UNIVERSITY OF
TORONTO

2nd ANNUAL BIM REPORT | 2019

CANADA WIDE SURVEY

torontoBIMcommunity
connecting architects engineers contractors owners operators

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RESEARCH CENTRE

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Foreword

Building Tall Research Centre at University of Toronto first partnered with the Residential Construction Council of Ontario (RESCON) and Toronto BIM Community (tBIMc) in 2017 to conduct a detailed survey of BIM implementation within the Canadian architecture, engineering, construction, and facility management industries (AEC/FM). It was motivated by the lack of a consistent benchmark for BIM implementation in Canada. Starting small, the effort resulted in the 1st Annual BIM Report - 2018 for the Greater Toronto Area[1].

Although, the first report focused on only one economic region of Canada, it had overwhelming support from the local industry with over 250 respondents to the survey and more than 20 in-person interviews. The success of the first survey attracted interest from national organizations, CANBIM and BuildingSMART Canada, and motivated the research team to expand the survey scope to include the entire country.

The 2nd Annual BIM Report 2019 comprises responses from 398 participants coast to coast. We thank the local BIM communities for their help in promoting the survey amongst their membership. Although significant effort was expended, the response rates did not fully mirror the activity in all of our provinces and territories; but we will double our efforts to promote participation and improve proportional representation next year. Further coordination with local BIM communities and industry organizations and associations will be essential in achieving this goal.

We sincerely thank Claudia Cozzitorto and tBIMc board members for their assistance in preparing and distributing the survey, Richard Lyall and the RESCON membership for their financial support and for their assistance in data collection, and all 398 participants and interviewees for their time and valuable insights. Finally, we would like to acknowledge the incredible support of the Natural Sciences and Engineering Research Council through Grant CRDPJ 530550-18.

Around the world, countries are integrating innovative BIM-based processes and analyses throughout their AEC/FM industry. Most, if not all, achieved this in a top-down approach through national mandates requiring BIM for all public and/or private projects. As of 2019, Canada is the only G7 country without a national BIM mandate. Instead, the BIM momentum is being driven outward from the middle by the design community. As the visibility of BIM grows, the push upstream to owners and downstream to contractors is making evident the value of BIM processes and efficiencies. Governments and regulators are recognizing the potential for reducing time and red tape, and for improving process transparency. We anticipate that these annual reports will capture this revolution as BIM philosophies are embraced throughout the Canadian industry.

As always, the research team at BuildingTall welcomes feedback from anybody who reads this report and has suggestions on how to improve its future iterations.

1   Available at http://buildingtall.utoronto.ca/

Research Team

Brenda Y. McCabe, Ph.D. P.Eng.
Professor of Civil Engineering and
Director of Building Tall Research Centre
University of Toronto

Li Hao Zhang
MASc Student | Civil Engineering
Building Tall Research Centre
University of Toronto

Arash Shahi, Ph.D. P.Eng. PMP
Associate Director of Building Tall
Research Centre University of Toronto
Research Chair of Toronto BIM Community
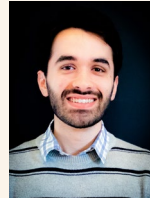
Mark Whitell
MASc Student | Civil Engineering
Building Tall Research Centre
University of Toronto

Yuan Cao
MASc Student | Civil Engineering
Building Tall Research Centre
University of Toronto

We would like to thank the following people for their time during the interviews and for sharing their valuable insights with the research team:

Bartzis, Yuri	BIM/Virtual Construction Manager – Maple Reinders Constructors Ltd.
Chikhi, Imen	Project Coordinator – EBC Inc.
Chung, Andrew	Senior Architect – FORREC Ltd.
Couffin, Jean-Marc	BIM Specialist – BIM One Inc.
Cozzitorto, Claudia	Director of BIM and Digital Practice, MJMA
Dadmehr, Nady	BIM and Integrated Design
De Berardis, Paul	Director of Building Science and Innovation, RESCON
de Lint, Michael	Director of Regulatory Reform and Technical Standards, RESCON
Deegan, Kevin	BIM Coordinator – ZAS Architects and Interiors
Karanfil, Yigit	Design Technology Specialist - DIALOG
Krishnakumar, Abarna	BIM Coordinator – R.V. Anderson Associates Ltd.
Majano, Bernardo	Manager, Mechanical Senior Associate - R.V. Anderson Associates
Medina, Clarice	VDC Coordinator – EllisDon Corporation
Moran, Laura-Lee	National BIM Leader – Smith and Andersen
Munro, Reed	VDC/BIM Lead– Clark Builders
Naoumov, Dmitri	Structural Engineer – IBI Group
Nonis, Steve	Principal – Turner Fleischer Architects Inc.
Robbins, Sean	BIM Manager – Moriyama & Teshima Architects
Stalkie, Kirk	BIM Manager – NORR Architects, Engineers, Planners
Yew, Simon	BIM Manager – VIA Architecture

Contents

Executive Summary

The data presented in the report were collected through an online survey of more than 100 questions. The 2019 survey followed a similar format to that of the 2018 Greater Toronto Area (GTA) survey, with some adjustments to fit nation-wide perspectives. In collaboration with Residential Construction Council of Ontario, Canada BIM Council, BuildingSMART Canada and local BIM chapters, the 2019 survey was disseminated across Canada in both English and French.

The Second Annual BIM Survey received 398 responses from Architecture, Engineering and Construction (AEC) professionals. Participation was significantly greater than the 2018 survey which had 252 participants, and two previous national BIM surveys conducted by other organizations in 2013 and 2016, which garnered 78 and 127 responses respectively. The wide reach of the 2019 survey provides invaluable documentation and benchmarking indicators of Canada's BIM transition progress and process.

The demographics and background of the respondents, as well as characteristics of their organizations are detailed in the first section of the report. Industry professionals from Ontario, Alberta, British Columbia and Quebec accounted for more than ninety percent of the respondents. The BIM adoption and implementation by different professions in various organizational scales were adequately captured and represented.
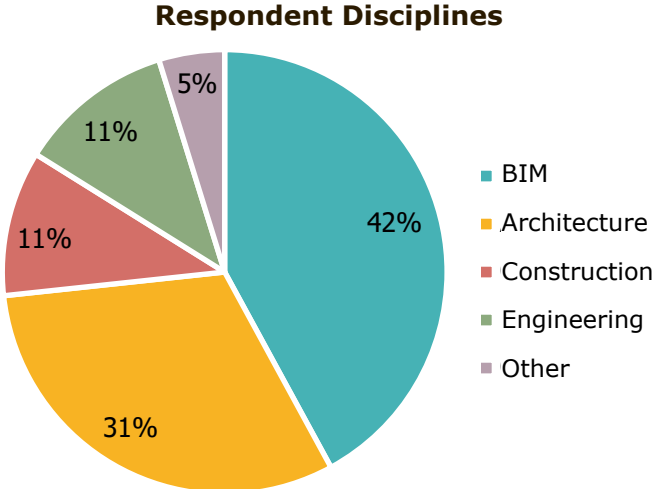
Compared to last year, the awareness and familiarity with BIM practices in the AEC industry continue to increase. More than 80% of the respondents felt extremely or quite confident in their BIM knowledge and 70% felt extremely or quite confident in their BIM skills. Nearly 90% of the participant organizations have adopted BIM in their current operational workflow, and 90% of the remainder indicated that they have plans to implement BIM in the next few years.

Respondents overwhelmingly agreed on certain BIM beliefs, including 'BIM is the future of project information', 'You hear more and more about BIM these days' and 'BIM can result in operation and maintenance savings', which shows that BIM is gaining significant momentum in the industry. However, most respondents also believe that 'The industry is not clear enough on what BIM can do' and 'Clients don't understand the benefits of BIM', which underlines the immediate need for BIM awareness, training and education. There was also strong agreement that BIM should be mandated by the government following other jurisdictions around the world, as Canada remains the only G7 country without an announced national BIM plan.

Finally, the majority of the respondents believe that BIM will continue to grow in prominence in the upcoming years. They also predict that new technologies such as cloud-based systems, virtual and augmented reality, and artificial intelligence will have significant influence on the industry over the next decade.

To complement the survey, 18 in-person and online interviews with industry representatives from diverse backgrounds and geographical locations were conducted. These interviews validated some of the survey findings and provided in-depth information that were not adequately captured through the survey questions. Quotes from the interviews are integrated into the report.

Section 1: Getting to Know the Respondents

Respondent Disciplines

- BIM — 42%
- Architecture — 31%
- Construction — 11%
- Engineering — 11%
- Other — 5%

Three hundred and ninety-eight respondents from a range of professions within the AEC industry participated in the survey. The largest groups represented BIM specialists (including BIM coordinators and visualization specialists) at 42% and architecture (including architects, architectural technologists, interior designers, and architectural managers) at 31%. The participation rate of engineers (including civil, structural and mechanical engineers) and those in construction (construction managers, estimators and contractors) each comprised 11% of the respondents. The 'Other' group included students, researchers, professors, facility managers, lawyers, and manufacturers, accounting for 5% of respondents. The distribution of disciplines is similar to the 2018 report.

Respondent Locations

- Ontario
- Alberta
- British Columbia
- Quebec
- Outside of Canada
- Nova Scotia
- Manitoba
- Saskatchewan

GDP
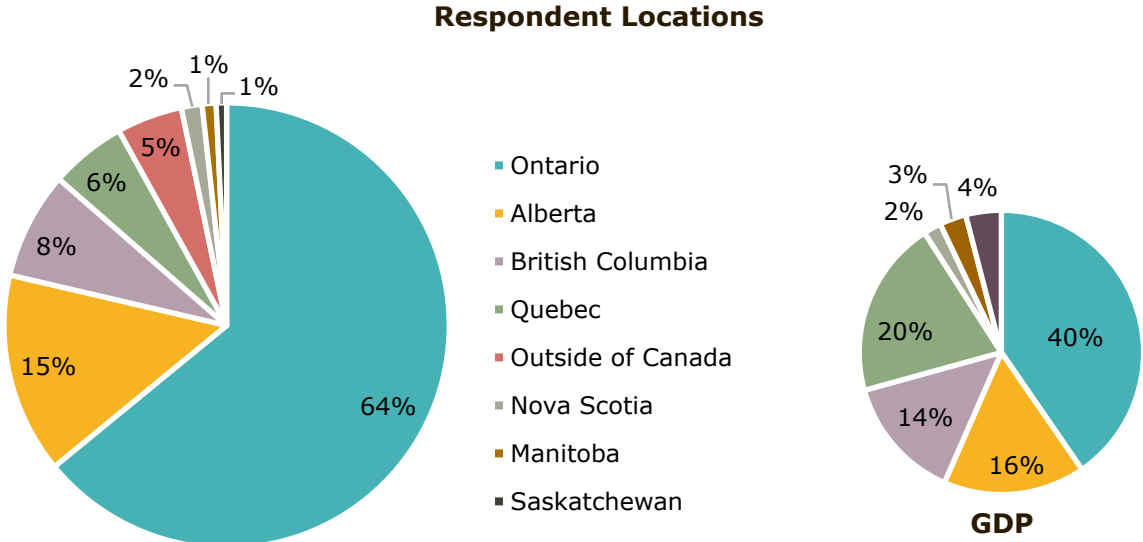
The left pie chart shows the distribution of the respondents by province. The pie chart on the right, representing the same provinces by their contribution to Canada's GDP[1], provides contrast with respect to proportionality of the respondent sample.

