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ROBERT **FOX**
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SUSAN **SZENASY**
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STEPHEN **KIERAN**
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CHAPTER 3 **ACHIEVEMENT THROUGH
INTEGRATED DESIGN**

The participants in *Vision+Voice 4* consistently supported integrated design as the best method by which to design, construct, and operate a sustainable building. Because the term is still gaining acceptance, this chapter serves to better define integration. Speakers refer to past projects that visualize stakeholder involvement and orchestration; included among these case studies is an ideas competition that the Design Excellence Program conducted with *Metropolis* magazine. Interestingly, almost all of these interviews also underscore the importance of research in sustainability, suggesting that an integrated process improves the chances for innovation to come to life.



BRUCE FOWLE

ARCHITECT **BRUCE FOWLE** CO-FOUNDED FXFOWLE IN 1978 (THEN KNOWN AS FOX & FOWLE ARCHITECTS), AND HE HAS BEEN PRACTICING SUSTAINABLE ARCHITECTURE SINCE HIS EARLIEST RESIDENTIAL WORK. DESIGNING FOR RESOURCE CONSERVATION GAINED A NEW LEVEL OF NOTORIETY IN 2000 WITH FOX & FOWLE'S COMPLETION OF 4 TIMES SQUARE, THE FIRST GREEN SKYSCRAPER IN THE UNITED STATES—AND CREDITED WITH HELPING LAUNCH THE LEED RATING SYSTEM. TO DATE FXFOWLE'S PORTFOLIO INCLUDES 15 MILLION SQUARE FEET OF LEED-REGISTERED OR LEED-CERTIFIED SPACE, AND OTHER MAJOR PROJECTS INCLUDE THE FIRST CARBON-NEUTRAL MUSEUM IN AMERICA. WITH RENZO PIANO BUILDING WORKSHOP, FXFOWLE ALSO RECENTLY COMPLETED THE NEW YORK TIMES BUILDING. FOR *VISION+VOICE*, FOWLE DISCUSSES THE UNIQUE SUSTAINABILITY OPPORTUNITIES OF URBAN REAL ESTATE, AND RECOUNTS THE TIMES SKYSCRAPER TO ILLUSTRATE RISK MITIGATION OF GREEN TECHNOLOGIES.

FXFOWLE IS STRUCTURED AROUND THREE DESIGN STUDIOS, WHOSE SPECIALTIES RANGE FROM ARCHITECTURE AND INTERIORS TO PLANNING AND URBAN DESIGN. ALL OF THESE GROUPS ENGAGE IN OPEN AND COLLABORATIVE DESIGN, A PROCESS WHICH FOWLE ALSO DESCRIBES HERE AS A DELIBERATE ORCHESTRATION OF DESIGNERS, CLIENT, AND CONSTRUCTION AND FACILITIES PROFESSIONALS; HE PRAISES THE LEED PROGRAM FOR PROVIDING ALL STAKEHOLDERS WITH A COMMON VOCABULARY. FOWLE IS A MEMBER OF GSA'S NATIONAL REGISTRY OF PEER PROFESSIONALS.

BRUCE FOWLE: Sustainable design is a thread that runs through our whole office. It's part of the culture, which really comes from leadership. The main idea is to make it part of the lexicon. It's taking advantage of every opportunity to make something greener and push the envelope.

There is no one-size-fits-all sustainability solution. That's why it's so important that sustainability is deeply embedded in a firm like ours—so that every opportunity gets taken. There are thousands of decisions that go into the design of any project or any plan.

I was not in favor of Leadership in Energy and Environmental Design initially, because I saw it as something that would limit creativity, but LEED has proven to be a very important instrument to move everything forward, because it is a common language that architects and clients and the public could share.

The client has to be committed to sustainability from the top of the pecking order. If it comes from a lower level, you might get a little ways into it, but by the time all the scheduling and costing are evaluated, everybody gets talked out of it. So there really has to be a commitment. Recently, we did a headquarters for the software company SAP, outside Philadelphia. The budget was tight as a tick, but the CEO was committed to doing a LEED-Platinum building. That was one requirement they never relinquished. So everything that was necessary to make it LEED-Platinum stayed, and that was wonderful.

To make these sophisticated buildings, the number of specialists is growing all the time. The real challenge, then, is for the architect to be the leader of the design process. In tandem with the owner, we need to decide who is going to be on that team, and then it's like leading an orchestra. We have to call on the instruments when we need them. And that's an art form in itself. Part of the creative process is figuring out that timing, and making sure everybody is working efficiently.

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The old-fashioned way of bidding with general contractors doesn't really work well, given the complexities of buildings today. A building's systems get integrated most effectively when there is a really integrated design process. Obviously, the commitment of the client is extremely important. And having the contractor or construction manager on board early is important, so that they are part of the learning process, they can contribute, they can do cost analyses—also so that, when the construction crew moves forward, everybody knows the rules and objectives. The same goes for the operations professionals.

The problem we've had on almost all buildings is the way they operate, and getting performance information out of them. We're also finding that designs and energy analyses are overly optimistic. They are ideal. They are taking a year's worth of climate conditions and analyzing all of that in ways that are assuming everything is running perfectly: that the maintenance crew knows exactly when to turn this on and turn that off, or when to flush this out, or whatever the case may be. And that's proving to not be the case. We definitely need regulations for buildings to perform the way they are designed. Payback and cost savings shouldn't be the only incentives.

There are huge differences in how you approach a green building, depending on its scale, type of use, and location. Location alone is extremely critical, because if you're in a high-density urban area where there are zoning constraints, you've got to fill up that envelope. Zoning regulation has nothing to do with green. So sustainability in this case is mostly internal, in the systems. To be sure, any high-density urban building is much greener than one that is in the suburbs, thanks to mass transit and many other things. The greenest thing we can do is to create urban environments that have good quality of life.

For the New York Times Building, one of the wonderful things about collaborating with Renzo Piano was that he brought all kinds of European technology and new ideas to America. The American mentality is that if we haven't done it before, we're going to charge twice as much for it.

With the ceramic tubing and the intricacies of the Times facade, for example, we were getting [cost estimates] that were off the wall. But because it's a shading device, it was extremely important to the building from an environmental point of view. If we took it off, we'd have to change the whole design of the building, and it certainly wouldn't be as green as it is now.

This was where collaboration with the client was extremely important, because the client was determined to make this work and they were willing to put money up front. So we collectively developed the idea that we could pay a stipend to four different curtain-wall manufacturers. Each did the engineering and shop drawings for a 2-story-high section, which they submitted to us. We reviewed them and then they built mockups in their own shops.

