SmartMarket Insight



Accelerating Digital Transformation Through BIM

Regional Focus:

United Kingdom/Ireland





Premier Partner





Research Partners





























Introduction

igital transformation is sweeping the globe, and the design and construction industry is no exception. Since 2009, Dodge Data & Analytics has been conducting quantitative research about the use and value of design and construction technologies. As adoption has steadily expanded over that time, so have users' capabilities, expectations and creativity at applying digital technologies in innovative ways to derive the most value from the underlying data being captured, created and shared across the project lifecycle.

Autodesk has partnered with Dodge on many of those efforts over the years and has now done so again for a major global SmartMarket Report titled Accelerating Digital Transformation Through BIM, which spans four continents and gathers the experiences of contractors, architects, civil engineers, and MEP and structural engineers who are currently using BIM to determine:

- Where they are in their process of digital transformation and how BIM is contributing value to that evolution.
- How they are deploying BIM and in what ways they are leveraging the data from models and processes to improve decision-making and effectively power integrated digital workflows among project team members.

About This SmartMarket Insight Report

As can be expected in any comprehensive global research, there are interesting variations in findings among the geographic areas studied. To help practitioners better understand the specific dynamics of how technology is being deployed in their region, Dodge and Autodesk have created a series of SmartMarket Insight reports specifically about each region's findings. This SmartMarket Insight report focuses on United Kingdom/Ireland and includes:

- A section showing key highlights of responses from BIM users in United Kingdom/Ireland.
- A section providing a summary of key findings from the full global study for context and reference.

Readers of this SmartMarket Insight are encouraged to also explore the full Accelerating Digital Transformation Through BIM SmartMarket Report to gain a complete understanding of how BIM is driving digital transformation throughout the entire global design and construction industry, and learn from the case studies, interviews and articles that supplement the data findings in that report. The report also explores the growing use of emerging digital technologies and practices in several categories, including design intelligence tools, innovative construction methods, jobsite technologies and smart building technologies.

Digital Transformation Trends in the Findings

Several key themes emerge from the global survey.

- A company's BIM intensity (i.e., the percentage of their projects where they use BIM) correlates directly to the progress of their digital transformation, the degree to which they report enjoying benefits from BIM and the ROI (return on investment) they believe their company is receiving on its investments in BIM.
- An even more pronounced correlation appears related to active use of BIM data for analysis and digital workflows. Companies conducting a higher number of the 22 datarelated activities studied often report even greater positive experiences from BIM than those doing most of their work in BIM. And of course, the combination is a powerful and reliable formula for success.
- All respondents were asked to evaluate
 where they believe their company is on its
 journey of digital transformation. While the
 report shows that there are some variations
 in the responses between companytypes and regions studied, there are more
 commonalities than differences as the entire
 industry moves toward a more efficient,
 connected and productive digital future.

Dodge thanks Autodesk for its ongoing support of important research on the digital transformation of the global design and construction industry.



Stephen A. Jones Senior Director Industry Insights Research Dodge Data & Analytics

Stephen A. Jones leads DD&A's Industry Insights Research division. He is active in numerous industry organizations and frequently speaks at industry events around the world. Before DD&A, Jones was vice president with Primavera Systems (now part of Oracle), a global leader in project management software. Prior to that, he was principal and a Board of Directors member with Burt Hill, a major A/E firm (now merged with Stantec).



Donna Laquidara-Carr, Ph.D., LEED AP Industry Insights Research Director Dodge Data & Analytics

Donna Laquidara-Carr currently provides editorial direction, analysis and content to DD&A's SmartMarket Reports. Prior to this position, she worked for nearly 20 years with DD&A's Dodge division, where she gained detailed insight into the construction industry.

