



# International BIM Report 2016



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We would like to thank the following organisations for supporting this report:



# Introduction

## **Adrian Malleson**

Head of Research, Analysis and Forecasting, NBS

This report is our second look at the use and adoption of BIM within the international design community. This time we have worked closely with the International Construction Information Society (ICIS) to get the views of a number of different diverse countries. The report is the result of cooperative working between the UK, the Czech Republic, Canada, Japan and Denmark.

In each country, we ran similar surveys which shared some key questions. This enabled us to compare BIM adoption in each country. We can also see similarities and differences in beliefs about the future of BIM, as well as attitudes towards BIM. What emerges is a complex picture, with different stages of BIM development in different countries. We also start to see the effects of governmental policy, such as the BIM mandate in the UK.

It is fair to say that running an international BIM survey posed a number of methodological challenges. Aside from differences in language (with the associated problems of fidelity and grace in wording) there will, naturally, be national differences in understanding what BIM is; differences rooted in different construction practices and regulatory frameworks. Therefore it's best to read this report as an indicative picture.

We would like to take this opportunity to thank those who took part in the research, not least for their patience. We hope it is of value to the reader.

# Views from the countries



**Adrian Malleson**  
Head of Research,  
Analysis and  
Forecasting, NBS

[theNBS.com](http://theNBS.com)

## The UK

With one year left until the UK Government requires the use of BIM on all centrally procured projects, 2015 saw the release of our fifth National BIM Survey.

It was one of the more interesting sets of findings. Previously we saw year-on-year growth in BIM adoption, but this time, shortly before the Government mandate comes into force, we saw a pause in BIM adoption. BIM adoption is moving from being led by innovators and early adopters towards being a more mature market, where the more mainstream are investigating and assessing the benefits of doing so. Time, levels of expertise and cost remain barriers to BIM adoption.

But the direction of travel remains clear: in the UK BIM will increasingly become the norm for the design and maintenance of buildings. It is through the success of BIM in centrally procured projects that we will see – and are seeing – real savings that make the returns on investment in BIM evident to all sectors of the construction industry.

Adopting BIM is more than the adoption of a particular set of technologies, standards and working practices to support an improved process for construction. Through collaborative BIM, data collection, aggregation and interrogation is driving fundamental changes in design practice. This change has the potential to help us deliver, at lower cost, more efficient buildings that better meet client requirements.



## Japan

The survey in Japan was conducted by the Institute of International Harmonization of Building and Housing (IIBH). This is the first International BIM Survey held in Japan and the respondents numbered up to 244. 60% of them work in field of design, 16% in construction (including technical development, quantity surveying and product planning), 8% are students or researchers, 3% work in estimating or planning, and 13% work in fields other than these. Classification by employer shows that 36% are from design firms, 34% are general contractors, 8% subcontractors or suppliers, 9% from research institutes, 6% consultants and 3% quantity survey consultants.

The survey reveals that 46% have experience of BIM, which is higher than expected.

When it comes to impressions/expectations of adopting BIM on a project, those who have experienced BIM give lower value for cost efficiency and profitability than those who have no experience of it, which means that BIM had not been good for them. On the other hand, experienced respondents give higher value for improvement of visualization, which means that non-BIM users expect more for BIM than actual users.

Only 57% felt that using BIM was successful, and 45% felt that it is too expensive to purchase the necessary tools to start using BIM. This survey made clear that there is still a long way to go for BIM to become popular in Japan.



**Hideya Kato**  
Secretary of ISO, IIBH

[www.iibh.org](http://www.iibh.org)

## The Czech Republic

The results of the survey showed increased awareness of BIM in the Czech construction industry. Almost half of the 157 respondents are aware of BIM, but only 13% use it. The price of BIM software is the biggest obstacle in BIM implementation for half of respondents (mainly small companies). Thus BIM tends to be used by bigger companies. According to results of the survey, it is necessary to implement BIM into legislation for public procurement and prepare standards for BIM libraries and outputs.

Two thirds of those who implemented BIM view this decision as successful; only 6% wish they hadn't implemented BIM. Most of those who are aware of BIM (87%) believe that BIM is the future of the construction process. They see positives in the increase of productivity due to easier access to information (72%), and thus higher profits. Respondents find the impulse for BIM implementation in both demands from clients (71%) and contractors (47%).



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# NBS International BIM Report 2016



**Adrian Malleson**  
Head of Research,  
Analysis and  
Forecasting, NBS

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## The International picture

“BIM is the first truly global digital construction technology and will soon be deployed in every country in the world. It is a ‘game changer’ and we need to recognise that it is here to stay – but in common with all innovation this presents both risk and opportunity.”

**Patrick MacLeamy**  
Chief Executive Officer of HOK

In the UK, we have seen a significant increase in the numbers using BIM, and those who are using it tend to report positively on the advantages that it gives. These themes are explored in the NBS National BIM Report.

This report takes an international view. The construction industry is increasingly international, and growth is driven, at least in part, by increasingly sophisticated ways in which information is collaboratively gathered, aggregated, analysed and shared across and between countries. This is where BIM, used internationally, comes in.

Our joint report looks at international BIM through a selection of countries that are at different stages of BIM; it looks at current BIM adoption, the trajectory of change, and the assessment of risk and opportunity that each country sees.