We traveled among the mockups to kick the tires and see what we liked and what we didn't like, what worked and what didn't work. And then we put it out to bid and we brought it under the budget, which basically saved the job and saved the sustainability of the building. It took away

the fear factor, because we had gone through this process and the contractors knew what they were dealing with. By the time we were all said and done, we saved millions. This was instant, hard-cost payback.

The private sector is being influenced by sustainability. From a marketing point of view, it's become unacceptable to not do a green office building. And if corporate leadership is not concerned about it, the staff is putting on the pressure. I think employees are more concerned about health than they are about climate change, but that varies. And now it's catching hold in the residential marketplace, because the public is more aware and concerned about these health aspects of green building.

I think the federal presence has been extremely important [to the private sector's acceptance of sustainability]. GSA owns more buildings than anybody else in the country; that offers a huge opportunity to make things happen. There's no greater place to make an impact on climate change than in buildings.

Whether it's a courthouse or federal office building or a land port of entry or whatever else it may be building, it is extremely important that GSA continues to pursue sustainability. It demonstrates the smart thinking of the government and it respects the intelligence of the people it serves.

Sustainability in federal buildings could have to do with site selection—the whole question of density and accessibility, and how that impacts one's quality of life. Or it could mean demonstrating a building's relationship to its region—that you're not doing the same thing everywhere, because that would be the cheapest way to do it; respecting a region means respecting its people. If you have the highest esteem for the country and you want to raise everybody's expectations, then you have to really set a standard that makes people think and makes people know there's a difference.



BOB FOX

OVER THE COURSE OF HIS CAREER, **BOB FOX** HAS EARNED A REPUTATION AS A DEAN OF SUSTAINABLE HIGH-RISES. FOX & FOWLE ARCHITECTS, OF WHICH HE WAS A FOUNDING PARTNER, DESIGNED THE PIONEERING SKYSCRAPER 4 TIMES SQUARE, AND IN 2003, FOX AND RICHARD COOK FORMED COOK+FOX ARCHITECTS IN DIRECT RESPONSE TO THE COMMISSION TO DESIGN THE BANK OF AMERICA TOWER AT ONE BRYANT PARK. THAT 2.2-MILLION-SQUARE-FOOT PROJECT BECAME THE FIRST COMMERCIAL SKYSCRAPER TO EARN LEED-PLATINUM CERTIFICATION. SINCE 2006 FOX HAS ALSO OVERSEEN TERRAPIN BRIGHT GREEN, THE CONSULTANCY HE COFOUNDED WITH COOK, BILL BROWNING, AND CHRIS GARVIN.

IN ADDITION TO PRACTICE, TODAY FOX ADVISES THE HARVARD MEDICAL SCHOOL'S CENTER FOR HEALTH AND THE GLOBAL ENVIRONMENT, THE USGBC'S URBAN GREEN COUNCIL AND CENTER FOR GREEN SCHOOLS, AND THE RAY C. ANDERSON FOUNDATION. HE IS A MEMBER OF MAYOR MICHAEL BLOOMBERG'S ADVISORY COUNCIL FOR THE OFFICE OF LONG-TERM PLANNING AND SUSTAINABILITY AND OF THE NATIONAL REGISTRY OF PEER PROFESSIONALS, WHICH GSA MAINTAINS THROUGH THE DESIGN EXCELLENCE PROGRAM; IN 2011, GSA ALSO TAPPED HIM TO CHAIR ITS GREEN BUILDING ADVISORY COMMITTEE. IN THIS *VISION+VOICE* CONVERSATION, FOX DISCUSSES CLIENTS' WILLINGNESS TO EMBRACE SUSTAINABILITY INNOVATIONS, AND DESCRIBES HOW HE MAXIMIZES BUILDING PERFORMANCE BY BRINGING TOGETHER ALL OF A PROJECT'S STAKEHOLDERS FROM THE EARLIEST PHASES OF DESIGN.

BOB FOX: At the time we were making it, 4 Times Square was the greenest high-rise building in the country. We put in variable speed drives and solar panels on the facade—having no idea whether they were going to work. We had terrific engineers on the project who never said no. We put two fuel cells in the building, which was unheard of for a Manhattan office. We learned a lot, and if you ask [developer] Douglas Durst whether he had any regrets on that project, he would say, “Nobody copied us.”

To try and sell a client on something that hasn't been tested is very difficult. Generally, the scale at which we build is \$100 million for an exterior wall: not an investment in which somebody wants to take a risk. That's why companies are testing new things very rigorously before they even get to the market. We like to push the envelope, but with stuff for which there are data.

I absolutely think that the federal government has an opportunity to test new technologies, but it's not going to do something that hasn't been fairly proven. The government also needs backup plans in case of failure. You can't make critical building systems vulnerable. It's not prudent to spend a lot of resources, whether they're natural or financial, that way.

I think the public sector offers greater opportunity for sustainability leadership. GSA can set high standards and compel teams of architects and engineers to meet them; if you're working in the private sector, budgets come into play more and there's time pressure. GSA should continue stepping back and saying, Wait a second, we're tired of doing regular old buildings.

I can use the Bank of America Tower at One Bryant Park as an example of the leadership and teamwork it takes to get there. From the first design meeting, we had the people who are now running the building sitting in. The Dursts were smart enough to have facilities people be part of the decision making, because they were going to live with it.

Facilities professionals need to inform the architects and

engineers of what will work and won't work. And the architects and engineers need to propose to them the systems that will move the needle from okay to better. It is the owner's responsibility, I think, to bring in an educated team of people who are going to run the building.

On all of our projects, we like to start with as complete a team as we can. We do a charrette[, an intense collaborative meeting for brainstorming concepts and guiding principles]. We urge that that team includes the builder, because without the builder, it doesn't make a lot of sense for us to be talking about how we're going to execute things. This way, you're thinking about building at the same time you're thinking about designing. That allows for more creative design, because a builder is then incentivized to really collaborate and make a beautiful building, as well as change the way construction is done.

Besides the builder, and of course the client, our charrettes include the mechanical engineer, the structural engineer, landscape architects if landscaping is a key component of the project, and the people who are actually going to run the building. Sometimes clients think they're too important to be part of these meetings. That's not our deal. We want everybody and we try and do it off site, so there are no Blackberries or cellphones.

It's best to conduct another charrette when you pass from the early design phases into design development and then documentation and construction. You do a number of these just to reorient everybody to make sure there is good communication on the team. It's very important.

The whole notion of performance metrics—whether we're ensuring the success of a sustainable building, or using metrics to guide a charrette—is fairly new. In the early days with 4 Times Square, simply commissioning the building was a new idea. A lot of people would have been pleased with that, and not cared to continually measure whether the building really worked.

Also, the tools that were available 10 years ago were nowhere near as sophisticated as they are today. Now a lot of data can be taken simultaneously, such as the day's weather and exactly how many people are in the building. The real trick in running these buildings is understanding and predicting weather so that one can turn on refrigeration systems in a logical order, and to keep the occupants happy while using the least amount of energy or making the least amount of impact on the grid.