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1   Canada, Government of Canada, Statistics. «Gross domestic product, expenditure-based, provincial and territorial, annual». www150.statcan.gc.ca. Retrieved 2019-06-05

A proportionally large number of respondents (64%) came from Ontario (ON). The participation rate from Alberta (AB) and British Columbia (BC) are more representative of their economic activity at 15% and 8%. There was no participation from New Brunswick, Newfoundland and Labrador, Prince Edward Island or the three territories. It is expected that participation rates in subsequent years will more closely reflect regional activity as increased collaboration with the local BIM community organizations is achieved.

Eighteen industry professionals from outside of Canada, including, the United States of America, the United Kingdom, France, India and Colombia, also participated in the survey.

In the following sections, some analysis will focus on the location of respondents. For brevity, only the four provinces with the highest participation rates i.e. Ontario, Alberta, British Columbia, and Quebec, are discussed.
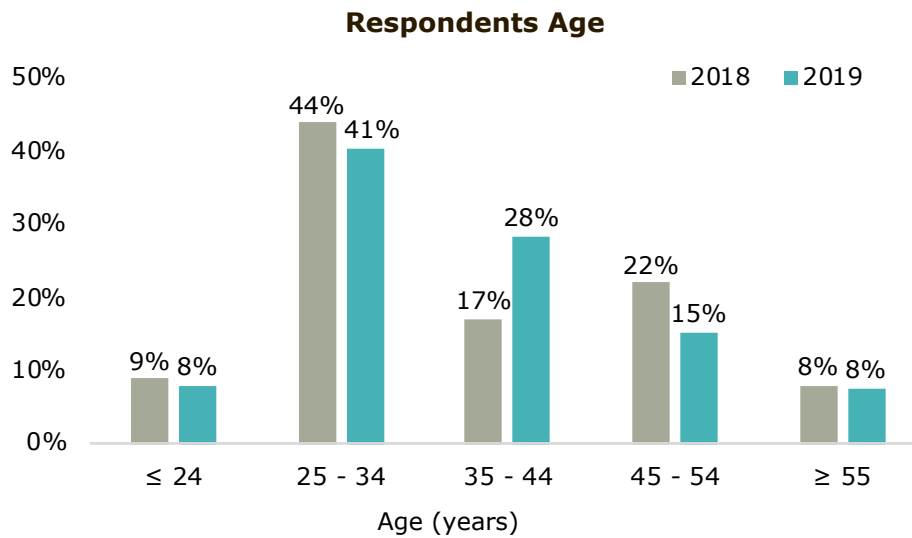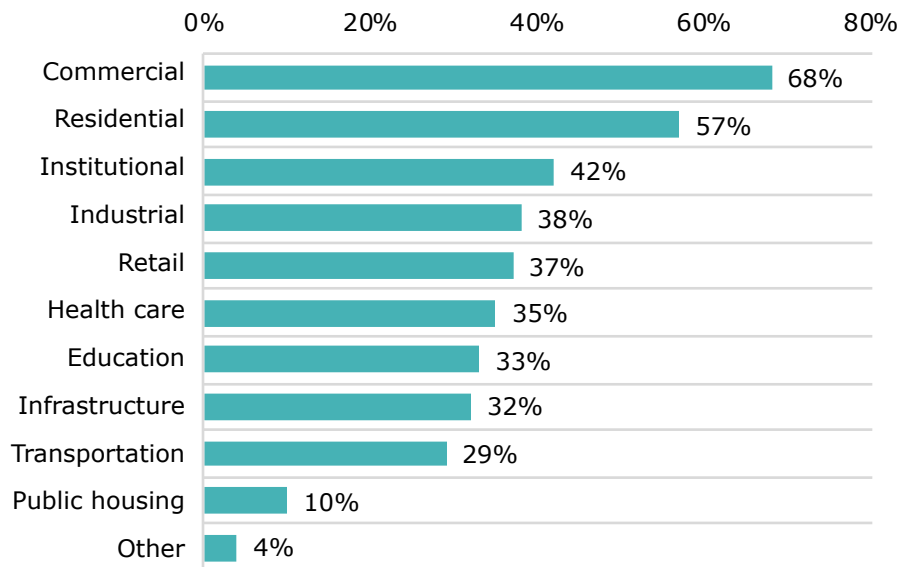
Respondents Age

In terms of age, almost 50% of the survey respondents are under the age of 35, which shows the active participation of young professionals in the survey and their enthusiasm in BIM-related opportunities. The age distribution from this year's survey is similar to the age distribution of respondents in 2018.

Respondent Experience
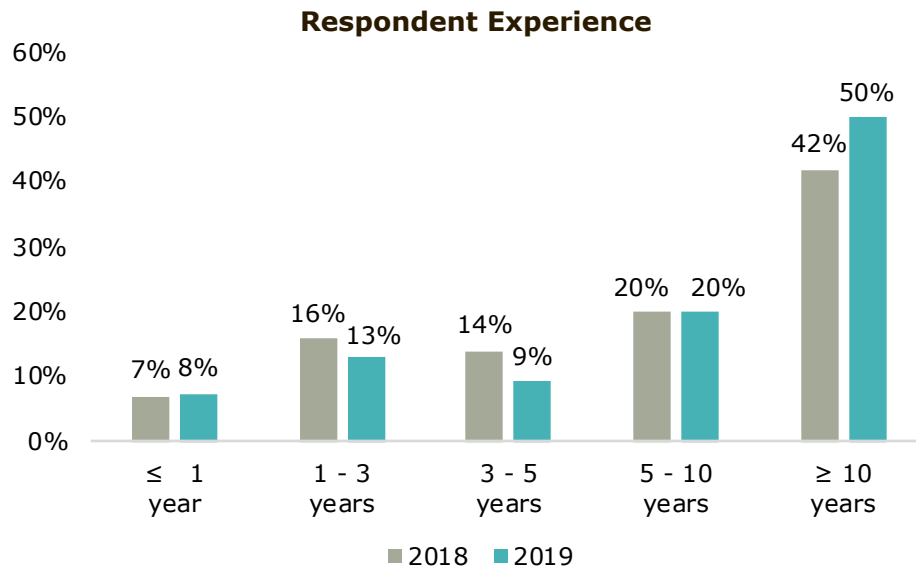
Despite the high participation of younger respondents, 50% have 10 or more years of experience in the AEC industry. This shows that the majority of the participants are experienced industry professionals who have seen the transition towards BIM in their organization and in the industry. The distribution of experience is similar to 2018.

In which of the following project types have you participated in the past 12 months?

Respondents identified as many projects types as applicable in answering the question. The top two project types are commercial and residential projects, followed by institutional, industrial, retail, health care, educational, infrastructure and transportation. Only 10% of the respondents indicated their participation in public housing and other types of projects, such as water treatment plants and recreation centers.

Section 2: Getting to Know the Organizations

In addition to general information and background of the respondents, data were gathered on their organizations.

Organization Types

Organization Type	Percentage
Architecture	63%
Engineering	30%
Consulting	28%
Contractor	20%
Construction management	13%
Owner	5%
Facility management	4%
Manufacturing	3%
Software vendor	3%
Property developer	3%
Education	2%
Regulatory body	1%
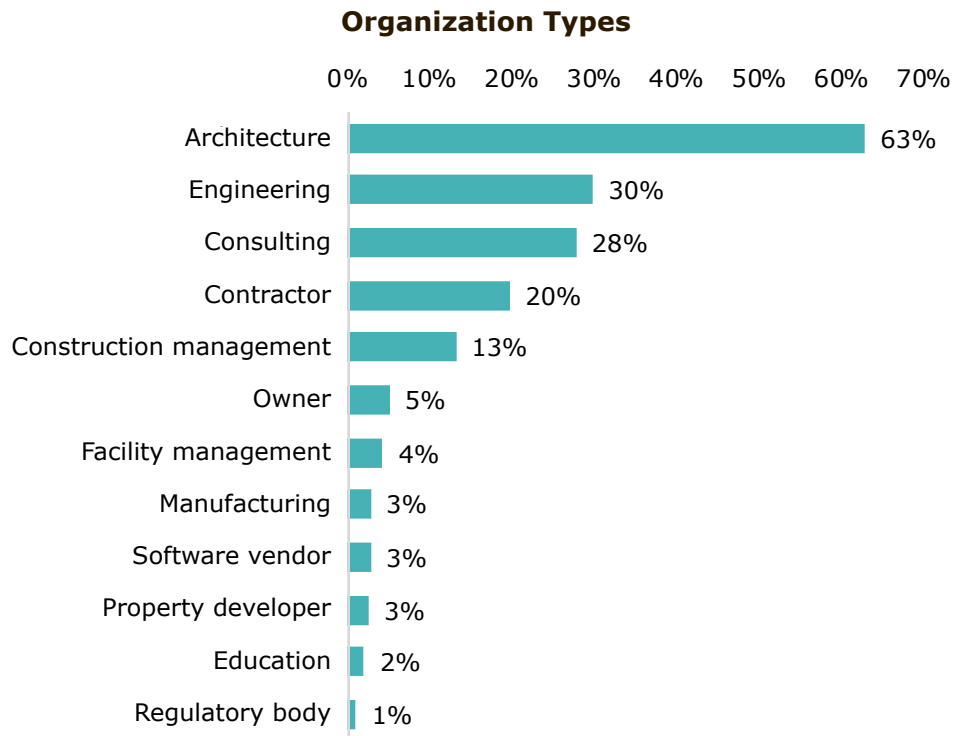
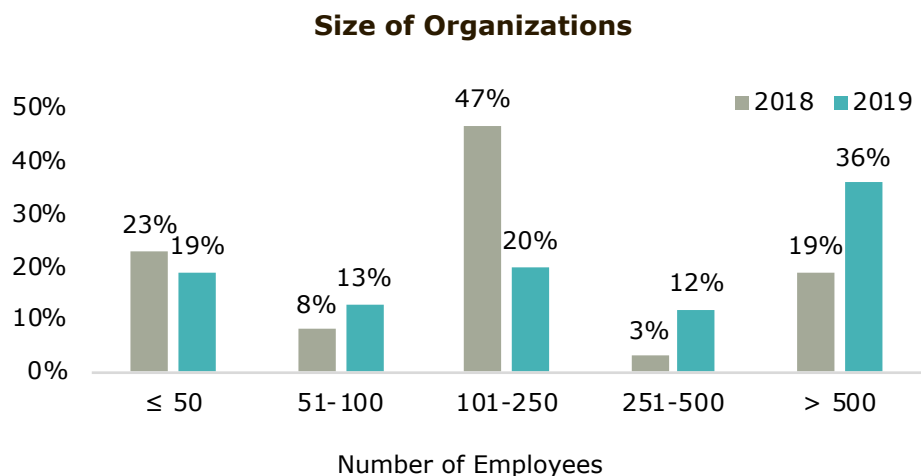Respondents were asked to select all descriptors that applied to their organization. Since it is common for the organizations to work in more than one discipline, the percentages are not mutually exclusive. As in 2018, more than 60% of organizations work in the architectural sector. Twenty to thirty percent are involved in engineering, consulting, or construction, which includes construction management and contractors. Fewer respondents work for owners, facility managers, manufacturers, software vendors, and property developers. Limited responses were received from the education sector and regulatory bodies.

