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Now or Never

Our annual report on corporate efforts to curb CO_2 emissions has never been more urgent. It's time for industry to lead, follow, or get out of the way. These Eco-Leaders prove it can be done.

Leveling Up in the AEC

New world order. Standardized creation of a digital "metaverse" can make a project design's benefits and shortcomings obvious to architects, builders, owners and residents much faster than traditional 2D drawings. CREDIT: GORODENKOFF/SHUTTERSTOCK

A technological boom lies ahead for the green building industry. **Collaboration is the key.**

BY TERRY BEAUBOIS

I'VE BEEN SELECTED TO SPEAK at an international online conference later this year, "The Future of Architecture," as it relates to the world of the digital-built environment. To prepare, I'm returning to a topic I've been speaking on for decades. I always enjoy updating members of the architecture, engineering and construction (AEC)/building industry on what is ahead.

My goal is to raise awareness within the AEC industry, as well as with homeowners, Request for Proposal (RFP) writers, software companies and university AEC programs, as to how crafting sustainable, net-zero energy efficient, cost effective, design-for-all green buildings can improve the AEC for everyone.

Because I have been significantly involved in advancing technology in the AEC over the years, I can offer a perspective on upcoming technologies that will improve the effectiveness and efficiency of our work.

Three perspectives—large-scale projects, small-scale projects and advancing technology—offer valuable information to the AEC/green building industry. These perspectives also appeal to those developing software for the AEC and to its educators.

THE LARGE AND THE SMALL

One of the most significant differences between large-scale and small-scale projects is that larger projects often have RFPs written by experienced companies and professionals. These RFPs describe what deliverables are to be provided by the designers and builders. Bids for the project are based on meeting RFP requirements. In smaller-scale residential projects, a homeowner is often not aware of all aspects of design and construction, and cannot write the equivalent of a homeowner RFP.

In these cases, architects, engineers, contractors and home building real estate developers help homeowners arrive at the project they want. But they are often dealing with people who are less experienced with what can and needs to happen during the design and construction, and who are not familiar with typical practices within the AEC.

In smaller single-family residential projects, many architects and designers early in their careers mistakenly believe that the main focus of the work is residential. Sometimes, the experts are drafters who can create drawings but are not yet experienced in managing a project's requirements and regulations. They were selected to "save money" over the cost of more-experienced architects. As you are probably aware, there are many well-qualified, responsible architects who practice residential design.

INCREASED AEC COLLABORATION IS A KEY TO SUCCESS

The AEC has a tremendous responsibility to acknowledge the effort undertaken by contractors in single-family residential projects—and to increase appreciation of this fact. The goal is to encourage development of teams that collaborate to make all construction efforts successful. This collaboration begins with increasing awareness of our current situations and other team members' roles, and then successfully addressing and improving the AEC for all.

For example, increased collaboration can be achieved by looking at the industry's available software and making it more collective between architects, engineers and contractors, clients, government review agencies, subcontractors and yes, even building inspectors. Some companies have already begun work in this direction.

These are major areas that can affect every aspect of the AEC. It begins in our colleges and universities, and professional programs that already provide our future AEC members with knowledge and the talent to bring these capabilities into established design and construction practices.

INCREASED AWARENESS OF HUMAN HEALTH AND THE BUILT ENVIRONMENT

During the pandemic-hindered past year, I evaluated opportunities for improving efficiency and effectiveness of the AEC/green building industry. I continue to look at advancing technologies and practices in various businesses and in academia. I look for things from which we could expect the AEC and industry to benefit.