To do that is a little bit of science, a little bit of seat-of-the-pants art, but there are a lot more helpful tools today than we've ever had. So I think there's another great opportunity for GSA. Installing sophisticated controls on a building, if they're not that expensive, is a great way to be a sustainability pioneer while controlling risk. If they really don't work as someone predicted, then you can take them off. You don't want to be doing that with the curtain wall of a building.

We want to set a totally different standard for sustainability. To do so, we can start looking beyond resource consumption. We get the energy side. We're also really good at saving water, capturing rainwater, and reusing graywater and even blackwater. These should all be normal architectural practices at this point. Now, how do you create the best indoor environment in your buildings? That's next.

Let's look at the Bank of America project again. The cost savings of energy efficiency is about \$3 million per year. Yes, that's huge. But there are thousands of people going to work in this building. And if we increase productivity by one percent for those 5,000 Bank of America employees, based on their salary and benefits, that's \$10 million. An extra five minutes of productivity daily equals \$10 million. So, where would a corporation or federal agency put its money? Of course, decision makers at that level are not going to do an energy-inefficient building. But they may not be sufficiently focused on making the best environment for workers and

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visitors. Do these buildings feel good on the inside? How do people in the buildings relate directly to nature? Can they even see outside, or are you still doing cubicles with 7-foot-high partitions?

Another issue on the horizon is that we will have to make our cities resilient to climate change, especially as more people move to cities. If we have a big storm surge, a big hurricane, or a sea level rise, what's going to happen to New York or DC's subway systems, for example? Does that mean we should be looking at light rail? We have the capability of designing a beautiful, safe, quiet system above grade, whether it's rails on the street bed or it's elevated.

There's really bad stuff happening and we are going to have to adapt. We will see sea levels rise; despite the naysayers, we've already seen it, in fact. Ask the people in Joplin, Missouri, about climate change. We just don't fully understand what that all means yet



BRANDON HARWICK+ SEAN QUINN

THE METROPOLIS NEXT GENERATION COMPETITION IS AN ANNUAL IDEAS COMPETITION HELD BY *METROPOLIS* MAGAZINE AND OPEN TO ARCHITECTS AND OTHER BUILDING PROFESSIONALS WHO HAVE BEEN PRACTICING FOR 10 YEARS OR LESS. IN 2011, INSPIRED BY GSA'S COMMITMENT TO SUSTAINABILITY, EDITOR-IN-CHIEF SUSAN SZENASY ASKED THE AGENCY TO PROVIDE A CONTEST THEME AND A SUBJECT BUILDING WITH WHICH ENTRANTS COULD VISUALIZE THEIR PROPOSALS. IN THIS FIRST SUCH PARTNERSHIP IN THE MAGAZINE'S HISTORY, THE COMPETITION FOCUSED ON A 1965 FEDERAL OFFICE BUILDING IN DOWNTOWN LOS ANGELES.

THE WINNING SUBMITTAL, CALLED PROCESS ZERO: RETROFIT RESOLUTION, WAS CREATED BY A TEAM OF 11 HOK DESIGNERS AND FOUR ENGINEERS FROM VANDERWEIL, BOTH BASED IN WASHINGTON, DC. **BRANDON HARWICK** AND **SEAN QUINN** LED THE INTEGRATED GROUP, AND HERE THEY DISCUSS HOW THEY ENVISIONED REDUCING THE GSA-OWNED BUILDING'S ENERGY USE BY NEARLY 85 PERCENT AND MEETING REMAINING NEED THROUGH ON-SITE POWER GENERATION. SINCE THE CONCLUSION OF THE "GET THE FEDS TO ZERO" CYCLE OF THE METROPOLIS NEXT GENERATION COMPETITION, PROJECT MANAGER AND LEAD ARCHITECT QUINN HAS RELOCATED TO HONG KONG TO HEAD SUSTAINABILITY FOR THE COMPANY 10 DESIGN. IN ADDITION, HARWICK, PROCESS ZERO'S LEAD ENGINEER, HAS ESTABLISHED A BOUTIQUE ENGINEERING CONSULTANCY IN WASHINGTON, DC, CALLED ENGENIUM GROUP.

BRANDON HARWICK: The *Metropolis* competition was based on 300 North Los Angeles, a 1.2-million-square-foot office building that GSA owns. The goal of the competition was to get that building to net zero, in part with technologies that GSA could use to improve its existing building stock. GSA wasn't asking for a design to actually build; this was an ideas competition.

SEAN QUINN: At HOK we'd actually been working on feasibility studies to retrofit HUD headquarters. One of the principals in charge on that project had found out about the competition from Les Shepherd, the chief architect of GSA, and passed it on to me. I sent out a mass email that attracted about 10 people from HOK, and four engineers from Vanderweil's Alexandria and Boston offices. For me, taking on the project manager role arose out of the sense that sustainability has to branch into architecture, interiors, and engineering.

We set up a rule that nothing could be just beautiful, and nothing could just function exceptionally well without being experienced. That way, everyone interacting with the building could understand that they were part of the solution.

sq: One of our first impressions of 300 North Los Angeles had to do with footprint. Every floor's about 100,000 square feet with a double-H corridor on the inside, which means that it takes roughly five minutes to walk from one end of the building to the other. And then a very select few people work next to a window.

bh: We wanted to reorganize the office into open layouts and introduce more daylight into them by punctuating the building with a series of atria. Eight small atria surround the major fire staircases, and there are three large atria that curve as they come through the building to better track the sun trajectory over the building. That way they introduce daylight not just to the top two floors, but all the way down.

sq: When we then looked at how to develop the interior scheme, we wanted to pull away the private offices from the outside edge and closer to these atria. They also create wonderful public gatherings, so we have breakout spaces where people from different departments can cross-communicate. But it was really about organizing the building around daylight.

bh: From the engineering perspective we also use atria to drive natural ventilation. The perimeter wall and the atria are located within 60 feet of one another, which allowed us to open the windows and draw air through the occupied portions of the building and out through the atria. Leeward-facing openings at the top of the atria and hot-plate collectors help draw more air through the building.

sq: If we were going to hit net zero, then we needed to generate a lot of energy on this site. We wanted to look at both solar and geothermal, but nixed the idea of wind power. Algae was introduced as a way to do something with biomass, and actually ended up solving a lot of other problems.

Algae constantly grows around us. It occupies both urban and rural environments, water as well as air. It thrives on carbon dioxide and grows faster in dirtier environments. Now it's being engineered in small tubes, and when we started looking at ideas for how to apply that to the exterior of a building, we thought about the New York Times Building, which has these ceramic baguettes that line the building that help diffuse light. All of a sudden we had our a-ha moment: We could use biomass to generate energy, filter daylight into the space to reduce glare, and to clean dirty air and water.

