

Optimizing the Project Delivery Process

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INSIDE THE COST SAVINGS, INCREASED EFFICIENCIES AND INFORMED DECISION-MAKING OF BIM.

Digital transformation may seem like the buzzword of the hour, but its benefits are real, especially in sectors with high-dollar projects and multiple stakeholders.

In the construction industry, building information modeling (BIM) plays a central role in leveraging data from both building models and company processes to dramatically improve decision-making capabilities, establish more efficient workflows, and reduce design and building errors and cost overruns.

“BIM is the foundation of the digital transformation of the [construction] industry, from design through operations,” said Amy Bunszel, executive vice president, AEC Design Solutions at Autodesk. She adds that the more companies use BIM, the greater returns they see on investment in the technology.

In a recent report, “Accelerating Digital Transformation Through BIM,” Dodge Data & Analytics reviews how the architecture, engineering and construction (AEC) sector is transforming into a data-driven industry.



Who's Using BIM?

According to the Dodge report, nearly half of heavy BIM users surveyed say they have achieved (or are close to achieving) company digital transformation goals. Architects are the most intense users of BIM – 89% of those surveyed employ BIM on at least 50% of their projects.

Mechanical, electrical, and plumbing (MEP) and structural engineers are the next most prominent users (80%), followed by civil engineers (72%), and contractors (69%). When it comes to data-related activities in BIM, usage is highest among architects, structural engineers, and MEPs.

More than half of BIM users have come to the technology and its benefits only in the last five years. Architects, unsurprisingly, have been the earliest adopters and users of BIM, with 14%

of firms reporting use of BIM prior to 2008. Dodge's research shows that the firms that have been using BIM for longer report the greatest benefits and ROI.

Is BIM Worth the Investment?

Among BIM's earliest users is United Kingdom-based Anglian Water, which first began adopting building information modeling on its construction projects in 2010. Since then, BIM has become a critical component when designing and building new water infrastructure projects.

Recently, the firm created a digital twin in conjunction with construction of a vast greenfield pipeline project known as the Strategic Pipeline Alliance (SPA). A digital twin is essentially a digital version of an existing asset that is powered by real-time data. In Anglian Water's case, the digital twin established a virtual "representation of the company's assets, systems and treatment processes" in one of the driest regions of the country, according to asset data lead Guy Gregory. As a result, Anglian Water was able to design the SPA project with smaller-diameter pipe than they anticipated, ultimately saving the company \$6,840,000. Anglian Water is only one among thousands of companies that have reaped financial benefits and costs savings through digital transformation with BIM.

Dodge's study regions included North America, Scandinavia, Australia/New Zealand, Japan, Germany, U.K./Ireland and France. For example, according to the Dodge survey, designers, whether architects or engineers, who use BIM in 75% or more of their projects report higher design quality and an increased ability to meet client expectations – 70% of designers also report major project sustainability benefits from BIM, the biggest one being regularly exceeding project performance goals and standards.

Meanwhile, 70% of building contractors report significant cost control benefits to using BIM. Builders also indicate BIM promotes an array of schedule control benefits, including greater likelihood of project completion within anticipated timelines and more efficient resource planning.

While North American contractors report fewer business growth and cost benefits from using BIM than their European

and Japanese counterparts, they remain enthusiastic about quality control gains.

Can BIM Save Time on Construction Projects?

BIM proved crucial to helping design firm Lombardini22 meet project goals and timelines for renovation of commercial office space in a densely populated, historic area of Milan, Italy, in 2020. With a tight developer timeline that also included design approval by the local historical review board, Lombardini22 found BIM technology critical to its completion of the project by the end of 2021.

"[BIM allowed] a more proactive approach to design," said Andrea Meneghelli, project architect and BIM coordinator for Lombardini22. "We could fix issues earlier."

Among the benefits of BIM was the team's ability to create two potential designs for the historical review board and replace one with the other quickly when the first was not approved. The firm was also able to quickly tweak the building's design to accommodate a new client goal of gaining LEED Platinum certification for the structure rather than LEED Gold and being able to maintain efficient, real-time team communications via a cloud platform.

"We could all work together, which is a big savings from a design point of view," Meneghelli explained. He adds that Lombardini22's BIM strategy allowed the team to be "adaptable to different scenarios without having to throw anything away."

He says BIM also allowed the firm to quickly leverage a detailed model and make or change decisions quickly during the permitting and approval processes.

What Kind of ROI Will BIM Offer?

While there is currently no global standard for measuring the return on investment (ROI) for BIM use, Dodge's study of BIM system users over the last 12 years shows substantial self-reported ROI – 51% of BIM users claim a 25% or higher return on investment.

Interestingly, North American building industry professionals reported the lowest ROI from BIM usage. Only 29% of North American users indicated that they saw a ROI of 25% or more, and 31% claimed they either broke even or lost money on their BIM investment. Given that France and the UK and Ireland reported no loss of earnings in BIM investment, the Dodge study suggests North American architects, engineers, and builders need more training in engagement with BIM tools.

Since 2018, the government of Hong Kong has mandated that all state-funded projects valued over \$30 million employ BIM as part of the design and construction process. To that end, the Hong Kong Construction Industry Council has created BIM technical standards as well as training and support services to encourage private sector adoption of digitization as well.


“We have seen that governments can play an important role in encouraging the digitization of the construction sector,” said Adam Matthews, chair of the Global BIM Network. “They can signal the way ahead with policy ... [and offer] confidence to the sector to invest in digital upskilling, process improvements and technology.”

The Digital Future of Construction

Digital transformation has an industrywide impact, whether individual companies are using BIM or not. Those who use it heavily are increasingly outpacing those who don't in project completion timelines, cost savings and gains for clients.

“This study demonstrates that the data revolution is already underway in design and construction,” said Steve Jones, senior director, industry insights at Dodge Data & Analytics.

BIM represents “the first intensive digitization of AEC information” that hasn't been designed to create a physical artifact, like a drawing per se, according to Phillip Bernstein, associate dean and adjunct professor at Yale University. Rather, BIM helps designers, engineers and builders establish a comprehensive visualization of all the complex pieces that go into representing a project before construction even begins.

“It is my hope,” Bernstein said, “as the industry faces its next set of existential challenges – climate change, social inequity, labor shortages, broken supply chains – it will deploy tools like BIM, and eventually artificial intelligence (AI), in the service of optimizing the entire delivery process.” 



About the Author

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