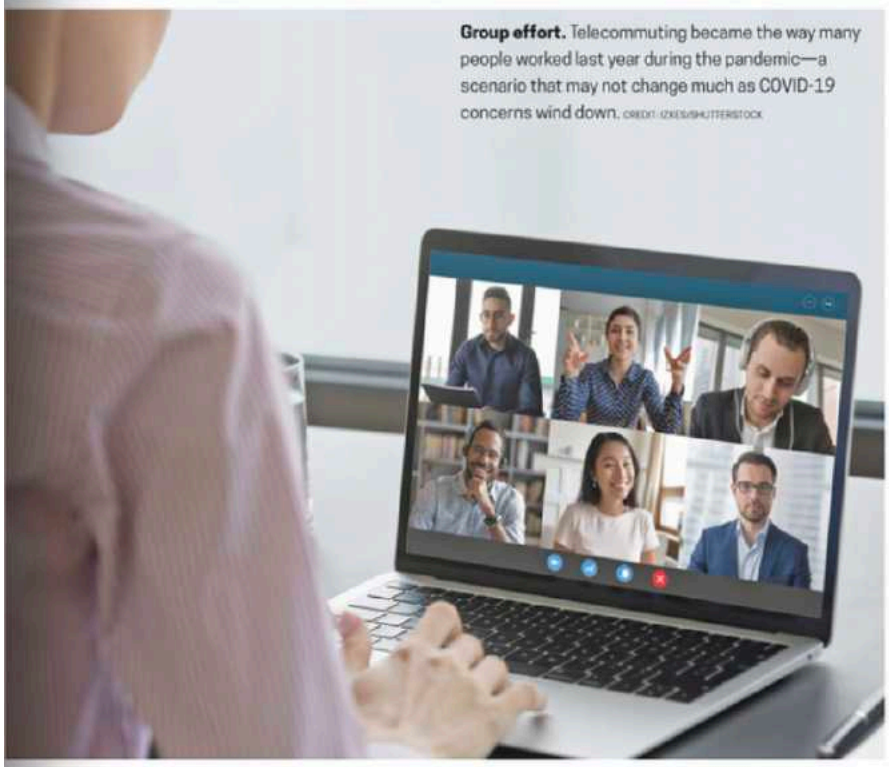
There is no question that during this last year, with our minds on the pandemic, everyone, in every building type—homes, restaurants, offices, schools, sports facilities, concert halls and museums—have become aware of the need for healthy building environments.

Technology will play a significant role in helping the AEC successfully address these health concerns. For example, I've seen studies that use artificial intelligence and advanced computer simulations to show how Plexiglas screens could lead to an increased rate of disease spread rather than the intended decrease. Guesses, speculations and experiments can be supplemented with simulations to test theories that contribute to practices for health issues.

THE BUILT ENVIRONMENT AND HUMAN HEALTH: AIR QUALITY

Nowhere has awareness of the effects of the built environment on human health become more prominent than with the issue of indoor and outdoor air quality. The related HVAC systems in homes and non-residential buildings such as classrooms, offices and public spaces are of far greater importance. Homeowners and business owners are now more aware of the systems' importance than they were even a year ago.

These benefits may have gone unacknowledged in the past, but that is not how HVAC will be considered going forward. Increased knowledge and collaboration by architects, engineers and contractors will be required to bring clients earlier awareness of and delivery of HVAC solutions in all projects. Issues as simple as heat recovery ventilation (HRV) and energy recovery ventilation (ERV) must be intelligently and promptly discussed, as must demonstration of the value of budgeting for them at the beginning of a project.



Group effort. Telecommuting became the way many people worked last year during the pandemic—a scenario that may not change much as COVID-19 concerns wind down. CREDIT: IZKES/SHUTTERSTOCK

REMOTE WORK

While many individuals and businesses have been or are waiting to "return to normal," the idea that every employee of every organization must leave their residence and "go to work every day" has been brought into question. Many people who have been required to remain at home during the last year have greatly benefited. Some businesses and individuals are now considering allowing more employees to work remotely for some portion of the normal work week, if not on a regular basis. This has significant ramifications for home design and home office needs, as well as office design.

Zoom calls are now a regular part of my projects. My clients and I have enjoyed the reduction in time spent commuting to meetings,

"Nowhere has awareness of the effects of the built environment on human health become more prominent than with the issue of indoor and outdoor air quality."

Learning curve. Consumer awareness of HVAC systems and their impact upon indoor and outdoor air quality will continue to grow, but only if architects, engineers and contractors work together more efficiently to get the word out. CREDIT: OLENA HROMOVA/SHUTTERSTOCK

and the convenience of short face-to-face sessions, as well as how we can easily bring remote contractors, product and material suppliers and others into those meetings.

