Both these areas need to change significantly to ensure all project participants benefit from using digital technologies. We also need to stop telling each other how to do BIM and instead learn how to accommodate the various workflows that exist across the entire building life-cycle. What works for an engineer, doesn’t necessarily work for an architect, and what is used by a contractor doesn’t necessarily work for the building operations team.”

“Organisational cultural shift – making “BIM” business as usual rather than something new. This is an industry-wide issue, where most organisations appear to be happy sticking with the status quo, with only isolated instances of innovation. Project procurement methods need to change, and move away from competitive tender, with clients realizing that lowest cost and best value are not one and the same. Procurement methods such as ECI (alongside negotiated open book pricing) have proven to be far more collaborative and provide “best for project”.”

Government leadership on BIM – whether through mandating or leading the way (9% of participants mention this):

“The government must develop a comprehensive BIM standard that is a living digital document, this could, for instance, contain a library of BIM objects that manufacturers can populate. Government to lead the way by encouraging BIM in its procurement processes. Government to lead the way in procurement by not using the lowest pricing conforming method as this is driving out value and BIM is an investment up front, value later, type of system so it struggles to survive the procurement process.”

“The government and industry needs to promote use on schemes with potentially mandatory use on government and local authority projects of certain size to ensure industry adopts BIM use as has occurred in Europe and elsewhere in the world.”

We use BIM on every project we can, but it’s still a voluntary thing for clients and project teams to adopt. The government mandating BIM use on projects over a certain size/value/scale would be a big driver to the increased use of BIM.”

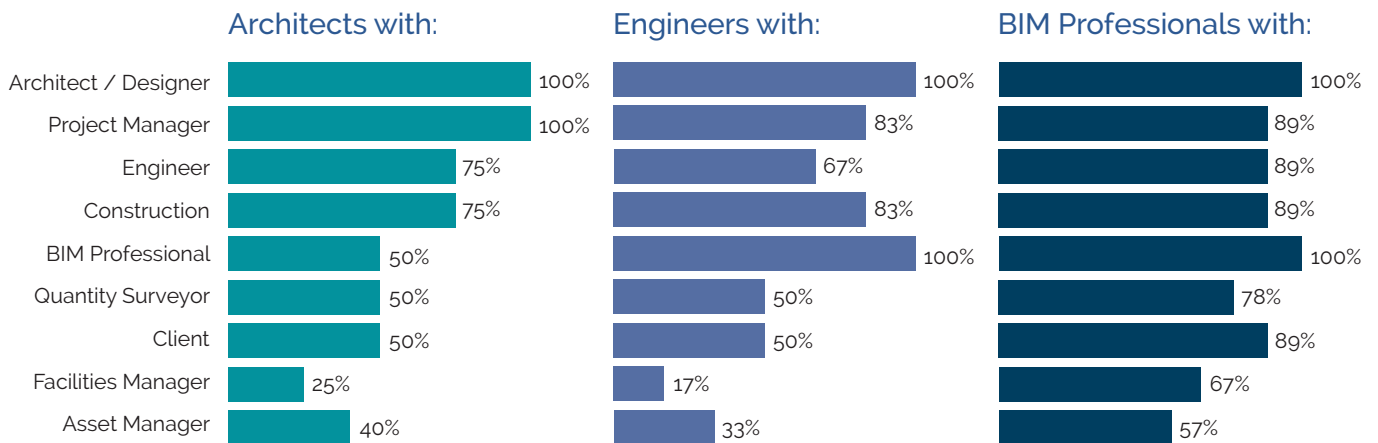
23% of participants said they’re fully committed to BIM and therefore don’t require any assistance in increasing uptake.

Collaboration between industry parties using BIM

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 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 sub-group sample size). Due to low sample size we have not provided a direct comparison to 2017.