Data: United Kingdom/Ireland

Introduction

The 80 respondents from the United Kingdom (UK) and Ireland make up 9% of the total number of participants in the study. Most of them, 66 respondents identify themselves as BIM users, and they account for 10% of total BIM users in the study. About three quarters of the UK/Ireland BIM users are designers (architects, engineers and consultants), while about one quarter are contractors. This report highlights the responses from these respondents to better understand BIM use and value in the UK and Ireland.

Use of BIM

As the chart at upper right shows, the current intensity of engagement with BIM in the UK and Ireland is highly consistent with the global average, with about half of the respondents reporting that they use BIM on 50% or more of their projects. And, in fact, the average share of projects on which they are using BIM is 53%, very close to the 52% average share globally.

This finding is surprising given the UK BIM mandate, but it may be influenced in part by the fact that all of the other markets included in the study—North America, Western Europe, Scandinavia, Australia and Japan—are relatively advanced markets in general for the use of design and construction technologies.

As the chart also reveals, the use of BIM is anticipated to grow in the UK and Ireland, with 82% reporting that they plan to use BIM on 50% or more of their projects. In fact, the average share of projects in that region on which users plan to use BIM will grow to 70%, demonstrating the value seen in deploying BIM and making it poised to be a common practice in this region.

Collaboration With BIM

As many previous Dodge Data & Analytics studies have demonstrated, use of BIM yields the greatest benefits when many players across the project team are engaged with it and use it to collaborate. Therefore, the study examines the degree to which data is shared and the expectations for its use across the project team.

USE OF A COMMON DATA ENVIRONMENT

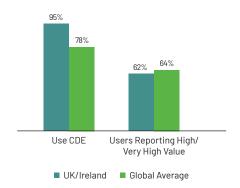
Respondents in the UK and Ireland were asked about whether they use a common data environment (CDE) to exchange data with the project team, and those who do so were asked to rate the value of its use on a five-point scale, from no value to very high value. Their responses are compared with the global averages in the chart at lower right.

Use of BIM on 50% or More of Projects

Dodge Data & Analytics, 2021



Common Data Environment: Use and Value in Improving Performance of Project Team



- Use of a CDE in the UK and Ireland is much higher than the global average.
- The degree to which they believe it adds value in improving the performance of the project team is roughly on a par with the global average.

It may seem surprising that the ubiquitous use of a CDE does not yield a greater estimation of its value. However, this may be in part due to it now being standard practice for many respondents, which makes it harder to estimate the value than when an approach is new or emerging.

EXPECTATIONS FOR BIM USE ACROSS THE PROJECT TEAM

Expectations about the degree to which other project team members use BIM differ in the UK/Ireland from global averages.

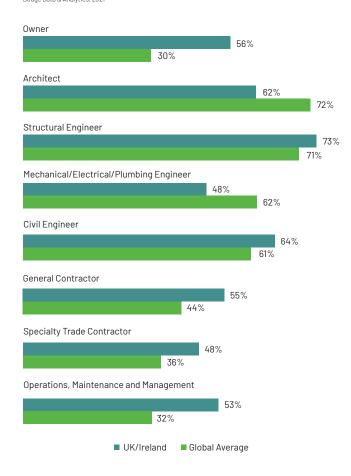
- A much higher share of them expect owners (56%), GCs (55%), trade contractors (48%) and those in building operations (53%) to have full use of BIM software than do the total pool of survey respondents (30%, 44%, 36% and 32%, respectively).
- This may be the strongest evidence of the influence of the BIM mandate in the UK, encouraging a higher level of use among groups often seen as less likely to engage with BIM.
- However, their expectations about designers, including architects, structural engineers, MEP engineers and civil engineers, are generally lower or on a par with the global averages.

Respondents were also asked about their level of satisfaction with the BIM skills they encounter for each of the project team members.

- Respondents from the UK and Ireland are most satisfied with the skills of architects (55%), civil engineers (53%), and general contractors (52%).
- The share satisfied with the skill levels of architects, though, is slightly lower than the global average of 61%, while the share satisfied with civil engineers is slightly higher and the share satisfied with general contractors is notably higher than the global averages (49% and 44%, respectively).