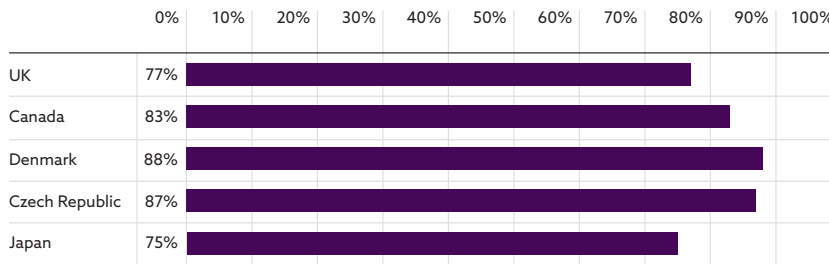
Five countries worked together to gather the findings for this report: the UK, Canada, Denmark, Japan and the Czech Republic. All those who took part have a long history of working together to improve construction information for design professionals through the International Construction Information Society (ICIS).

## BIM and the future

Throughout this report, we will see a range of data about BIM, its use and adoption. Before looking at the detail though, one figure is worth highlighting. In all countries, irrespective of BIM

maturity, BIM is seen as the future of project information. In every country, more than three quarters of respondents agree that this is the case.

### BIM is the future of project information



## BIM usage and awareness

We asked whether people were aware of BIM. In all countries except one, awareness is over 90%, nearly universal. The exception is the Czech Republic: here awareness is at just over 50%, although we can expect this to rise rapidly, as we have seen in other countries.

BIM adoption is highest in Denmark, and lowest in the Czech Republic. Both Canada and Denmark report a majority using BIM on at least some projects in the previous year. In Japan and the UK, the figure is just under half. These figures suggest that BIM is increasingly becoming the norm for construction information across a range of countries. Indeed, adopting BIM may become a prerequisite for working overseas.

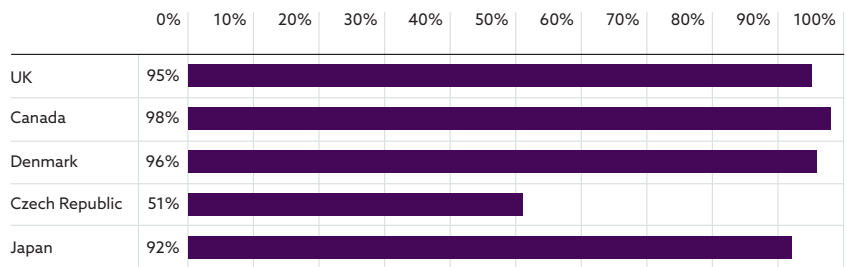
In the two countries that have taken part in this *and* the previous international survey, the UK and Canada, we can see an appreciable overall increase in the number of BIM users. The UK has moved from 39% in 2013 to 48%. Canada has moved from 64% to 67%.

We do need to apply some caution when viewing these figures, however. The figures given above are simply the percentage who tell us that they use BIM. As a country becomes more mature in BIM adoption, the criteria for describing oneself as practising it may become more demanding.

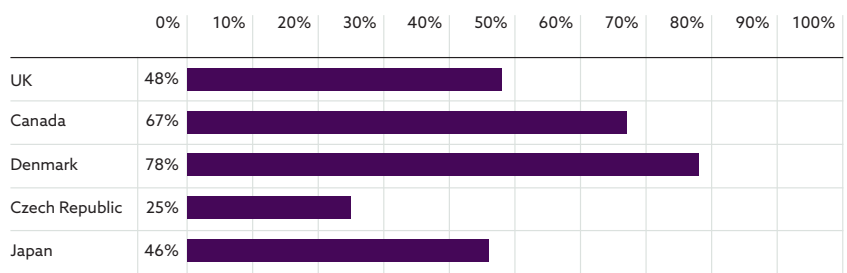
The survey did not give a definition of BIM, so it's quite possible that what people understand BIM to be varies somewhat by country. Whilst BIM is increasingly well described in international standards, we must allow for variance of understanding in different countries.

This is borne out by respondents' views about the clarity of BIM. The graph on the right illustrates, albeit with a significant degree of regional variation, that there is a feeling that the industry is not yet clear enough on BIM.