Industry collaboration with other parties



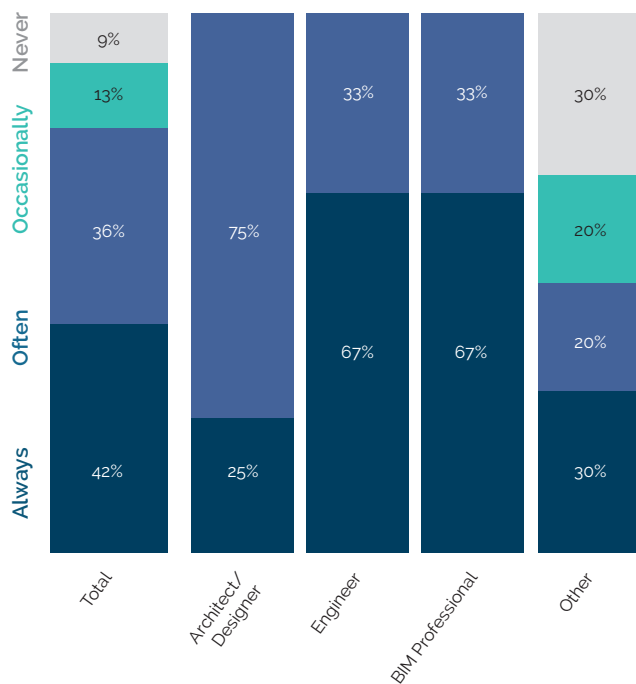
Base: Architects 2019 n=4, 2019 n=6, BIM professional 2019 n=9

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

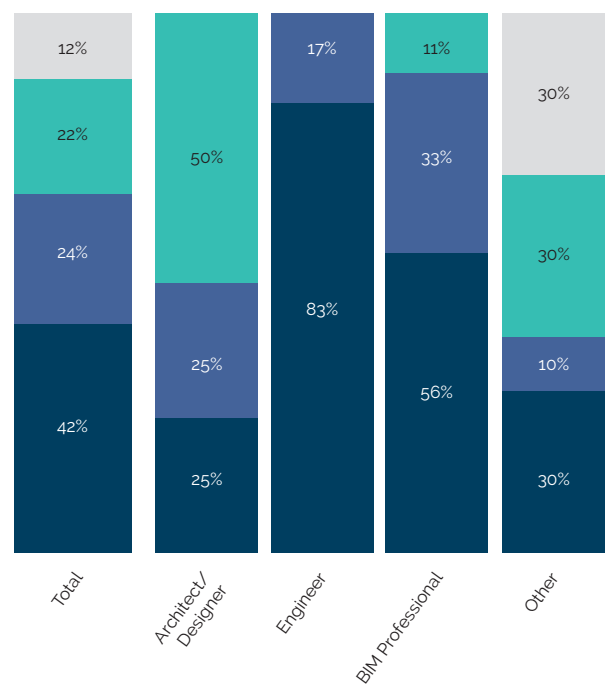
This year we wanted to understand if professional or commercial boundaries slowed sharing models. Industry group participants were asked how often they share BIM models with other professions and other businesses involved in a project. Two in five (42%) always share their models with other professions, and the same proportion always share their models with other businesses involved on a project. Only 9% say they never share with other professions, and only 12% never share with other businesses involved in a project. Those not sharing models include Project Managers and Quantity Surveyors.

Industry sharing BIM Models

How often do you share BIM models with other professions?



How often do you share BIM models with other businesses involved on a project?



Base: Total n=33, Architects n=4, Engineers n=6, BIM professional n=9, Other n=10

Q. How often do you share BIM models with other professions?

Q. Thinking across projects that use BIM, how often do you share BIM models with other businesses involved on a project?



As in previous years, enabling increased sharing of models comes down to consistency, standards, and common environments that allow for collaboration. Several comments this year mention BIM360 as a positive, but there is still a way to go to allow secondary users easy access.

Comments made by the industry group on the need for consistency, common data environments, and collaboration include:

“A focus on models for information rather than models for documents.”

“Willingness of all project participants to utilise collaborative model sharing platforms. Client understanding/driving all project participants to collaborate – suitable procurement and engagements/consultant agreements.”

“Autodesk BIM360 has given us a better workflow for Revit projects, but still needs to be enhanced to enable model interchangeability with the rest of the Autodesk software. We seldom deal with other non-Autodesk file formats now so have not reviewed IFC in detail for a few years. Always room for improvement though.”

“Common cloud environment that manages versioning, coordinate systems, access and verification.”

“Having consistent file types, and making web based viewers more user friendly and less “log in sign up based.” This would empower secondary users participate in the process easier. Start seeing the model become a contract document.”