The algae concept functions out of a central bioreactor located in the basement of the building. 300 North Los Angeles is located along the Santa Ana Freeway, so we've actually placed intake ducts facing the highway, to pull in as much nasty air as possible. The algae absorbs that and really starts thriving. It also thrives on the graywater and blackwater

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that we provide it through a Living Machine water recycling system. We then circulate the algae to the top of the building and through gravity it begins flowing down the exterior in a series of pipes.

As sunlight hits those algae tubes, photosynthesis starts. The algae is consuming the carbon, which it turns into a biomass or lipid. When it reaches the end of that gravity stream, it comes back into the central generation plant. We have excess levels of oxygen that we can exhaust into the building plaza, which is otherwise overcome by fumes from the Santa Ana Freeway. From the public's standpoint, there's only one major reason to come to this building: the U.S. Bankruptcy Court is here. And then you wait on the street for a half hour of security while you're breathing in the smog. So now we can reintroduce oxygen, getting the building to act like a tree.

Finally, we process the leftover lipids in a centrifuge that allows them to be converted to biomass for heating and cooling systems or lighting. Obviously, as you burn anything, you release carbon dioxide. But in this case we like it, because we can recapture it and feed it right back into the algae system. You end up with a totally positive loop: generating clean energy; reducing energy load through shading; exporting clean water; cleaning the air. We don't necessarily put a price on all these benefits now, but it will become more important as cities become denser and more polluted.

sq: A lot of the ideas that we introduced in this net-zero proposal came out of our HUD feasibility studies, and now we have the opportunity of actually executing about 55,000

square feet within HUD headquarters. In partnership with Vanderweil, HOK is going to explore some of those opportunities that we had detailed in the *Metropolis* competition.

Also as a result of this competition, we're trying to institute energy modeling on as many projects as possible. HOK has been minimizing the formality of handoffs between our partnering engineers and specialty consultants; we want to be more freely able to exchange ideas, so that we can really consider all possible schemes and technologies before working out full calculations. Now we're doing conceptual-level energy benchmarking and basic climate analysis, like the interdisciplinary process we employed in the competition.

bh: For me the competition was eye-opening. Before I started working on this project, a lot of my work was based in LEED management and policy guidelines—trying to enact long-term operational change within our clients. What changed with this project was that engineers exerted real influence on the envelope, massing, and orientation: Environmental and energy analysis began as high-level discussion and, as we moved forward, the engineer could build out a whole-building energy model that allowed us to understand long-term operational costs and environmental impact.

This inspired me to go off and start my own firm. Engenium Group really focuses on getting owners involved early, and getting architects more engaged throughout the process, and talking with all stakeholders about different systems and new technologies. That helps to identify and implement the most appropriate sustainability strategies for a project.

sq: What we really hope to see is that architects are not the only ones defining architecture. We want to have mathematicians who are able to parametrically design a single atrium to optimize natural daylight every day of the year. We want to bring biologists into our work. Style isn't just going to be driven by architects anymore.



SUSAN S. SZENASY

SUSAN S. SZENASY HAS BEEN EDITOR-IN-CHIEF OF *METROPOLIS* SINCE 1986. THE NEW YORK-BASED MAGAZINE COVERING ARCHITECTURE, CULTURE, AND INDUSTRIAL DESIGN HAS BEEN SHORTLISTED FOR HONORS BY THE AMERICAN SOCIETY OF MAGAZINE EDITORS AND THE COOPER-HEWITT, NATIONAL DESIGN MUSEUM, AND IT HAS RECEIVED MULTIPLE AWARDS FROM THE SOCIETY OF PUBLICATION DESIGNERS AND TYPE DIRECTORS CLUB. A *METROPOLIS* SIGNATURE IS ITS ANNUAL METROPOLIS NEXT GENERATION COMPETITION. IN 2011 SZENASY, PARTNERING WITH THE DESIGN EXCELLENCE PROGRAM, MADE A MIDCENTURY GSA PROPERTY THE SUBJECT OF THAT YEAR'S CONTEST, AND CHALLENGED PARTICIPANTS TO PROPOSE HIGH-PERFORMANCE MODERNIZATIONS FOR IT. FOR *VISION+VOICE*, SHE DESCRIBES THE ORIGINS OF THE COMPETITION, AS WELL AS POTENTIALS FOR UPGRADING THE SUSTAINABILITY PROFILE OF GREAT SOCIETY-ERA BUILDINGS.

SZENASY IS INTERNATIONALLY RECOGNIZED AS AN AUTHORITY ON SUSTAINABILITY AND DESIGN. IN 2008 SHE RECEIVED THE AMERICAN SOCIETY OF INTERIOR DESIGNERS PATRON'S PRIZE AND PRESIDENTIAL COMMENDATION AS WELL AS THE MEDALION OF HONOR FROM THE SOCIETY OF AMERICAN REGISTERED ARCHITECTS NEW YORK COUNCIL. IN 2011 SHE WON THE GENE BURD URBAN JOURNALISM AWARD AND WAS NAMED A SENIOR FELLOW BY THE DESIGN FUTURES COUNCIL.

SUSAN S. SZENASY: In American cities there's an enormously important cultural heritage in the buildings and streets and infrastructure. The federal presence in these cities is very palpable. Courthouses and other buildings are usually bigger and they're usually centrally located. I'm not sure the federal government itself has always understood or valued its importance to the culture of American cities. There's an enormous input of energy and ideas and art and design and power that is hidden in these buildings, which we should celebrate and think about more.

Under President Johnson's expansion, the federal government was hiring interesting architects. And just like Great Society programs, the buildings were socially involved and interested in serving the common citizen. Unfortunately, those buildings also were built at the time when we ignored nature, when we ignored greenery, when we built highways, so they were highly flawed buildings. But there are many of them in number, and it seems like there might be an opportunity to make them into something that the 21st century would be proud of.

To me, existing inventory is an essential resource. We have already spent the money on creating these buildings—there is energy embodied in these buildings—so we cannot throw them away. But the reality is that a lot of these buildings are leaking at every pore. We cannot afford to maintain and pay the energy bills on these buildings, and they're not healthy. So we have to do something with the existing physical environment in order to make it healthier, to perform better, and to adapt to the needs and phenomena of the 21st century, like cloud computing. I think that that's a good opportunity for architects and for clients like the federal government to come up with some really important new ideas.

Partnering with GSA for the Metropolis Next Generation Competition actually started with me reading a Denver newspaper article about a Department of Energy building

that was built to produce its own energy and not take from the grid. As I was reading this, I decided to send a note to the chief architect [Les Shepherd] that said, Well, if the Department of Energy is doing this, is GSA doing it too? Because I've been really interested in how GSA is taking the lead with some larger ideas about sustainability and new ways of building.

