

The future of building engineering

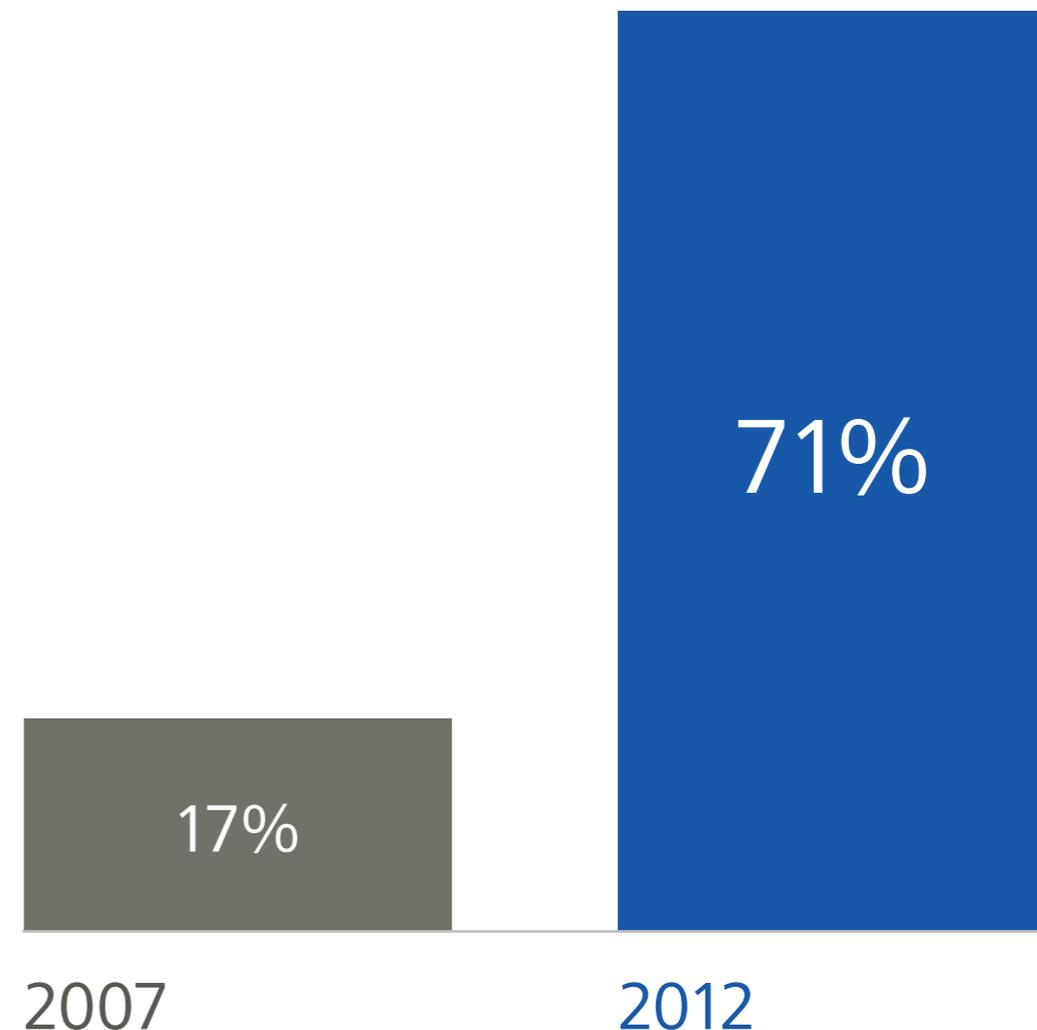
How digital infrastructure is shaping BIM
processes and redefining the way engineers work