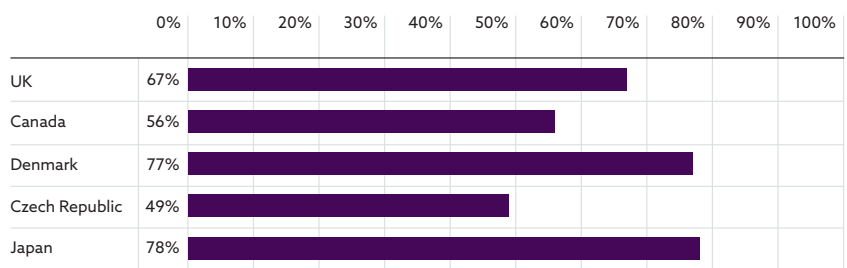
### Awareness



### Respondents aware of and currently using BIM



### The industry is not yet clear enough on what BIM is

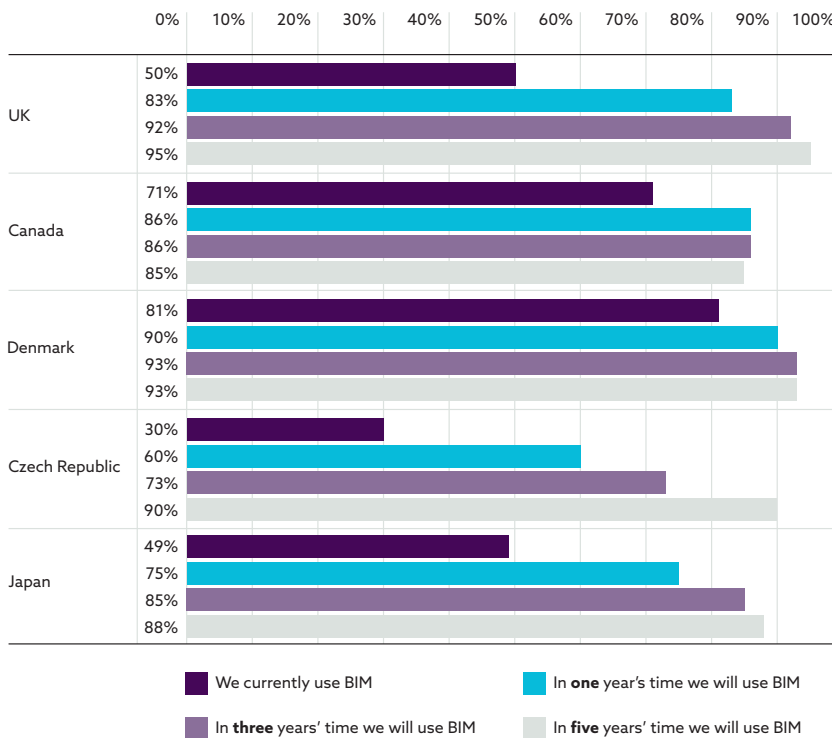


## Future use of BIM

The trend of increased adoption is set to continue. We asked whether people would use BIM in the future. If people's intentions become professional practice, the next five years will see a very rapid transformation in how information about buildings is created, shared and used. Within five years, all countries expect BIM to be adopted by over 80% of design professionals. The next twelve months will see the most rapid rate of adoption.

Respondents from the Czech Republic take the most measured view, with the increments in adoption being the most evenly distributed across a five year period. In contrast, the UK, Canada and Denmark see the vast bulk of BIM adoption as happening within a three, or even one, year timeframe.

### Future use of BIM



If people's intentions become professional practice, the next five years will see a very rapid transformation in how information about buildings is created, shared and used.



## Understanding of BIM

Given the rise of BIM, it's worth spending a little time looking at people's understanding of what BIM is, what it isn't, and how people feel about BIM. There is a strong level of similarity across the countries we surveyed, but some significant differences too.

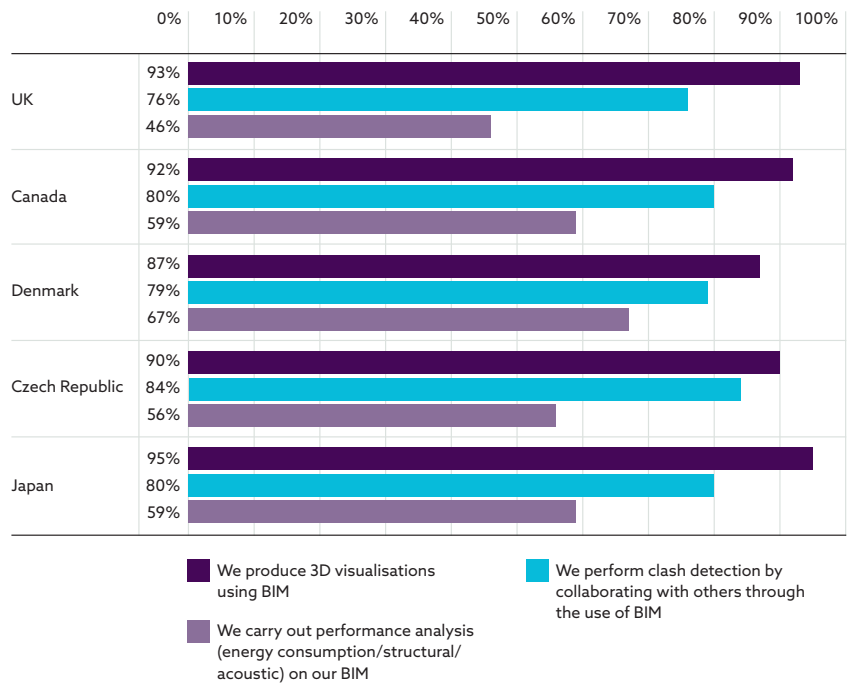
BIM has some immediate and real uses. BIM can readily be used to render accurate (and at times striking) 3D visualisations of projects.

Typically 90% or more are using BIM to produce 3D visualisations. Clash detection is used by more than three quarters of BIM users in all countries.

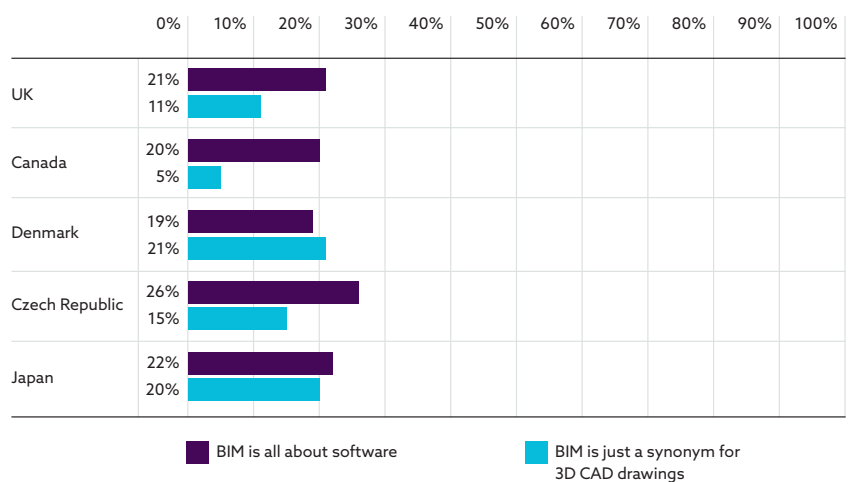
BIM also allows for more performance-based design practice, where performance analysis informs design decisions and product selection. Performance analysis is widely used, though less so than 3D visualisations and clash detection. Denmark is leading the way here, perhaps informed by its ambitious Climate and Energy Policy: the Danish Government's target is to reduce total Danish greenhouse gas emissions by 40% by 2020, compared with the 1990 level. Given that buildings account for 36% of EU greenhouse gas emissions, BIM can make a real contribution here.

