Q4

2020

REINVENTING ISSUE

DesignIntelligence
Quarterly

DesignIntelligence® Quarterly

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Contents

CONTEXT: REINVENTING

To culminate an inconceivable year of change, a year in which "truth" has been stranger than fiction, our fourth quarter issue looks at Reinventing - the anchor leg to our four-part series - with themes of Research, Reframing, and Redefining from the first three quarters.

To explore the notion of Reinventing, we feature interviews with managing principals from three leading design firms. From Grimshaw and Partners in the UK, Kirsten Lees discusses exploration as design process. HKS CEO Dan Noble offers a contemplative inside look at his firm's value-based makeover. To complete the trilogy, Troy Thompson overviews SmithGroup's restructuring and design process evolution in the current context.

For an out-of-industry perspective, Wireless Insiders Network partner Hamish Caldwell gives us a primer on wireless networks, their relevance to the built environment industry, and suggests new leadership skills. Dr. Calvin Kam's multitasking, boundary-crossing technology observations extend the frame internationally, to survey optimal recipes for private innovation and government technology mandates. RPI's CASE director Dennis Shelden

EDITORIAL ROADMAP 2020

GLOBAL GEOPOLITICS

DOMESTIC POLITICS   ENVIRONMENTAL DYNAMICS

"REINVENT"   "RESEARCH"

Q4   Q1

- THE FUTURE   - ACADEMY
- LEADERSHIP CONSTRUCTS   - PRACTICE
- RELATIONSHIP DYNAMICS   - INDUSTRY

"RESILIENCE"
ENSURING A FUTURE

DISRUPTION   RISKS

Q3   Q2

"REDEFINE"   "REFRAME"

- VALUE   INVESTMENTS   LANGUAGE   - CONTRACTS / APPROACHES
- SUCCESS   - COMPENSATION
- RESPONSIBILITY (ACCOUNTABILITY)   - CULTURAL PURPOSE
- IDENTITY   - TECHNOLOGY USE

speaks candidly in an epochal discussion of technology's potential to enable scaled analysis and simulation data to solve systemic problems. He answers the question: Are we there yet?

Design Futures Council Senior Fellows and regular DI Quarterly contributors Scott Simpson and Paul Hyett share more than a century of perspective in their respective essays Ripe for Reinvention and Pace and Place - Planet and Purpose. My three-way conversation with Dave Gilmore and Bob Fisher, and my own essay on Reinventing Leadership punctuate the need for firms to understand the 5 Tiers of Change and seize the crisis-driven opportunities that confront them. Bob Hughes' essay gives us a post-election economic outlook for 2021, and, hopefully - a post-COVID worldview.

For years DesignIntelligence Quarterlies proffered a series of scholarly interviews and essays to share world class thinking among the DI community. With an aspiration to maintain the quality of content and contributors, in 2020, we began an intentional journey to become more approachable. More accessible via digital media, a more graphical visual format, and a more personal, human tone. We hope our efforts have struck a chord for deep content.

Like you, we had little ability to foresee the COVID pandemic and other crises that have rocked this year and that seem poised to continue well into next year.

We hope that you benefit from this content - the collective wisdom of a dozen industry thought leaders - and that it spurs you to action in the year to come. We wish you a positive conclusion to what has been an unfathomable year -- and a better outlook for 2021.

Talking About Transformation

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DI's Dave Gilmore, Bob Fisher, and Michael LeFevre discuss 5 Tiers of Change and the principles of reinventing businesses.

Michael LeFevre (ML): Our theme for this issue of Design Quarterly is reinventing. Dave, you suggested the three of us come together for a discussion on transformation, as opposed to more gradual incremental change. I'm thrilled to be a part of it and to be here with you. Why is transformation so important?

Dave Gilmore (DG): I believe it's more than transformation. In my recent podcast, I talk about the five tiers of change. I'm most concerned with the last two in this COVID period. The first tier of change occurs through the natural passage of time. It's what we experience in our bodies, growing year over year, decade over decade. Our bodies change through the natural passage of time.

The second tier is marked by event-based, adjustment-oriented change. An event occurs, we adjust to it, and that creates a change. That is also incremental over time. The third tier is planned incremental change. Think of the discipline of project management. It's planned incremental change from a current state to a future state. The fourth tier is transformative change, and the fifth tier is change driven through intentional re-invention.

That last type is volitional re-invention and intention to do something. I've laid out this hierarchy or taxonomy of change for us to consider, because as I noted in the podcast, Heraclitus is attributed as saying, "The only constant is change." I think he meant simply the natural-passage-of-time kind of

change, that things change on their own, but he disconnected us from having autonomy in our choices to determine change. That's where we find ourselves now in this series of crises. They are forcing us to a new posture around change.

ML: I wasn't familiar with that structure. I'm assuming it's original to you.

5 Tiers of Change

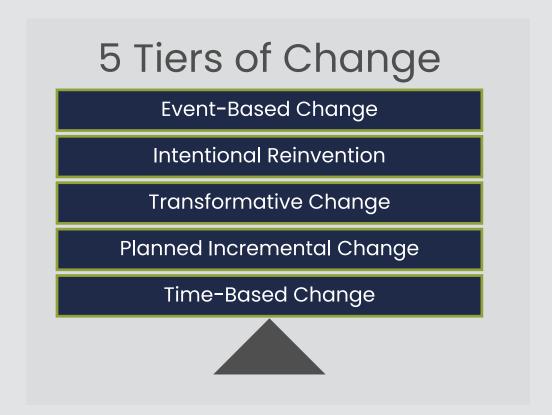| Event-Based Change |
|---|
| Intentional Reinvention |
| Transformative Change |
| Planned Incremental Change |
| Time-Based Change |

DG: Each aspect has had volumes written about it, but I assembled the five tiers into a taxonomy. That's how I think about it.

ML: You called it a hierarchy or taxonomy. It brings to mind Maslow's Hierarchy of Needs, although, I'm not sure it's hierarchical, where one tier builds on the last in importance, on a path

from base level survival to self-realization. In your model, the five types could be concurrent. Would you agree?

DG: They could be. There is a difference between transformative change and intentional reinvention. I talk about those differently, because I think of transformative change, like the transformation in a Chrysalis from the larva to the butterfly. What is so interesting in that transformation is that a gooey little thing inside a cocoon morphs to the unbelievable beauty we see in a butterfly or a moth. The interesting thing here is the DNA is the same. It's a change from one state to another, but the essence is the same.

Reinvention is dramatic. Several years ago, at the Design Futures Council in La Jolla, Billy Sorrentino, the former executive creative director and head of creative at WIRED magazine, challenged the audience to make sharp left turns. There wasn't the obsession with political lefts and rights we have today. He was simply saying: you get to this place and simply make a sharp turn. What

you're doing is radically changing direction, which changes the trajectory and the outcomes. You're reinventing altogether and saying, "The old is not satisfactory. We must create something new. Both transformation and reinvention are challenging us as an industry. The challenges have probably been in place for a while, but they've come to the fore now, forcing firms to make choices. Intentional reinvention is usually triggered by the question of relevance. When we realize what we've been doing and offering to the market might no longer be relevant, we are confronted with the choice to deny this irrelevance or reinvent our doings and offerings towards relevance. This is where the built environment industry is poised today.

ML: What a great framework to begin the discussion. Bob, through DI Strategic Advisors, you help firms with their business transformations. Why do you have a job? Why is it important for firms to transform themselves?

Bob Fisher (BF): The reason I have a job, and why that degree of change is important, has to do with what Dave just referred to: the characteristics of change in the time we're in. We're all experiencing a broader global environment and an industry changing more rapidly and fundamentally. These changes are coming at us quicker, more deeply, and with more lasting impacts. Those not prone to change or who want to stay the same are going to become irrelevant in the new context.

We're being challenged in new ways. Change is difficult, but that's not necessarily a bad thing. It's a clarion call for us to use our imaginations, to figure out how to respond to all this change happening, and how to be more proactively adaptive to stay ahead of it. Firms that recognize that are why I have a job.

ML: I think about Darwin and the sigmoid, S-curves, life cycle curves discussed in Jonathan Salk's book, A New Reality. Transformation is important because change, conflict, and these kinds of external events

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When we realize what we've been doing and offering the markets might no longer be relevant, we are confronted with the choice to deny this irrelevance or re-invent our doings and offerings towards relevance.

are inevitable. Those who deny them will decline more quickly or come to the end of their life cycle curves. We may not like change while it's happening, but it is inevitable.

Dave, during this COVID period, you've been insistent on the demand — and the opportunity — for transformation or radical change, almost to the exclusion of more gradual change. In your five tiers of change, a couple stand out that you're steering people towards. Why, and why now?

DG: Economic health did not wholly return to the Nation until 2012. From 2012, until early 2020, we have been on a radical expansion and prosperity trajectory. It's been unbelievable. As a matter of fact, it grew our economy at record levels, to become exceptional as the largest economy in the world, at close to 21 and a half trillion dollars during that period. In prosperity, revenue covers a multitude of sins. We get obsessed with the idea of revenue and prosperity, and we put up with inconveniences. When we're doing well, we don't take the time to fix the things that need to be fixed.

In some cases, the squeaky door that irritates us in other times just becomes acceptable, and we keep putting up with the squeaky door. In our prosperity over the last eight years, very few firms have taken the time to reconsider what transformation or reinvention might look like. Why? We're doing well. We're making money. As the old saying goes, if it ain't broke, don't fix it. But now we're in dire straits with backlogs atrophying. Most firms' backlogs are a third of what they were a year ago, and we'll be into 2021 soon.

Thousands of people were let go from their jobs within the built environment industry. And we've been hurt less than many other industries. The question is, will we squander these crises, hold on and hope we get through it and go back to our old practices, or will we use this as the opportunity for authentic change, authentic transformation, or possibly intentional reinvention? I don't believe we have the luxury of gradual change, if we want to make it through. This is not just another recession. As big and awful as 2008 was, this is not a recession like in the

early 1990s or 2000s, this is a radical change occurring in so many dimensions, not just an economic downturn.

This is a perfect storm of destruction — or opportunity. It requires action that will be uncomfortable, disruptive, and at times, disorienting. We must distance ourselves from old, unhealthy paradigms and forge new ones. That will require a destructive force in parallel with a creative one.

ML: That call has been clear. Why is this perfect storm such an opportunity? That seems counter intuitive. The normal reaction for most humans would be to adopt a defensive posture and wait it out. Why does crisis present opportunity?

DG: I track volumes of economic data on multiple fronts. Since December of last year I've watched the dramatic — almost overnight — changes in attitudes and behaviors of the large asset managers, global pension funds, and large hedge funds who serve as the foundational investment vehicles globally for much of what we do in our space. In

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> *There's a new set of thinkers in town. They come from the younger Gen X-ers, the Millennials, and the Gen Z'ers stepping up. They're speaking loudly about the things that matter to them.*

this ten-month period, I've watched them shift to becoming laser focused on climate change. They are actively withdrawing investment from companies not complying with the Paris Accord or the United Nation's sustainable development goals. News reports are highlighting an escalation of activist investment. You may have seen last week — Samsung is on the griddle because they put $14 billion into supporting coal mining investments.

People are saying: "Hold on. We're not doing that anymore," and that's just one anecdote of how radically things have shifted. I use that example because we're seeing something happen right now that we've talked about for the last few years. That's the shift in demographic thinking, values and attitudes. There's a new set of thinkers in town. They come from the younger Gen X-ers, the Millennials, and the Gen Z-ers stepping up. They're speaking loudly about the things that matter to them. We've watched that come to the fore. For example, in the Black Lives Matter movement that has gained force this year, if you watch the audiences, they're not all black.

The crowds are filled with Hispanics, whites and Asians saying, "Enough is enough. Enough systemic racism and prejudice. We're not going to put up with that anymore." As a result, they have teeth. It's refreshing. The same thing is occurring with climate change. Momentum is building regarding how we spend our money as a nation and as a populace. 20th-century spending in an oil economy is fast moving towards irrelevance. Extraordinary spending towards traditional defense is swiftly shifting to new forms of engagement. Across multiple dimensions, values and attitudes are driving new behaviors. Things will not revert to "the good old days." Organizations operating in the old paradigm are going to be left behind within 12 months. It's moving that quickly, because this is not an economic crisis isolated into itself.

We are going through a health crisis, a social crisis, a political crisis, an economic crisis, a climate crisis, and a severe crisis of truth. I could go on. Six or seven crises have come together to re-shape how, in the case of the American mindset, we will reshape a new set of values and attitudes. That will result over the

next three to four years in a radically shifted culture. That's where we are. The industry must shift to accommodate, support, and lead in this, as opposed to enduring and being dragged along behind.

ML: Bob, in the early weeks of the COVID outbreak, you were the first to articulate this. Your comment stuck with me. You said, "In a crisis, the first thing to go is perspective." From your perspective, why is this crisis such an opportunity?

BF: Dave painted a wonderful picture of the perfect storm of change happening in the world today. We are hurting for predictability and clarity. We're in a highly fluid situation. Firm leaders don't have full information with which to make decisions. In many cases, they don't even have adequate information. But they have decisions to make — many of great consequence. One of the best opportunities for firms is to get clear very quickly on their deepest, truest, authentic values.

Not just their stated values, but those they're willing to back up with action.

Because operating from a solid set of core values is the best chance they have to make decisions that will be right for the long-term, when the short-term is throwing so much confusion at you.

ML: In your role at Design Intelligence Strategic Advisors, you've had the opportunity to coach many firms in their own reinventions, both before our current crises and during. In this current context, what prevalent issues stand out as people are coping?

BF: Three come to mind, and they're familiar, because they relate to what works in other contexts. Trust is a key ingredient. Firms able to change rapidly have a good foundation of trust among their people, especially senior leadership, because there are going to be times where you need to take chances. To take chances collectively and successfully navigate those situations, you have to trust the people around you, and yourself. Trust brings a certain grace, because people will make mistakes. Things will happen.

At times, decisions will be incorrect, and it's important for the quality of the relationship and the leadership teams to have the kind of trust where they can say, "I know you had the best intentions. Things didn't work out as we thought, but we're still a team. We're still in this together, and we're going to move forward together." The second characteristic is awareness. By awareness, I mean of self and of what's happening in the marketplace. Firms living in the "dumb, fat and happy" paradigm had the luxury of focusing on what was on the boards, what was coming to them, and getting that work done.

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We see this over and over. Firms have a hard time thinking about the future because they've got so much going on in the present.

In this highly fluid changing situation, awareness is critical. Looking outside and making that part of the way that you do business every day. Now, awareness of self is also important, because firm leadership can often sugarcoat or look through rose-colored glasses at their own current situation, and not understanding their own vulnerabilities. They miss understanding the strengths they can leverage to get past those vulnerabilities. Knowledge of the firm itself and knowledge of the environment, or awareness, is the second big one.