Share Expecting That Project Team Members Will Be Able to Fully Use BIM Software





Use of Data-Driven BIM Activities

In addition to being asked about their use of a BIM process, respondents were asked about their use of specific datadriven BIM activities. Twenty-two total activities were included in the survey, although respondents were only asked about those that they are likely to use.

CURRENT USE OF DATA-DRIVEN ACTIVITIES

The top activities utilized in the UK and Ireland are shown in the chart at right, contrasted with the overall share globally who use them.

- The top three activities in the UK/Ireland are related to construction, and they are all much more widely used in this region than they are by most of the other respondents.
 - Particularly notable here is safety analysis of the construction site, which is used by under 20% globally but over one third in the UK.
 - The UK has embraced Prevention through Design, which encourages analysis of safety during the design process, and that could contribute to the high degree of performance for this option.
- Three other top activities are more widely used in the UK than globally: cost estimation, explanation of the construction process for the owner and surrounding residents, and presentation of the construction process in dynamic 4D.

ANTICIPATED FUTURE USE OF DATA-DRIVEN ACTVITIES

Respondents were also asked about the top activities that they want to use in the next two to three years. In the UK, the following items top this list, selected by 20% or more of those not currently using them:

- · Material management by classification code
- Enabling factory production and prefabrication
- Constructability evaluation (which already has high levels of use in this region)
- · Various design checks

Top 10 Data-Driven BIM Activities in the **UK/Ireland** Dodge Data & Analytics, 2021 Construction Process Presentation (in static 3D) Constructability Evaluation 38% 31% Safety Analysis of Construction Site 18% Spatial Coordination/Clash Detection (in static 3D) 34% Cost Estimation 33% Explanation of Construction Process for the Owner and Surrounding Residents Presentation of Construction Process (in dynamic 4D) 29% 22% Preparation of Shop, Fabrication or Installation Drawings 27% 27% Cost Planning and Cost Control 24% Various Design Checks 27% UK/Ireland ■ Global Average

Top BIM Benefits

The study included a thorough look at the benefits that BIM

users gain from its use. Each was asked to rate the degree to which they experienced potential benefits on a five-point scale, from none to very high.

- Designers (architects, engineers and consultants) were asked to rate 22 benefits in four categories—business, sustainability, risk reduction and operational efficiency.
- Contractors were asked to rate a different list of 22 benefits in five categories—business, quality, cost, schedule, and health and safety.

The most highly rated benefits among designers are shown in the chart at upper right. Since the number of contractors using BIM who responded to the survey in the UK/Ireland did not exceed the minimum statistical threshold of 30, a table with their top benefits is shown at lower right, all of which were rated at a high/very high level by over two thirds of these contractors.

BIM BENEFITS EXPERIENCED BY DESIGNERS

Fifty percent or more of designers experience nine benefits at a high/very high level.

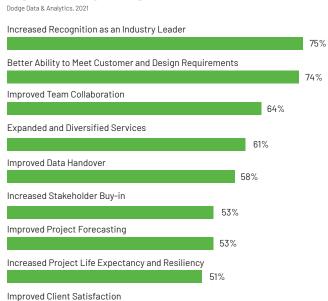
- Interestingly, despite the UK mandate, 75% regard their use of BIM as a factor that distinguishes them as an industry leader, suggesting a high priority on sophisticated BIM use in this region.
- Nearly as many (74%) believe that their use of BIM helps them to meet client and design requirements. This could include the necessity to use BIM on government projects.
- The remaining top benefits demonstrate that designers are experiencing significant BIM benefits across all four categories measured.
 - Two of the remaining top benefits improve operational efficiency for the designers: improved team collaboration and improved data handover.
 - Two of them are business benefits: expanded and diversified services and improved client satisfaction.
 - Two of the top benefits involve risk reduction: increased stakeholder buy-in and improved project forecasting.
 - One sustainability benefit, increased project life expectancy and resiliency, made the top list.