Size of Organizations

Number of Employees	2018	2019
≤ 50	23%	19%
51-100	8%	13%
101-250	47%	20%
251-500	3%	12%
> 500	19%	36%

The proportion of small (<100 employees), medium (100-500 employees) and large (>500) organizations is more evenly distributed this year than in 2018. This indicates that the adoption and implementation of BIM in small, medium and large organizations is well represented in this year's survey responses.

Service Areas

4%   4%

- Canada
- USA
- International

92%
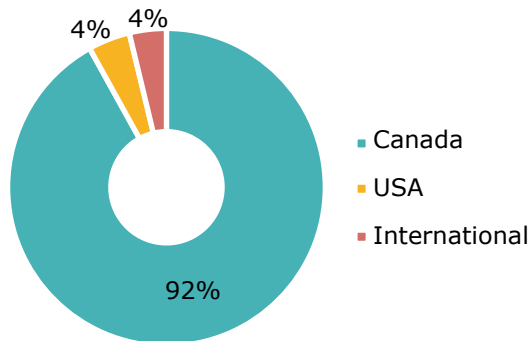
The respondents indicated the region in which their organization is doing most of their work. In 2019, 92% of the organizations undertake the majority of their professional services in Canada whereas that proportion was 86% in 2018. Of the 8% who work primarily outside of Canada, half focus on the United States of America. The remaining organizations work in China, Dubai, India, and United Kingdom.

Section 3: BIM Awareness and Beliefs

Participants were asked about their knowledge and skills in BIM, and what they believe BIM can do for them. The degree of confidence in their knowledge and skills was measured in five increments, ranging from extremely confident to not confident at all. The percent of respondents confident in their knowledge and skills in BIM are shown by discipline, location, and experience.

Respondent answers	Interpreted as
Extremely confident	Confident
Quite confident	
Somewhat confident	Neutral
Not very confident	Not confident
Not confident at all	

How confident are you in your knowledge and skills in BIM?
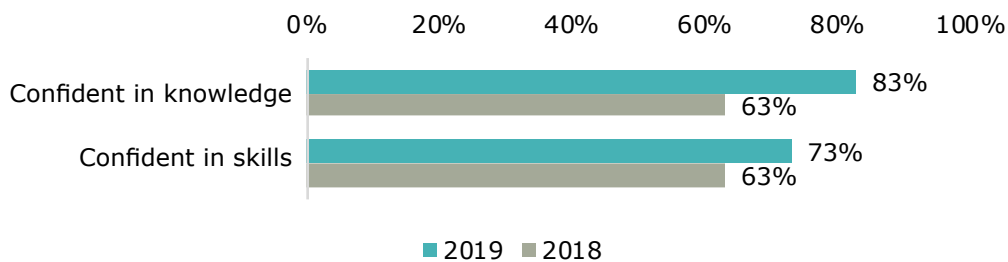
In the 2018 survey, confidence in BIM knowledge and skills was one question, with 63% reporting confidence; however, this year's survey asked it as two questions. 'Confidence in BIM knowledge' is consistently above 'confidence in BIM skills' without regard to whether respondents are examined as one group or by disciplines, location, or experience. This may indicate that, while many are familiar with the concept of BIM, there is a gap in translating that knowledge into practical skills. Respondents might feel as though they understand the general BIM process but are not familiar with the software that is being used in industry, particularly in engineering and construction where BIM is less commonplace.

Confidence in Knowledge and Skills by Discipline
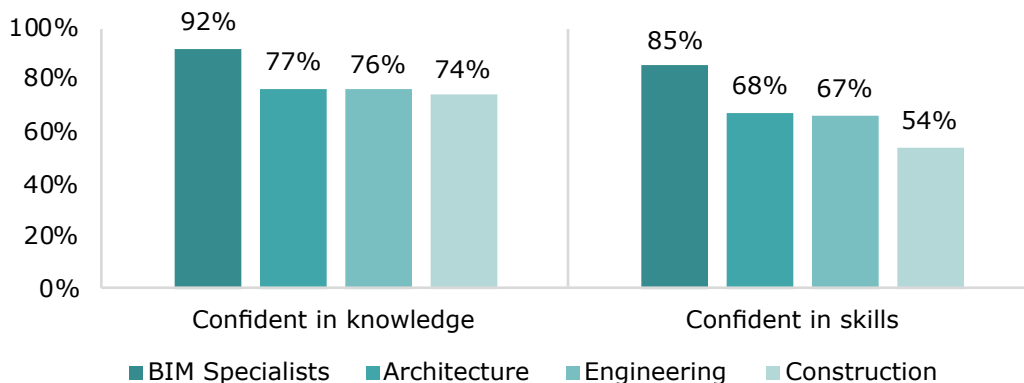
Unsurprisingly, the most confident group was BIM specialists, with 92% and 85% of respondents being confident in their knowledge and skills respectively. Three quarters of those in architecture, engineering and construction feel confident in their BIM knowledge. When asked about their skills, the level of confidence dropped about 10% for architects and engineers, and 20% for those in construction.

Confidence in Knowledge and Skills by Province
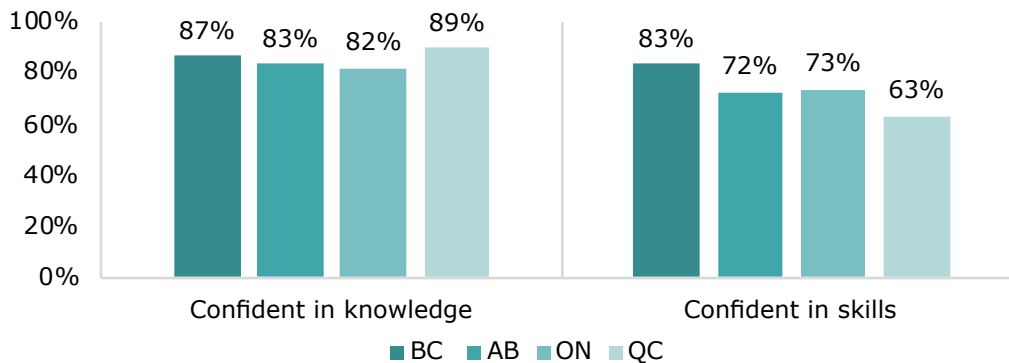
When looking at the confidence results by province, respondents are similarly confident in their knowledge, with Quebec leading the way at 89%. There is less consistency when it comes to skills – ranging from 83% in British Columbia to 63% in Quebec. Quebec in an interesting case, as they have the highest percentage of respondents confident in knowledge, but they are the least confident in skills. Perhaps some BIM communities or urban centres are promoting the use of BIM in the industry, resulting in an increase in knowledge and awareness, but the technical training has not caught up to demand. Regardless, this is an opportunity for future analysis and training.

Confidence in Knowledge and Skills by Years of Experience
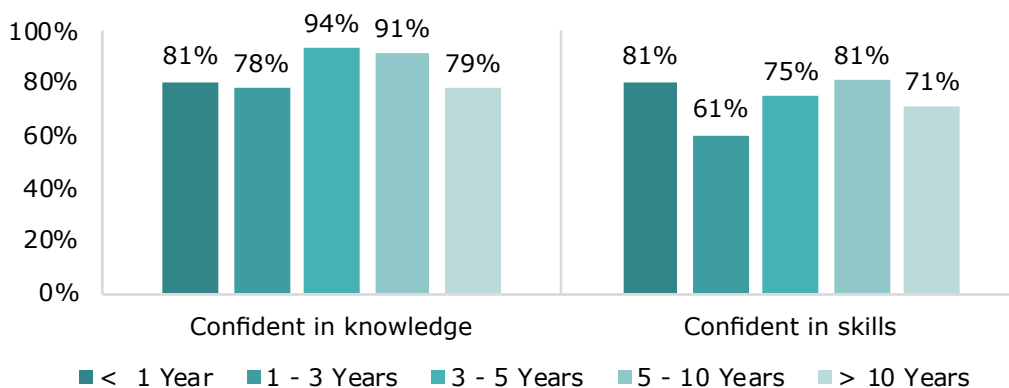
Another interesting trend arises when examining confidence through the lens of experience. Those with less than one year of experience are more confident in their knowledge, and significantly more confident in their skills compared to those with one to three years of experience. In fact, respondents with less than one year of experience reported being most confident in their skills. This was also the only group that was equally confident in their skills and knowledge.

An important aspect of the Annual BIM Surveys is to capture the industry's perspectives on common BIM-related beliefs, which are presented next. The following diagrams show 2018 data on the inner circles and the 2019 data on the outer circles.

Do you agree or disagree with the following statements?

BIM is the future of project information

You hear more and more about BIM these days

Using BIM can result in operation and maintenance savings

	Agree	Neither	Disagree
2019	Agree	Neither	Disagree
2018	Agree	Neither	Disagree
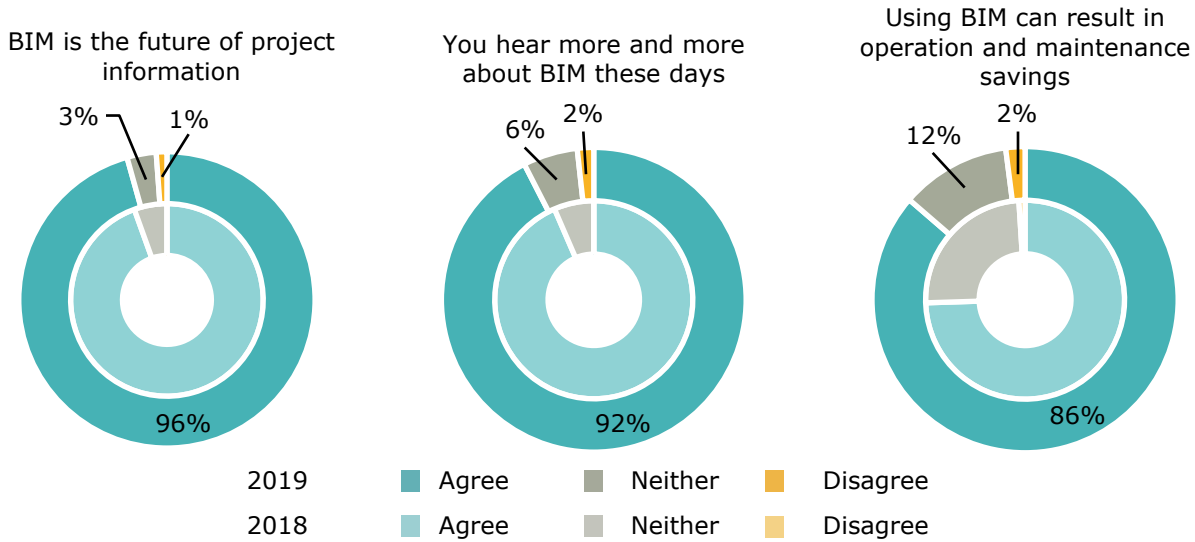
The agreement from industry professionals towards "BIM is the future of project information" is overwhelming at 96%, an increase of 2% over 2018. Only 1% of respondents disagreed with the statement.