The third factor is what I call courageous commitment to change. This relates to what Dave was talking about with intentional reinvention. Those two words are important when you're talking about making change on that level. To do that, you need to be fully committed. Not only that, but you need to be willing to take chances. A lot of courage is necessary to do that, because when leaders are making decisions about fundamental or radical changes, nobody knows how everything's going to work out. When things work out well, we can look back, and we can pat ourselves on the back for a degree of foresight we probably didn't have. But in the moment, it takes courageous commitment to change, to lead people through that kind of transformation or intentional reinvention.

ML: Dave, any follow up thoughts? You're talking to people all over the world. What are you seeing as people cope with this context?

DG: Interestingly, from a profit and loss standpoint, many firms have done very well in this current fiscal year of 2020. They built such a large backlog in 2019 that it flowed over to 2020. That backlog has sustained them this year. The problem is with the backlog they would be creating now for 2021. That's where the atrophy has occurred. The question, during a time of current prosperity based on last year's backlog, is: am I using some of my time, effort, energy, and money to do what Bob just talked about, apply courage towards transformation or reinvention? Or am I floating along, thinking this is like another recession and it's all going to bounce back next year?

It takes intentionality to look deep into the future and make logical, common-sense projections of what it could mean for me and apply courage by investing toward reinvention. There's no either/or here. There's a this, and a that. You maintain where you are while, in parallel, moving toward a reinvention trajectory. If we can use the idea of two train tracks in parallel, there will be a time when we will shift over to the reinvention track from our status quo track, but we have to build the reinvention track concurrently.

I love how Bob mentioned courage. It takes courage during a time like this. We're seeing various levels of courage. We're seeing folks doing nothing. We're seeing folks using the term "reimagine," which is not reinvention. We're seeing people tweaking, but not truly changing in

the resilient fashion we've been speaking about. Then we're seeing some firms who have put everything on the table and are moving intentionally toward reinvention. It's exciting.

We've been in touch with firms in Australia, the United Kingdom, Canada and across the United States, so we have a good survey worldwide, at least in those countries. It will be an exciting time when the dust settles. It won't for another two years. That's when we'll know who's left standing, who reinvented themselves, and who is hanging on by fingernails.

ML: I love your parallel tracks analogy. Transformation, revolution, or rapid change of an entire organization is dramatic. Something I'm not sure I've experienced in my career. While I have been a constant change advocate, the opportunities for wholesale change have not materialized. I've been in two firm mergers, changed companies, even changed industries from design to construction, but never been a part of an organization-wide, dramatic

transformation over a short time.

To cope, using your analogy, Dave, I've always adopted a two-pronged approach. I worked on one track with gradual, constant, incremental change, always on the lookout for those bigger opportunities where leadership was ready for that. It's rare to find, build, or nurture leadership that is ready for such top-down driven, full-on revolution. I'm sure people come to you asking for that help, but in other cases, you're there whispering and trying to change their minds. What have been your experiences in changing leadership mindsets top-down?

DG: Bob and I, and the rest of the DesignIntelligence advisors, operate from a set of principles. The first is, vision is a firm's ideal response to the future. Strategy is a response to vision. We begin with future, we then have vision, we then have strategy. We ask clients: what is the future telling us. We get such responses as, "I don't know, I wasn't given a crystal ball today," to, "How do we figure that out?" That's where we believe

any kind of strategic planning begins with research. It must begin with understanding what's happening in the greater world, and how the greater world dynamics impact markets. How will those market sectors respond to that greater set of global dynamics?

Then we need a vision of how we will respond to where those markets are going. When you do it in that structure, it starts to make sense to people. Suddenly they ask, "Okay, so what are you saying?" Well, you happen to be a healthcare design firm. My question to you is what's the future of healthcare? How are you going to figure that out? You do some research. Many firms come to DesignIntelligence and ask us to do the research for them or with them because we have such a pervasive reach and can access data and decision makers.

Together, we develop a future-state vision for that market. Then we ask firm leadership, "What's your response in a visionary way to this future?" That's where the challenge is. Because if you're a pure architecture

firm today, and you're watching, in my example of healthcare, radical changes occurring in American healthcare delivery — as well as in the economics of healthcare, an area radically challenged to stay buoyant during this time — you realize that's probably going to translate to fewer hospitals being built. So, what do I, as a traditional healthcare design firm do in a context like that? That's where vision starts to come into play. Bob, additional thoughts?

BF: Mike painted a picture of change focused on emerging opportunities. It's possible, especially in a situation where a major change is happening,

like a merger, to find opportunities to create unexpected, positive change. In special circumstances, those changes may even stretch an organization beyond where it thought it could go. I'm a big believer in seizing opportunities when they arise. I'm also an advocate of trying to create positive change from any level in an organization. But it's nearly impossible to create transformative change or intentional reinvention using an opportunistic, ad hoc approach.

Transformation or reinvention happens when organizations are fully committed and capture their deep

intentions in a vision and a plan. Those plans need to be supported and led by the executives and driven at all levels of the firm. Everyone needs to be all in on fulfilling a collectively held vision—especially the collectively held visionary response to the future Dave talked about.

ML: **Were any of these transformations generated bottom up or middle out?**

DG: Yes. One client had issues and came to us. People were leaving. They were saying, "We're stuck. This isn't going to work." After exit interviews and confrontations senior leadership realized, "Oh my gosh, we have a hole in our boat. What are we going to do?" They finally woke up to the idea that something had to change. They didn't call it transformation or reinvention. They just said, "Something has to change." And we got called in to assist with that, to highlight what could that look like, and to diagnose why people were leaving. It ended up being led by senior leadership but was incited from the middle. Extraordinary

Change Drivers

Top Down   Bottom Up   Center Out

things happen when that occurs, because it's not top-down.

BF: My answer echoes what Dave was saying, but you presented a false dichotomy—the idea that change either comes from the middle or below, or from above. Truly effective change has to be supported by leadership and led in some way. That doesn't mean the roles in change are lesser for the people in the middle or toward the bottom of the organization. Nothing could be further from the truth. Because change will never be effective if it's not led, bought into, and earnestly carried within everyone in the organization.

Organizations good at changing are often smart about communicating the need for change — a vision for how things can look at the end of a positive change path. They are intentional about how they include people in key parts of the organization in creating that change to bring everybody in the organization along through communication. These ideas apply to any firm that's going to successfully navigate the times we're in.

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Reinventing Leadership

In changing contexts, we need new models and skills for an old role.

MICHAEL LEFEVRE

FAIA, Managing Editor,
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Rarely discussed in architectural studios, leadership may seem a distant, ancient skillset, little changed in recent centuries. The average architect likely feels it has scant applicability to design. Such thinking is mistaken. Why? Because the design profession needs leadership now more than ever. And the art of leading has changed drastically from its "set a direction and command boldly from on high" days of old. How so? The pace of change since March 2020 has been bewildering. A global pandemic, an economic recession, job loss, business closures, lingering racial and social inequity, political divisiveness, and an environmental tipping point threaten life as we know it. Old leaders and their obsolete approaches won't do anymore. We need new models and skills.

NEW LEADERSHIP SKILLS

In support of the above hypothesis, I offer some new leadership skills to cope with a post-COVID design industry and world.

1. Know Your S-Curve
To address these new contexts, new leaders should start by learning about the S-shaped lifecycle curve of any living system: rapid growth in the organism's early years that slows in maturity and falls off as the organism eventually dies. Those

who don't appreciate this curve will fall victim to it. S curves tell us the inexorable march of decline faces us all — whether we admit it or not. Admit it we must. In his book, A New Reality, Jonathan Salk illustrates the sigmoid life cycle curve that governs all living systems. Where are you on your curve?

Those who refuse to mitigate their own S-curve with Darwinian adaptation and evolution will suffer from stagnation, failure, and extinction. Why reinvention? Because as the world changes, so must we. Whether by self-induced equilibrium punctuations or externally driven chaos events, leaders must induce self-evolution by anticipating and reacting to the changes happening around them. Those who do will reap the rewards of reshaping their S curves – a benefit when changes aplenty are afoot.

2. Know What's Happening: Situational Awareness

A second critical leadership skill for our new world is situational awareness. In a world changing more radically than ever before, any leader's duty is to continually look out, up, down, and around in multi-directional awareness to constantly reevaluate and reset direction for their organizations. More akin to the attitude of an Army Special Forces or Green Beret soldier than a designer sauntering through a design exploration, leaders bear responsibility — to themselves and those who follow them — to be aware. This need has always been present but beckons louder these days. Looking, seeing, absorbing, and filtering sensory data must now occur at a frightening pace. Now that data exceeds humans' abilities to process it in time, and some of it is intentional disinformation sent by foes to misdirect us, we need new ways cope with infoglut. Filters, teammates, and new ranking skills for admitting, absorbing and processing information are required.

3. Know Where You Are - And Where You're Going: The Heisenberg Uncertainty Principle

Drawn from physics, the Heisenberg Uncertainty Principle, rephrased and reapplied for a lay audience, states: the more you know where are, the less you know where you're going. And conversely, the more you know where you're going, the less you know where you are. If you find yourself on a NASA spacecraft hurtling at light speed toward earth at a given trajectory, you can predict with certainty that you'll reach your destination. But because of your velocity, you have little ability to accurately know where you are at that moment. [1]And similarly, if your craft – let's say your car – is still in its parking space at the office, you know precisely where you are, but you have little certainty where you'll go, You could decide to drive home, go straight, or turn left, and all at yet to be determined rates of speed and vectors. Leaders understand these two extremes and factor them into their decision making. And to help themselves along the way, they look for buoys and guideposts in their journeys. Look for yours. Take the long perspective. Know better where you are and where you're going.

[1] My reference may not be accurate at all macro and micro scales. Hell, I'm not a physicist. But the dichotomy of Heisenberg's uncertainty principle still holds appeal, and I apply my variant in the common English sense. For design firm leaders, the question is: can an organization know both its location and its vector simultaneously?

4. Take Risks

Because of the greater uncertainty we face, another leadership skill now in high demand is accepting, taking and managing risk. For a century and a half, the profession of architecture has evolved at a glacial pace. By all admissions, and by design, design has been a gentleman's profession, intentionally distanced from commerce, risk, and speculation. In school, we weren't taught to even consider risk, much less manage it. We were taught to focus on the art and the science of design and building. A distant third category was business. With an already full curriculum, there was little to no discussion about context, strategy, leadership, or making change.
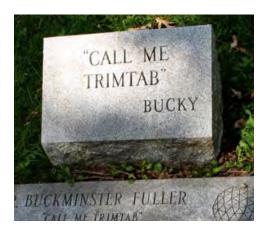
Nassim Nicholas Taleb makes several excellent points in his recent TEDx talk, entitled "Skin in the Game." https://www.youtube.com/watch?v=uv6KLbkvua8 To paraphrase, he posits that any business which is judged by its peers rather than reality is doomed. As an example, take weather forecasters. They are only valuable when their predictions are accurate, not when they agree with other networks forecasts. y I'd suggest architecture be added to that mix. Our focus on design awards is narcissistic— we need reality and consequences to hold us accountable. Things like clients, users, and P&L statements help us achieve that. Only recently are a few bold design firms beginning to measure carbon footprints, energy use, building and human performance, and life cycle cost (the only meaningful cost metric). Without further punch-pulling: architectural firms must change their relationships to metrics and risks. They should be willing to wager their own profits on real performance metrics, and clients should be skeptical of any designer unwilling to share the risk of implementation. And maybe, just maybe, architects should also be rewarded more handsomely than with mere trophies when their performance is exceptional – as measured by the performance of the buildings they design for their clients.

Taleb calls these truths simple Darwinian survival, because systems learn at a biological level. They change at a cellular level. By learning and changing over time, they eliminate cells with the wrong traits. As a result, the unaccountable, maladapted organisms don't survive. They die. In a final ancient counterintuitive reminder, Taleb cites Hammurabi's code. The edict "an eye for an eye" tells us: we must own our own risks. The aggregate upside for newly adapted risk embracers is a better outcome for clients, designers and communities alike.

5. Be A TrimTab: Catalyze Small Scale Change

Buckminster Fuller's tombstone epitaph reads: "Call Me TrimTab." By this he refers to the small flap seen on boat rudders, particularly large ocean liners and cruise ships, whose job it to turn, catch some water, and overcome the inertia so the larger rudder then turns the ship. His notion of the trimtab as an analogy to reflect the power of small, personal, local, and well-placed change to effect greater change is captivating. New leaders need to understand and convey the power of trimtabs to their extended teams in making precise yet minute adjustments to the overall machinery, such that minimal effort leads to maximum directional change.

6. Go "Zone": Use Rotating, Shared, Collective Leadership

I was privileged to be a part of strong band of friends growing up. We played sports together, got in trouble together, and retain strong bonds today – those of us still above the dirt. We enjoyed great success in those years and still do today. What was our secret? We had no singular leader. In sports parlance, rather than lead "one-on-one" or "man-to-man" we employed a "zone" defense. Each of us had a "zone" of expertise that rotated and flowed in response to our teammates and context.

Each of us possessed unique skills that were respected and deployed situationally to create a stronger-than-its-parts leadership team. Each of us led in different ways at different times. One of us was the smartest. Another the fastest. Yet another was politically and socially connected. He was a class officer and tennis captain and legitimized us. He was so focused on saying the "right" things, we branded him "Eddie Haskell." Another of us had great skills in deceit and chicanery. He also was the best athlete, at one point being

scouted by the New York Yankees. Another friend was the free-spirited lover of life, always willing to challenge conformity and authority in search of his next adventure on a lifelong existential, Zen journey.

In leadership times, because of our trust and group outlook, we intuitively knew which leader would step up in any given situation. Because they simply did. When one of us fumbled, that leader would step in with a pep talk: "Get yourselves up," he'd yell. "We'll pick you up on the next play." When we were in trouble, Eddie Haskell would step in to complement the teacher on her dress. Because we knew our limitations and valued group over self, we respected and relied on our diversity. We never turned to a single leader. We were a band of equals, radically different, but committed to the group. How lucky we were, and still are. Business, firms, and governments should be more like we were, because no single person can know everything they need to anymore. Those who deconstruct and expand the role will better position themselves for change. Even if you're

required to have a single leader, learn to widen that leader's impact by activating experts beyond their formal leadership team.

6. Keep Going, and Never Finish: The Zeigarnik Principle

There's an old Woody Allen adage that tells us just showing up is half the battle. Beyond showing up, the follow-on advice touches on the value of persistence. Keep going and never give up. You'll win out in the end. But I want to add a third nugget, a secret psychological principle that can help us all. It's called the Zeigarnik Principle, named for Russian psychologist Bluma Zeigarnik. In psychology, it states that an activity that has been interrupted may be more readily recalled. It postulates that people remember unfinished or interrupted tasks better than completed tasks, and that open ended, incomplete encounters heighten focus. They hold our attention and keep us on task. For example, remember Robert Ludlum's thriller beach books about Jason Bourne? As you turned the pages, Ludlum would place his hero in another precarious position, and

on the last page of each chapter leave us with a scenario such as: "Bourne saw the assassin through the window across the 10-story light court below. Poised, he leapt through the window and…" Ludlum left us to wonder what happened next. That's the Zeigarnik Principle. Intentional open-endedness. We see it in TV sitcoms, serial dramas, and other places. Even after having coffee with a friend we might end by saying: "Let's do this again." It gives us something to look forward to. As a result, we are more aware, engaged, hopeful, and positive. Creating a built-in open end keeps us focused, purposeful, intentional, and curious. More alive. In that regard, I feel sorry for friends, neighbors and colleagues who respond to the question: "How are you doing in COVID times?" "I'm bored."