BIM BENEFITS EXPERIENCED BY CONTRACTORS

While based on a smaller sample, it is still very notable that over two thirds of the contractors in the UK/Ireland are experiencing eight benefits at a high/very level.

 Half of the top benefits they experience are businessrelated: increased percentage of successful projects,

Top BIM Benefits Experienced at a High/Very HIgh Level by Designers in the UK/Ireland



Top Benefits Rated High/Very High by Contractors in the UK/Ireland

Improved Handover Experience
Increased Percentage of Successful Projects
Improved Stakeholder Engagement
Improved Schedule Control
Reduced Environmental Impact
Improved Safety Awareness
Improved Win Rate
Expanded Service Offerings

improved stakeholder engagement, improved win rate and expanded service offerings. The share reporting experiencing each of these is also much higher than the global average. These findings suggest that contractors using BIM in the UK and Ireland see measurable improvements to their businesses due to its use.

- Improved handover experience is the top benefit reported, and that is a quality measure, the only one to make it to the top list.
- Two health and safety measures are included among these top benefits: reduced environmental impact and improved safety awareness.
- Only one schedule benefit made it among the top eight, improved schedule control, and no cost benefits were noted in these top measure.

BIM Investments and ROI

INVESTMENTS IN BIM

The top BIM investment that those in the UK/Ireland anticipate making in the next two years is developing internal collaborative BIM procedures. A larger share of respondents from this region (55%) report that this will be a top investment than do those globally (44%).

Over 40% in the UK/Ireland also anticipate investing in BIM training, developing collaborative processes with external parties and BIM solutions, but far fewer are planning to make technology investments.

PERCEIVED BIM ROI

Per the chart at upper right, a higher share of respondents in the UK/Ireland expect to have a positive ROI on the investments they make in BIM than do respondents globally, and they are measuring ROI on a higher percentage of projects.

Digital Transformation

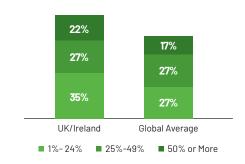
BIM is a critical component of a company's process of digital transformation, but it is also one of many potential technologies and approaches emerging in the design and construction industry that promise to improve project and business outcomes.

STAGE OF DIGITAL TRANSFORMATION

To better understand where the design and construction industry stands in terms of its process of digital transformation, respondents were asked to place themselves at one of five points along a spectrum, from haven't started yet to having achieved full digitalization. The chart arright shows the responses from those in the UK and Ireland

BIM Users Experiencing Positive ROI From Their BIM Investments

Dodge Data & Analytics, 2021

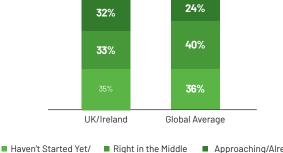


Share of Projects With Formal Measurement of ROI on BIM UK/Ireland: 43%

Global: 36%

Stage of Digital Transformation

Dodge Data & Analytics, 2021



Haven't Started Yet/ ■ Right in the Middl In Early Stages ■ Right in the Middl of Our Effort

 Approaching/Already Achieved the Goal

compared with those from the entire study. These responses include both those of BIM users and nonusers.

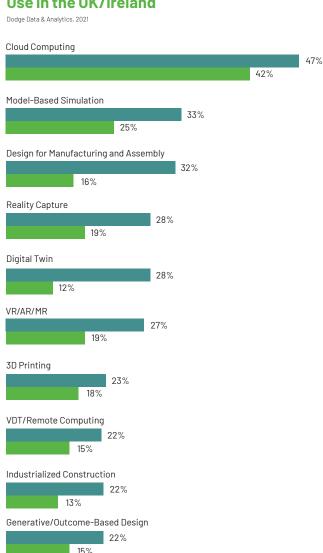
- Nearly one third (32%) of respondents in the UK and Ireland believe that they are approaching or have even achieved their digital transformation goals, far more than those who report being in this stage globally.
- However, more than one third (35%) also report that they are in the early stages of this transformation or haven't even begun it yet, a share comparable with the global average.
- These findings suggest that the design and construction communities in the UK and Ireland are right in the midst of the process of digital transformation.