So I asked whether GSA would like to be involved in our Next Generation Competition, which engages new, young design talent—students and designers and architects in practice for 10 years or less. They're not set in their ways and they're still navigating how to set up their businesses and even their thinking about design and architecture. They're also the creative minds who are technically savvy and environmentally aware, urban-oriented, and culturally connected to each other and to the rest of the world. I wanted to bring that energy to GSA, and at least give GSA some ideas about how it could make net-zero-energy buildings.

[Design Excellence Program Director] Casey Jones and Les Shepherd chose a 1960s Great Society building as the subject of the competition. I loved the idea of a real building. Then we rewrote the competition brief to fit the needs of that building. So we challenged young designers to think about how they would upgrade a specific building that had a lot of problems like a lot of government and other buildings from the 1960s. These buildings have huge footprints, and daylight doesn't get all the way into the offices, for example.

We'd been running this competition for nine years, and before, it was always young offices entering. This time, because the project was so specific and so sophisticated and so nuanced, it was the big offices who let their young members work on this challenge. They used it as a research project, which is very smart of them, because as architecture offices they have to get to the next level of their game. And they also know that in order to keep the young architects involved and interested in their offices, they're going to have to

innovate. So this was what happened in most of the cases: the entries were from young groups of architects within larger, more established offices. The winner was a group from HOK's Washington, DC, office, which collaborated with an engineering firm called Vanderweil, which has offices in Washington and Boston. It was long- and short-distance communication and collaboration, yet they worked as a very tight research group to make this thing happen.

In speaking with the designers, it was clear they used all their talents. They used their engineering power to measure the environmental performance of every design move as it was being made. It wasn't like one person designs it and then somebody else measures how it performs; the design was actually informed by performance modeling in real time. The competition was not only interesting for generating ideas for GSA, but it also proposed how to put together a new office.

A team like this is very interesting to watch and every firm does it differently. In the case of the winners, there's a young man, a sustainability expert at HOK—this contest was his baby. What happened in this case is that when the engineer needs to step to the forefront, then the engineer is the star. But there's always a coordinator, somebody who keeps it targeted.

This coordinator is identifiable first by a passion for the project, secondly by skills, and thirdly but not least important the ability to get everybody excited about working together. The leader also relies on people being independent; people for whom the end game overall is much more important than the potential squabbles that can happen.

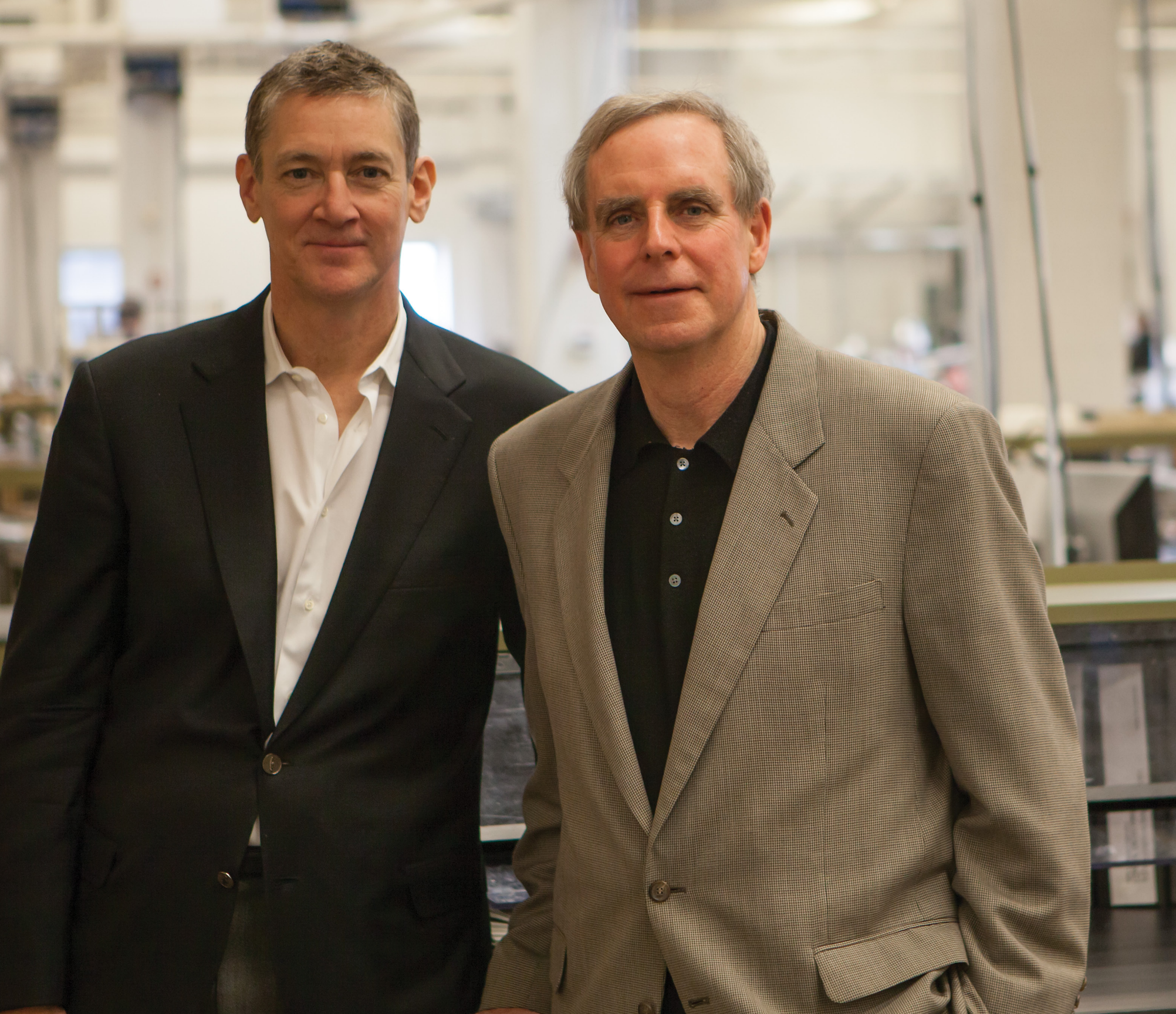
Trust comes up all the time, too. With HOK/Vanderweil, it was really interesting to watch how team members were able to get out of each other's way and were able to accommodate each other's expertise and listen to each other and question each other without being threatening. You can't attribute a project like theirs to one mind, because it's so nuanced, it's so full of information, it's so full of statistical probabilities.