The best projects and meetings are ones in which we discuss a trend, a learning or sharing opportunity, or a crisis, problem, or new initiative to be solved. We're evolving, growing, moving toward something: a common can't-fail goal. We're not being stagnant or regressing. When it

Bluma Zeigarnik – Internet Photo

comes to your life and work, my advice is simple: use the Zeigarnik Principle. Keep enough initiatives going so you always have something to do, to work on, and to look forward to. In that way, your work is never done. It keeps you young and ever changing.

7. Cycle Quickly. Change Radically. One of the most dramatic lessons of the COVID pandemic has been how quickly large organizations have been able to reinvent themselves when forced. In our DI November virtual event, The Future of Environmental Responsibility, presenter Richard Palmer shared the remarkable story of the Australian government, who reacted overnight to fund and solve their country's homeless problem as a pandemic response by putting homeless people in vacant hotels. At home in the US, nearly every business was forced to learn how to reinvent themselves in mere days to be able to work from home. The US Congress acted relatively quickly – by partisan congress standards - to legislate and implement the PPP stimulus bill. Hundreds of pharmaceutical companies reacted at warp speed to develop clinical trials for possible new vaccines. How were these entities all able to move so quickly? They had no choice.

In all these examples, organizations continued to operate — doing their primary functions and day jobs, in some cases more productively than before – while they bore the added pressure of reinventing themselves! This kind of speed and success at rapid change makes one ask: What the hell were they all doing before?

Yes, forced change can be a good thing. We change when we have to, but we'd rather have some advance notice. Consider this your notice: change is upon us, don't squander it. And it will come again. When it does, be ready. Fail early and often. Entrepreneurs of all different risk profiles employ thinking from the risks down. They use rapid prototyping and iterations to analyze and simulate outcomes. Michael Schrage's book Serious Play is a fine investigation of rapid prototyping as a simulation, iteration, and risk management tool.

WHERE DO YOU START?

Where you begin to change your leadership approach, by necessity, must be up to you, because it's unique to you. But here are a few possible points of beginning.

Embrace Change

In the COVID context, don't complain, don't wait. Embrace the sudden change. Seek new rhythms and patterns of connection, communication, and creation. Despite our early hopes, the pandemic will not be gone quickly. While we may have to retreat into a shell and self-isolate physically, don't do it emotionally. Keep active. Keep connected. And find what's next.

Leverage Technology

One possible point of beginning is technology. In many firms, technology is still tangential, not assimilated. A tool, not an integral way of life and working. Every firm should have a technology strategy and plan to prioritize and fund it on an ongoing basis.
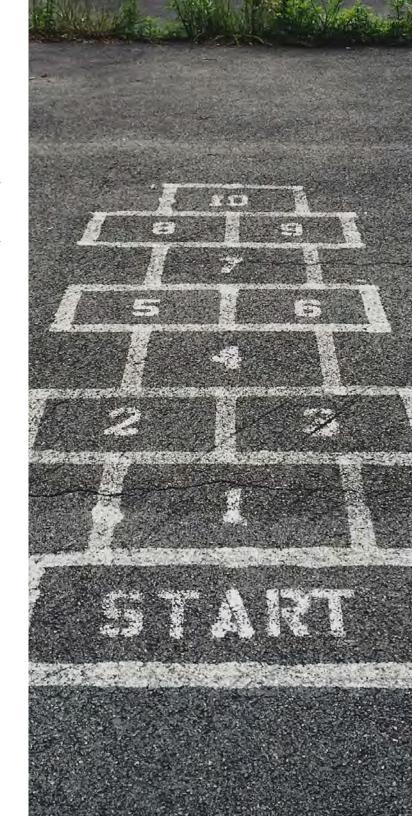
Break Boundaries

In assessing your own current location and destination in a self-audit, consider looking beyond the design business space. Look at events happening around you and affecting your organization to spark change. Blow on those embers and turn them into grassroots brushfires and blazes. When you see a fire burning in the eyes of a talented associate create a role or an initiative for them. Let them do what they love.

Start with Why: Meaning and Purpose

Having viewed the larger context, study those reasons that led you to change. Good leaders are clear on why they are doing what they do. We should all be. To be purposeful in connecting people, giving back, and showing meaning, I suggest reading Viktor Frankl's classic book, Man's Search for Meaning. In it, he outlines four sources of meaning:

- work or vocation
- a significant mentor
- a life changing experience or epiphany, and
- aging gracefully

> "
>
> *"You have to die a few times before you can really live."*
> *Charles Bukowski*

The lucky ones among us have had the benefit of finding more than one of these, or even all of them.

Expand Leadership, Collaboration, and Connection (We Need Each Other)

Deputize your teams to contribute, engage and commit. Make conscious plans and investments in connecting, being thankful in work, health, wealth, family, and friends. Create a new personal sense of sanity for how you relate. Do it for yourself and for those who need you. There's something counterintuitive in the people who comprise the design professions. Although many are introverted, when their projects are done, people who like to design buildings are dying for the chance to share it with someone. Surprise. The reality is we need each other. That's how life works. Connecting with people is work, an important aspect of the job. We must stop relying on the denial, divide, and cancel cultures as solutions to things we disagree with. We all have biases and beliefs - and stories of struggles and difficulty. Let's reinvent our default mode to look for the wonderful chances to share, connect, and find common ground. We are privileged to get to do what we love. Let's bring collaboration back with conscious actions and strategies.

Be a Continuous Learner

Learn from the process and be a student of the game, strategizing – and leading – out loud. Avoid "one and done change" mantras.

Go Beyond the "Project Mentality" – Adopt New View Horizons

As designers and builders, most of us have an ongoing need to effect change, make progress, and get things done. We need movement and progress from A to B. We have to be going somewhere, even if it's just staying busy doing what we love. Besides, that keeps us from having to focus on important things.

A good number of us thrive in these short-term purposes. Some call it the "project mentality." We have to have a project. But true leadership demands a longer-term vision, or view horizon. Managers follow the vision. They adjust resources to maintain and keep that vision — their project — between the lines. Leaders, with the help of their teams, determine

that vision, and are responsible for monitoring and redirecting it when required. Managers do things right. Leaders do the right things. Henry Ford knew this distinction: "there is no worse fate than doing with the utmost efficiency, that which should not be done at all."

THE NEW LEADERS?

Just who are the new leaders I'm talking about? Not the current leaders, firm founders and principals nearing retirement. Most of them are more interested in maintaining the status quo, surviving until it's time for them to retire. It's where they are on their S-curves: they have far less need to reinvent themselves or their firms. Emerging leaders have the most to gain from reinvention. As mid-career professionals they've been around long enough to know the industry and its problems. They have suffered the inefficiencies in their firms and industry. Their processes and peers have felt the pain. They see the need for change. And they need to begin the process now — in a way that's unique to them and their firm

— to have benefit. To leave their firms a legacy of continued excellence, firm founders should be actively finding the next generation of emerging leaders.

In an ironic twist, COVID may have an unintended consequence as a "boot camp" for current leaders transitioning out of their firms. Having more time alone or working from home may have given them time for reflection. COVID has perhaps given them a preview or practice run at being empty nesters, retiring, or turning over the reins. Or maybe it's spurring them on to contemplate their next evolution in the design industry — as mentor, or experienced contributor in some new way.

The new generation of leaders is coming of age in a time where they have been shaped with new perspectives and values. Advocates of equity, diversity and inclusion, and environmental issues have different values about capitalism, racism, home ownership, and fossil fuel use. They have these new values because

they grew up in a different context. They need them because they are now are faced with leading a radically different world.

REINVENTING MYSELF

In my essay last quarter entitled New Rules, I proposed suggestions for new leadership. Some might ask if I followed those rules myself. The answer is yes. In fact, I went beyond creating new rules. I reinvented myself on countless occasions. To catalog this shapeshifting, here are a few of the roles I've had over the course of my more-than-50-year career as an "architect." I'm way past my allotted nine lives.

As an "architect", I've been a student, teaching assistant, research assistant, invited lecturer, adjunct instructor in architecture, drafter, carpenter, laborer, graduating to roles as project designer, project architect, and associate design director, project manager, and principal. I've been a member of the AIA, NCARB certified, LEED accredited, and

elected to the AIA's College of Fellows, now Emeritus status.

After crossing the line to join a national CM firm as an industry change agent and evangelist, I founded roles, services, and departments in planning & design support services, building information modeling / virtual design & construction, and design management.

In my latest iteration as speaker/mentor/writer/editor/ and strategic advisor I've morphed into a keynote speaker, advisory board member at several universities, author of an Amazon #1 new release: Managing Design (Wiley 2019), principal at DesignIntelligence Strategic Advisors, and managing editor, DesignIntelligence Media Group.

Have you had enough? If so, try this kind of self-assessment exercise for yourself. It will energize you to the history of – and possibilities for – your own reinvention.

RESPONSIBILITY TYPES

DI's Dave Gilmore speaks to four responsibility types among the design community:
1. Leadership
2. Environmental
3. Relationship (interpersonal and societal)
4. Business and Financial (including operational, and administrative matters and profitability)

Do you have the requisite skills in all these areas? If not, you may be ripe for reinvention. Or, as an alternative, augmentation from other resources.

BE OPEN. BE VULNERABLE: RETHINK AND REINVENT

DI's editorial theme for 2020 was a cycle of redoing things: Researching, Reframing, Redefining and Reinventing. As we end the year and look forward to a better 2021, we urge you to allow yourself to express your vulnerability in the appropriate contexts. If you're open, I can give

you something — and vice versa. Give the benefit of the doubt to those you trust. Listen, and always be looking for new ideas and perspectives. Look for experiences different from your own. Practice role reversal: strategic reinvention and business insight can result. We offer this menu of options for your consideration.

We wish you good fortune in your quest for new and provocative ways to reinvent leadership.

Michael LeFevre, FAIA is Managing Editor of DI Media Group Publications, and the author of Amazon best seller new release - Managing Design, (Wiley 2019.)

Pace and Place,
Planet and Purpose:
Reinvention Required

PAUL HYETT

PPRIBA and Honorary Fellow of AIA

Paul Hyett's perspective on the pace of change gives pause for thought.

THE WORLD WE LEFT BEHIND

If Christopher Wren had walked into my father's new office, he would have felt very much at home. Albeit a small practice, like architects' offices of all sizes across the country and around the world, the basic tools of the day were very much as they had been down the centuries: refined but largely unchanged.

Sir Christopher would have been familiar with Dad's drawing board, T square and high draughtsman's stool, his pair of compasses, dividers, the multitude of pens of various thicknesses, the pencils from hard to soft, and the many other fine instruments required for making those marks on paper intrinsic to the processes of design. Those marks slowly and surely became ever more clearly defined until, ultimately, they were copied and transported to the site where skilled craftsmen would translate them into reality.

The staff and dumpy level used to assess terrains, the tape measures, scale rules and set-squares, the brushes and colour washes, erasers, dusters, draughting tape, drawing pins and lettering stencils – even a plumb-line: Sir Christopher would have been "good to go" without a word of instruction or explanation.

Or perhaps not quite: it was 1972 and Britain had just "gone decimal." Not only had shillings and pence been abandoned, but our beloved feet and inches had been replaced with metres and millimetres, and our pounds and ounces had given way to the kilo.

But Wren would have mastered such changes in moments and taken just minutes to come to grips with the telephone (securely connected to the wall by wires) and the little battery-operated calculator — great for doing those complicated calculations. And, of course, the electric kettle and the fluorescent lights would have been welcome comforts — to say nothing of the heating.

THE OFFICE REINVENTED

Fast forward another fifty years and this most revered of architects would be completely lost in my office of today. So intensive and extensive are the learning and training necessary to operate current IT systems and equipment that the process must begin pre-school. Generations of professionals of all disciplines are being left behind, floundering and incapable, as system and

> *Such changes and radically new equipment and methodologies transcend previous innovation of practice: the architect's office has been completely reinvented over these last three decades.*

communication developments accelerate along an exponential curve.

For the drawing board, wonderful paraphernalia, and instruments in Dad's office, substitute the modern computer screen and its array of programmes: Revit and Rhino; systems like BIM and parametric design; Zoom, Microsoft Teams, WhatsApp and WeChat for communication. For archives, plan chests and the multitude of filing cabinets, take The Cloud. For physical state take cyberspace and virtual reality. Such changes and radically new equipment and methodologies transcend previous innovation of practice: the architect's office has been completely reinvented over these last three decades. The journey to reinvent the architect's office started with Rubenstein and Barnaby's word processing in 1979; then progressed through the fax machine (common from the early 1980s but invented back in 1846); the mobile phone (1985); CAD (1989); websites (1991); Google (1998); screen sharing (2014); and all the other contemporary tools that have

transformed design and construction from physical to virtual processes.

The breath-taking scale of this reinvention is now being further accelerated, courtesy of Covid-19. As has been noted far and wide, we are entering a new "norm" from which there will be no return. The pre-COVID office that, despite its systems, technologies, and virtual connections within and beyond, had stubbornly endured as both a physical reality and an institution, cannot and will not survive. As a hub where workers occasionally meet in real time and place? Perhaps. But as a work setting, with the restrictive demands of assembly and nine-to-five entrapment? We are witnessing its death throes.

Just as our towns and cities have suffered the upheavals of shopping centres and out-of-town malls replacing the High Street, and the disinfecting choreographies of mail order and on-line food delivery have replaced our shopping excursions, so our commercial landlords face the imminent collapse of that hitherto bastion of investment: the office. We are witnessing the phenomenon of

collaborative assembly dissipate into a dislocated corporate condition: the virtual office matrix.

REINVENTING THE CITY

This is where we designers must shift from a reactive assimilation of the skills necessary to survive and compete in the digital world of an office environment that has been reinvented and virtualised around us, to the proactive role of using our programming and design skills (our 'stock in trade') to reinvent the very essence of towns and cities as we currently know them.

In this respect, everything is up for grabs, and all norms will be swept aside. To quote Brennar Bhandar, even "the conceptualisation of wealth as a fusion of the value of land with the value of people," initiated through the thinking of that father-founder of the modern political economy, William Petty, will inevitably be challenged as never before.