USE OF EMERGING TECHNOLOGIES/APPROACHES

The study also included 17 emerging technologies/approaches associated with digital transformation and asked respondents to indicate which ones they are using now. The top 10 for the UK and Ireland are shown in the chart at right, contrasted with the share reporting that they are using them globally.

- Use in the UK/Ireland for each of these 10 exceeds the
 use reported globally, often by a relatively high share of
 responses. This suggests that the design and construction
 industries in the UK and Ireland truly are farther along in
 their process of digital transformation than the other global
 regions studied.
- Particularly notable are the relatively high levels of use for design for manufacturing and assembly and digital twins.
- Respondents were also asked about the technologies/ processes they intend to begin to use in the next two to three years. The top ones in this region are:
 - Generative/Outcome-Based Design
 - Model-Based Simulation
 - AI/Machine Learning
 - Model-Driven Prefabrication
 - Robotics/Automated Vehicles

Top Emerging Technologies/Approaches in Use in the UK/Ireland



■ UK/Ireland ■ Global Average

Data: Summary of Global Findings

Global Summary Introduction and BIM Usage/Skills

Introduction to Global Summary

The next four pages provide highlights of the findings of the full global study, titled Accelerating Digital Transformation Through BIM SmartMarket Report.

BIM Usage and Skills

The chart at bottom left shows how many BIM users, by company-type, currently use it on most of their projects compared with how many plan to be doing so within two to three years. Findings clearly forecast significant growth by all.

Engagement With BIM Data

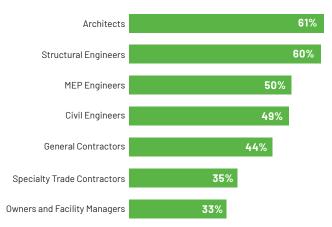
The research evaluated usage of 22 activities that leverage BIM data for improved decision-making and digital workflows. The chart at bottom right shows two levels of engagement with that full set of activities by company-type and size.

Satisfaction With BIM Skill Levels

The chart at right shows how many BIM users are currently satisfied with the level of BIM skills they encounter from each company-type shown. The findings point to a broad industry need to enhance BIM skills across the project team.

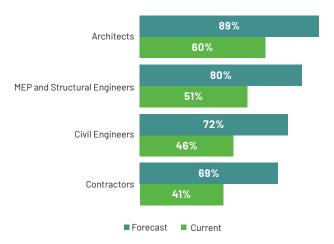
All BIM Users' Satisfaction With BIM Skills of Each Type of Project Team Member

Dodge Data & Analytics, 2021

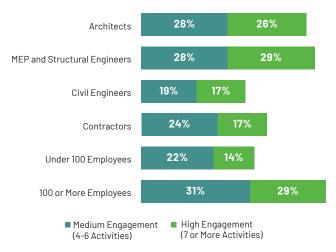


Current BIM Usage on 50% or More of Projects Compared With Forecast (2-3 Years)

Dodge Data & Analytics, 2021



Engagement With Data-Related Activities by Company-Type and Size



Summary of Global Findings

Use of a Common Data Environment and BIM Benefits

Common Data Environment

Nearly all BIM users use a common data environment to exchange data with their project teams, with contractors reporting the greatest value from its use.

Benefits of BIM

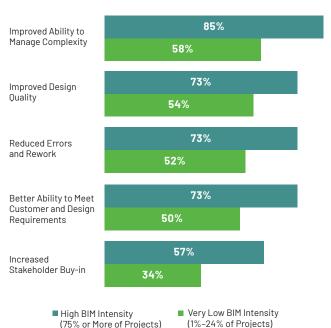
The survey examined BIM users' experience with 41 separate benefits received from their use of BIM.