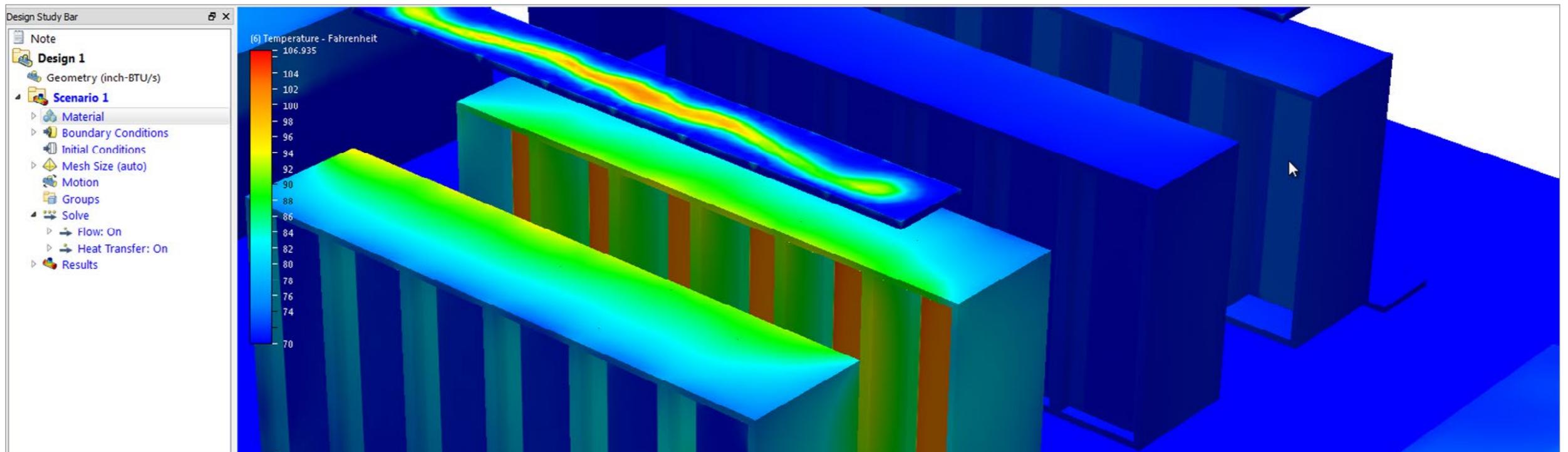
HOW ENGINEERS CAN DIFFERENTIATE TODAY AND ADAPT TO TOMORROW'S HIGHER EXPECTATIONS

Digital infrastructure has evolved considerably over the last two decades. Take the fax machine. Once, it had a place in every business; today, it rarely is seen. Digital infrastructure evolved to newer methods of communication—email and mobile and social mechanisms—that are quicker and more efficient, and allow greater productivity and reduced overhead. In just the last 10 years, the architecture, engineering, and construction industry has rapidly adopted Building Information Modeling (BIM)—an intelligent model-based process for informing and communicating project decisions. As these two trends intersect, owners are reaping the benefits of faster project delivery, higher-quality outcomes, and more efficient and economical operations over the lifecycle of buildings and infrastructure.

Mechanical engineers play a key role in two of the biggest benefits to owners—fewer clashes during construction and operational cost savings. Savvy architecture and engineering firms have understood these benefits for some time and use their BIM experience to differentiate themselves in an increasingly competitive marketplace. In fact, BIM adoption among North American architecture, engineering, and construction firms has risen dramatically, climbing from 17 percent in 2007 to 71 percent in 2012. Where BIM goes from here will be determined by evolving building owner requirements and how quickly mechanical engineers can adapt to higher expectations.

BIM adoption among North American AEC firms





Technologies that enable us to store large files for access anywhere, anytime—such as superfast broadband, 4G LTE, and cloud services—are changing what’s possible. Today’s design teams are using the information contained in 3D models to perform increasingly complex tasks, including energy performance and structural analysis, airflow simulations, and near-realistic visualizations. As the design progresses, more and more data is added to the model.