Our recent dalliance with globalisation; the ability of multi-nationals to shift materials, production and capital around the

> *This is where we, as designers, must shift from a re-active assimilation of the skills necessary to survive and compete in the digital world of an office environment that has been reinvented and virtualised around us, to the pro-active role of using our programming and design skills (our 'stock in trade') to reinvent the very essence of towns and cities as we currently know them.*

world in pursuit of obedient and competitive labour sources; the desire of our large corporates to provide services tax-free across borders — all these agendas are up for review and revision. So too is the essential purpose of our cities and their buildings. As IT-savvy urban populations relocate to their new sub-urban and rural home platforms, the dinosaurian fabric of the commercial city will be rendered increasingly redundant. For architects, urban designers, planners, and engineers, the challenges are immense: our cities need to be reinvented in terms of programme, and their existing fabric must be retrofitted to new purposes hitherto unimaginable.

Despite the extraordinary impacts of IT that now threaten our essential concept of place, the challenges can only intensify as the very notion of freedom — so beloved by the West — is threatened by the escalation of a multitude of factors, such as monitors, sensors, barricades, business closures, and masks. Against all this we will see the increasing

phenomena of migration not only from strife and economic catastrophe, but also increasingly consequent on climate change, as our global populations continue to grow exponentially:

Taking one million years to double from two and a half to five million in 8000 BC, the world's population doubled every thousand years thereafter through to 1650 AD, when it reached five hundred million. It doubled to one billion less than two hundred years later in 1805 AD, while the next doubling took only until 1930. By 1974 it had doubled again to four billion. Today, the global population is nearly eight billion souls.
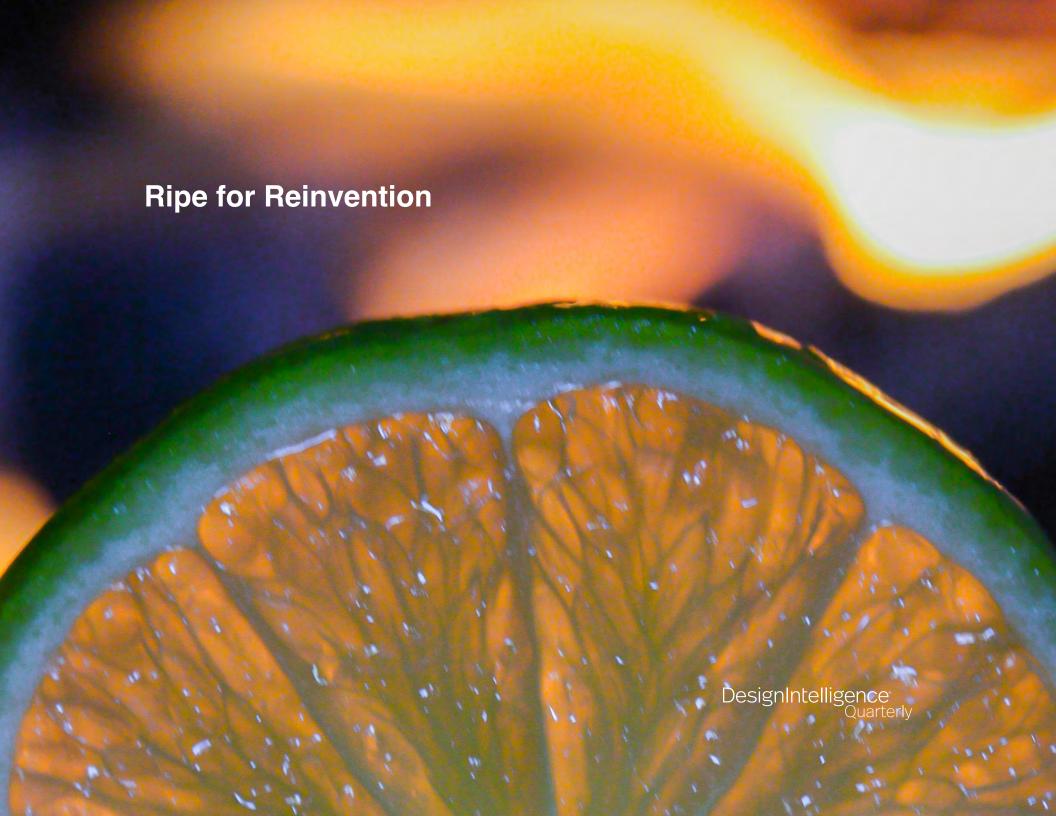
So, here we find ourselves, at a second to midnight. Population growth attenuation, education and sustainable lifestyles have emerged as challenges against which our politics appear increasingly unable to cope, the eco-systems of our world struggle, and disorder threatens from every side.

REINVENTING OUR WAY OF LIFE

But our resolve must not falter. Just as the developments in information technologies and communication have prompted the reinvention of the very ways we work and live, so we must now reinvent our relationship with both planet and place. As never before, the very purpose of our cities and their buildings needs reinvention. Now cities must accommodate their functions as safe havens and adaptive organisms.

Design intelligence has never been in greater demand.

Paul Hyett, RIBA, Hon FAIA, is a founder-partner in Vickery Hyett Architects. He is formerly a Principal with HKS Architects in the UK and is a regular contributor to DesignIntelligence.

Ripe for Reinvention

SCOTT SIMPSON

FAIA & Senior Fellow,
Design Futures Council

Scott Simpson posits "life cycle value" and service as new mindsets for design thinking in an industry ripe for change.

Covid-19 has had a huge impact on the A/E/C industry. In the early stages of the pandemic, construction in some markets was shut down entirely. Design firms began living on backlog and with new projects so scarce, many firms experienced significant layoffs. The talent pipeline is drying up, as there are no jobs for new graduates. While things have started to rebound somewhat, it is clear going forward that the demand for many project types (especially retail, hospitality, and office space) will be particularly hard hit, and it could take several years to recover. This is not a time for business as usual.

That said, the Covid-19 crisis is not the only—nor even the most important—reason design and construction are ripe for reinvention. For decades, the A/E/C industry has severely underperformed other industries in process innovation and productivity. Annual expenditures for construction in the US are approximately $1 trillion—a significant slice of the GDP. However, one third of all projects still do not meet budget or schedule and 30% of construction materials wind up as waste, costing the economy $300 billion per year in aggregate. Compare that to the $50

billion architects bill annually, and the scale of the problem becomes immediately apparent. What's more, buildings account for about 45% of all carbon emissions. In short, while we may be spending way too much time and money in how we design and construct buildings, at least we are polluting the environment in the process!

Changing times always bring new opportunities. For far too long, design has been a transactional business. Architects get paid for their services before the project is completed, which is why the primary focus during contract negotiations is on budget and schedule. For owners, first cost dominates the discussion. However, the value of a project does not begin to accrue until after the ribbon is cut and the building is put into service. Most owners don't realize: the up-front capital cost is just 10% of the long-term operations and maintenance (O&M) cost over the 30 to 50-year lifespan of a typical structure. Instead of worrying mostly about minimizing first cost, owners should be focused on the project economics over the long haul. That's where the real money is.

In that context, it stands to reason designers should be acutely interested in what happens during occupancy, using life cycle cost as a design tool. Ironically, that's not how architects sell nor get paid for their services. Compare that approach to the business models of other artists such as singers, songwriters, or authors, who receive royalties and/or a percentage of the profits for their efforts. Their value propositions are based on long term value, not short-term results. Call it life cycle value. Design professionals should be thinking along the same lines. This would do two things: save money up front for clients (making it easier to finance their projects) and provide a stable income stream for design firms over the useful life of a project (putting them on a sound financial footing and dampening the effect of boom-and-bust business cycles).

It's time architects understood the real value proposition that underlies design - and organize their efforts accordingly. They can start by broadening the definition of "design." For too long, architects have viewed buildings mostly as static objects ("nouns"). Massing and materiality ruled the day. All well and good, but there's more to the built environment than physical appearance. In fact, the legal basis for professional licensure is the architect's responsibility to safeguard the "health, safety and welfare" of the public. Color, texture, and playful geometry don't enter into that discussion. We need to expand our definition of design to include processes as well as products—the how as well as the what ("verbs"). For example, if a skilled architect can design a nursing unit in a hospital that can operate safely and effectively with fewer staff, everyone benefits. Patient outcomes would be improved, the stress on staff would be reduced, and a great deal of money would be saved for the institution.

Doing this requires an intimate knowledge of how space is used inside buildings—what works, what doesn't, and how much things really cost. There's much we don't yet understand about how to maximize building performance. Developing a deep understanding will demand collection and analysis of all sorts of

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data. So far, design professionals are woefully behind in this regard. Just compare the amount of data collected about building occupancy with how thoroughly our shopping preferences are analyzed by Amazon. New ways of gathering and interpreting data will equip designers to address myriad questions:

- **How can good design enhance productivity in offices, factories, and airports?**

- **How can it improve learning outcomes in schools? How can it increase attendance at museums?**

- **How can it increase safety and security in the public realm?**

- **What role might physical design play in improving public health?**

That last question is particularly pertinent in the context of Covid-19.

Broadening the definition of design to include both process and product (verbs and nouns) will increase problem-solving opportunities exponentially. Need to know how to increase occupancy in your hotel? Want to get more foot traffic in your store? Looking to fill the freshman class at your university? Design thinking can help answer these questions and lead us in new directions.

New tools and technologies can help, but the A/E/C industry is woefully behind in taking full advantage of them. BIM technology is mostly viewed as a fancy drafting system rather than an information management tool. The sophisticated logistics employed by major corporations such as Walmart and Amazon are rarely deployed on typical construction sites. Paper-based design documents still litter construction trailers. Drones, robotics, and 3-D printing remain relative novelties in design studios and jobsites. The promise of pre-fabrication at large scale remains elusive. If we compare the level of technology adoption in design and construction to other major industries, such as manufacturing, retail, communications, or entertainment, it's easy to see: the

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The reasons for change are clear. The opportunity is at hand. There is plenty of money in the system to support widespread process improvement (all we need do is re-deploy the $300 billion being left on the table every year.)

A/E/C industry lags far behind. Given the choice to use a hammer or a nail gun, we tend to choose the hammer.

As an example of how powerful technology can be, consider electronic gaming, which has grown exponentially since its inception just a few years ago. It's now possible to create remarkably realistic electronic environments (now known as the "metaverse") which can be populated with avatars and manipulated at will. If applied to design and construction, the technology would allow us to test all manner of alternatives quickly and objectively. Algorithms could maximize building performance while minimizing lifecycle cost, and the quality of design would improve. The implications for designers—and their clients—are immense.

The reasons for change in the A/E/C industry are clear. The opportunity is at hand. There is already plenty of money in the system to enable widespread process improvement— all we need do is re-deploy the $300 billion being left on the table every year and convert wasted dollars into productive ones. Best of all, we needn't upend the entire industry to make significant improvements. A few tweaks will do the trick:

1. **Gather real-time data about building occupancy, and use that new knowledge to enhance both design and building performance.**

2. **Change standard contract language from transactional to life-cycle value, lowering up front cost while extending the revenue stream for design firms.**

3. **Add process design to the menu of standard services.**

4. **Consciously include health, safety, and welfare as specific, expressly-stated design goals in all projects.**

5. **Embrace the full potential of technology in design and construction.**

Embracing new ways of thinking about design—the why, the what, and the how—will require a fresh look at how architects and engineers are trained. Currently, it takes about seven years to satisfy the basic requirements for licensure, and many more years after that before new graduates are truly proficient. We can start sooner (by introducing courses in design thinking in secondary school) and we can re-design how design is taught, including exposure to such topics marketing, management, and finance - all essential to long-term success. There is tremendous upside to improving how we design, engineer, and construct our built environment – and we don't have to wait for a crisis to get started, it's already upon us.

Let's begin.

Scott Simpson, FAIA is a Senior Fellow in the Design Futures Council and a regular contributor to DesignIntelligence.

Reinventing Design Process

KIRSTEN LEES

Managing Partner, Grimshaw

Interrogating the Brief, Exploring, and Embracing Differences A Conversation with Grimshaw's Managing Partner, Kirsten Lees

DesignIntelligence - Michael LeFevre (DI): **Are you surviving the crises that surround us all?**

Kirsten Lees (KL): We'll always be saying we're thriving. Or is it just surviving now?

DI: **Dave Gilmore had an interesting comment recently: "Those sitting there complaining, grousing or waiting for this to be over are mistaken." The COVID world is reality now and some version of it will be in the future. So, we better make our way and accept this in a positive way or we're in trouble.**
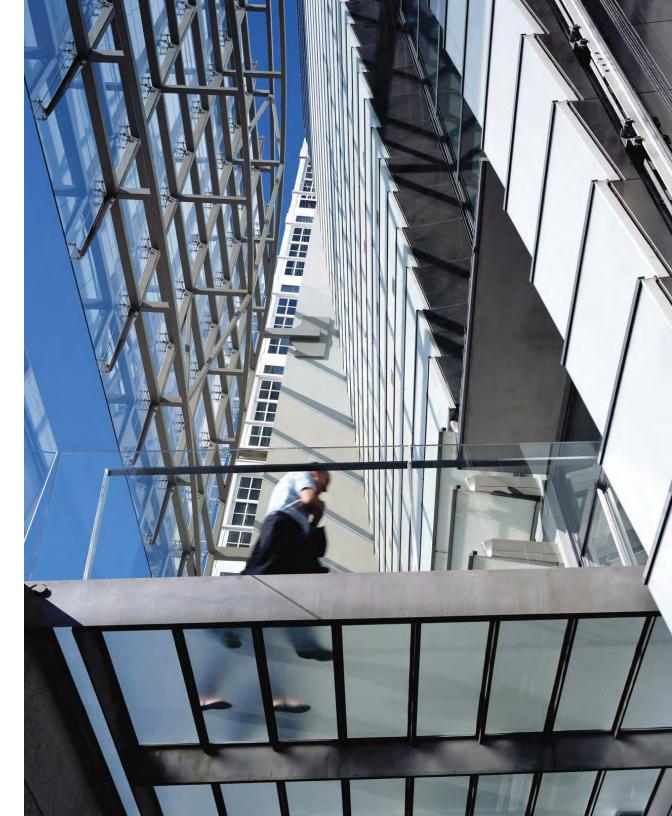
KL: Yes. There's a rush to say: Let's get it all back to how it was before. This idea that how it was before was perfect. It wasn't. In some aspects it was better than it is now – but let's be honest, other aspects are better now. As you say, you've got to continue moving onwards and upwards, grasping what you can and evolving. If you don't, you'll get left behind. It's about flexibility and agility and openness to change.

DI: **That's a perfect opening comment to a discussion about reinventing. To set the stage, we're with Kirsten Lees, Managing Partner at Grimshaw, a 40-year-**

old, 650-person, global practice based in London, with offices across the world in Sydney, Melbourne, New York, Los Angeles, Doha and Paris. Welcome Kirsten. Thank you for being willing to share with us.

KL: Thank you Michael. It's great to be here. It's an honor to be invited to contribute.