The findings reveal a strong correlation between BIM intensity and the experience of BIM benefits. The charts at bottom show the top five benefits reported by designers (architects and engineers) and contactors, comparing the percentages doing 25% or less of their work with BIM to those doing more than 75%.

The compelling differences shown in these charts provide an explanation for the findings on the previous page about the dynamic pace at which current users are planning to increase their BIM intensity. More BIM means more benefits.

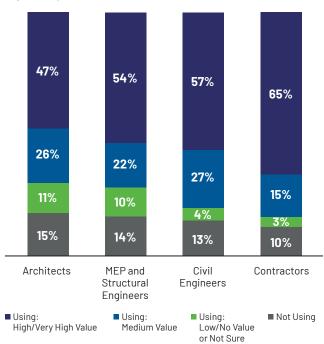
Impact of BIM Intensity on Top Five BIM Benefits for Architects and Engineers

Dodge Data & Analytics, 2021

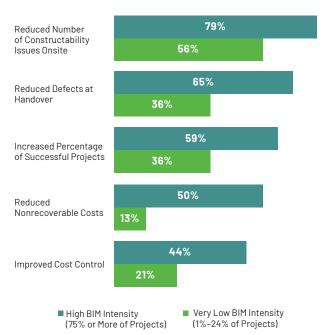


Use and Value of a Common Data Environment by Company-Type

Dodge Data & Analytics, 2021



Impact of BIM Intensity on Top Five BIM Benefits for Contractors



Summary of Global Findings

Perceived ROI of BIM

There is no standard, globally accepted way to measure the ROI (return on investment) of BIM. In studies of BIM users over the last 12 years, Dodge has asked them to select which of seven percentage ranges they best believe represents their company's ROI on its BIM investments to that point. This is referred to in Dodge reports as the perceived ROI on BIM. The charts on this page combine several of the seven range options into three broad ROI tiers.

Perceived ROI by Company-Type and Region

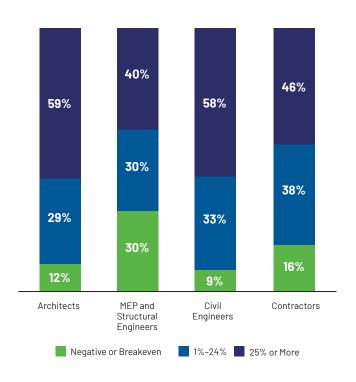
The chart at right shows this analysis by company-type. While architects report somewhat higher ROI than contractors, civil engineers differ notably from MEP and structural firms. This points to a need to focus on helping these professionals engage more successfully with BIM.

The chart at bottom shows the analysis by region and provides the overall response as a baseline for comparison.

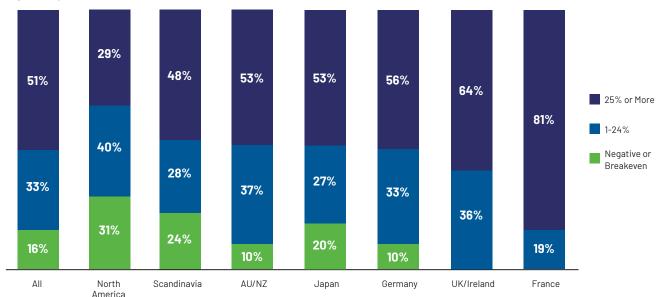
- 48% or more report a good (at least a 25%) ROI in every region studied except North America, which also shows the highest number at negative or breakeven (31%).
- This contrasts sharply with France and UK/Ireland, where no users report negative or breakeven.