BIM is described in many ways, but at heart it is a collaborative way of working, supported by software tools that make information about buildings available and analysable. We wanted to see if this view was shared, or whether people feel that BIM can be identified solely with software or 3D CAD. Across all countries, as the graph shows, it is a minority who feel that BIM can be reduced to a piece of software or a set of 3D CAD drawings.

### Current use of BIM



### BIM is...

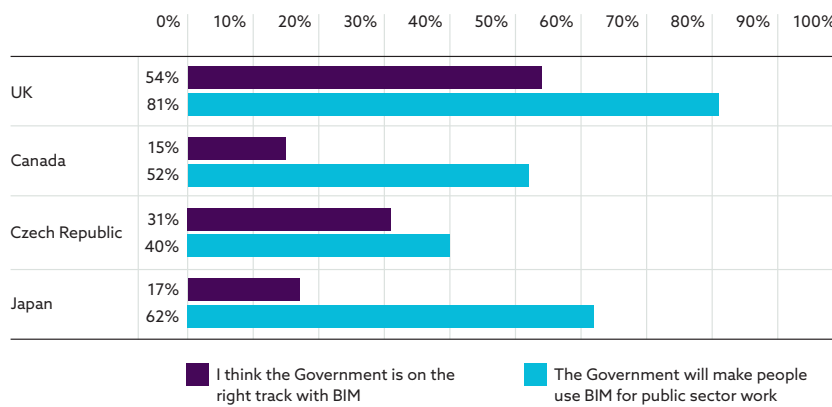


## Attitudes towards governments and BIM

In the UK, as a part of the Government's Construction Strategy, the Government will require all centrally procured buildings to use BIM by 2016. Thus far, this requirement has been consistently held and communicated. We asked about people's attitude to their Government's approach to BIM. The UK

scores the highest both for agreement that the Government is 'on the right track' and that BIM will be required for public sector work. This suggests that, in the UK at least, the design community is open to the Government taking a lead on BIM. This may be the case in other countries too.

### Agreement with statements...



The UK scores the highest both for agreement that the Government is 'on the right track' and that BIM will be required for public sector work.

## IFC and COBie

We have seen that BIM has been adopted in a range of countries, and that adoption will increase rapidly over the coming years. In principle, this will allow greater levels of international working and collaboration. But collaborative working across disciplines, teams and countries requires shared standards and the free exchange of data between different software tools.

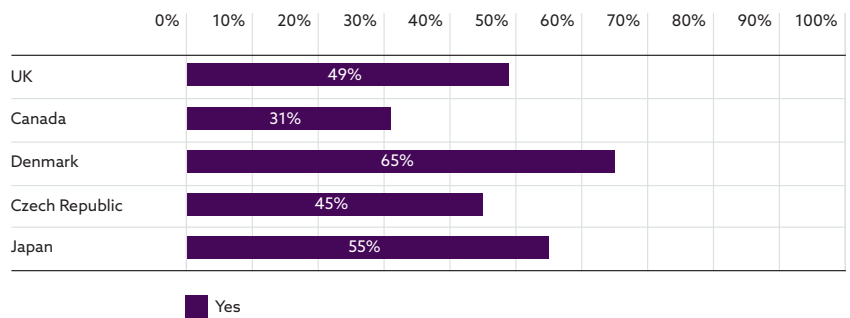
Industry Foundation Classes (IFCs) are there to allow this free exchange, albeit with some limitations. IFC is a vendor-neutral file format which allows models to be shared and worked on independently of any specific piece of software.

Denmark leads the way in IFC use, with 65% telling us that they have used IFCs on their projects. Around half of those in Japan (55%), the UK (49%) and the Czech Republic (45%) use IFCs. Canada has the lowest level of adoption, at 31%. In Canada, Japan and the UK, the number of those who don't know whether they use IFCs is notable, suggesting a greater need for communication about the importance of open file formats in collaborative working.

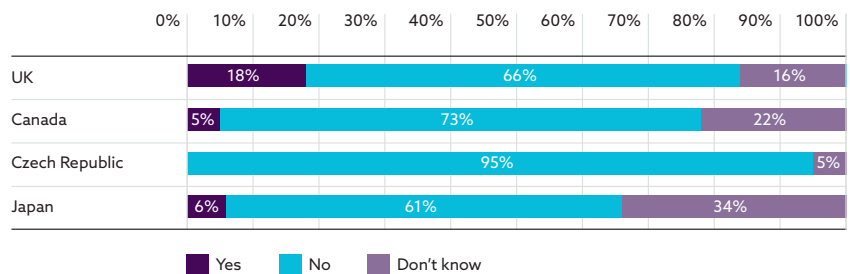
Our survey has concentrated on the use of BIM among the design team. We can see that BIM is delivering greater value and better ways of working for designers. But for BIM to fully realise its potential, it needs to inform not only the design and construction of a building, but also its use. It is in the operation and maintenance of a building that most cost is incurred. In principle, BIM can inform correct maintenance decisions, just as it does design decisions.

Construction Operations Building Information Exchange (COBie) datasets are a way of delivering part of a Building Information Model to assist in managing and maintaining a building. They are not widely used. The UK leads the way, but only with fewer than one in five generating COBie output. The data does not tell us whether this is an issue with the format itself, with procurement methods, or with current methods of asset management. In any case, delivering the value locked in a BIM to those maintaining a building remains an issue.