DI: : Last year, back in the days when humans were free to roam the earth, we held a conference in London. You and I sat at across from one another. The discussion was about efficiency or process and I asked you: "Are you doing any investigation or work in standardizing your process? Are you templatizing or automating things?" And you said something like, "Hold on. I hate the word process. Everything we do is a unique exploration." Since we're talking about reinvention, I want to open with that question. Obviously, I struck a nerve there… what did my question provoke?

KL: In a creative industry there is always a drive for efficiency and methodology that often results in the

word 'process'. And process can be so misunderstood. It's not that we don't have processes; of course we do. But you don't just follow A, B, C in sequence and get fantastic architecture, products, interiors, or landscapes. The nature of our industry means it's important to explore ideas, to have the space and the forum that can lead you to develop some areas of exploration that might not ultimately be the final output or design, but that are absolutely fundamental to shaping that.

Maybe my reaction to the word 'process' was that it evokes moving through a linear progression and getting to the answer. I like to call it 'approach' or 'methodology', instead. That ensures you're deeply interrogating, rigorously challenging, and opening a collective forum that sets the framework for exploration. But exploration isn't the only thing. It is about making sure the project has strong leadership and directionality, so it ends in a high-quality, meaningful result everyone buys into. Ultimately, it's about producing an outcome better than we all anticipated. So, you did touch a nerve

there, probably because of having had lots of internal conversations about this over the years.

DI: Those who have never been through design school or practiced design, despite working with us (and with us telling them), don't understand the nature of design exploration; that you go down some likely wrong paths. There's a famous T.S. Eliot quote about arriving back to the same place and knowing it for the first time. Until you went down that path or around that circle, you didn't know. In your recent podcast with Owen Wainhouse on Architectural Masters, you talked about management and design. What's your take on those terms?

KL: The two come together because design needs to be managed. And there's an approach or a process in there, too. But that process needs to allow for a design to ultimately be the best it can be; to allow for exploration. What I see within the industry now – because we live in such an image-heavy, outcomes-driven, sped-up world – is frustration that we're trying to get to the answers

before we've had the time to challenge if the questions are right themselves.

DI: Eventually we must turn the corner and begin to converge on a solution. What I love about your work, despite being large-scale – transportation, infrastructure, sports and urban projects – is that there's always craft. There's an expression of humanity or poetry to your architecture that's not the faceless, corporate, or institutional outcome it could be. In your work, craft and the hand of humans are present. I'd like to understand how you achieve that, by understanding more about your design process.

Let's talk about the mechanics of your explorative approach. Since every project is different, how do the paths to be explored manifest and prioritize themselves? One might be driven by its site, one by its materials, and one by its historic context. How do you begin?

KL: People in every sort of practice work in their own way. So, I speak very much from personal and Grimshaw points of view. How do we

start? Something we intrinsically value is that we start by not drawing anything; we start by asking questions. We start by interrogating the brief. Understanding what it is we're trying to achieve and who will use the building, who is going to be part of creating the building and master plan.

I remember one – an energy-from-waste project. Normally, the nature of this typology is that these projects are often delivered within the construction company as a turnkey project. In this instance, the specific location was very sensitive, and they felt, "Oh, for this one we need services of an architect to help us with." And so, they brought us in expecting us to just get on with making the facades pretty.
We started by asking, "What's the process?" "Well, you don't really need to know the process" was the response! We said we did because we needed to understand what parts of the building had to go together, where the adjacencies were, what bits we had got to play with in terms of creating the massing; could this be dislocated from this component

because that's what makes the composition? And what size are the trucks? "Why are you asking these questions, why do you need to know the size of the trucks?" they said. That project in Suffolk has become SUEZ's flagship Energy from Waste power facility. It became that not because we were brought in to do a nice façade – which is what they expected of us – but because we developed a relationship and an understanding among ourselves, SUEZ, the council, and the community about what we were trying to achieve. Obviously, we needed to achieve an efficient engineering plant. But we also wanted to break down the perception that energy from waste is basically burning rubbish. We wanted to intervene and improve upon this sort of big, scary, horrible thing you don't want in your backyard.

By asking all these questions we delivered a design that was very efficient to use and delivered on the objectives we set for the project, and beyond. We delivered a building that is loved by its community and its users, that gives back in a way they

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> *...we start by not drawing anything. We start by asking questions. We start by interrogating the brief.*

hadn't anticipated. Questions are fundamental – understanding the brief and getting to a point where there's an understanding of the task and the challenge we're trying to resolve.

Building from that shared point of understanding, we then start from the site, the use, and look strategically at big moves that start to put in place a series of principles. Then the design evolves around those principles. But it's about those big, early, key moves and establishing the principles everyone can buy into. That is how we avoid flip-flopping or changing the design. It continues to build and evolve to develop and enrich the original principles, but you need to set those in place first.

DI: You called it: "interrogating the brief" or asking the right questions. For most of my career, what we were typically given as a program in the US was a little more "I need a 100,000 square foot building and it's got to cost 30 million dollars. That's all we know. We don't do this for a living. You're the experts".

DEVELOPMENT OF A CLEAR BRIEF

I just read Broken Glass, a book about Mies van der Rohe and the Farnsworth House. For so many of architecture's iconic buildings, it was all about the making of the thing. Forget the program or asking questions. Forget the client, whether it leaked, or if the air conditioning functioned. In Mies' case he got basically no program, just "design a country house". He certainly never interrogated the program or reached common goals with his client. It was simply his art, his creation.

Now, in a more complex world with more regulatory, social and environmental issues, you're addressing those forces in a deeper way. In some instances, you run the risk of alienating your clients when they ask: Why are you asking me these questions? In some cases, such questions can come up with scary answers. Like, do we need to build this building at all? Or what is its impact on society? Have you had those experiences?

KL: Asking questions initially throws the client, because they won't be expecting it. They expect us to simply go away and come back with a

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Questions are fundamental - understanding the brief and getting to a point where there's an understanding of the task and the challenge we're trying to resolve.

From that point of understanding, we start from the site, the use, and looking strategically at big moves that start to put in place a series of principles. Then the design evolves around those principles.

... But you need to set those in place first.

product. We believe passionately that our buildings need to work for the users, and therefore we need to understand everything about them, the community and even the users beyond the immediate use of the building. Buildings must have a longevity and a flexibility to outlive their immediate use; therefore, you need to be thinking about that in advance.

So, we try to really impress the importance of questioning. In the example I gave – SUEZ Suffolk – we initially asked some questions and the client didn't understand why we were asking them. But at the end, they really appreciated the journey we all went on. Not every client has the same level of understanding in delivering buildings. Why should they? Because often that is not their training or background. But in developing a building for people to use ultimately, it is a very close collaboration between the project team. It's fundamental that the client understands that they have an important role in developing that. What clients appreciate about the way that we work with them is not that we need all these answers and sit

back. It's that we assist them and take them through the impact of the decisions and the different directions that projects can take on that basis.

DI: So many clients are not skilled with writing programs and don't understand why you're asking these questions. They're not expert in what we do as designers and builders and are uncomfortable with design process. They say: "I don't have time for this planning and dialog". But insisting they do it builds common goals. Then, when you're on the journey together, you don't find out half way through that they wanted to get this building done and sell it in a year, and you wanted to do the most sustainable building on planet earth to own long-term. Too many people mistakenly think they don't have time for questioning and goal setting.

KL: Every project is different. Depending on the scale – on infrastructure projects for example – clients aren't always involved in the end use of the building. So, we've got to tailor methodology to

the project circumstances. But we're very clear with our clients that we need a strong brief. If they don't have one in place when we're appointed, we assist them in developing a brief because it's sets out key goals and questions. To your point earlier, do we even need a building? Is this the best idea for this location?

I read an article the other day where this old practitioner had been approached by a client with a stunning, beautiful site and he wanted an individual house. Ultimately, he persuaded the client they shouldn't build a building there because the impact on the environment would be detrimental. To your point earlier, there is a perception and maybe it's come from historical examples whereby architects sometimes are perceived as people obsessed by their own vision and the output and the product: "To hell with the brief and the client! They're not important, it's the architects' vision". We're almost the antithesis of this. We're about realizing the client's vision.

We bring huge amount of skill and experience and professionalism and

creativity and we're very proud of what we can contribute to that. But ultimately, it must be about a shared vision – one we can all invest in.

DI: How is a typical design team organized? I'm assuming it's not one individual sitting off in a corner having their "vision". Are some more expert at the brief and programing process? And others whose responsibility is design?

KL: One thing we're immensely proud of comes from the ethos and culture that Sir Nicholas Grimshaw established – that good ideas can come from everyone. We operate a flat structure with no hierarchy or monopoly on ideas. We think it's important that everyone feels they can speak up and contribute ideas, obviously, with different levels of experience. We also believe that craft – how things go together – is similarly important. You need to understand the process of making.

As a result, we have never organized our teams into specialists – some practices have a competition team, a design development team, a construction team. We're integrated because we think it's important that everyone has experience of every stage of the design process. Because if you don't understand what you're drawing on paper and the implications of that on site, you'll never really, fundamentally understand it. After you've been poring over drawings that line up perfectly, and then you're onsite and you see the way they chuck concrete into formwork… they're just worlds apart. You need to understand that.

There are different parts of our project teams. They will grow and some individuals aren't able to stay with projects all the way through. But there's a core set of individuals with any project from start to finish. With architecture, you never know everything and you're constantly learning. So, it's important that everyone can question, learn and contribute. Every project has a partner in charge and we always have a project architect. That's a critical

role within any project because in many ways, as the holder of all the information, and the vision. They interface with the client, the design and consultant teams. Depending on the scale, you can have three, four, or ten project architects responsible for different areas. They're the holder of all knowledge and coordinate pulling everything together because there are so many strands, so many decisions. It's important that it's brought together in a cohesive way.

We always have a combination of architects at different levels of their career, to bring different levels of experience. Depending on the project we may include urban designers and industrial designers within our team. We think it's valuable to develop our specifications in-house, so we have a team that helps with that. The design team write the specifications so we're very familiar with the details of the building with assistance and guidance from our specs team. Essentially, we're writing our specifications ourselves through a process that builds on experience using a system that ensures the level of quality.

DI: Where does design responsibility fall? Is that the partner, a separate project designer, or is that the project architect? And management? Do you have those designer and manager roles?

KL: Yes, but again it comes down to project scale. You can't separate design and management because you need to be aware of the program within which you're designing and pull together all the inputs and consult at the right time. It's important that every member of the team is aware of traditional management aspects. Every member of the team also contributes to the design. No, we don't have a designer sitting in the corner developing design sketches and then instructing others to develop that in service of their vision. The vision is developed creatively and collaboratively between the team and the partners. The partner's role and experience is very much about providing strategic direction, being part of the design decisions. You're making hundreds of decisions all the way through, but they build to points where you need to make larger decisions and so making them well is important.

At Grimshaw, we offer a lot of partner time to projects and to clients. We're not just figureheads. We don't just win the project and then move on to the next one. All the partners in our organization are intimately involved in leading their projects, in terms of managing the client relationship and managing the design process, and then managing and leading the design and contributing creatively to it. But that doesn't mean to say we undervalue the huge creative contributions of the project architect and team.

Even where you have tasks broken down and performed by different individuals, it's still vitally important that you get the right level of knowledge and communication. We don't have a separate project management team saying, "you need to meet this deadline". If you don't have all the information you need you can't make that date. So, you have to manage yourselves to get it. You can't coordinate a design if you haven't got anything to coordinate. Even where we have identified project managers on a project team, they're embedded in the team structure and not a separate group.

DI: **Let's talk about the "management-design continuum". You made a comment on your podcast that you're the managing partner now, but you didn't necessarily go to school for that or necessarily have the skills to manage anything. In architecture, it seems very few of us do. We went to school to learn to make things. Had we been good managers, we would have been managers or bankers. One of the biggest things we fail to manage is the cost of our projects. Too often, architects have this reputation, perhaps deservedly, "We are going to blow the budget and it's going to be beautiful, client be damned". We see it as our responsibility to push the edge and use innovative materials. Blowing the budget seems an almost inevitable result. In the US, we have design-bid-build-delivery, but for most of my career, I worked under a CM-at-risk delivery method. That brought cost accountability to the team. In the UK you have quantity surveyors and cost estimating. Has that shaped how you go about your design journey? Is it positive? Does it keep you in check or do you still have the inevitable rollercoaster ride which causes design rework and dilution?**

KL: I think architects are great generalists in a world of specialization. Everything has gotten more complex, everything is being subdivided. One of our prime roles beyond developing the design and the creative vision for a building is about coordinating all the inputs from all the other parties. That includes the engineering team, the client and a huge number of other people contributing to creating the building. Any architect that doesn't have a strong relationship and open communication with the core consultants isn't doing their role. The reasons for a building going over budget is often about design process itself: the design gets developed and everything gets refined and fine-tuned as the design progresses.

But the way the design process works is that the cost consultant is always a few steps behind (this can be anything from three to six weeks behind) and schedules typically don't allow enough time to recognize that. They need that time for doing the estimate. Then we evaluate. What

decisions led to this and why did it deviate from before? And then what should follow is a period of alignment and correlations. So often, because a programme is seen to be driving everything, it creates a schedule disconnect. It takes time and effort to coordinate design, and then suddenly, you make all these crazy, fast-paced decisions about cost without the same focused and detailed level of consideration. That's where a lot of conflicts, misconceptions and errors come in.

DI: **I'd certainly rather spend that time upfront aligning the goals and controlling cost along the way than doing the frenetic rework process you just described.**

KL: Agreed.

DI: **On the other side of the spectrum from this issue of cost and convergence, you've got incredible divergence within your firm. You've got people that speak 55 languages in cities around the world. How do you manage and embrace and translate that to result in richer, more diverse thought, input and work? I spent the last 20 years of my career just translating between owners, architects, and contractors - and we all spoke English. How do you cope with that diversity and number of cultures and languages?**

KL: We work all over the world, but our buildings are for local communities. They are shaped by and need to respond to their context but have to reflect the needs of the people that use them. We fundamentally believe that having a diverse and broad range of experience that contributes to design makes for a richer process and building. Generally, we speak English as the common language. It's the world language, but we do have many people on our teams – and 55 different languages. There's no one person that speaks them all though!

But so many people do speak four or five. I'm so impressed. How do you do that? I joined the practice because I was a Spanish speaker. The firm just won a project in Spain and was looking for a Spanish speaker. But as you rightly said, language isn't just about language. There are so many components to it.

For example, we were doing an art gallery in north-west Spain and between the Spanish contractor, a British architect, and an Austrian specialist façade engineer, there were all sorts of cultural differences and approaches. The Spanish like to resolve more things on site than the Austrians or even the British. With the northern Europeans there's more pre-planning. What I find fascinating about it was that it started off as condemnation and misunderstandings. I remember the Spanish contractor complaining about the façade specialist: "They're asking about every single millimeter! They're just planning away and fretting over every millimeter and they're charging us for this tolerance and saying we're out of tolerance. They're just planning. It's all about planning".