The same percent of respondents as in 2018 indicated that they hear more and more about BIM these days. BIM is maintaining significant attention in the Canadian AEC industry.

86% of respondents believe that the adoption and implementation of BIM in the operation and maintenance phase of a project will lead to cost savings, and only 12% are unsure about the statement. In comparison, only 75% agreed in 2018.
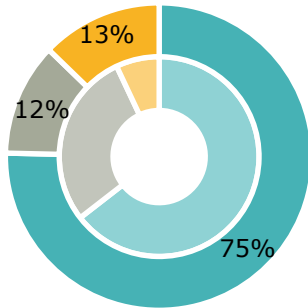
**96% of respondents believe
BIM is the future of project information.**

The industry is not clear enough on what BIM can do

Clients don't understand the benefits of BIM

BIM should be mandated by the government

13%

12%

75%

8%

21%

70%

17%

21%

62%
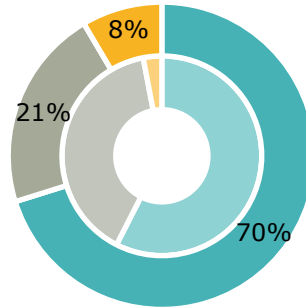
	2019	Agree	Neither	Disagree
	2018	Agree	Neither	Disagree
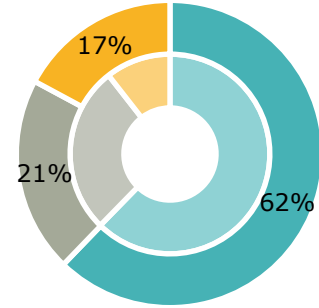
> *"Canadian companies need to push forward with BIM or they run the risk of losing clients"*
> — Expert Interviewee

An increase of 11% over 2018 results, 75% of respondents agreed that the current AEC industry is not fully aware of the capability of BIM. This indicates a pressing need for increased education efforts so that the industry is more aware of the potentials of BIM.

In addition to the lack of understanding towards the potential of BIM in the industry, 70% of respondents indicated that this is especially true for clients. There is no doubt that clients play a crucial part in the BIM transition process as they experience more of the benefits of BIM.

As in 2018, 62% of respondents agree that our government should follow other jurisdictions around the world and mandate BIM on publicly funded projects. As of 2019, Canada remains the only G7 country without a specific national BIM strategy. However, the number of respondents who disagree with the statement grew substantially from 11% in 2018 to 17% in 2019.

BIM is
just a software

6%
10%
84%

BIM is only for new build,
not refurbishment

6%
9%
85%

BIM is just for large
organizations

8%
10%
81%

	Agree	Neither	Disagree
2019			
2018	Agree	Neither	Disagree
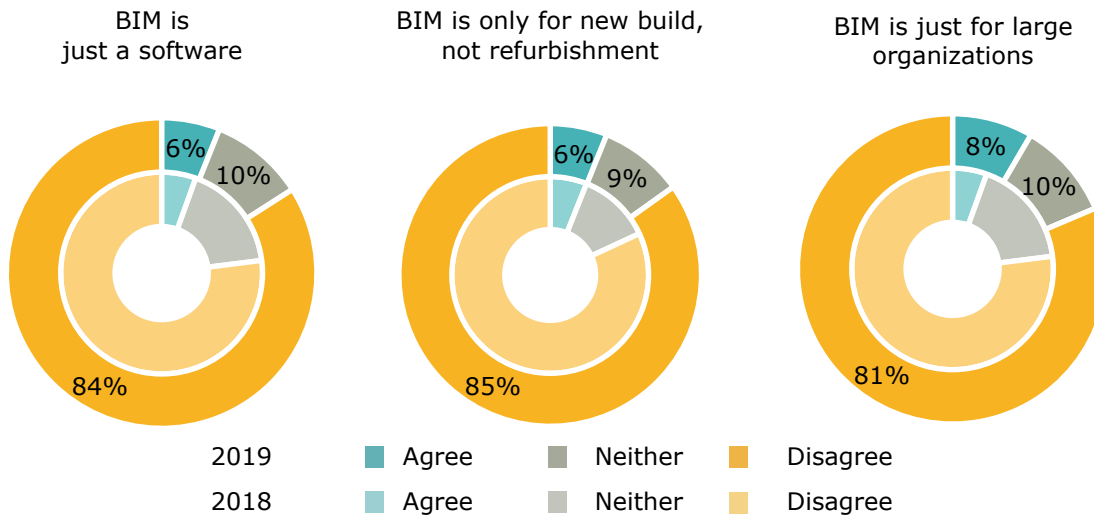
Only 6% of respondents agree that BIM is just a software. With the increased rate of BIM adoption in the industry, more people are recognizing that BIM positively affects the entire lifecycle of a facility from design to operation and maintenance.

Even though 85% of respondents disagree that BIM is for new builds only (up from 80% just one year ago), the adoption of BIM for refurbishment projects is not common in the current industry. With the advancement of technology, the adoption rate is expected to grow in the future.

Despite the high disagreement that "BIM is just for large organizations" (up from 77% in 2018), it was mentioned by some industry professionals in the interviews that the software subscription fees as well as the changes required in operation workflow might hinder BIM adoption in smaller organizations.

Section 4: BIM Adoption and Implementation

This section addresses BIM adoption across Canada and how respondents are using BIM in their professional activities and organizations. The discussion compares BIM users and non-users. Users are self-identified as those who are aware of BIM and currently using BIM. 82% of the 2019 respondents identified themselves as BIM users, an increase of 3% from last year.

Discipline
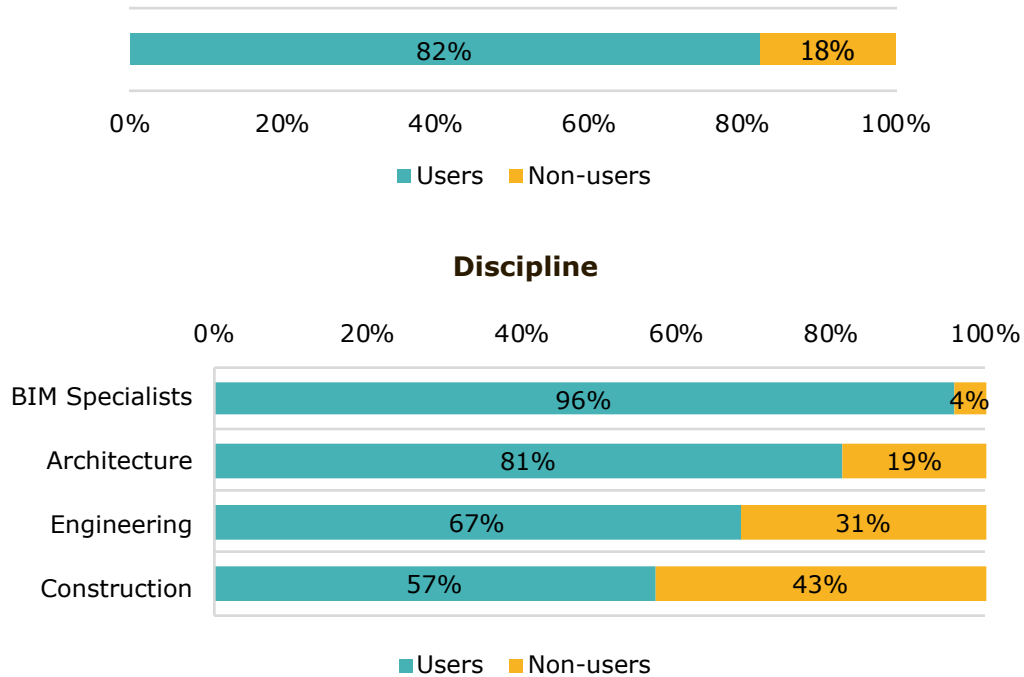
most all BIM specialists identified themselves as BIM users, followed in decreasing proportions by those in architecture, engineering and construction roles.

> **Self-identified BIM user rates were reasonably consistent across the provinces, with Quebec leading at 86%.**

" There are many contractors in Quebec that are advanced in BIM and trying to get their sub-contractors to adopt BIM to make sure they have the same tools all the time.

Expert Interviewee "

Which of these statements better describes your organization?

2019	89%	11%

Legend: ▪ We currently use BIM ▪ We have not used BIM yet
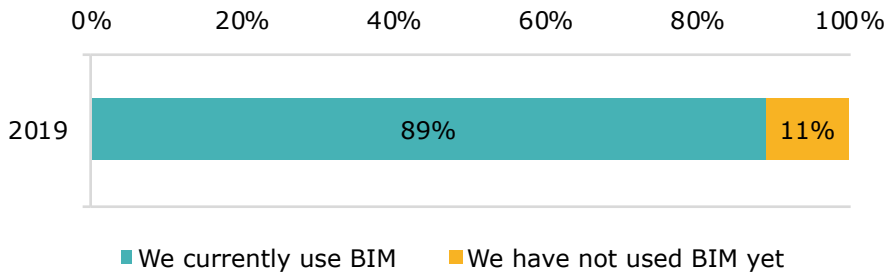
In terms of the adoption of BIM within organizations, almost 90% of the respondent indicated that their organization is currently using BIM, which is an increase of 2% from 2018.

> **97% of respondents indicated that they are currently using BIM or will be using BIM in the next 5 years.**

> **84% of non-users acknowledged that if they do not adopt BIM, they will get left behind**

Approximately in what percent of projects have you used BIM in the last 12 months?

Year	0%	1-25%	26-50%	51-75%	76-99%	100%
2019	9%	12%	7%	12%	26%	35%
2018	8%	13%	13%	14%	20%	31%
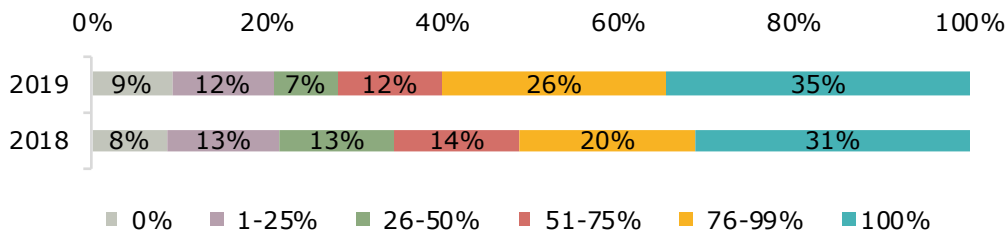
Only 9% of respondents say that they have not used BIM on any projects in the past year.