John Mack, BIM manager for San Francisco-based Herrero Builders, recently spoke about the industry’s reliance on digital infrastructure and what it might mean for the future. “The industry is already pushing models to the threshold of current desktop technology,” Mack said. “At times, I am crashing the best machine I can buy. As data explodes, the cloud is going to be the most financially viable option for the industry. This is most certainly enabled by the fact that upload and download speeds are constantly improving on a rapid scale.”

With the advent of the cloud, the technology landscape is set to change yet again. The cloud makes available virtually unlimited computing power; engineers are harnessing this power for such computationally heavy tasks as energy analysis, air and fluid flow, thermal-comfort simulation, and even rendering. The cloud also provides key financial benefits related to information technology infrastructure. “Moving my files and potentially my software products to the cloud means I can buy less-expensive computers, which is a huge hardware-cost advantage,” Mack said. “I’m no longer buying expensive servers or the knowledge to run those servers.”

BIG DATA

The evolution of digital infrastructure, including the proliferation of cloud computing and mobile devices, enables and strengthens another change affecting the industry: the proliferation of data. According to IBM, 90 percent of the data in the world today was created over the last two years, and every day, 2.5 quintillion bytes of new data are created.

We are just getting too much data. And the demand for data will continue to increase as buildings become more intelligent.

John Mack
BIM manager, Herrero Builders

The Internet of Things is a phrase used to describe the changing pathways of information—sensors and actuators linked to physical objects, connected through wired and wireless networks, churning out huge volumes of data that flow to computers for analysis. The laws of economics tell us demand must be met by supply. The demand for increasing amounts of data by building owners is going to change the responsibilities of architects, designers, engineers, and construction professionals in the long run.

David Pikey, BIM implementation director for Franklin Park, Ill.-based The Hill Group talks about the potential effect of data on the expectations of the industry. “As technology evolves and the demand for data increases, our industry is going to have to address that, and we are going to need to understand the entire life cycle of a building,” Pikey said.

The level of detail and amount of data needed in a building information model is a source of debate within the industry, but the expansion of hosted storage and sharing, increases