So yes, there was a long period of planning and preparation of schedules and shop drawings. Then the Austrian contractor arrived on site and within a matter of weeks their element was complete. Then, the Spanish contractor's view was: "This is incredible. They come in and it's like Mecano. It all goes up

perfectly. It's just done, clean, and they're gone". For those sorts of initial misunderstandings and cultural differences to move to absolute appreciation taught us all a new kind of respect for different approaches.

We also had a resident engineer from the façade contractor on site. What they valued from the Spanish side was their flexibility. The attitude of working together to solve a problem because – let's face it – there are always unknown elements and surprises on site. The flexibility to do that without rancor or recrimination offered real value. Moving from oppositional miscomprehension to come to view and respect each other is a tiny example of the value of the rich, diverse workforce we have at Grimshaw, on our projects and how quality results.

DI: **So, a healthy respect, tolerance, and empathy for diverse cultures and others' processes are an integral part of your approach. I love that discussion of the cultural side. But I wonder, in a practice in which you're reinventing the design process every time, working in dozens of locations all around the**

world with 55 languages, how do you achieve consistency and quality? Are there rules, guidelines or procedures, or do you just rely on good old-fashioned human judgment and experience to ensure that projects don't go off the rails?

KL: It's wrong to say we don't have a process. We do. We have an approach and methodology, but it needs to align and adjust to the circumstance of the project. We develop the brief. We challenge and share the design as it evolves with the client and by working closely with the wider design team and other specialists including engineers, acousticians, lighting, landscape, etc.

The methodology is about communicating regularly and frequently and having a direction; always coming to conclusions developed through consensus, then built on and believed in. Maintaining a program of continual consistent improvement and refinement is the framework for achieving quality in projects that are very different. We don't have a style book we draw from. We approach every project from first principles. They're consistent in their

level of rigor, interrogation, and quality of output. It's a method which has been fine-tuned over years that is applicable to every project – the cornerstone of excellent output.

DI: In your process of continual reinvention, what will your next reinvention look like? Have you had to reinvent your process for COVID? And what do you see beyond that?

KL: Obviously, we've gone through the impact of the pandemic. In our attitude and approach, it's important to be open to change. So, we've embraced change positively but not blindly. For example, last year we spent time looking for new premises. Our London studio had grown beyond the confines of the space. We had two satellite studios five minutes from the office, but it still created a sense that not everyone was together.

Then there was the COVID lockdown and the move from being within one place, which was our aspiration, to being in 270 different places. The sense of communication became even more important now that we collaborate via the medium of Zoom. Do we all love Zoom? No But it gave us pause. Now we've thought about how it will be when we return to the office. We've seen the benefits of working from home. We did surveys last year to understand what people were looking for in a future office and what the office means to them culturally, socially, and functionally – to allow them to do their job. We got lots of feedback and found that some elements of the office didn't work. We've also done surveys of people working remotely, intensely, doing highly focused tasks. Having environments where you can focus has been productive and beneficial. But what everyone is missing is the contact, the interaction, and collaboration. Sure, we found ways to collaborate technically, but we're human animals and we need that contact. That led us to rethink what the office is and what its fundamental function is. Clearly this virus is still with us and is likely

to be with us for some time. We still are not returning to the full office because of social distancing, but we'll look at it differently when we do. Over the summer we reconfigured the office. We haven't sought to recreate the traditional office with some individual desks with fixed workstations, but socially distanced. We've identified some areas within the office and said: let's look at these in a completely different way. Let's create what we say we all miss about the office environment, the opportunity to meet as a group and collaborate over a desk. Not a desk with a series of screens on it, but a desk where you can see your fellow colleagues and share. To lay out a big drawing and sketch over it is a fantastic means to collaborate. We've also provided a long space to pin up and showcase our projects.

So, we've created two areas we're actively encouraging people to trial out and move and shape as they require. To shift, try out, explore and experiment to see if that helps us collaborate in a different way. Home working is with us to stay, so we'll need to find a balance in the future.

Maybe the purpose of a studio is more about when we come together. How can we make that intense, interactive, productive, and collaborative? That's what we're trying out right now – our approach to current circumstances. Beyond that, we'll continue to explore.

DI: That's a fitting conclusion to a discussion about reinvention: you're in the middle of reinventing as we speak and will continue to be. Despite a difficult subject to understand and talk about, you've illuminated how you're reinventing your process on each project. You have a wonderful way of making your work client-and-user focused, and project-unique – the kind of work that invokes the best out of professionals doing what they love.

Thank you.

KL: It's been a fascinating and fantastic interlude to think about these things.

Kirsten Lees is Grimshaw's London studio's Managing Partner, overseeing the development of the studio as it continues to grow. Kirsten is a highly experienced architect with over 25 years' experience in architecture, strategic planning, urban design and regeneration in sensitive environments within the arts, sports and master planning sectors. She brings insight and creativity to the development of strategic projects and demonstrates strong conceptual judgment when integrating buildings into sensitive urban and rural settings.

Genuine innovation and architectural distinction distinguish Kirsten's projects, which are founded on the insightful translation of client and stakeholder objectives. Her work has been acknowledged for its subtle response to place, the pre-eminence of the cultural agenda, and its unique expressive and material qualities. She was shortlisted for the AJ Woman Architect of the Year award in 2014 and is currently shortlisted for the BD Architectural Leader of the Year 2020.

Reinventing the Firm

DAN NOBLE

President, CEO, HKS

DI: You have had time for reflection during the COVID sheltering in place and working from home period. What have you been thinking about — personally, for your firm, and the industry?

DN: This time has been valuable for reflection. Although we are quite busy, my schedule has been more predictable and stable these past months. That's given me time to think, strategize, and determine what is important in this phase of my life — for me, as well as for our firm. I stumbled into a balance that has enriched my relationships and connections to many facets of life, personal and business.

My outlook is positive. Things are never as bad as they seem, nor as good. We are in a time of accelerated growth in innovation, technology, and focused, quality thinking. Good things always come out of these trying moments when we're grinding away with purpose. We will take these lessons into the future to improve lives and do good. I believe we'll look back at this time as one where we experienced a quantum leap in the quality of our lives. It may not feel that way while we are immersed in it, but time and perspective will be the barometers.

DI: Your firm recently completed a strategic refocusing — a reinvention of sorts. It seems prophetic that you

Dan Noble reflects on HKS's firm transformation using a values-based approach. An inside look.

accomplished this just before the arrival of COVID-19, and simultaneous economic, racial, and political crises. Are you a shaman, or was it a case of good timing and fortune? How did the process come about? How long did it take? Who did it involve? And how would you score it on the "pain index" on a scale from 1 to 10?

DN: Mostly good timing and good fortune. I've been in this industry long enough to expect constant cyclical fluctuation. After such a prolonged expansion, we knew we were due for a down-cycle. We had been on a ten-year run and felt like we were on borrowed time. That compelled us to reimagine our strategy and look for ways to continue to evolve — possibly even re-invent ourselves. We felt a change was afoot, but honestly, I don't think anyone could have anticipated what we've experienced this year.

We started the process in the winter of 2017. I had met Dave Gilmore a year earlier, and we were kindred spirits in philosophy, ethics, strategy, and friendship. We hired D.I. and Dave to work with us to understand who we were and who we wanted to be before we jumped into planning. That's something all firms should consider. That self-reflection and imagining forced us to look at every aspect of our business, from how we were structured, to how we invested our resources, to our people strategy.

We better defined our values, developed our mission and strategy, streamlined our business structure, created accountability and role clarity, and formally invested in a powerful Environment and Social Governance (ESG) strategy. Last year we created a Director of Justice, Equity, Diversity and Inclusion (JEDI) position. We put our money where our mouth is by investing in these things – and it all fell into place to put us into a managed position to deal with the crises that presented themselves this year.

We are experiencing a punctuated equilibrium in our society – a

sudden, intense period of change in an otherwise stable world. Revolutionary vs. evolutionary change. I'm grateful we had already put in the hard work to reposition ourselves — not only to survive but to thrive during such a time. To use a sports analogy, we let the game come to us.

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> *The biggest pain point was holding our existing structure and strongly held beliefs too tightly. We needed to loosen up our thinking and let go of our egos.*

We started with a small group of leaders talking about our core values and expanded that to meet with all sector and regional leaders in a series of work sessions. Ultimately, to all shareholders. Dave was instrumental in guiding us through this process. It took over a year to complete and coordinate all the content of the work sessions and nearly another year to test and put the structure in place.

Two years later, we are still learning.

On a scale of 1-10, it was probably a solid 7 – some days a hard 8. Change is difficult. For some, the biggest pain point was holding our existing structure and strongly held beliefs too tightly. We needed to loosen up our thinking and let go of our egos. In that uncomfortable space we allowed ourselves to imagine what could be. We realized we had been operating in silos, and we didn't have some of the business rigor and intention we needed to continue to grow and prosper. Formalizing the Plan was just the beginning of the story. The necessary change enablement strategy that followed was just as important – if not more

so. Changing legacy patterns of entrenched behavior takes time, patience, and constant strategic communication.

DI: Can you describe the transformation to build a foundation for readers? What was the firm before, and what is it now? Structurally, culturally, and in every other way.

DN: In 1939, our founder Harwood K. Smith created a firm that felt like family and became known for technical excellence, professional management, and outstanding client service. Over the years, many spent their entire career at HKS. If there is one aspect we didn't want to lose, it's the family culture our firm was built upon, and the continuity through generations.
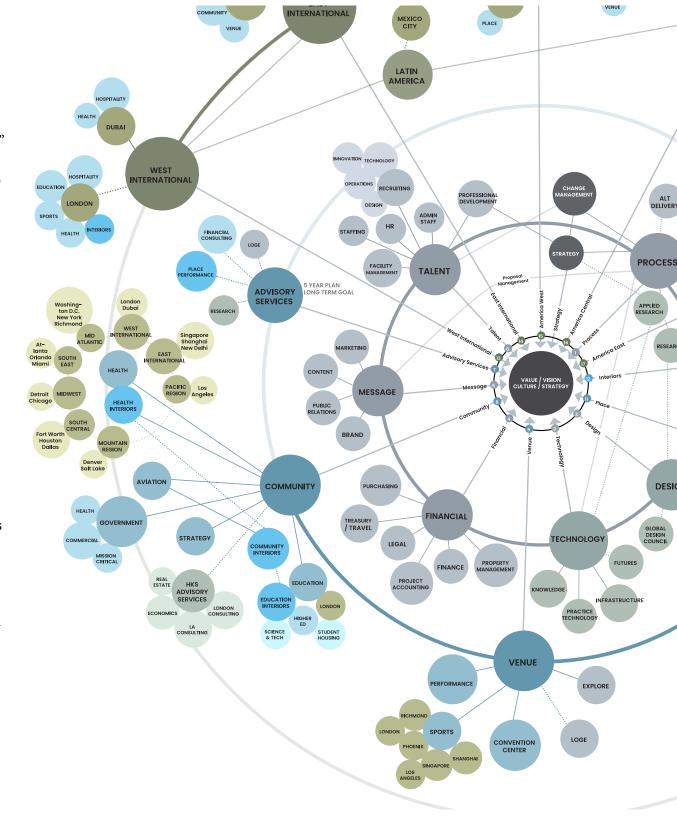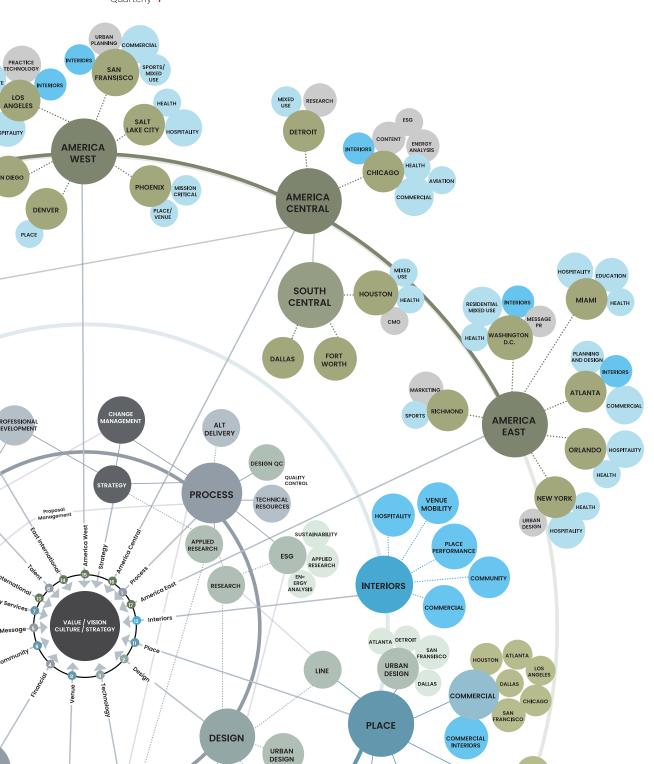
So, when we kicked-off our visioning sessions, we started by defining our values. Our values aren't just our business — they're personal. Relationships, Character, Purpose. These values make us who we are as connected humans and define our firm.

We clarified our vision: "To be the most influential firm in our industry." Beyond the buildings, we want to impact and influence the people who engage with the space — furthering not only our firm, but the industry. We want to create the kind of architecture that heals communities, brings people together, enhances their lives, solves real problems, and is beautiful too. We want to expand our expertise and renown in technical delivery and make our mark as a firm globally known for our outcome-driven, high quality design.

For our organizational structure, we built on longstanding logic. We had always been a sector-driven, region-executed firm. Our new plan simply clarified the relationships and drivers between our sectors and regions. By clarifying roles and decision-making responsibilities, we gained accountability and agility in determining our market strategy and in which marketplaces we wanted to invest. We mapped a more robust, equitable, and diverse leadership structure and changed our culture to

be more collaborative and forward-thinking.

We also simplified our reporting structure. In the past I had over 80 direct reports. By shifting and distributing the leadership responsibility, I have fewer than 15 now, but I've also empowered others to grow and assume leadership roles to leverage our talent more effectively. I still have an open door, but now I share in the accountability and mentoring with a larger team of leaders.

DI: Why did you decide to undergo such a radical transformation? Your firm had been successful and had decades of longevity. What was wrong with the status quo, or with continued incremental change and evolution? What were the primary factors that drove you to reinvent the firm?

DN: As an 80-year-old firm, we were hovering in the territory of becoming commoditized – which we feared would lead to stagnant opportunities at best and irrelevance at worst. We could no longer afford to call

ourselves an "architecture, interior & urban design" firm. We had to organize and resource ourselves to become a problem-solving technology firm that provides design services. That's not just semantics. It's a seismic shift in strategy. We sought to become a "solutions" firm that influences our industry to create a better world. As designers, we are uniquely equipped to optimize urban design, density, socialization – even pandemic control. Our voices and expertise can generate powerful influence in every one of our practice

areas – from community and health groups to schools and city planning.