> **35% of respondents report that they are using BIM on 100% of their projects, and over half of respondents are using BIM on at least 75% of their projects.**

Percentage of BIM Projects by Discipline

Discipline	0%	1-25%	26-50%	51-75%	76-99%	100%
BIM Specialists	1%	11%	7%	10%	27%	44%
Architecture	9%	10%	8%	15%	29%	28%
Engineering	18%	10%	5%	15%	28%	23%
Construction	26%	18%	9%	6%	15%	26%
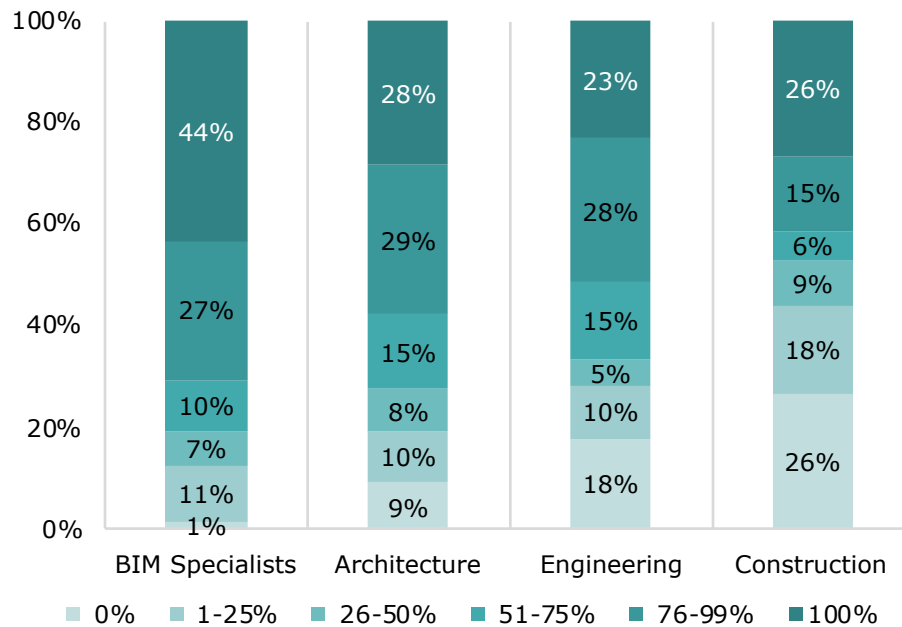
BIM specialists report using BIM on the highest percentage of their projects with 71% of respondents using BIM in over 75% of their projects in the past year. At the other end, 26% of respondents from construction did not use BIM on any of their projects. This follows the trend where those in construction have not had the opportunity to fully capitalized on BIM's abilities.

> **BIM specialists shared their models with stakeholders the most – 41% say that they share with over 5 stakeholders. Conversely, those in construction shared the least, with 38% reporting that they did not share their files.**

How many stakeholders and/or organizations (outside of your own) do you typically share BIM with on a project?

0	1	2	3	4	5+
15%	11%	17%	13%	9%	35%
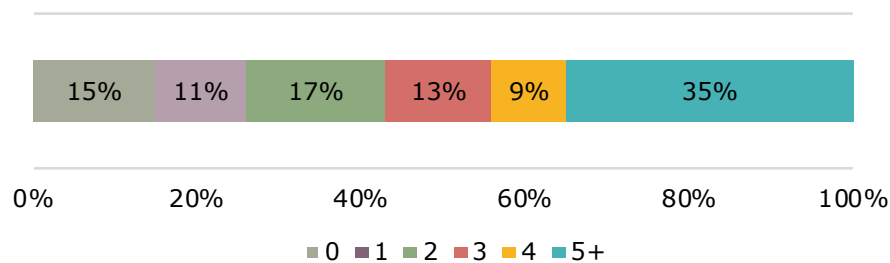
Only 15% of the respondents kept their BIM files to themselves. Thirty-five percent of respondents indicate that they usually share the BIM files with 5 or more stakeholders. Compared to 2018 results, more respondents are sharing their files with more users – BIM users who shared their BIM with 5+ stakeholders increased over 7%.

What do you use BIM for?

Category	Percentage
Coordination	69%
Visualization	68%
Collaboration	64%
Clash detection	60%
Design - architectural	47%
Scheduling	42%
Quality control	39%
Quantity take off	35%
Data management	34%
Optimization	32%
Communication	31%
Marketing	30%
Design - civil / Structural	26%
Design - MEP	26%
Estimating	22%
Structural analysis	16%
Facility management	10%
Inspection	9%

The majority of respondents indicated that they use BIM for coordination, visualization, collaboration and clash detection. These functions are all cross-discipline applications of BIM, so it makes sense that they report the most use. This also speaks to BIM's strength as a communication tool. Other common uses include architectural design, scheduling, quality control and quantity take off. These applications are more discipline specific, understandably resulting in less use overall. Very few respondents use BIM for inspection or facility management, a significant potential that remains mostly untapped in the Canadian market.
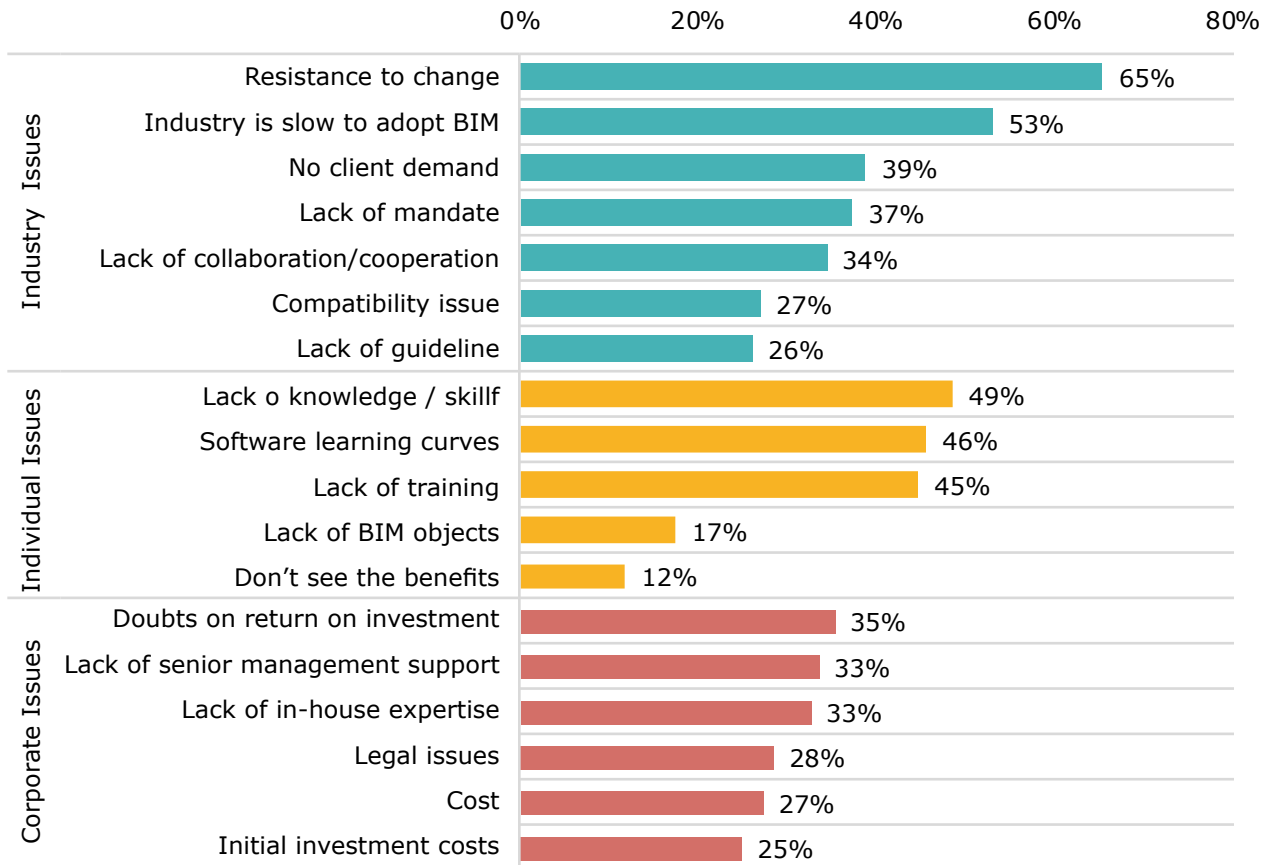
> "
> *BIM can encourage collaboration between different offices as it allows for people in different time zones to work collaboratively in a shift-like process and for geography to not influence business.*
> *Expert Interviewee*
> "

> "
> *Clash detection reduces on site design issues, which results in cost savings.*
> *Expert Interviewee*
> "

Section 5: BIM Barriers and Benefits

In this section, respondents assess a list of potential benefits and barriers to BIM adoption and implementation. While the barriers are organized by industry, corporate, and individual issues, some may fit in more than one category.

What are the main barriers to using BIM?

Category	Barrier	Percentage
Industry Issues	Resistance to change	65%
Industry Issues	Industry is slow to adopt BIM	53%
Industry Issues	No client demand	39%
Industry Issues	Lack of mandate	37%
Industry Issues	Lack of collaboration/cooperation	34%
Industry Issues	Compatibility issue	27%
Industry Issues	Lack of guideline	26%
Individual Issues	Lack o knowledge / skillf	49%
Individual Issues	Software learning curves	46%
Individual Issues	Lack of training	45%
Individual Issues	Lack of BIM objects	17%
Individual Issues	Don't see the benefits	12%
Corporate Issues	Doubts on return on investment	35%
Corporate Issues	Lack of senior management support	33%
Corporate Issues	Lack of in-house expertise	33%
Corporate Issues	Legal issues	28%
Corporate Issues	Cost	27%
Corporate Issues	Initial investment costs	25%

More than half of respondents identified two barriers - 'Resistance to change' and 'Industry is slow to adopt BIM'. It's interesting to note that while 62% of respondents believe that BIM should be mandated by the government (see Section 3: BIM Awareness and Beliefs), just 37% believe that the lack of a mandate is a barrier to use. This may speak to the challenges that firms must overcome when only part of the industry adopts a new technology. A mandate would both level the competitive playing field and speed up the realization of BIM's benefits. Similarly, 70% of respondents believe that clients do not understand the benefits of BIM, while 39% believe that the lack of client demand is a barrier. This suggests that adopting BIM has been a decision that is made for internal purposes, such as better profitability or efficiency, as opposed to meeting external client or owner demands.