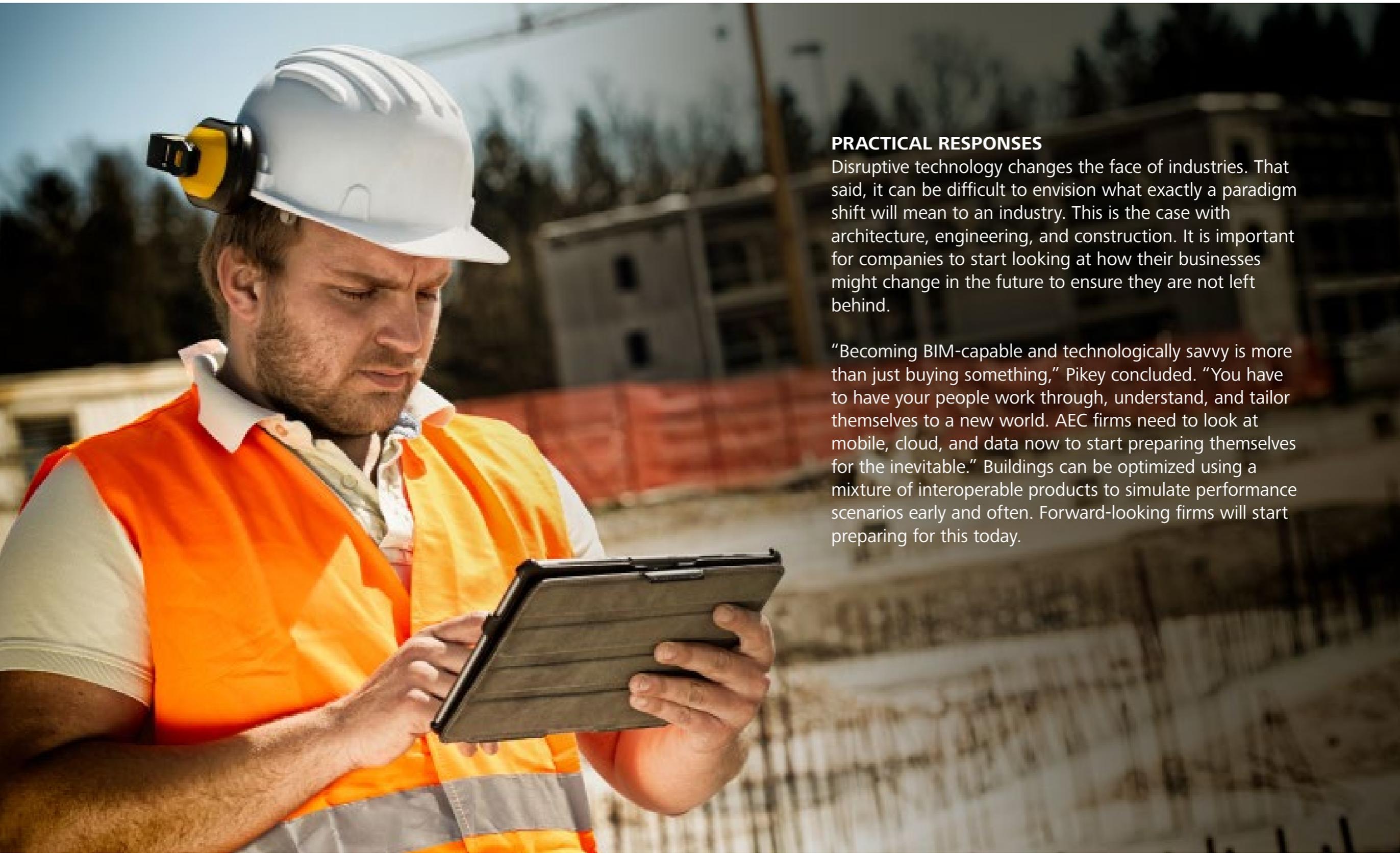
in download and upload speeds, and the computing force of cloud services will ease concerns about optimizing buildings for performance and the manageability of large models.

As building owners expectations broaden to include intelligent buildings smoothly integrated with building information models, architecture, engineering, and construction professionals will need to revisit how their processes work and what they are inevitably responsible for delivering.



As technology evolves our industry is going to need to understand the entire life cycle of a building.

David Pikey
BIM implementation director
The Hill Group



PRACTICAL RESPONSES

Disruptive technology changes the face of industries. That said, it can be difficult to envision what exactly a paradigm shift will mean to an industry. This is the case with architecture, engineering, and construction. It is important for companies to start looking at how their businesses might change in the future to ensure they are not left behind.

“Becoming BIM-capable and technologically savvy is more than just buying something,” Pikey concluded. “You have to have your people work through, understand, and tailor themselves to a new world. AEC firms need to look at mobile, cloud, and data now to start preparing themselves for the inevitable.” Buildings can be optimized using a mixture of interoperable products to simulate performance scenarios early and often. Forward-looking firms will start preparing for this today.

REVOLUTIONARY PROCESSES

Rapid advancements in digital infrastructure and cloud computing and increased use of mobile devices have set the stage for upheavals in workflows and processes related to the design, fabrication, installation, and operation of mechanical systems for new buildings.

Designers will:

- engineer better systems using computationally heavy cloud simulation that previously was too cumbersome to conduct on a desktop computer
- accelerate cross-disciplinary clash detection, coordination, and collaboration through cloud storage, sharing, and services

Mechanical contractors will:

- improve fabrication and installation processes for just-in-time delivery, field management, commissioning, and handover using mobile devices

As building owners pursue the construction of intelligent buildings for more accurate reporting and regulation of performance, they will require smarter building models that better support facility management and operations. This will require architecture and engineering firms to shoulder more responsibility for commissioning data and utilizing infrastructure that can support the weight of a model with speed of access that is efficient for the end user.

Read more on this topic:

<http://hpac.com/building-controls/future-bim>