Perceived ROI of BIM by Type of Company

Dodge Data & Analytics, 2021



Perceived ROI of BIM by Region



Summary of Global Findings

Digital Transformation

While the overall global design and construction industry is clearly going through a comprehensive digital transformation, the pace varies widely by company. All respondents to this survey (BIM users as well as nonusers) were asked to assess where they believe their company is in its digital journey from one of four stages shown in the charts on this page.

BIM Users' Progress on Digital Transformation

The chart at right focuses just on BIM users. It compares all BIM users with those using BIM on at least 75% of their projects (high BIM intensity). The findings show how more BIM use correlates directly with overall digital transformation.

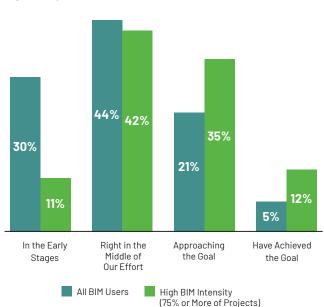
All Respondents' Progress on Digital Transformation by Region

Digital transformation is impacting all companies in the industry whether they are currently using BIM or not. The chart at bottom shows the averages of how all respondents from each region studied believe their transformation is progressing. The aggregate of all responses is also shown for comparison.

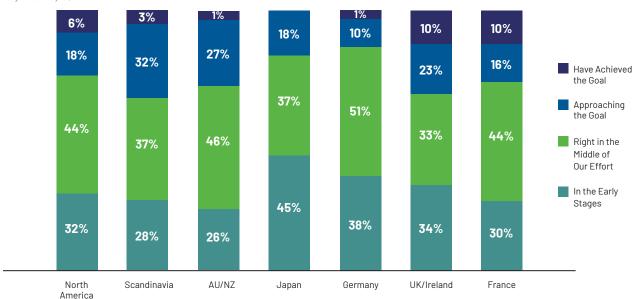
While there are variations, in general each region is fairly close to the average for all, suggesting that there is more commonality than difference in everyone's path toward our exciting digital future.

BIM Users' Reported Progress on Digital Transformation

Dodge Data & Analytics, 2021



All Respondents' Reported Progress on Digital Transformation by Region



Methodology

This global study was conducted to assess the extent to which BIM has been embraced in major regions of the world, including the experience of those who have used BIM in terms of related activities they employ, the benefits they receive, the ROI they get from BIM, the BIM engagement they expect and experience from other team members on projects. The study also examined digital transformation in general, and the current and future use of emerging technologies and processes in particular.

This research was administered online from October 2020 to March 2021. The survey data was collected from the Dodge Data & Analytics Architect and Contractor Panels, the Dodge Database of construction professionals and memberships of partnering associations (AMCA, Australian Constructors Association, CIBSE, CICES, CINOV, COMIT, GBC Finland, GBCA, Norwegian GBC, Planen Bauen 4.0, RICS, RIL, USGBC and UNSFA). The Dodge Data & Analytics Architect and Contractor Panels contain representative samples of architects and contractors across the US. The panelists are identified by many categories, including size, region, types of projects undertaken and specialty.

Respondent Profile

REQUIREMENTS

Respondents were required to be employed by an architecture firm, site design firm, construction company, engineering firm or consulting company, and located in Australia, Canada, France, Germany, Japan, New Zealand, Scandinavia, UK or the US.

BIM USERS

Most of the analysis focuses on respondents who report that their

company uses BIM. In total, 641 respondents report using BIM in this study, including 66 in the UK and Ireland.

The following definition was provided for BIM to identify those using it:
Building Information Modeling (BIM) is a process that begins with the creation of an intelligent 3D model and enables document management, coordination and simulation during the entire lifecycle of a project (plan, design, build, operation and maintenance).

BIM USER PROFILES

The responses of BIM users in the global study include a cross section of types of job roles and company sizes.