> *Older generation is tougher to convince but some are still interested, younger generation is more eager to learn.*
> — *Expert Interviewee*

> *One successful project is all it takes for everyone to get on the same page.*
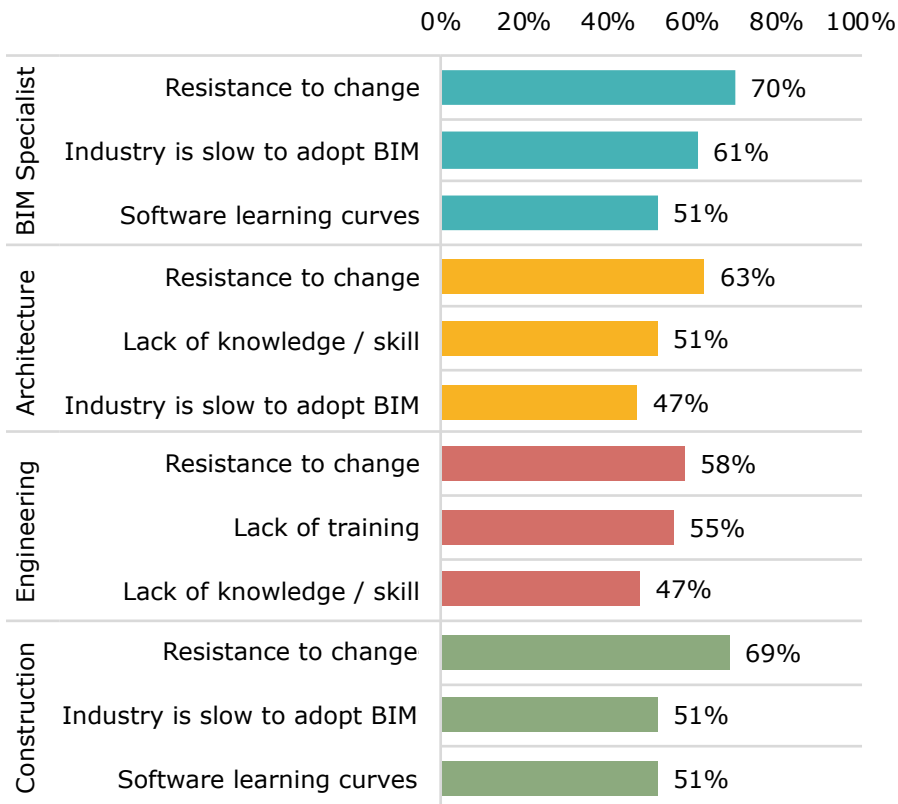> — *Expert Interviewee*

Almost half of respondents see individual issues as significant barriers, including the lack of knowledge and skill, the software learning curve, and the lack of training. This shows that there needs to be more effort put into teaching professionals the technical aspects of BIM either in post secondary institutions or through in-house training. There is also a significant opportunity for developers and vendors to improve the way in which their software operates by making it more intuitive and automated. Corporate issues were not commonly seen as major barriers by respondents, with just 25% to 35% of respondents identifying them as such.

> " *It is important to conduct in-house training on software and how it relates to their workflow.*
> — Expert Interviewee "

> " *New hires are fast with learning new software, but senior people have a more difficult time adapting to upgrades.*
> — Expert Interviewee "

The majority of the barriers listed above were identified less frequently than in 2018. The barrier that saw the highest decrease in identification was 'doubts on return on investment' which decreased from 60% in 2018 to just 35% in 2019 indicating that more professionals are seeing the benefits that BIM has to offer in terms of cost savings. Other issues that substantially decreased include lack of mandate (down 14%), lack of guidelines (down 16%) and legal issues (down 17%).
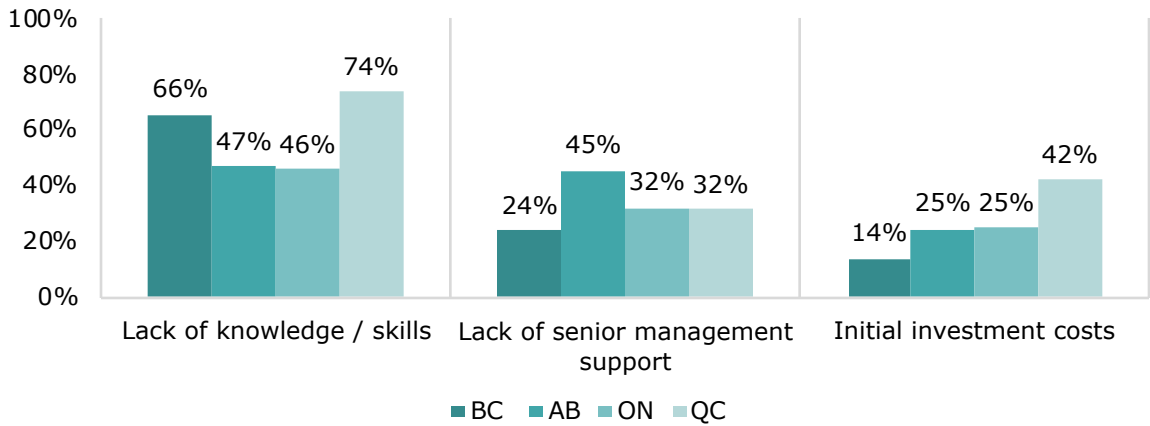
Top Barriers by Discipline

Discipline	Barrier	Value
BIM Specialist	Resistance to change	70%
BIM Specialist	Industry is slow to adopt BIM	61%
BIM Specialist	Software learning curves	51%
Architecture	Resistance to change	63%
Architecture	Lack of knowledge / skill	51%
Architecture	Industry is slow to adopt BIM	47%
Engineering	Resistance to change	58%
Engineering	Lack of training	55%
Engineering	Lack of knowledge / skill	47%
Construction	Resistance to change	69%
Construction	Industry is slow to adopt BIM	51%
Construction	Software learning curves	51%

> " *It is important to conduct training exercises for all levels of staff and make sure they keep track on new technology in the industry.*
> — Expert Interviewee "

Resistance to change was the most common barrier in each of the four disciplines. All groups also agreed that the lack of education – whether it be knowledge, training or software learning curves - were also significant barriers.

Select Barriers by Province

Select Barriers by Province

|	Lack of knowledge / skills	Lack of senior management support	Initial investment costs
BC	66%	24%	14%
AB	47%	45%	25%
ON	46%	32%	25%
QC	74%	32%	42%

■ BC ■ AB ■ ON ■ QC

When looking at regional variations, the lack of knowledge and skill is seen as a barrier by two thirds of British Columbia respondents and three quarters of Quebec respondents. Fewer than half of Alberta and Ontario respondents see this as a barrier. In Alberta, the lack of senior management support is considered a factor at a higher percentage than other provinces. Finally, the initial investment costs were seen as a barrier by 42% of respondents from Quebec, while just 25% of all respondents agreed.

> " Strategic plan says BIM, everyone on the ground says BIM, everyone in the middle doesn't have time for BIM.
> — *Expert Interviewee* "

> " It's easier to take on BIM if management level understands the benefits and process of BIM.
> — *Expert Interviewee* "

Select Barriers by Age

18-24 25-34 35-44 45-54 55+
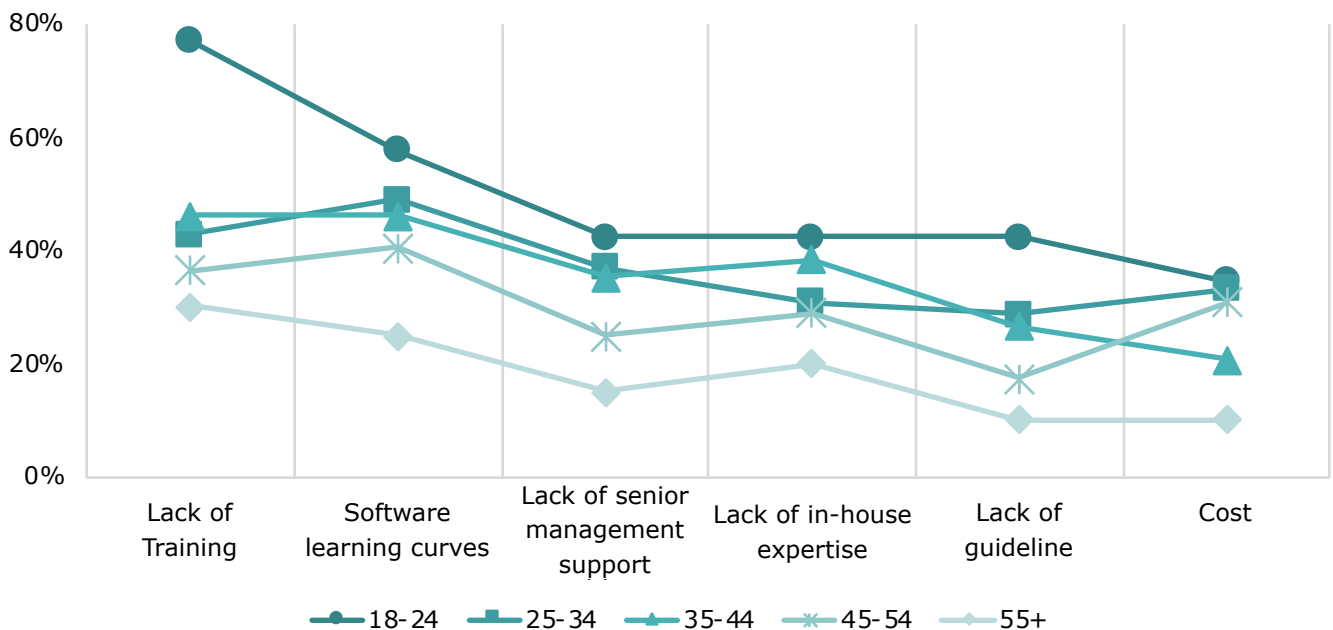
When examined by age, there is a clear difference in opinion. On average, younger respondents were more inclined to agree that barriers to BIM exist, while those in the 55+ age range were less likely to identify barriers – they reported barriers at a below average rate in 15 of the 18 categories. Additionally, those aged 18-24 said that the lack of learning resources, like software training and guidelines, were largely responsible for BIM not being more broadly accepted.

> *Industry standards and mandates aren't in place so people are following different options, which makes collaboration difficult.*
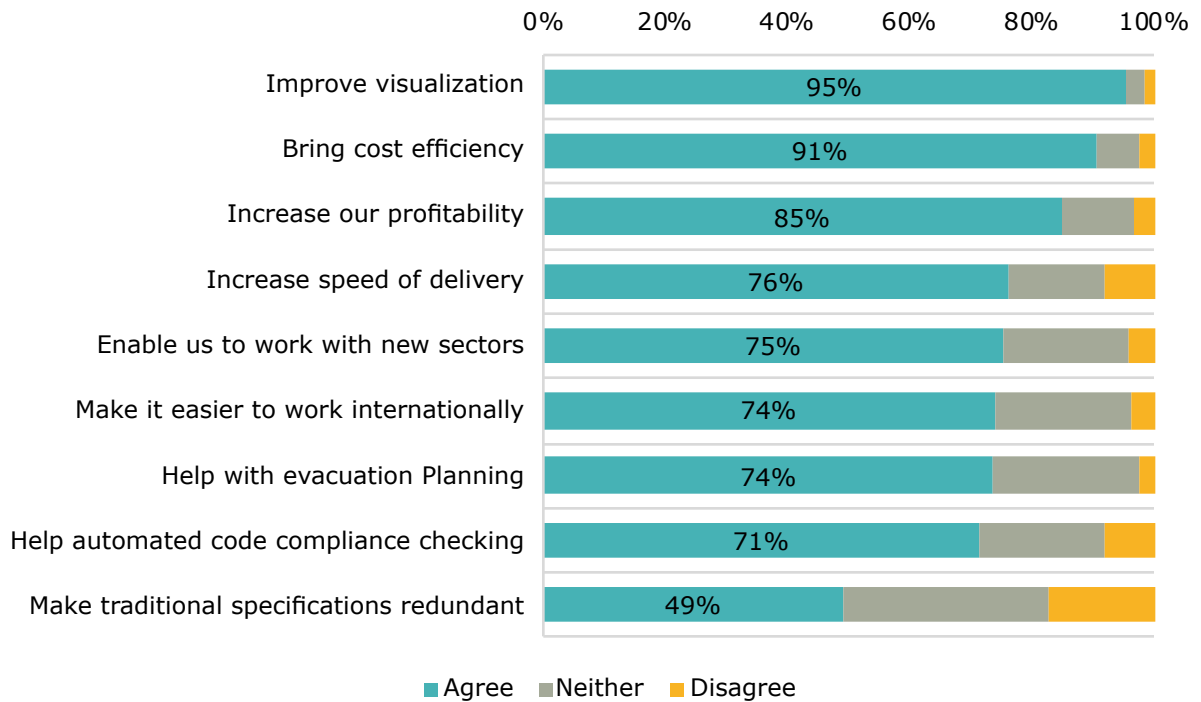>
> *Expert Interviewee*