Collaboration is key to getting something really complex done. Because we are asking very complex questions about architecture and design and planning, you need the complex structure of a team to produce answers. Right now, a lot of firms are learning this new choreography. I think it feels natural for the younger groups, just because they feel more connected through their social media experience.

Overall, the winning team needed to figure out how to get the building to the point where almost all of its energy was being produced by renewable resources. So every aspect had to perform. They modeled every skylight, and each one twists through the building differently, according to how the sun moves across that part of the roof. Somebody had to understand that the sun did that. Somebody had to understand what kind of light it would bring to the interior. Somebody had to model the actual structure. This is where collaboration is key.

That also meant breaking up the monotonous facade to help daylight penetration; integrating solar energy on a green roof that also absorbed rainwater; using geothermal. One of the most innovative things they decided was to install tubes of algae on the facade to purify the air around the building. This building is at an intersection of a highway, and algae thrives on carbon dioxide output. So the algae tubes not only clean the air, but also produce biofuel as a small part of the energy picture.

Much of this technology already exists, what happens right now is to make it better. The federal government really is the pacesetter. And I'm hoping for the next generation of architects and engineers and landscape architects and interior designers and product designers to work together more on the same problem, so we can have whole sustainable systems instead of piecemeal fixes.



JAMES **TIMBERLAKE** + STEPHEN **KIERAN**

JAMES TIMBERLAKE AND **STEPHEN KIERAN** ESTABLISHED KIERANTIMBERLAKE IN PHILADELPHIA IN 1984. SINCE THEN THE FIRM'S PORTFOLIO HAS EXPANDED TO INCLUDE PROGRAMMING, PLANNING, AND DESIGN OF NEW AND EXISTING STRUCTURES IN MULTIPLE BUILDING TYPES. ONE OF THE PARTNERS' FOUNDING INTERESTS—IN THE EXPRESSIONISTIC POTENTIAL OF A BUILDING'S STRUCTURAL AND MECHANICAL SYSTEMS—ALSO HAS GROWN TO ENCOMPASS MULTIPLE KINDS OF SUSTAINABILITY RESEARCH. THAT RESEARCH AND ITS MANY APPLICATIONS HAVE ESTABLISHED KIERANTIMBERLAKE AS ONE OF TODAY'S MOST PROGRESSIVE DESIGN STUDIOS. THIS *VISION+VOICE* CONVERSATION EXAMINES THE INCREASING IMPORTANCE OF RESEARCH PROFESSION-WIDE, AND DESCRIBES SEVERAL SUBJECTS CURRENTLY UNDER REVIEW INTERNALLY.

ACKNOWLEDGING THAT BUILDINGS ARE COMPLEX NETWORKS OF SYSTEMS UNDERLIES THE FIRM'S OVERALL APPROACH TO DESIGN, AS A PROCESS OF FINDING SINGLE SOLUTIONS TO MULTIPLE PROBLEMS. HERE, TIMBERLAKE AND KIERAN ILLUSTRATE THE DIFFICULTIES OF AN INTEGRATED PROCESS, IN PARTICULAR THAT ACCESS TO KNOWLEDGE MAY BE BARRED. USING THEIR WORK ON AN NEW SECURITY PAVILION FOR THE EISENHOWER EXECUTIVE OFFICE BUILDING AS AN EXAMPLE, THE PARTNERS SAY THAT GSA IS EXPEDITING CONTACT BETWEEN THE DESIGN TEAM AND THE FORTHCOMING PAVILION'S MOST INSIGHTFUL USERS.

STEPHEN KIERAN: We were founded on the idea of technology in design—looking at how systems impacted the form of a building, if you thought of the two in a really integrated way. A steel building with a self-bearing masonry skin. A cast-in-place concrete building with a panelized skin. We were exploring different systems' impact on architecture holistically, as opposed to forming ideas about the buildings and then just jamming the systems into them.

In order to get better at our self-questioning and questioning of the profession at large, we decided about a dozen years ago or so that we needed a more rigorous approach and more dedicated resources. So we founded a research group, initially just a couple of people with James and me. It has now grown to several people, and it undertakes really rigorous inquiries that come out of the making of our buildings and get applied to those buildings. The research also is general to the profession at large and to the development of products and processes and systems for the profession at large.

JAMES TIMBERLAKE: Designing with the environment has always underpinned our practice, as we started it in 1984, right after the oil crisis. And it has evolved over time. In the middle of the 1990s, we did a project for a middle school, the Shipley School, which looked very deeply at materials that were local and not toxic. It became a project that was seminal for work going forward. It began with an awareness about materials, their properties, and their relationships to one another, and about their effect on design and construction. Now we have moved more toward life-cycle analyses. But going back to Steve's use of the term holistic, this is one part of a toolkit we bring to any project.

SK: It's a term we use constantly here, because quality is not about any one single thing or system; it's about the integration of all of them, synergistically, in a way that the whole of a

building resonates way, way beyond any individual part. And that is a principle that applies mightily to an environmental aesthetic: that, if you pay attention to all of the problems a design is trying to solve, you can generate really extraordinary things. It makes for a more articulated, rich, and detailed building that people can look at and see what it's doing for them and how architecture relates to the world.

So we welcome constraints. We look at constraints as positive impetuses to innovation, to invention, to better integration—as ways to move buildings forward as responsible citizens in the world.

JT: It's a process delivery method, not a solutions delivery method. And I think one of the ways that architects have veered off track over the last 10 or 20 years is they focus on solutions first and then ally a process to this preconceived notion.

SK: Another aspect of the toolkit is measuring environment inside and outside buildings.

We have our own packages of instruments. We can do it remotely now—and get actual data on places before we begin design, and get actual data on our designs after they are built. And you can compare your predictive modeling to what actually happens and you can reflect on the differences, in order to potentially tune the performance of a building. You also find out what works or what doesn't work and modify systems designs and methods of integrating systems to get better results the next time around.

JT: I think another tool we use is simply gaining feedback from our consultants, our clients, and others in the delivery process. The critical thing then is to take that feedback, both the best practices and the failures, and improve your design the next time. No matter the typology of the building.

SK: What the profession needs is not just research, but discourse about that research. We need to share it to the extent that intellectual property interests and clients' concerns allow. We need to share it with each other, in order to provoke each other and broaden the base of research.

Most architects work in small entities across the world. One of the advantages of that is that we're nimble, and can move quickly in search of research topics that have merit. But the only way we're going to add up to something larger than a collection of small entities is through sharing and communication. That's the way we can advance ourselves as an industry, despite the atomized scale of individual organizations. There's tremendous opportunity there.

JT: An example of expanding our knowledge and then sharing it with architects: We found a disturbing environmental circumstance of at least one of our buildings where birds were hitting the glass walls. And we wanted to understand why those bird strikes were happening and what we could do to mitigate it. One of our research team members did a white paper on this, published it widely on the Internet, and it has been shared with the profession at large. I think it has also mitigated circumstances on several other glass buildings that we have gone forward with.