### Do you use IFC on projects you've been involved with?



### Do you generate COBie output for projects you've been involved with?



## The BIM adoption process

The decision on whether, and when, to adopt BIM is influenced by beliefs about how it will turn out, and what will be involved. But beliefs held in anticipation may differ from those held after the fact. We explored this by asking similar questions of both those who were using BIM and those who had not yet done so. We found some differences, and some close similarities.

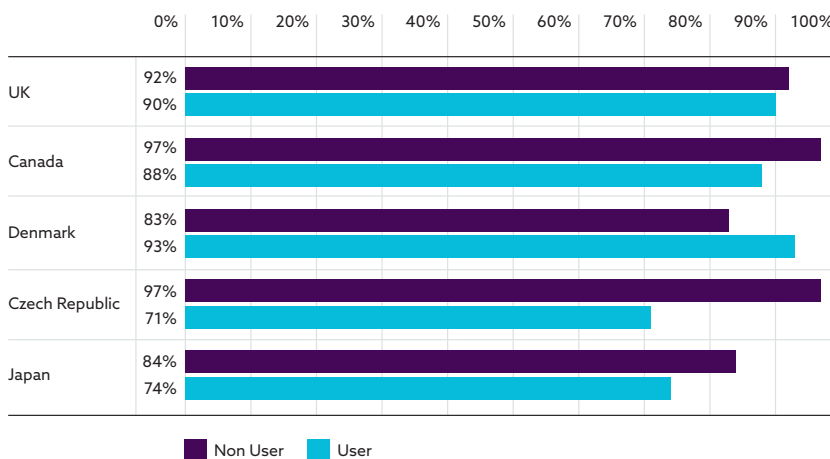
Given the benefits that BIM may offer, we might expect an upfront cost in changing the way in which design is practised. Across the countries, there is appreciation that adopting BIM is a process which demands change in workflow, practice and procedure. Both those who have adopted BIM and those who have yet to do so believe that BIM brings change (though *generally* those who have yet to adopt BIM are a shade more likely to anticipate change).

Current BIM users were more likely to tell us that both contractors and clients will increasingly insist on BIM. The graph on page 13 shows the high level of difference. In the UK, for example, less than a third of non-users anticipate an increasing contractor demand from BIM, whilst three quarters of users do.

We have seen the projections of BIM adoption. This move towards BIM is broadly welcomed. Across all countries it is a small minority of non-users, fewer than a fifth, who tell us that they would rather not adopt BIM. In Denmark, it's less than 5%.

Encouragingly, *very* few of those who have adopted BIM tell us that they'd rather they hadn't. This is important because, ultimately, it is through design teams experiencing the benefits of BIM for themselves that BIM will become the norm for design practice.

### Adopting BIM requires changes in our workflow, practices and procedures



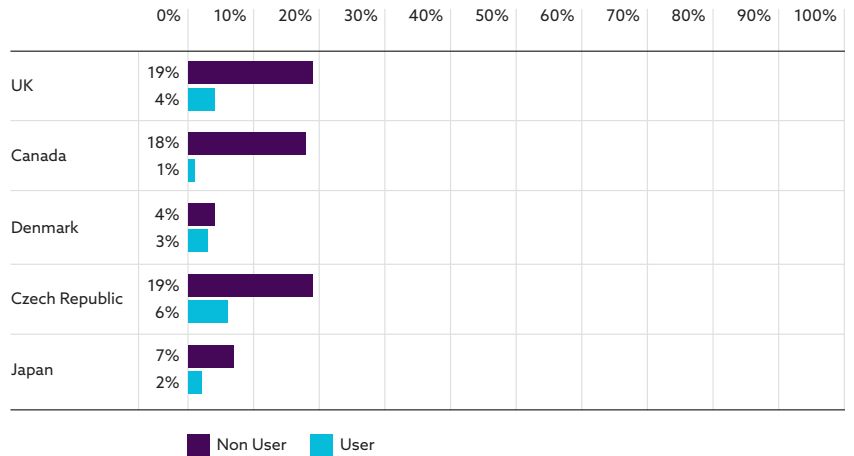
This move towards BIM is broadly welcomed. Across all countries it is a small minority of non-users, fewer than a fifth, who tell us that they would rather not adopt BIM.

## End note

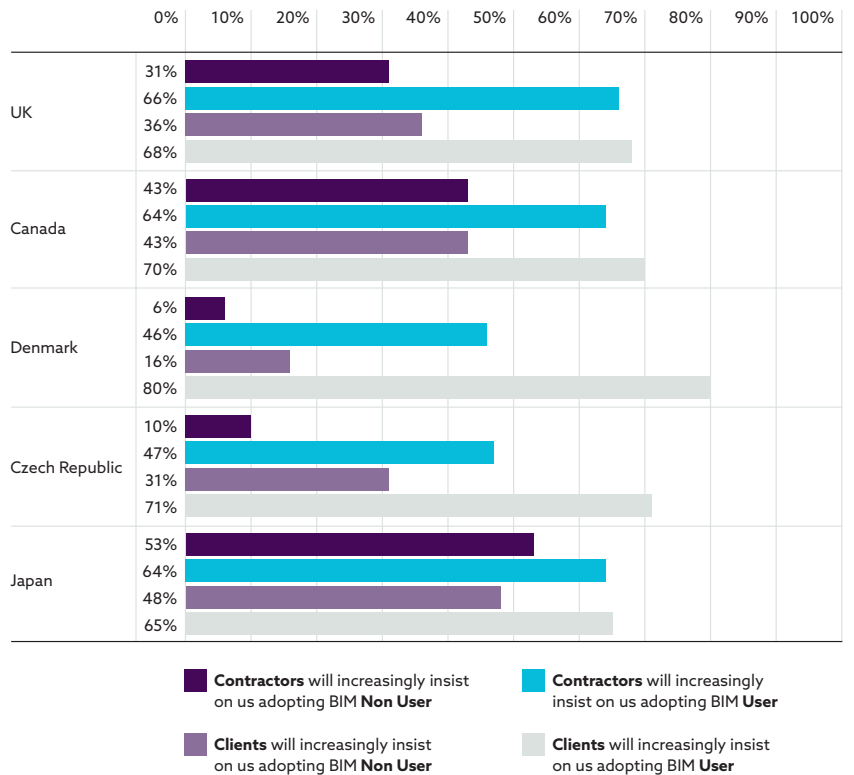
This report has explored views about BIM in a range of countries. Whilst all these countries are mature economies with developed construction sectors, they are diverse in language, culture and design tradition. So whilst we can see differences between them, what is striking is the broad similarity in views about BIM. In all countries, BIM is seen as the future of design practice, and it's a future that is fast approaching. For most, BIM will become the norm within the next three years. BIM adoption is looked on positively by those yet to adopt BIM, and even more so by those who have done so.