DI: What initiated it? Were there key indicators, feelings, hunches — or data that prompted it? Client, partner or associate feedback? Or market and contextual awareness? How did you know it was time?

DN: The recession of 2009 profoundly impacted our firm. Having lived through that, I wanted to understand how we could be better prepared for future

contractions in the economy. I love the quote by W. Edwards Deming: "It is not necessary to change; survival is not mandatory." Especially now, agility is THE indicator of a firm's ability not just to survive but to thrive. How quickly and nimbly can we adjust to the needs of our clients and communities before our competitors do? This dynamic will only be amplified with each passing year.

But it's important to know we did not deny or reject our history to reinvent the firm. We didn't throw the baby out with the bath water, so to speak. We took the best things about our history and improved them and took a hard look at what we wanted to be in the future and figured out a transition plan to get there.

DI: Since your firm reinvention two years ago, in the current context, how did you do? Certainly, you couldn't have imagined any of what is happening now. Are your new systems serving you well? What are the greatest successes? Specific services, forms, systems, or concepts that have been game changers? Any that didn't work as well that need to be refined? Has
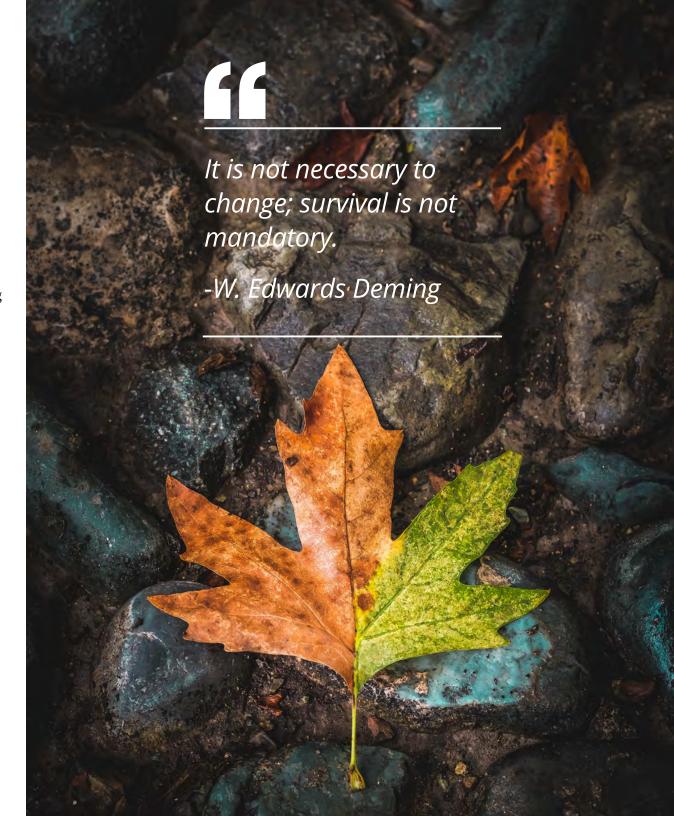
the firm's new strategy positioned you to better cope with COVID and the other crises we are facing? How has COVID affected those strategies?

DN: We are certainly more agile than we were two years ago. Change is like a muscle. If you don't exercise and flex it, strength atrophies. If you exercise consistently, you are building muscle mass you can leverage when you need it. Our endurance and comfort with change has been enhanced over the last two years of focused effort.

The cross-practice agility and creativity we demonstrated in tackling some tough assignments in record time to deal with the surge of COVID cases is one great illustration of how our culture has changed and strengthened. We worked with the Army Corps of Engineers to transform convention centers and decommission hospital spaces into COVID treatment spaces. And, we did it in a matter of days, not weeks or months.

Our hospitality, health, and advisory leaders came together to define ways

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> *It is not necessary to change; survival is not mandatory.*
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> *-W. Edwards Deming*

> *Honestly, we surprised ourselves with how many 'impossible' disruptions we were able to navigate.*

hotels could be healthier and adaptable for other uses. We made an acquisition into the senior living or later living building type, because we felt that industry was ripe for re-invention and meshed with our expertise in health, hospitality, mixed use, research, and sports.

We wrote research pieces on loneliness/isolation, mental health, and human behavior to understand how isolation affects our work relationships and personal lives. We redefined office space design to create more effective teams and a safer hospitality space, expanding beyond physical environment to digital. We formalized our Advisory services – not just micro, but macro solutions. Rather than merely physical environment, we looked at the implications of how we use space more effectively to rework the client's processes.

Many examples of cross-practice thinking wouldn't have happened in the same way before we implemented the plan. COVID played a role in moving us to a virtual environment, which enhanced our communication and collaboration. The plan also exposed some gaps in leadership and resources, and we have been addressing those to strengthen those capabilities.

We also realized we didn't have a structure in place to measure performance at the level the plan required. This year we invested in a performance management system that allows us to create and track target Objectives and Key Results (OKRs) at company, practice, and individual levels. This not only helps us measure specific objectives, but also gives us a connected, big-picture vantage of our priorities and investments. In short, we are absolutely better positioned and poised to cope in times like these. Our clarified roles and responsibilities help us make decisions quicker. We're better informed. We don't waste time wondering who the key stakeholders are – we know them and are able to spend more quality time focused on the challenge at hand.

It has also made us smarter in prioritizing our investments. We use the strategic plan as our guide for making difficult decisions. Honestly, we surprised ourselves with how many "impossible" disruptions we were able to navigate. For example, moving an international company of 1,300 to a purely remote working environment in 3 days without skipping a beat, and almost immediately advising our healthcare clients on how to radically transform their operations in the face of COVID.

DI: Has COVID necessitated any further organizational shifts? Service line or locational shifts?

DN: Not significantly. We've movedpeople around between practices to balance the need. Hospitality, sports, and commercial don't need that help. Health, education, mission critical, research, and advisory services did. Shanghai, Singapore and Dallas remain busy, so we've shifted resources to accommodate their needs.

DI: You have a strong consulting advisory services practice. Has COVID affected that, or impacted its location and centrality?

DN: Yes, they are very busy and in demand. We've added personnel in London, Dallas, Austin, and California. Both our research and advisory teams have been working overtime to provide service and guidance to our clients and communities.

DI: What do see as you look forward? Your contemplations about the firm, the industry, and the world? How are these uncertain times shaping your view of the future?

DN: I'm an optimist. I see great things coming out of this time of sacrifice. I believe you make incredible strides when times are challenging. Necessity really is the mother of invention. I've asked our leaders, "Do you want to be the authors of your future or the victims of your circumstances?" I believe, as designers and problem solvers we can help define a better future our communities are clamoring for.

DI: What does the HKS life cycle curve look like going forward?

DN: We will always have peaks and troughs – that's normal in a business. But the behavior and accountability we have in place now will allow us to run the business while intentionally looking ahead.
If we're structurally sound and appropriately diversified, we can stay ahead of the innovation curve using novel ways to support our clients. We believe the work we have been doing will yield a stronger, more equitable firm — one well positioned to meet the challenges of the future. We're excited to explore what is next.

DI: When will you be due for your next reinvention? Will it be just an oil change or a whole new vehicle? Or maybe abandoning vehicles and inventing a new kind of transport?

DN: As a learning organization we are constantly assessing, iterating, learning, and retooling. It's funny, we look at our business in terms of the machine and the fuel. Our goal is to constantly refine and optimize how our machine (our people, governance, structures, processes, etc.) functions, while ensuring a steady supply of the right, high octane fuel (our people, client relationships, projects, revenue, strategic diversification, etc.).

With a balanced focus on these two critical aspects, we don't have to completely reinvent ourselves. Instead, we can simply create the most sustained, optimized performance possible.

DI: What can you share about the experience and process of firm reinvention with others who haven't completed their own? Any advice for how to go about it?

DN: Large-scale transformation is not for the faint of heart. You need real commitment and buy-in — especially at the highest levels of leadership. You have to know it's a marathon, not a sprint. It's an exercise in sequential layering. Some changes can't be made until others are solidified. For example, you must have a functional organization structure before you can make more granular changes at the practice level. You also need an appetite for extreme transparency and trust. It's not always comfortable – but without it, your communication and change efforts will get waylaid before they begin.

So, with some endurance, grit, honestly, humility, trust in your fellow leaders — and a big dose of levity — any kind of transformation is possible.

Dan Noble, FAIA, FACHA, LEED AP, is President and CEO at HKS. An architect, Dan leads the strategy and development of a global design firm. Under his leadership, the firm has won numerous design awards from organizations such as the World Architecture Festival and Fast Company. Dan values character, purpose, and relationships, and instills these values into the firm's culture.

Preemptive Reinvention

TROY THOMPSON

Managing Partner, SmithGroup

SmithGroup Managing Principal Troy Thompson discusses firm restructuring, process, technology, and culture

DesignIntelligence (DI): You were integral to the firm's recent reinvention. Your bio says you're responsible for "innovation, positioning the firm for the future, focused on design, delivery process, tools, research technology, and talent" — in one of three firm leadership roles. Can you describe the restructuring — and your role?

Troy Thompson (TT): My role was a result of the restructuring four years ago. We started by asking, "what do we need for the future from a business perspective, and what pressures might we face?" Those questions led to the creation of the three-headed leadership team. That's also what led us down the path where none of us are identified as CEO, COO, or traditional titles. We have a President, but that's a role not a title. Then we distributed the CEO and COO duties across the three new leaders in a way that made more sense than the traditional default. We organized around our markets, our offices and our infrastructure and people.

The newest element of this organizational focus was on the firm's infrastructure, tools, and processes. We had detail libraries we evolved from stickyback to AutoCAD to Revit. But we felt technology would be changing the relationships of the players in the AEC industry, and we needed to get

ahead of that to control our future. That created my role. I have some aspects a traditional COO or CEO might be responsible for because they're about the services, the people, and the technology.

DI: What catalyzed the restructuring?

TT: At that point, firm leadership had been in place for 15 years. They recognized when they took over the firm, it was a unique time with a specific set of issues they were equipped to deal with. It was the early 2000s. The economy wasn't going well. The first transition rule our former CEO and COO had was, "It's not going to serve the firm if everybody just picks their successor, because that's going to give us more of the same. That's human nature." Other internal issues pushed us to look at our processes, accountability, and transparency. They recognized their success was based on getting the right combination of people to take over the firm given what the firm was facing at that time.

But we were no longer in that same context. We weren't in that kind of economy. In fact, even with the recession, our previous leadership has us in great shape financially. We had also grown significantly and had many more offices than we had in their tenure because of the continued expansion of the firm, in practices, market types, and geography. Our CEO liked to describe this as: "instead of just owning Amazon stock, we're now a mutual fund. Our healthcare market goes up when the commercial and workplace market sectors are going down."

They recognized we were in a different time and facing a very different future. Concurrently, lots of things were going on in the industry around technology and encroachment into the design fields by non-design firms. Facing a different future gave us an opportunity as a firm to say, "what future do we want to create?"

So, we spent the first several months with a committee looking at what we thought the future would be. What did we think the big issues and trends would be? The threats and opportunities to our business model? Out of that came the idea of a three-headed leadership group focused on what's going on with our clients, how do we do our work, and how we build the firm. That was the catalyst: the firm they inherited was built for a world that no longer existed. We needed to find what we wanted to set ourselves up for, then pick the people to do that.

The firm's structural model came before the three of us. We tweaked the model once they started to zero in on who the three of us might be, because we all came from different backgrounds. We all had different experiences at SmithGroup as well as outside the firm.

Another unique move was that all the resource directors were split up based on where they best aligned, not in a traditional hierarchy. Rather than the resource directors all reporting to the CEO or COO, the HR director and CIO report to me because we deal with talent development, technology, process, and tools. Mike Medici, in Phoenix, has the head of marketing and communications because they're focused on what's going on with our clients firmwide. Russ Sykes has legal and the CFO with him because

they're focused on our offices as profit centers and are where we deliver projects.

Other parts of the firm reorganized around areas of synergy and functional responsibility in order to get the right groups of people together around the right themes rather than blindly follow an obsolete structure.

DI: Firm leadership found themselves in a new context, and a strategic need for diversity and responsiveness in leadership, people, and market types? You look like geniuses to have done that several years before COVID. Kudos.

TT: COVID and Black Lives Matter are going to be more impactful events than the recession was. They're highlighting what we were thinking was right. We needed to be concerned about who, how and where we do our work. About how technology and culture collude or undermine one another. Now we're re-assessing our governance in light of COVID and social justice discussion and revisiting some

assumptions we made. COVID and racism are interesting lenses right now through which to test what we thought we knew four years ago about being beholden to old notions of hierarchy and structure. Some of it is proving we were thinking the right way but didn't go far enough – or go fast enough. COVID is an accelerant to where we ultimately knew we were likely headed.

DI: Let's shift to operations and process. When I was in school, true to the spirit of its Motor City roots, SmithGroup was organized in assembly-line fashion, with design and production departments that had very different types of people. That was a classic firm organization back then. How is the firm organized now, operationally?

TT: Our growth and having more offices changed the dynamic of how we work, and who works on which projects. Even before technology was facilitating cross-office work, we adopted a resource sharing philosophy. For years, we shared more work than many big firms because we had a philosophy if one

place gets slow, we'll send work over there. As we grew, we thought about the right mix and where we needed expertise. How many lab planners do you need for a practice our size? You probably don't need lab planners in every office where you do a lab building but you need enough for the firmwide volume. Over the last couple generations, we thought a lot about how we organized around sharing work and having the right balance of expertise and local execution teams.

That balance demands a strong culture. For example, we didn't have offices competing against offices for projects. You hear that from design firms and contractors. Their business units will compete and fight for clients. We did a lot culturally in the early 2000s to make sure that didn't happen so we could be successful.

The other thing that happened is that we didn't force a singular culture on every office. Each office developed its own culture. Even today, we have some very studio-centric offices. In DC, where I sit, we have studios in healthcare, workplace, culture,

government, higher ed, and science and tech. DC is also our center of excellence for our historic preservation that supports all of SmithGroup. In those studios there will be architects, planners, interior designers, and engineers all together, and it's very much a studio culture. Conversely, our office in Detroit is still largely a discipline-based culture. Several other offices are a hybrid of these models.

The firm today is more focused on integrated design and the entire life of a project, not around phases, or the assembly line it used to be. The cultures still vary for how we staff projects locally and manage people, but we share people seamlessly between offices now. We've refined the processes and standardized the tools that let us translate between the office cultures. That doesn't mean we shouldn't be more alike. We're learning we need to be more alike on some things. Projects still largely reside in offices, but we continue to have a high percentage of shared work and expertise across the firm and this sharing demands that we have consistent tools and processes, that we all use the same standards

and details. Design process and project delivery are areas where we focus on consistency.

Teams generally stay with projects from start to finish. We have a handful of folks scattered around for big projects that may do full-time, onsite construction administration, for example, but even in those cases, folks on the design team will stay involved through Construction Administration and be part of that process. From the history you described, which long predates my time at SmithGroup, we've completely reintegrated the entire team into all stages of the design process, following their project all the way through from the time we put the proposal together until we do one-year walks and post-occupancy evaluations.