SK: The client has to be a willing participant in all this. It requires them sharing things that didn't work as well as they could have. In order for them to contribute to making better architecture, they too need to be self-reflective and open and willing to engage in making a building work better.

JT: That's the operative word: engagement. The clients who are engaged get better buildings, get a deeper commitment from all the participants that they are bringing to the table. I think our best buildings are those where the clients have been incredibly and deeply engaged.

SK: Through that engagement, they can actually improve their long-term cost of ownership, which is a far more important component of the total cost of a building than the initial cost.

JT: We won a border patrol station in northern Vermont that never came to fruition; about the same time we became peer reviewers in the Design Excellence Program. We then applied for additional work and continue to do so, because we think it's a building-delivery and agency form that we think we can get great success with.

I think GSA's peer review process has been intriguing and successful, in terms of an open, constructively critical process that engages GSA, the architects, and other project participants in an open conversation about improving the architecture that comes from the federal government.

Certainly, I think we don't treat the peer review process any differently from how we would expect to be treated—certainly in terms of how we go about designing holistically, looking at a project quite widely, and trying to help our peers move their buildings forward and to consider things that they might not have considered. In the case of the Eisenhower Executive Office Building project that we are doing—a screening facility and new entrance for the EEOB—we expect that in turn from our peer reviewers and our client group.

SK: We applied for the Eisenhower Executive Office Building, because there was a real important design problem inherent in that project. Over the last two-plus decades, security concerns have dominated some of our architectural responses to government buildings here in the U.S. and all over the world.

There have been two end results. One is, and I'll use the term perhaps dangerously, security blight has been retrofitted onto buildings that deserve better. The consequence is

that it becomes a very important part of the urban realm, particularly in a place like Washington, DC, where there are so many public buildings that have undergone security modifications. It's a different city now than it was a quarter of a century ago. So the design problem on the EEOB was a chance to address the security concern in a way that it could be thought through—in an integrated way, over time.

To us it's a huge issue, because it starts to change the way we perceive our government. It's a very profound and difficult design problem of our time, and we thought there was just an unbelievable opportunity with the EEOB to take it on, and to address how to retain the extraordinary quality of that extraordinary building.

JT: We were shortlisted to a very small group of architects as a defined limited competition, and we were selected from that group principally, I think, because we understood the constraints of the site, and we understood that security requirements are ever-changing. And, as Steve said, it's a prominent building that has great meaning, right next to the White House.

So, how do you design something that feels both welcoming and safe, while also enabling new security requirements to be incorporated into it without demanding changes to the entry sequence or the landscape? In this particular case, the design suppressed any structure by identifying the plaza in front as the potential for a building beneath it, essentially integrating it into the landscape below grade—but with abundant natural light coming into the building, to graciously get people in from the sidewalk. In an extensive, ongoing design process, that has proven to be a robust idea with GSA and the Secret Service and others.

It's been an iterative process working on the EEOB. We've had two peer reviews, we've had meetings in front of the U.S. Commission of Fine Arts. We've had a variety of meetings with our client groups. We're working with sometimes

competing requirements, addressing the needs of the client group as well as the design mandates of external circumstances like a federal commission.

It has been a unique process—one in which you receive feedback that you then need to be open and iterative and collaborative about, in terms of getting to the solution that is going to address all the requirements. They aren't necessarily insurmountable. Just like anything else that we do, working holistically, you can solve them quite graciously and creatively. But it takes multiple conversations, and it takes people remaining open to possibility.

As facilitators and managers, GSA and the Design Excellence Program have made the client available to us. Security is quite different now than when we first got the brief. And by conversing about it and by allowing us to show them multiple solutions, the Secret Service can come to the agreement about what they need directly with us. The facilitation of that has been absolutely critical. I think the very, very best Design Excellence projects have been successful because of that deep engagement with end users.

SK: Setting up a collaborative framework for a project fundamentally allows excellence at the end of the day. Sometimes, you can't get to the people that actually use the building and know it; there isn't the collaboration that provides access to the client's extraordinary intelligence about how activities function—how they come to be, how they come to pass—into a building. The Design Excellence Program does a good job in facilitating true interaction.

JT: The Design Excellence Program has deeply improved the relationship between architects and the federal government. It has resulted in projects on time and on budget, and it has resulted in more robust federal buildings that will serve the federal government for a very, very long time, and which are recognized worldwide as exemplars in architecture.

SK: The day a building opens, its embodied energy—the energy that went into all of those materials that make up the building, as well as the transportation and movement of those materials—is already substantial. It's about equal to 40 percent of the cost of operating the building over 40 years.

So, knowing that, one of the questions we are starting to ask is, If you have already expended half of a 40-year life cycle of energy on the day a building opens, then what are you putting into the building in the first place? How can we select materials that have lower embodied energy in the first place? How can we develop systems and integrated components that have less energy on opening day? How can we continue to lower that energy as the building operates?

That is deep knowledge the design profession is not thinking much about at this point. We're trying to understand decision making from the perspective of not just operating energy, but embodied energy. That's an example of an area where GSA could lead if it chose to.

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JT: One of the federal government's roles is to lead. And a private-sector economy tends to follow federal mandates and guidelines in a variety of ways. By leading in arenas of invention, innovation, and exemplary design, the federal government can bring the private sector into the 21st century.

SK: If you really believe that the energy we put into a building is of value, then the next question is, What happens to that value as a building starts to change? What happens to that value when the building is in the wrong place or of the wrong program and character?

Starting to think about ethical responsibility toward a building across time, not just at the time of conception, starts to change the way our buildings look. If you think about how to put something together and how it might come apart so that the energy that went into it could be reclaimed—that starts to change the way a building looks. Joints become more important again and exposed again, for example, because you are assuming responsibility for the origin and potential disposal of a building.

JT: You and I buy automobiles. The moment we drive that automobile off the lot, its value is immediately halved. When the federal government creates buildings, the building can't be worth half of its value the moment the first occupants walk into it.

SK: We see lots of clients who will accept the artistic novelty of architecture without ever questioning its performance. There are other clients that care almost wholly about performance and not a whit for the lasting artistic value of a building.

GSA has great balance. There is an insistence that the architecture of the United States both performs and has meaning. That's probably the thing we value most, this belief that you can't give a free pass either way. You have got to have both.