Barriers by User/Non-User
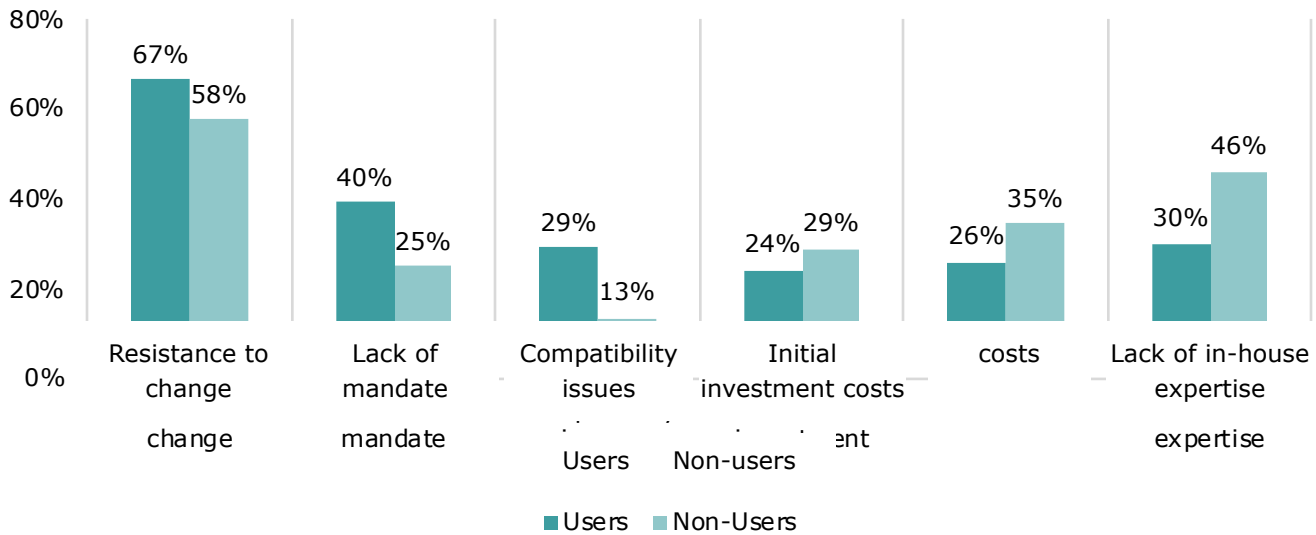
BIM users and non-users showed distinct differences on BIM barriers. BIM users were more likely to identify issues as barriers overall, but non-users focused on management or organizational issues, such as lack of in-house expertise, cost, and initial investment costs. On the other hand, resistance to change, the lack of a mandate and compatibility issues were identified as barriers more often by users compared to non-users. This provides some interesting insight into the differences between the non-users who are may currently be experiencing these barriers as they look to adopt BIM, compared to the retrospective views of the users that have already adopted BIM.

Respondents in BIM specialist roles believed in the benefits of BIM at a higher percentage than other disciplines and identified the benefits 10% more frequently than average respondent.
Generally, those in engineering saw the benefits at the second highest rate, while those in construction saw the benefits the least.

Do you agree or disagree with the following statements regarding BIM benefits? Adopting BIM can...

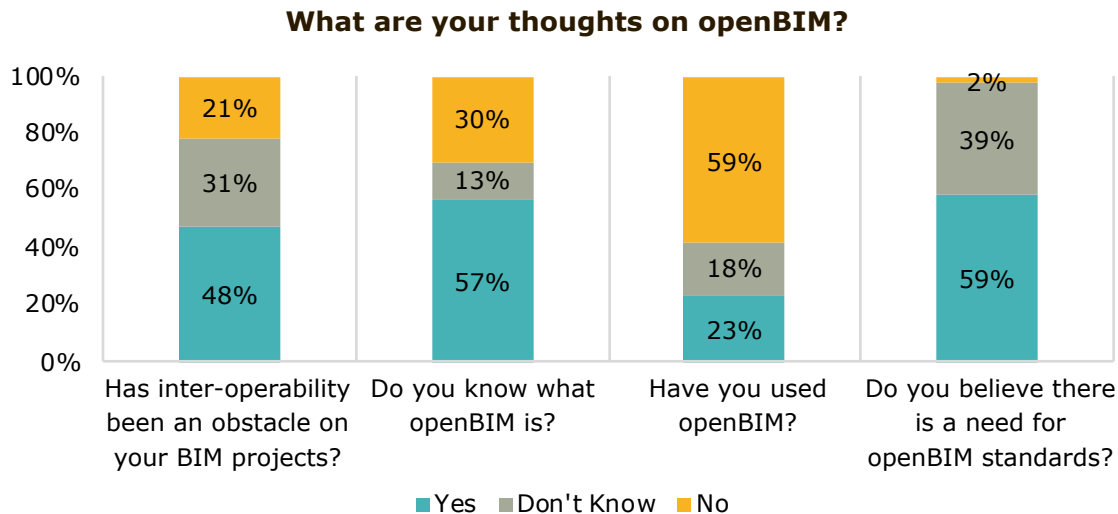| Statement	Agree
Improve visualization	95%
Bring cost efficiency	91%
Increase our profitability	85%
Increase speed of delivery	76%
Enable us to work with new sectors	75%
Make it easier to work internationally	74%
Help with evacuation Planning	74%
Help automated code compliance checking	71%
Make traditional specifications redundant	49%

■ Agree ■ Neither ■ Disagree

Most respondents agreed that the BIM was beneficial in all of the listed applications. Over 90% agreed that BIM can improve visualization and cost efficiency, and 85% agreed that it can increase profitability. The other benefits, though more contentious, still garnered the support of approximately three quarters of respondents.

> **When comparing across age groups, younger respondents identified the given statements as benefits at a much higher rate than older respondents – the difference between those in the 18-24 age group and the 55+ age group was, on average, 15%.**

Section 6: BIM Tools and Resources

With many different BIM software, resources and tools available in the marketplace, respondents were asked to specify what they used.

What are your thoughts on openBIM?

Question	Yes	Don't Know	No
Has inter-operability been an obstacle on your BIM projects?	48%	31%	21%
Do you know what openBIM is?	57%	13%	30%
Have you used openBIM?	23%	18%	59%
Do you believe there is a need for openBIM standards?	59%	39%	2%

buildingSMART[2] defines openBIM as "a universal approach to collaborative design, realization and operation of buildings based on open standards and workflows." openBIM aims to create transparent workflows, common languages, and enduring project data. Over half of the respondents were aware of what openBIM was, but just 23% had used it. Among openBIM users, BIM360 was identified as the most common sharing platform. While 59% of all respondents believe that there is a need for openBIM Standards, an overwhelming 91% of those who use openBIM agree that the industry needs standards for openBIM.
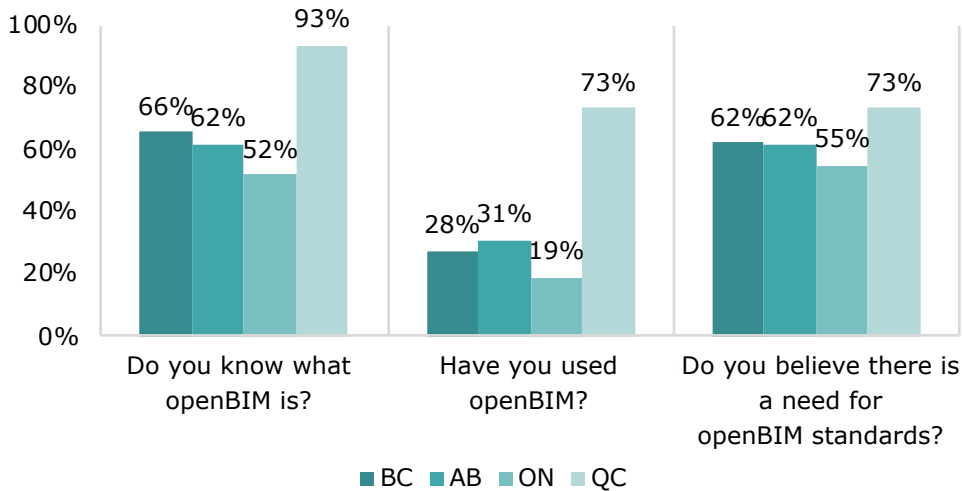
> **An overwhelming 91% of those who use openBIM agree that the industry needs standards for openBIM.**

" *It is important to define clear roles and responsibilities for Open BIM projects.*
Expert Interviewee "

> **Respondents from Quebec were much more aware of the BIM resources available – just 17% were unfamiliar with the common Canadian BIM resources. Those from British Columbia, despite feeling the most confident in their skills and second most confident in their knowledge, were the least aware of these resources with 63% of respondents being unaware of these resources.**

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2   "Technical Vision." buildingSMART, www.buildingsmart.org/standards/technical-vision/. Retrieved June 5th, 2019
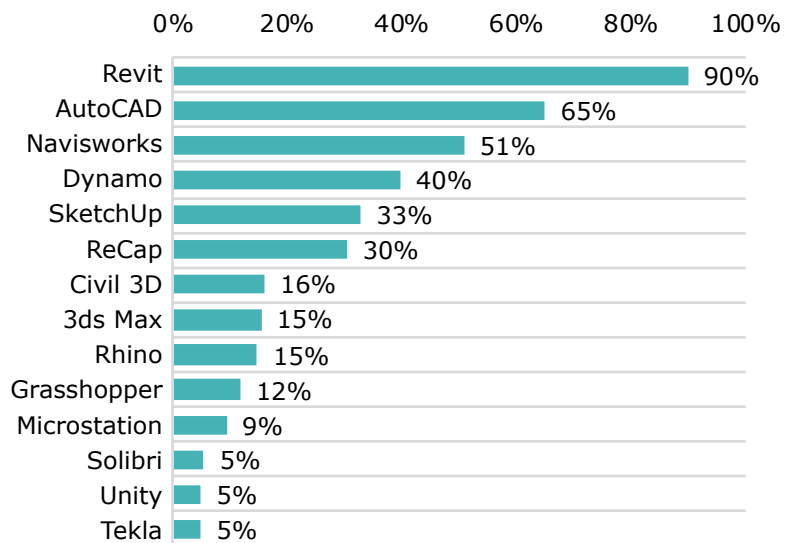
openBIM Responses by Province

Legend: BC, AB, ON, QC

Do you know what openBIM is?
- BC: 66%
- AB: 62%
- ON: 52%
- QC: 93%

Have you used openBIM?
- BC: 28%
- AB: 31%
- ON: 19%
- QC: 73%

Do you believe there is a need for openBIM standards?
- BC: 62%
- AB: 62%
- ON: 55%
- QC: 73%