· Types of Job Roles:

- Architect: 37%
- Construction Professional: 32%
- Civil Engineer: 12%
- Building Engineer(structural, mechanical, electrical, plumbing): 10%
- $\hbox{-Consultant:}\,5\%$
- Other: 5%

Size of Company by Number of Employees:

- Very Large (500 or more): 23%
- Large (100 to 499): 30%
- Midsize (50 to 99): 17%
- Small (Fewer Than 50): 29%
- Prefer Not to Answer: 1%

Seventy percent of the BIM users primarily work on vertical buildings and 30% on infrastructure projects.

Finally, the study also explores the differences in responses among BIM users in the seven regions/countries included in the study. Because of a high number of smaller companies in the responses from North America, weighting was applied to make the proportion of North American respondents in varying size categories (by number of employees) match those of respondents located in regions other

than North America.

- North America: 34%
- · France: 12%
- · Australia/New Zealand: 12%
- Scandinavia: 11%
- Germany: 10%
- Japan: 10%
- · UK/Ireland: 10%

DIGITAL TRANSFORMATION

The questions on digital transformation include responses from BIM users and nonusers. 843 total responses were received on the stage of digital transformation, with 80 from the UK/Ireland, and 576 were asked about the technologies/processes they use and plan to adopt, with 60 from the UK/Ireland for this question.

Resources

Organizations, websites and publications to help you get smarter about BIM and digital transformation.



Dodge Construction Network

Main Website:

www.construction.com

Dodge Construction Central:

www.construction.com/products

Market & Competitive Intelligence: www.construction.com/products/

Sweets:

www.construction.com/ products/sweets

construction-market-data

SmartMarket Reports:

www.construction.com/ toolkit/reports

ACKNOWLEDGEMENTS:

We would like to thank Autodesk for their ongoing partnership with Dodge to bring intelligence about BIM and the digital transformation of the design and construction industry.

We thank all of our research partners for their participation in the survey process to help make sure the industry is better informed. These include the Air Conditioning & Mechanical Contractors' Association (AMCA), Australian Constructors Association (ACA), the Chartered Institution of Building Services Engineers (CIBSE), the Chartered Institution of Civil Engineering Surveyors (CICES), Federation CINOV, COMIT (Construction Operation & Maintenance through Innovative Technology), Finnish Association of Civil Engineers (RIL), Green Building Council of Australia (GBCA), Green Building Council Finland, Norwegian Green Building Council, Planen Bauen 4.0, Royal Institution of Chartered Surveyors (RICS), US Green Building Council (USGBC) and UNSFA (L'Union des Architectes).

We thank all those who shared their insights and experiences, including the thought leaders featured in this report and those who provided us with case studies or shared their insights in our feature articles.



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Research Partners

Air Conditioning & Mechanical Contractors'

Association: www.amca.com.au
Australian Constructors Association:

www.constructors.com.au

Chartered Institution of Building Services

Engineers: www.cibse.org

Chartered Institution of Civil Engineering

Surveyors: www.cices.org

Federation CINOV: www.cinov.fr/la-federation-cinov COMIT (Construction Operation & Maintenance through

Innovative Technology): www.comit.org.uk

Green Building Council of Australia:

https://new.gbca.org.au

Green Building Council Finland: https://figbc.fi/en

Norwegian Green Building Council:

https://byggalliansen.no

Planen Bauen 4.0: https://planen-bauen40.de

RIL (Finnish Association of Civil Engineers): www.ril.fi/en/ril.html

Royal Institution of Chartered Surveyors: www.rics.org/uk

US Green Building Council: www.usgbc.org
UNSFA (L'Union des Architectes): www.unsfa.fr

Other Resources:

BIMForum: bimforum.org

buildingSMART International: www.buildingsmart.org

Construction Innovation Hub:

https://constructioninnovationhub.org.uk Global BIM Network: www.globalbim.org

Lean Construction Institute: lean construction.org

National Institute of Building Sciences Building Information

Management (BIM) Council: www.nibs.org/bimc

SmartMarket Insight

www.construction.com

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www.construction.com/toolkit/reports