KNOWLEDGE IN THE DRAWINGS-AND COMPUTER GAMES

After 40-plus years of designing houses and buildings, and 20-plus years of teaching in architecture schools, I've found it comes down to this: You know how to do something, or you don't. Architecture, engineering and construction education, and experience are about learning a series of tasks via something that requires knowledge to successfully complete that task and then proceeding. This is true during the drawing of the renderings of the building—the "working drawings"—and throughout the construction process, as one incorporates the "as-built" conditions into the final drawings delivered to the client, homeowner or facilities managers.

In this way we can understand how architecture, engineering and construction can be correlated to a computer game. This is one with a series of challenges that must be met by acquiring knowledge or "powers." These powers allow you to successfully complete the task and proceed on your journey.

This computer gaming world of "leveling up" is literally a way of life. It is time to begin leveling up and integrating this learning technology into our education system and the AEC/building industry. And, we can benefit from computer gaming technology without necessarily playing computer games. The ability to creatively model 3D objects, terrain and buildings is at the heart of all computer games and at the heart of every AEC green building industry design project.

As I looked into the broader world of online films and online TV, I saw some interesting advances that can be utilized in the AEC. For example, interactive media has come to online television. Some portion of every building is somehow conveying to the client, before the construction begins, what the building will look like after it is built. If, for a moment, we consider this as "storytelling," we can see the potential to learn about using new technology to "tell stories" about buildings as they emerge from nothing and take shape.

In the past, I've mentioned an architecture firm that I interviewed that had designed a hospital for a client. The client wanted to do a television commercial about the finished project before the construction phase began. That architecture firm made more money doing the 3D animated fly-around of the hospital for the commercial than it did with the working drawings for the project. Looking at the potential of extending the value of our talents in the AEC to our clients is an important aspect of the topics I write about.

Coming soon. The technology exists to create a project's "digital twin," a functional, 3D interactive model of an actual building before it is built.

CREDIT: MONOPOLY919/SHUTTERSTOCK

A "DIGITAL TWIN" BUILDING INCREASES THE VALUE OF WORK IN THE AEC

There is no question that the era of "digital twins" is coming. The technology exists today to create—during the process of developing design drawings, agency review documents and construction documents—a functional, 3D interactive model of a building before it is built. This digital twin can be devised by collaboration between the members of an AEC design and construction team.

After construction is completed, this digital twin can be used by homeowners and facility managers to assist in managing a building. This capacity will mean an incredible increase in the value of the work done by AEC members for homeowners, building owners and facility managers. I'll be writing more about this as things develop further.

Meanwhile, the logical extension of having just one isolated building as a digital twin is using this technology to allow a "metaverse"—a "village" or a "campus" of buildings of the educational or corporate variety— to inform facility managers and help them access, collect and monitor building function to increase the value of the deliverable provided by the AEC.

The first members of the AEC to create and deliver these capabilities to their clients, along with the drawings for building permit and construction, will experience a significant increase in the perceived and real value of the product they develop during the design, engineering and construction periods.

DIGITAL TRANSFORMATION IS GLOBAL AND ACROSS ALL INDUSTRIES

The realization that the AEC "is not an island" and not the only industry experiencing digital transformation can be helpful and reassuring to AEC members. It can also encourage adoption of practices that allow members to efficiently receive information from banks, financial institutions, surveyors, and what might be considered "pre-AEC" industries. Digital transformation can also deliver to the "post-AEC" industries some well-organized, valuable, beneficial information to homeowners, facility managers and building operators.

An experienced facility manager recently gave me an earful of comments on the poor job the AEC is doing of providing information of value in a usable form to those in the business of using and managing buildings construction. I think we can turn those concerns into "wins" for AEC members who work together to address them. I'll be writing more about this topic in future articles in *Green Builder* magazine.

Will this all happen in the next year? No, but this is the roadmap for the green building industry in coming years. Every software company, every architect, engineer, contractor and subcontractor, and every college or university that wants to participate is welcome. **GB**

Terry Beaubois, M.Arch, is CEO of BKS: Building Knowledge Systems in Palo Alto, California. He can be reached at tbeaubois@gmail.com.

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