> "There is a lack of competition in software in Canadian market.
> — *Expert Interviewee*"

Respondents from Quebec both know and use openBIM at a much higher rate than those from other provinces – Quebec is 36% above average in openBIM awareness and 50% above average in openBIM use. Despite this substantial difference, all provinces have similar percentages of respondents saying that they believe there is a need for openBIM standards, ranging from 55% to 73%.
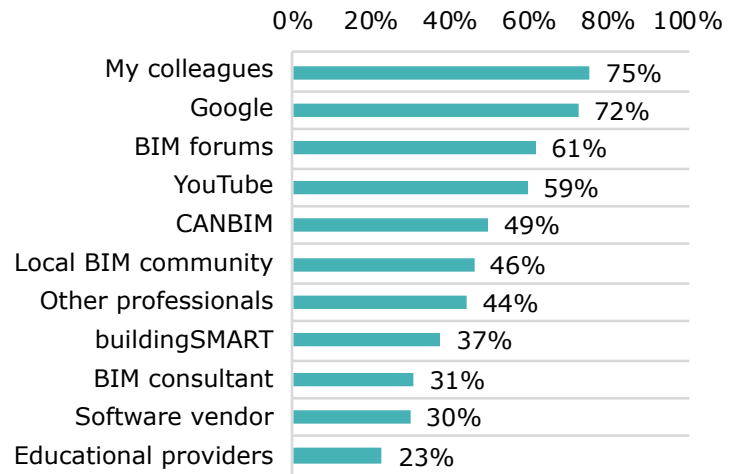
> "We use several BIM tools to perform different tasks as Revit cannot perform more sophisticated analysis that other software can do.
> — *Expert Interviewee*"

Over the last 12 months, which of the following tools did you mainly use?

- Revit: 90%
- AutoCAD: 65%
- Navisworks: 51%
- Dynamo: 40%
- SketchUp: 33%
- ReCap: 30%
- Civil 3D: 16%
- 3ds Max: 15%
- Rhino: 15%
- Grasshopper: 12%
- Microstation: 9%
- Solibri: 5%
- Unity: 5%
- Tekla: 5%

There are a variety of software packages and tools that have BIM capabilities, but Autodesk products dominate the Canadian market space. Revit, AutoCAD and Navisworks are the most commonly used tools. Dynamo, a Revit add-on for visual programming, was fourth; no other software was used by more than 40% of respondents. The use of these products is relatively stable from 2018.
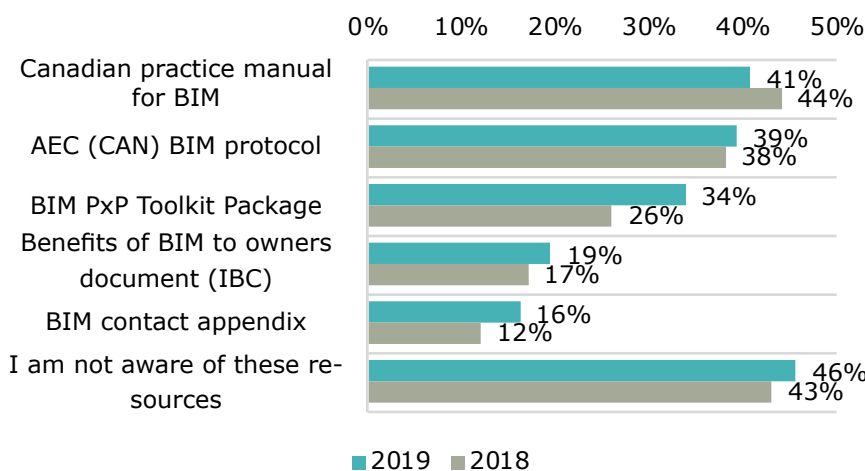
Which of the following sources of information about BIM are you most likely to use?

Over half of those in Architecture (54%), Engineering (61%) and construction (71%) were not aware of any of the listed BIM resources. These results may prompt resource developers to better promote their guidelines in the industry.

Source	Percentage
My colleagues	75%
Google	72%
BIM forums	61%
YouTube	59%
CANBIM	49%
Local BIM community	46%
Other professionals	44%
buildingSMART	37%
BIM consultant	31%
Software vendor	30%
Educational providers	23%

After filtering the results for BIM Users, three quarters of the respondents rely on their colleagues or Google as a point of reference on BIM matters. Over half of respondents used general information sources for BIM advice, including BIM Forums and YouTube. Professional organizations were the next most common source of information, with the local BIM community, other external professionals, and buildingSMART. Finally, the least used sources were those that offered more technical support like software vendors, BIM consultants and local educational providers. Some respondents also reported using other resources to gain knowledge in BIM, such as conferences, in-house training protocols, and Lynda's and LinkedIn's learning tools.

Which of the following Canadian BIM resources are you currently aware of?

Resource	2019	2018
Canadian practice manual for BIM	41%	44%
AEC (CAN) BIM protocol	39%	38%
BIM PxP Toolkit Package	34%	26%
Benefits of BIM to owners document (IBC)	19%	17%
BIM contact appendix	16%	12%
I am not aware of these resources	46%	43%

■2019 ■2018

> *buildingSMART Canada practice manual is very helpful as it provides consistent approach on BIM usage specifically in Canada.*
>
> *Expert Interviewee*

The Canadian Practice Manual for BIM and BIM PxP Toolkit Package continue to be the most commonly known resource for BIM users. Unfortunately, 46% of respondents had not heard of any of the listed resources.

Section 7: Future of Industry

In this final section, respondents were asked about what technologies they feel will have an impact on the AEC Industry and BIM in the coming years.

Do you agree or disagree with the following statements regarding the future of BIM adoption?

Clients/Owners will increasingly insist on us adopting BIM

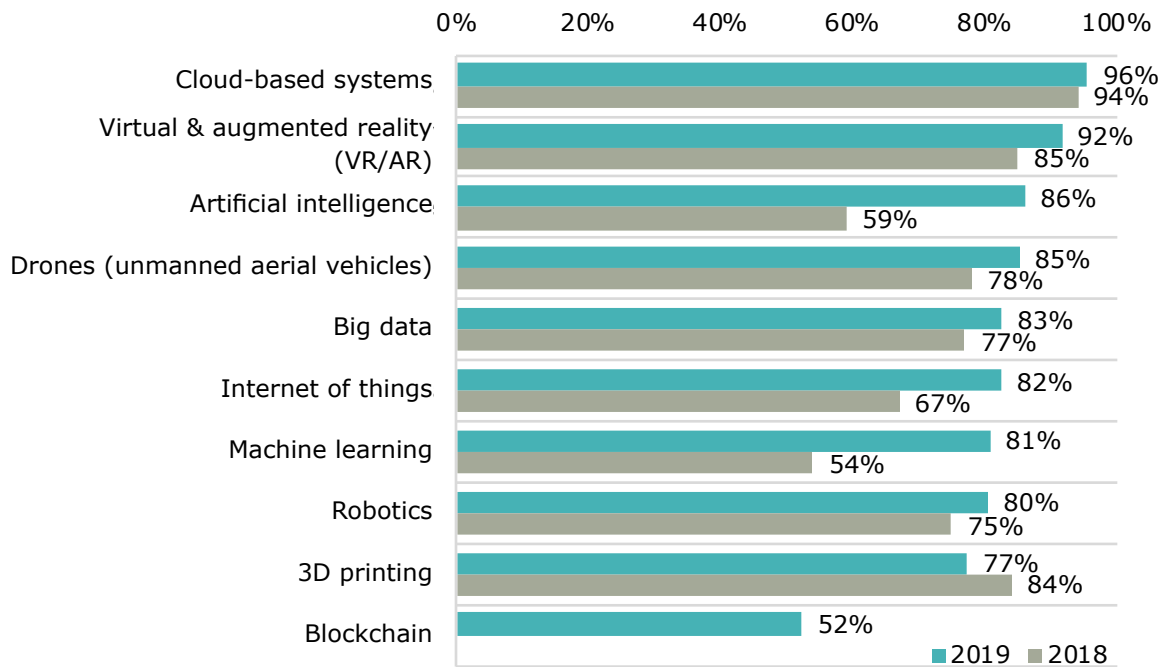Government agencies will increasingly insist on us adopting BIM
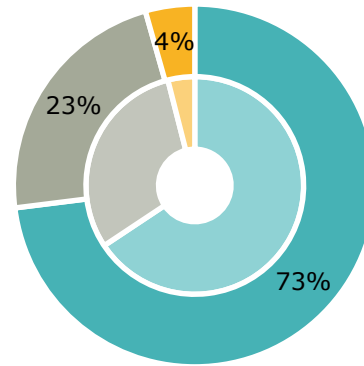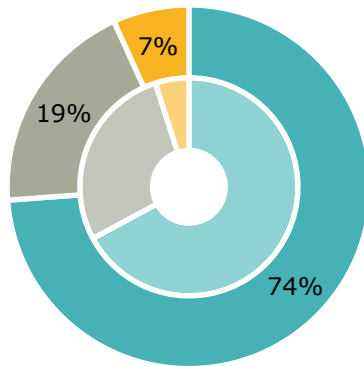
	Agree	Neither	Disagree
2019	Agree	Neither	Disagree
2018	Agree	Neither	Disagree

Respondents believe that BIM will become more prominent across various sectors of the industry. Approximately three quarters of respondents agreed that governments, owners, and clients will be either insisting on BIM adoption or adopting BIM themselves. The percentage of respondents who were unsure about governments, clients and owners insisting on BIM adoption decreased from the last report, with more respondents now agreeing that these groups will insist on BIM.

> **Respondents from Ontario were pessimistic with regards to the government adopting BIM with just 68% agreeing that the government will insist on adopting BIM, compared to 95%, 83% and 81% in Quebec, British Columbia and Alberta respectively.**

In your opinion, how likely are the following technologies to have a significant influence on the industry over the next 10 years?

Technology	2019	2018
Cloud-based systems	96%	94%
Virtual & augmented reality (VR/AR)	92%	85%
Artificial intelligence	86%	59%
Drones (unmanned aerial vehicles)	85%	78%
Big data	83%	77%
Internet of things	82%	67%
Machine learning	81%	54%
Robotics	80%	75%
3D printing	77%	84%
Blockchain	52%	

With the exception of 3D printing, this year's respondents were more optimistic about technology influencing their industry in the near future. Cloud-based technologies and VR/AR had the highest agreement, with 96 and 92% of respondents indicating that these would be influencing technologies. Other technologies that garnered over 80% include AI, Drones, Big Data, the Internet of things, machine learning and robotics. Belief that 3D printing will have an effect on the industry dropped 7%. Just 52% agreed that Blockchain would influence the industry, though only 10% outright said that it would have no impact with the rest unsure. This was not evaluated in 2018.

> *VR is a good starting point, but AR is where the industry should end up with, as its safer for construction site use and beneficial to FM.*
> — *Expert Interviewee*

BUILDING TALL
RESEARCH CENTRE

Department of Civil + Mineral Engineering
University of Toronto

35 St. George Street
Toronto, ON, Canada, M5S 1A4

www.buildingtall.utoronto.ca