KEN WILSON

KEN WILSON WAS THE FOUNDER OF ENVISION, A DESIGN PRACTICE THAT PURSUED ENVIRONMENTAL RESPONSIBILITY IN ARCHITECTURE, INTERIORS, GRAPHICS, AND PRODUCTS. THE STUDIO RECENTLY JOINED PERKINS+WILL, AND WILSON NOW SERVES AS A PRINCIPAL IN THAT FIRM'S WASHINGTON, DC, OFFICE. AT ENVISION, WILSON WORKED WITH LEADING ORGANIZATIONS IN THE SUSTAINABILITY MOVEMENT, INCLUDING THE ENVIRONMENTAL DEFENSE FUND, GREENPEACE, AND U.S. GREEN BUILDING COUNCIL; THE COMPANY ALSO COMPLETED HEADQUARTERS FOR THE INTERNATIONAL INTERIOR DESIGN ASSOCIATION AND OFFICES FOR AL GORE IN NASHVILLE AND IN NEW YORK. SERVING ON THE USGBC'S LEED COMMERCIAL INTERIORS AND LEED CORE & SHELL NATIONAL COMMITTEES, WILSON PLAYED A KEY ROLE IN DEVELOPING THE LEED RATING SYSTEM, AND HE FOUNDED THE IIDA'S SUSTAINABILITY ADVISORY COUNCIL.

WILSON EXPLAINS THAT GOOD DESIGN AND SUSTAINABLE DESIGN ARE MUTUALLY INCLUSIVE, AND THAT ACHIEVING THIS OVERALL QUALITY REQUIRES DIALOGUE BETWEEN MULTIPLE EXPERTS. HERE, HE PINPOINTS EFFECTIVE METHODS FOR DISCUSSING DESIGN WITH THE MOST ESSENTIAL STAKEHOLDER OF THAT GROUP—THE CLIENT. AS A MEMBER OF GSA'S NATIONAL REGISTRY OF PEER PROFESSIONALS, WILSON ALSO REFLECTS ON SUSTAINABILITY IN THE CONTEXT OF LONG-TERM FEDERAL OWNERSHIP OF BUILDINGS. HE ADVOCATES FOR VERSATILITY TO ACCOMMODATE OBSOLESCENCE AND OTHER CHANGES IN GOVERNMENT SERVICES.

KEN WILSON: Integrated design is the way of the future. Previously the process was much more linear, in that an architect would come up with a design they were satisfied with and then they would kick it over to an engineer to figure out how to heat and cool it. Nowadays buildings are much more complicated, especially with multiple sustainable strategies and high technology, and you have to bring a much bigger group of people to the table in order to get the best outcome; you need to bring all of those people together very early and talk about the design holistically. I love to get input from our structural engineer, mechanical engineer, and any other consultants as early on as possible. The process is still led by the architect, but you have to be open-minded to accept that good ideas can come from anywhere.

Also, getting buy-in from this group is very important because it avoids misunderstandings down the road. Once a project starts construction, it takes on a life of its own and things can happen that are unanticipated. With an integrated approach there's no finger pointing; the group bands together and solves any problems that arise.

We like to set up clear vision statements and guidelines for a project early on, so with every decision down the road we can circle back to those statements and make sure what we're designing is supporting the original goals of the project. That's one way to help ensure a better outcome, certainly. For me personally, I like to see design that's driven by the functional requirements that were the genesis of the project. I like to let the aesthetic arise out of this process of pragmatic problem solving. I believe the most beautiful designs are those that are driven by their functional requirements, like an airplane. In order to accomplish the amazing task of picking 150 people off the ground and landing them safely a thousand miles away, the entire design

I LIKE TO SEE DESIGN THAT'S DRIVEN BY THE PROJECT'S ORIGINAL FUNCTIONAL REQUIREMENTS, AND LET THE AESTHETIC ARISE OUT OF THIS PRAGMATIC PROBLEM SOLVING.

of the airplane has to be completely functional, and the end result is really quite beautiful. As an architect, it can be challenging to convince a client of something purely from an aesthetic standpoint. I've found that clients respond much more positively if you say, Here are your problems, here's how I'm solving the problems, and here's what that looks like. I remember people looking at projects that we had done that were kind of edgy and asking how I got our clients to go there. It always ended up being a case where we solved a problem in an unusual way. Either the problem was a functional problem or a budget problem or something else—something other than an aesthetic problem. When you can show a client that something really works and helps their business, then they're much more open to what that could look like.

I have not yet gotten a client that says cost doesn't matter. With sustainable design, there's real potential for return on investment, so you can argue for a better quality design that, in fact, will pay off over time. In this country, we're obsessed with first costs, and that's really been a struggle. But you can take a client aside and say, Look, over the life of this project you're going to save money. Energy is the easiest to point at, certainly. We can increase productivity, too, though that's a little subjective in how you measure it. Reducing the energy

required for lighting is the low-hanging fruit. Right now lighting code is, pretty much everywhere, one watt per square foot. We're designing projects that get down to half a watt a square foot. What does that do to your cost? It's significant. When we designed the USGBC headquarters here in Washington, we cut out half the light fixtures, which ended up paying for a lot of the "added" sustainability strategy—occupancy sensors, dimming systems, upgraded mechanical equipment. Just by reducing the light fixtures, you can get an immediate payback. We recently did a study of the USGBC's energy use based on the 2011 calendar year. They are saving \$93,500 a year in energy alone, based on the Energy Star Target Finder baseline. So, it's pretty incredible.

Net zero is a much more aggressive goal, and I think for certain types of buildings it will be difficult to achieve, especially in urban environments where there's not enough roof space for solar panels or wind generators. You also don't always have direct exposure to sun because of the shadows cast by other buildings. The first thing to solve in this process is how to reduce energy use, and then you think about how to create energy with renewables to make up the rest.

Sustainability also means designing with flexibility for future uses. For example, I would imagine in the future there'll be large parts of the federal government that will merge, disappear, or otherwise change. I'm not sure in 10 years whether we're going to have a postal service like the one we have right now. As the federal government moves forward, an appreciation of this will likely drive the way buildings are thought about and they won't be so single purpose-driven. The idea of tearing down buildings doesn't always make sense either, especially in urban environments.

But I would also say that having a building of historic significance should not be an excuse for bad performance. As the owner and user of public buildings, the federal government is going to maintain its properties; they are not developing properties for sale at a later date. Presumably, they will control whatever they develop in perpetuity. So avoiding the teardown is important. The materials and technology you need for a highly efficient green building is available. The technology is not really state-of-the-art, it is state-of-the-shelf and it is available to anybody. For example, an automated shade system that can maximize daylighting and save energy is not a particularly innovative technology. It's just not in common practice, and more important, these technologies haven't necessarily been put together in a way that maximizes their efficiency synergistically. Architects are just starting to experiment with that.

You can't consider a project or a building to be an excellent design if it doesn't consider sustainability. We definitely can no longer accept designing with products or materials that are harmful to the environment or to people, and we can't knowingly design projects that are energy hogs. Sustainability is important to design excellence overall.