The free flow of goods, services and *ideas* that we see in other sectors has been facilitated by the sharing of standard data. The findings of this report suggest that involvement in (and development of) the global construction industry will increasingly be dependent on BIM.

### I'd rather not adopt/I wish we hadn't adopted BIM



### Agreement with statements...



# The Digicon Canada National BIM Survey 2015



**David Watson**  
CET, FCSC, CSP

President, Digicon Information Inc.

[digicon.ab.ca](http://digicon.ab.ca)

## Introduction

The Institute for BIM in Canada (IBC) and Digicon Information Inc, in concert with NBS in the UK, conducted the 2015 Canadian BIM Survey between January 2015 and March 2015. The main purpose of this online survey was to assess the extent of BIM adoption in Canada. It also aimed to assess types of practices associated with BIM such as use of open standards and data exchange mechanisms in the Canadian Architecture, Engineering, Construction, Owners and Operations (AECOO) community. As in 2013, the survey was also conducted in the UK, Finland, New Zealand and the Czech Republic. Excepting minor regional differences, this international survey allows a comparison to be drawn between Canada and these other countries.

## Overview

The 2015 survey was completed by 127 respondents, compared to 78 respondents in 2013. While this increase is encouraging, it should be noted that the survey respondents were largely those familiar with Digicon and IBC, as well as organizations that promoted the survey – namely Construction Specifications Canada (CSC) and Association of Consulting Engineering Companies (ACEC). Therefore, as was the case in 2013, statistical representation and significance are still questionable. That being said, the 2015 Canadian BIM Survey is the only one of its kind and thus serves as a significant benchmark for the Canadian AECOO community as it relates to BIM adoption and implementation.

With regards to BIM adoption, 67% of respondents state that they are aware of and are currently using BIM, while 31% are 'just aware of BIM'. This doesn't represent a significant increase from the 2013 survey, where 64% of respondents were aware of and were using BIM, and 32% were 'just aware of BIM'. A 2% decrease of respondents who were neither aware of nor using BIM was noted. This indicates that the BIM adoption rate in Canada is progressing slowly, if at all.

There is a drop in belief that the Government is on the right track with BIM from 30% in 2013 to 15% in 2015, although 52% still believe that the Government will eventually mandate BIM for public sector work, which is similar to the 2013 survey (54%)<sup>1</sup>.

Only 22% of respondents trust what they hear about BIM, down from 24% in 2013. Furthermore, 56% believe that the concept of BIM still lacks clarity within the industry; however, this is better than 68% of respondents in 2013.

Those who believe BIM is all about software amounted to 20%, down from 23% in 2013; 5% equate BIM and 3D CAD as the same thing, down from 10% in 2013. This implies a broader vision of what constitutes BIM, beyond the purely technical domain.

Other significant findings:

- 83% of respondents view BIM as the future of project information, compared to 86% in 2013.
- 63% of respondents equate BIM with collaboration.
- 76% of respondents disagree with the statement that 'Canada is a world leader in BIM'.
- For non-users, 58% of respondents agreed that they would be left behind if they did not adopt BIM.
- For respondents who use BIM, only 1% regret having adopted BIM, which is a significant decrease from 9% in 2013.

<sup>1</sup> To the author's best knowledge, as of this date there are no BIM policy mandates by any level of the Canadian Government, although BIM has been requested on selected projects.



## Demographics

This survey primarily targets commercial building construction. The 'primary discipline' indicated by respondents was 61% architectural (or architectural technology). This suggests that contracting and engineering disciplines are under-represented.

As far as disciplines are concerned:

- Architecture and multi-disciplinary firms were well represented (39% and 20% respectively).
- Engineering services represented 9% of respondents, whereas contractors represented 8% of respondents.
- Other respondents were in the manufacturing, educational or governmental sectors.
- A considerable portion of respondent organizations (13%) identified themselves as 'Other'.

Organization size was also quantified:

- 19% of respondents came from large-sized organizations (500+ employees), whereas 15% came from medium-sized organizations (100-499 employees).
- Micro and small enterprises (1-99 employees) unsurprisingly made up the bulk of respondents (68%).

It is significant that 10% of respondents identified themselves as BIM Managers. We can infer that they are 'experts' in their fields, and that the answers they provided are more likely to be accurate.