“Open standards and moving away from the “you must have Revit to do BIM attitude”.”

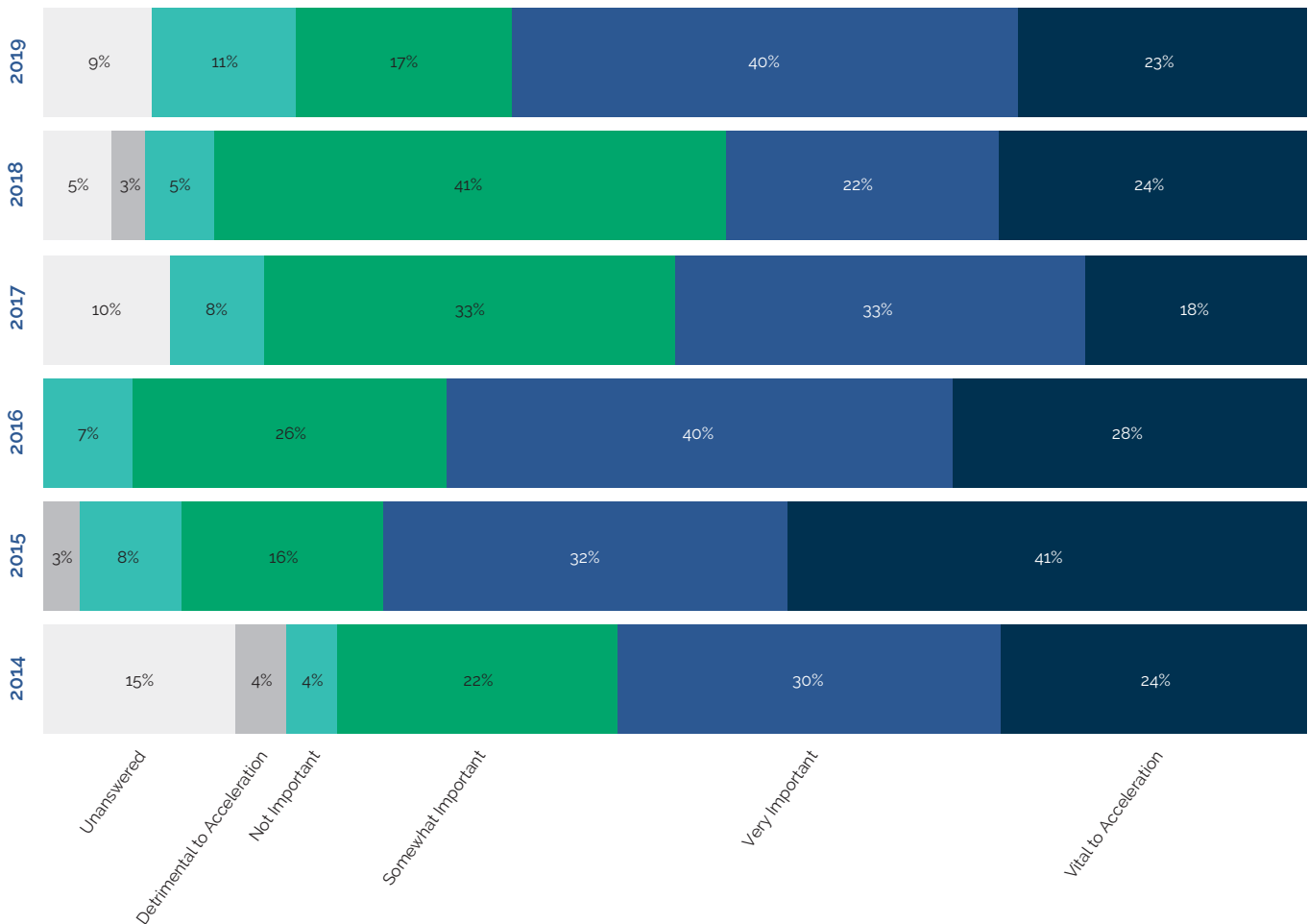
“The 3 key issues are: 1) BIM standards, or lack of in New Zealand. Investment in these would be very helpful for the industry. 2) Coordinate systems and again lack of guidelines for these in the BIM environment. There is a huge lack of understanding of the importance of coordinate systems in BIM and we spend a lot of time moving models. 3) Digital formats; there are still difficulties around formats and moving information between software although this is improving. Again guidelines around this would be helpful. The government must provide leadership in this area and this requires investment and getting the right heads involved to develop really pragmatic and useful standards for New Zealand.”