## Tools and software usage

Autodesk continue to reign supreme in drafting tools, making up 84% of drawing software. It is interesting to note that Sketchup is the only other software to make inroads as a 'secondary' tool to CAD software. Curiously, no software that was not CAD-related was identified as being used for digital work, despite the fact that 59% of respondents indicated that they perform analysis calculations on their BIM model.

A vast majority of respondents (89%) create their own models in-house and re-use them in different projects. About half (46%) use the 'default' objects that come with their software. It would appear that Canadian respondents are not shy about using objects created by manufacturers (69%).

As mature as we think 3D modelling is, the production of 2D drawing still dominates the types of activities carried out by respondents. BIM is being used primarily as a tool for 3D representations and automatic generation of schedules; clash detection follows closely as a top use for BIM.

In Canada, BIM is not used for the generation of Bills of Materials, whereas this use is widespread in Europe.

Lack of in-house expertise and lack of client demand are still the two biggest barriers to BIM in Canada, according to the survey.

## Open standards for BIM

Open standards for BIM, namely buildingSMART's 'OpenBIM' concept instrumentalized through the Industry Foundation Classes (IFC) file format to exchange model data, are part of the BIM landscape in Canada. Sixty five percent of respondents indicated that they export information to a non-proprietary format such as IFC or gbXML. On the other hand, only 31% of respondents indicated that they actually use IFC on projects that they've been involved with, a considerable decrease from the 2013 survey where 61% of respondents indicated using IFC. This could reflect the grip that Autodesk products have on the Canadian AECOO community, thus not requiring exchanges of data in a neutral file format. It could also indicate a shift in understanding of what constitutes IFC and gbXML, and its implications in a project setting between 2013 and 2015.

COBie is an emerging standard that is gaining ground globally for the delivery of project turnover data to owners and facility managers from the BIM model. Although a relatively small number of projects (5%) produced COBie exports, down from 14% in 2013, these numbers could grow exponentially as owners and facility managers learn of its existence and begin to acquire management software that consumes COBie data. If this growth occurs, it will drive demand for COBie data, and thus BIM adoption with COBie-enabled software on projects.

## Specifications Perspective (the 'I' in BIM)

As a company with a deep interest in the development of specifications technology, Digicon's primary motivation in entering the BIM environment is to promote the integration of specifications with BIM.

On the topic of specifications, it was noted that half of all respondents prepare project specifications, but integration with drawings is almost entirely missing (70% do not reference specs in drawings at all, or manually add section references to the drawings).

It was encouraging to see that 27% of respondents agreed that a project is not BIM unless specifications are linked with the model! This suggests that working with a specification database which is already linked to in-house model objects would be a very efficient way to work.

## Benefits and barriers to BIM

Lack of in-house expertise and lack of client demand are still the two biggest barriers to BIM in Canada, according to the survey. Other barriers that ranked as being important were the cost of BIM adoption, the lack of training and time to get trained, and a lack of standardized tools and protocols. Lack of collaboration, lack of industry awareness and adoption (as well as uncertainty over the future of BIM in publicly procured projects) were also seen as barriers.

However, respondents still hold on to the belief that both clients and contractors will increasingly insist on BIM in the future. Also, the majority of respondents who use BIM see its benefits in the following areas: better coordination of construction documents, improved visualization, increased productivity due to easy retrieval of information, engendered cost efficiencies and improved client outcomes. On the other hand, a minority of respondents believe that BIM increases speed of delivery and profitability. Overall, 59% of respondents who have adopted BIM believe that they have done so in a successful manner.

## Summary

The 2015 Canadian BIM Survey was an opportunity to ask the Canadian AECOO community about the rate of BIM adoption and its potential in the Canadian market. Most notably, the rate of BIM adoption in Canada is surprisingly slow, having risen only 3% in the past 2 years (as opposed to a 20%+ projected increase). The lack of a clear national strategy for BIM and lack of government involvement (at all levels) can be seen as root causes of this and were highlighted as major barriers to BIM in Canada in the survey. Other barriers highlighted, such as lack of client demand and lack of expertise, are consistent with the findings from other works.

The respondents who have adopted BIM see its benefits, and are increasingly geared towards a wider view on BIM and its implications for industry. While the use of IFC and COBie have in effect decreased over the last 2 years, this may be more attributable to a better understanding of these open standards. It could also be attributable to the strong presence of Autodesk as industry leader for software applications in the Canadian AECOO community, thus reducing the need for open standards. Regardless, the state of BIM in Canada does leave much room for improvement. Although awareness of BIM is high, the general sense of industry inertia, highlighted in the survey, needs to be overcome to push the industry forward. This can be done through several mechanisms such as policy and government involvement, as well as a move towards more collaborative procurement modes which fully support the collaborative nature of BIM.





# The Danish BIM Survey 2014



**Gunnar Friborg**  
Technical Director  
at bips

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## About the survey

This Danish BIM Survey was conducted by bips. bips is a non-profit member-driven association that develops standards and tools to improve the efficiency of the building process from concept to operation. 'bips' is an acronym from the Danish for 'building construction, information technology, productivity and cooperation', and can be said to be the Danish equivalent of NBS in the UK.

The survey was conducted during the summer of 2014 and received 189 responses from participants who represented over 120 companies, primarily recruited from bips' network of member companies.

Fifty eight percent of the participants were from architectural or engineering consultancies. Since bips' last survey in 2008, there has been a significant increase in responses from clients/building owners and maintenance organisations. This group shared a response rate of 15%.

Contractors and manufacturers were, with an 11% response rate, still the smallest group taking part in the survey. It should be noted that all sizes of companies were represented within the survey, with many representing large and medium-sized companies; however, smaller companies were also represented.

It can be construed from the results that the respondents represent a digital elite and reflect the status of the Danish frontrunners, more than the status of the sector as a whole. From subsequent workshops and networking in Denmark, however, bips can estimate that the general trends shown in the survey's results are representative. Implementing BIM and making it a daily and routine procedure within construction companies, of all types and sizes, takes time and effort. There is still a lot of work that has to be done.

Since bips' last survey in 2008, there has been a significant increase in responses from clients/building owners and maintenance organisations.

## BIM is widely used

Since bips conducted a similar survey in 2008, the use of BIM has grown considerably. In general, the companies have moved from 'heard of BIM' to actually working with it.

In 2008, every fourth respondent often used building models. By 2014, this number has doubled.

As far as disciplines are concerned:

- 15% are using BIM on all projects.
- 36% are using BIM on most of their projects.
- 20% have used BIM on some projects.
- 11% have used BIM on a few projects.
- 18% have never implemented or used BIM.

The use of models has become relatively advanced and BIM-oriented. During the last year:

- 75% have performed clash detection by cooperating with others through the use of digital models.
- 75% have extracted quantities from digital models.
- 60% have performed analysis within digital models.
- 60% have shared models with design partners outside of their organisation.
- 50% have exchanged models through open standards.
- Over 30% have passed on models to those responsible for the Facility Management of buildings.

Respondents clearly expect to expand their use of BIM:

- Over 65% of respondents who use BIM expect their company to use it on all projects, five years from now.
- Over 65% of respondents whose companies do not use BIM expect that BIM will be implemented to some degree, five years from now.

It can also be added that the IFC format is used by over 65% of respondents, and it now seems to have a foothold within the Danish Construction Industry.

## The attitude towards working with BIM is changing

In 2008, there was a significant amount of scepticism with regard to working with BIM. Primary concerns centred on costs, especially new services that might not attract a fee, change of culture and other general anxieties.

A great majority of respondents now state that:

- BIM is the future in terms of the handling of construction information (88%).
- BIM can create value on the construction site (84%).
- BIM is about collaboration and cooperation across all parties (79%).
- BIM is necessary to create a sustainable environment (31%).
- BIM is handled most efficiently with the use of IFC (30%).

Due to the experience gained by working within a BIM environment, any problems faced can be constructively solved using this gained knowledge, thus allowing BIM to work better. Problems can be more specifically addressed:

- BIM is not true BIM until information is attached to the objects in the model (e.g. property data, specification, etc.) (83%).
- There is still a need for a common understanding of what BIM is (77%).
- There is a need for further standardisation of BIM processes (68%).
- There is a need for better linking of the specifications and the building models (68%).
- It is still difficult to exchange information between software platforms (54%).





## Implementation is hard – but worth the effort

Eight out of ten respondents whose companies have implemented BIM perceive their implementation as successful. The majority of these respondents find that BIM creates value, especially by improving the visualisation and the coordination of project information. Increased productivity and competitive advantages are also stated as important benefits of working with BIM.

The survey confirms an interesting finding from the NBS survey of 2013, namely that the more you use BIM, the more you get out of it: the respondents whose companies use BIM most also feel, much more than the other respondents, that BIM creates value.

However, implementing BIM also requires large organisational changes, and according to nine out of ten BIM users, the implementation requires changes in a company's workflow and procedures.

The survey indicates other barriers such as:

- Companies' lack of knowledge around BIM.
- The cost of implementation.
- Lack of collaboration about BIM.
- Low client demand.

## Future needs

Overall, the survey indicates that BIM is definitely gaining ground in Denmark but that there is always room for improvement, e.g.:

- Wider knowledge sharing.
- Further standardisation of the BIM processes.
- Better connection between models and specifications.
- A common object library with standardised objects.
- More useful objects from manufacturers.

In the future, bips plans to conduct annual BIM surveys in order to monitor Danish development and to contribute to the coming international BIM surveys.

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## The context for BIM development in Denmark

In 2003, the Danish Government initiated a three-year programme called Digital Construction. The programme focused on the use of 3D building models, classification, digital working methods and collaboration, digital tendering and digital handover of information for operation.

As a result, from 2006 there has been a CAD manual for 2D, 3D and BIM on a small scale. In Denmark, as in many other countries, there is still confusion about the term BIM, ranging from a 3D building model with or without attached data to modelling a total structure, with all data related to a building linked together across different software platforms.

Since the end of the programme at the beginning of 2007, Denmark has had a legally defined demand for digital construction on all publicly funded projects. Privately funded projects were not obliged to make use of the digital process but could choose to follow suit and seeing the advantages some did. The demand for ICT in construction has mainly been focused on the consultants and the design processes, and, on a smaller scale, on the contractors for the tender process and delivery of data for facilities management and maintenance. The only duty for the client has been to request digitalisation from delivery teams through formalised ICT contracts.

During the period 2007–2014, there has been a steady increase in digital projects. Legislation has become more defined, according to experience and practice. There has been a development from using simple digital building models to practising Building Information Modelling, especially on larger projects. A lot of practical barriers have been identified and solved through project cooperation and collaborative discussions. The development of new working methods and standards in the practice of project organisation is constantly evolving.

In the period 2011–2015, the development project cuneco (under the auspices of bips) has focused on the next level of digital structure for BIM and the handling of all information exchange processes. cuneco has resulted in useable tools, including the CCS classification system for BIM. The CCS system is based on four international standards, the principles for the handling of property data, standards for developing an object library, defined BIM levels of information, measuring standards and digitised tendering documents.

The focus has also been to align the cuneco project results with buildingSMART IFC, Information Delivery Manual (IDM) and the buildingSMART Data Dictionary (bSDD), and for the next step to successively contribute to the development of these.

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