“Upfront memorandum of understanding around the use of the models (to remove the need for disclaimers), whether there is a procurement in place for the development of a BIM or not. The use of a common CDE, there are many around at present and this can cause confusion on which is being used for what by whom – this is dependent on project partners also, as not all CDE are software agnostic and workarounds need to be developed to make this so.”

Industry's view on government's role as a client in BIM use

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. As the chart below shows, the government's role as a client has become a little more important in 2019 – with an increase in those saying 'very important'.

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



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

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?

Respondents were asked what the government should be doing to accelerate the use of BIM.

The responses have focused on government's role as a client in

- Mandating the use of BIM,
- Leading by example and using BIM on all government contracts (with consideration of facilities management, not just construction), and
- Setting standards to create more alignment in industry.

Comments around mandating are focussed on mandating within government procurement processes – potentially for projects over a certain size.

“Government projects always have an operations component – all public projects should have BIM deliverables.”

“Make it a requirement for BIM to be part of all projects and things such as BEPs to be a legally binding document.”

“Mandate it on all Government projects. This will then trickle down and increase awareness and skill in the wider industry.”

“Someone has to mandate BIM in order for it to get the traction it requires. Otherwise there will be ongoing excuses not to adopt – or to dumb down the BIM requirements.”

Leading by example is again about using BIM within government’s own projects, though not to the extent of mandating use within government projects.

“Clearly define deliverables and goals in BIM and utilise those within their own projects. No need to mandate but if all government projects required BIM it would go a long way to pushing it forward in smaller operations.”

“Government should be leading by example rather than setting a minimum standard/ benchmark (ie BIM mandate). Government also needs a unified approach across all ministries/departments, whereas at present each department appears to be undertaking their own BIM pilot projects. Often with government also needs to lead from the top in regards to driving change in procurement methods – move away from competitive tendering, lowest price conforming bid etc.”

“Enable BIM on their own projects. Sort out the risk allocation and procurement methods in this country.”

“I think they need to drive this harder as a ‘client’. They are the truest example of a long term owner, and by extension ‘should’ have the clearest understanding of what BIM needs to do to satisfy their short and long term goals.”

“Engage more directly with BIM Acceleration Committee, include BIM in procurement guidelines.”

“Make sure BIM is requested in all tenders and in the maintenance of buildings.”

“Have an integrated suite of procurement and delivery guidelines across all ministries.”

“Look into procurement guidelines for BIM on projects for their own ‘government’ projects (understand this is underway).”

There are also comments about government setting standards for the use of BIM in New Zealand, bringing the industry into alignment.

“Set New Zealand BIM standards that align with a commonly used BIM standard. Government to specify that private sector implement BIM workflow as part of regulatory authority review. Implement a Singapore BCA type electronic review of Building Consent Application reviews for Commercial projects and all government projects. Structured education for BIM professionals in New Zealand.”

.....
“More case studies. Possible creation of a national library of building “objects” so that all designers use the same terminology when describing objects, this could make it easier for estimation.”

“Shift the focus away from BIM to something along the lines of ‘Digital Built Environment’ and actively participate in the international community to learn from similar sized countries who have achieved success in this space. Develop based on the idea of digitising built assets, regardless if they are buildings or not. Promote open standards and steer clear of monopolising BIM for only a select few companies, in order to allow the entire industry to participate and compete for work. Competition will accelerate growth and spur on innovation. Fund events that bring international expertise to New Zealand to spread ideas and make sure we don’t operate in a bubble.”

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	NZ Strong
Barnes Beagley Doherr Limited	Patterson Associates Ltd
Beca	Peddle Thorp
BGT Structures	Structex
Envivo	University of Auckland
Fletcher Construction	Wellington City Council
Hawkins	Woods
Holmes Consulting	WT Partnership

Client group organisations include:	
Auckland Airport	Ministry of Education
Auckland Council	Russell Property Group
Auckland District Health Board	The Warehouse Limited
Dunedin City Council	University of Auckland
KiwiRail	Wellington City Council

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

Both 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.