DI: **It's groundbreaking you're focused on being one company nationally but allow different cultures. I spent 20 years working for a large, national CM firm, and we worked on culture religiously, in ways none of the architecture firms I worked in ever did. But we took it all the way. Not only were we one**

company, we had one culture, and one message. We'd repeat and deliver that message consistently. While you're one company, you're allowing the culture of individual offices and regions to shape and define themselves and have unique identities. That's fascinating. It makes sense for architects, who are so much about culture. Yours is an interesting hybrid model.

TT: This is how we survive current events like COVID. Intentionally, a couple decades ago, we developed the DNA that was hinting at one firm, even though at that point, the offices may have still been standalone business units. The business units went away when I started here 15 years ago. We eliminated offices as standalone business units and became, financially and legally, one company. We worked even harder at finding ways to share work. Technologically, Autocad was starting to make work sharing easier, but we weren't really working any differently that we had been for decades. The workflows were still the same. The media was the only thing that was different. When Revit hit, it offered the opportunity to rethink

who does what, and how and when in the process. Early on, Revit pushed the boundaries across disciplines. That was a much more intriguing discussion for us, since we had everybody in house, than it might have been in firms who had external consulting engineers. Early on, we started challenging ourselves. For example, who really needs to draw the lights in the reflected ceiling plan? It doesn't need to be the electrical engineer, even though they had always done it on their electrical sheets. In a Revit model, everyone can contribute in the most integrated way at any time.

DI: Because of some notion of discipline control, or expertise…

TT: Yes. Most thought lighting was what the electrical engineer did. Well, sort of. That gave us an opportunity to get to the one culture idea. In Revit's integrated database it was different than AutoCAD where you were still sheet-based. This was also before the cloud so there were still hurdles to sharing models and truly collaborating in real time. In the early 2000's we spent a lot of money investing in infrastructure so we

could have people in two or three offices working on a Revit model. That was when a lot of firms said, "We're not going to spend all that extra money just to let a couple designers work in the same Revit model." But our culture told us to make that investment. So, we did, and it paid off because then 2008 hit. If we hadn't had the infrastructure in place in 2008 to let us break models up on Wednesdays and reassemble them on Fridays, we would not have survived the recession as successfully as we did.

Since we had that technology in place when 2008 hit, that gave us flexibility to deal with staff reductions because we could be more strategic and balanced with cuts and staffing. For example, my office in DC had several large healthcare projects active in 2008, but we didn't have healthcare planners in DC to do all the work — we had three or four of the best planners in the United States in San Francisco with nothing to do. So, the SF office did the planning for the DC project throughout 2009 and into 2010.

So, we had the right philosophy, and

we had the right technology that let it happen. Those are predecessor events to what's going on now with COVID. In March, we sent 1,300 people home on a Friday and said: "Don't come back on Monday." We had a few dozen people still working on desktops because they were doing big computing. We had to scramble and get them laptops and build more capacity for people to access server farms remotely. But largely, the technology and culture were in place.

Luckily, we had the engrained philosophy in place about work sharing and one firm. The Revit revolution gave us a platform to

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…you live and die with your culture. Technology's just going to accentuate the best - and worst - of that culture. You need to think about things in that order.

reinforce that culture unlike any technology before. If you're sharing a Revit model, you are all going to use the same Revit standards. This moment really focused us on what matters. "Let's worry about what needs to be the same to make us more productive and effective. Let's not get distracted about the things that don't matter to the people on the ground like how they relate to each other and their communities." Whether it's studio- or discipline-based doesn't matter. We're delivering projects, and we can share people.

DI: That's helpful background. Technology allowed the change and the firm processes to work. You're smart enough to have restructured in advance of surprise external events.

TT: Those examples show — when it comes to innovation and positioning yourself for the future — it's about culture, not technology. Culture made it important for us to prioritize investments in the right technology because it was supporting a culture we had been working on. Now with COVID, we've been trying to break down the silos between markets,

offices and disciplines not managing models. COVID has forced this change at warp speed. We could have sent 1,300 people home two years ago just as easily as we did six months ago. The technology we're using now, we were already using for project delivery.

You can't underestimate that you live and die with your culture. Technology's just going to accentuate the best — and worst — of that culture. You need to think about things in that order.

DI: Culture is king. Let's dive into the process of beginning the design of a building. In architecture, culture includes all these weird, idiosyncratic, vestigial things. How is the process of design conception different now from 30 years ago?

TT: To start with, you and I can't open most of the tools everybody uses today. AutoCAD was the end of my hands-on technology use. When we were doing AutoCAD, either you were using AutoCAD or you weren't. The bigger struggle we have today is, we have a menu of Revit, Rhino, SketchUp, and so many other apps

HOME VR

OFFICE VR

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The toolkit is varied. With that comes a range of attitudes about what drives design.

and add-ins as well as our own ability to write code. Recently, we've been hiring grads, as well as some mid-career staff, who are as apt at writing scripts and customizing software as using the standard tools. This lets us be smarter but it's not how we traditionally thought about our process – the idea of making our own tools. But there is no doubt, one of the big discussions in architecture is: "what is the relationship now between the tool, the aesthetic, and the output?" Or, more clearly, "what's the emerging relationship between process and product?"
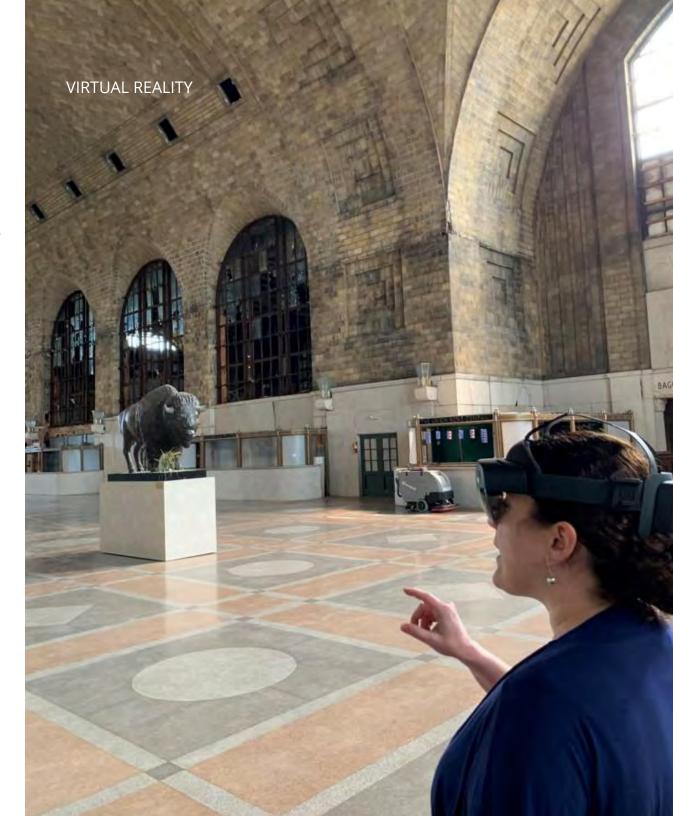
5 or 10 years ago, the sentiment was: "Well, if you use SketchUp, you can only get a rectangular building because Sketch Up can't do curves." Then Rhino came along, and, all of a sudden, everything's a curve because doing a curve is just as easy as doing a line in Rhino. In the meantime, Revit is still plugging along, trying to be the end-all digital model solution for everything — the place where it ultimately gets integrated. These tools do seem to have a generational bent. They reflected what was being taught in schools and, often, what the software was really designed to do.

Sketch-up is was meant to be just that-a sketching tool and BIM is a platform. As to how those tools affect design, we've graduated from the first phase of worrying about that. As a result, we now sense more control over the tools than when they first came out.

The toolkit is varied. With that comes a range of attitudes about what drives design. There's been a lot of discussion about technology's impact on design, technological determinism of forms, parametric and performance-based design. We have all kinds of off-the-shelf and customized tools we use for those things. We also have a lot of planning tools we've either adapted or built that give us all kinds of data from our floor plans, or that we can pull from Revit. The process is much more data sensitive and parametric, and design-assistive than it ever was. I'm completely amazed by the tools. And, the tools are allowing us to automate more of the research, planning and analysis and freeing up more time for creativity and exploration.

In the bigger picture, we struggle to understand what all that means to

our clients, and to what we do. Parts of it relate to clients who want to understand their building performance in energy, financial, life cycle cost, or flexibility terms — even the design process. They might ask: "What if I have this many more collaboration spaces and fewer desks? What does that mean to the program and cost?" We can do that kind of analysis now by hitting a couple buttons. Tools like that free us up to focus on bigger issues. They free us up to have more stakeholders involved in a design process, look at more options, or pull data out of other projects that we've done to understand them historically. Did they work? Maybe we can spend a little more time in post-occupancy evaluations than we used to because we can save some time in delivery documentation. That's where we are in understanding what the tools do, where we spend our time, and what impact that has. Projects are all delivered electronically. Some still get translated into PDFs but we went paperless in our DC office over 10 years ago. For a long time, we only printed to get a building permit because jurisdictions were behind.

VIRTUAL REALITY

Sometimes models are our deliverables. We share the electronic files in design-assist and design-build in ways we never would before. The transition from final documentation into fabrication and construction is starting to blur more than ever.

As people become more comfortable giving models to partners or allowing others into our models, agreements are evolving that govern how you're going to use the model, which minimizes and/or shares liability issues and risk concerns. This really starts to change the industry relationships and opens doors, which moves the culture to a higher level of collaboration and sharing. I believe we don't yet fully understand, let alone accept, the different relationship between design and making that's in store for our industry.

DI: When I started 50 years ago, we didn't have as many tools, but everybody knew how to use them all because it was just a pencil and a piece of paper. Now that we've got dozens of smart technologies, nobody can possibly know how to use them all. So, we need more specialists and translators. And people whose job it is just to manage and train for the tools.

Do you still have people who begin the act of conceiving a building with a pencil and tracing paper?

TT: I think today, nearly all our designers start electronically. We have a few folks that still start with a piece of paper. But most of our design principals, project designers, and mid-level designers start electronically. They might debate, "Is it going to be Rhino, Sketchup, or Revit?" Those tools have generational biases. The bigger changes are how the teams and our client's interaction throughout the design process. COVID is significantly altering these processes and I don't think we'll ever be fully back in person. It'll be a hybrid. So, like Revit in 2008, we

VIRTUAL DESIGN MEETING

have the tools now, but we didn't really accept or acclimate to them until COVID forced us to.

DI: That's a tipping point. It took half a century to get there.

TT: The more interesting question is: do projects still originate out of the head or hand of one person? That's one of the big cultural changes we're seeing. This invokes the integrated design idea. We like to claim we were thinking about — and had — integrated design because we've been architects and engineers for 170 years. But true integrated design culture is fundamentally different than the way we were conceiving and designing buildings a generation ago.

A key cultural difference in integrated design is who's around the computer screen making comments as ideas are first forming. Today it's is a completely different cast of characters than it used to be with the white guy in the white shirt sitting at his desk, coming up with a sketch that then worked its way around the studio the next day. We're well beyond that. The integrated design philosophy is fundamentally

changing who is involved. It's conception and creation under a very different model. And it's not just the internal design team around the screen; it's also clients, their stakeholders, contractors, manufacturers, and sometimes, even code and jurisdictional authorities, collaborating through the entire design process.

DI: If the traditional role model — the lone white male designer, lone wolf genius — is demonstrably obsolete, and designs are being generated out of the heads and machines of many, and more intelligently, what role models can firm leaders look to? Maybe they're not even in architecture? Maybe it's software, or the film industry? Where do firms look if they haven't accomplished their reinvention yet? Because our old role models don't seem to be valid anymore.

TT: That's not unique to the design industry. I just saw an interesting stat: barely half of business CEOs have MBAs. Many have humanities and engineering degrees or, increasingly, no degrees at all. We just never thought about it because many of the

MBA's are touted as the stars of business. But, the star CEOs or the star architects -- the personalities in the press -- remain a small percentage of our professions, even though many feel that's what we were taught to aspire to in school. I think the stars have a place in many industries, whether business, science or architecture, but I don't think their impact is as role models.

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…it's not just the internal design team around the screen, it's also client stakeholders thinking about their communities. The integrated design process is fundamentally changing who is involved. It's conception and creation under a very different model.

It's perplexing to think we saw the likes of Wright and Kahn as role models. We saw them as leading voices trying to push the art and the craft of architecture. Many starchitects weren't always the best for the profession. You ask an interesting question because I don't identify role models. But I am indebted to my mentors and they are my professors and first bosses. 30 years ago, I started my own firm, and my mentor was one of my partners. I feel our role models and mentors are people we meet along the way who help define who we're going to ultimately become. That just reinforces what we're missing so much with COVID: we don't have the opportunities to build those relationships face to face in colleges or in the office right now.

This is a big concern for the future of practice: how we connect graduates with people like that, so they can learn and grow? Not just the technical piece, but how to practice, or be a good peer, coach, or project manager.

DI: In the same way you talked about designs no longer coming from a single head and hand, maybe the same can be said about mentorship. Maybe we've got to draw influences from multiple mentors in ways we never had to before. When will SmithGroup be ready for its next reinvention?

TT: Knowing what's next is tough. COVID and our discussions about racism and equity are related to mentorship — and each other — in ways people don't yet understand or even accept. This raises the question about what each of us may want to do next individually. What should our roles be? Especially if you want to be in a position where you can have a bigger impact, either in a firm, or for the profession. I think the future will be defined by the COVID and social justice debates as more than by technology and our current cultures. The way we practice, and even who practices, will be very different in a few years than it has been up until now.

These trends will afford us the opportunity to seek mentors, experiences and relationships outside of our traditional professional boundaries. I think the legacy of COVID and social justice will demand that we expand our bubbles. I've been as much in touch with my friends around the world as with my local colleagues and friends through COVID. We are learning to reconnect in our disconnectedness. This opens new ways of keeping in touch with mentors and who becomes a mentor.

As far as SmithGroup "reinvention" goes, I think all firms should now be questioning their reinvention. We now have the chance, and more importantly, the desire to change the lack of diversity and equity in the design professions. We also have the cover of COVID to make the changes about our business models that many of us have been anticipating but just couldn't bring ourselves to take the step. Let's use the intersection of COVID and social justice to redefine the future. We know we create better together. We know diversity makes for healthier businesses and leads to innovation and better results for everybody.
We don't have the answers just yet, but we're working on it. Most

hopefully, I really believe our professions, and society, are finally ready to be better.

DI: I hope people are thinking about these issues. I'm glad you are.

TT: When we did the last succession process, Carl Roehling and Randy Sweich, our CEO and COO, weren't on the succession or nomination committees. As I mentioned before, Carl's first rule was, you don't get to pick your own successor because you'll pick yourself. Another of their charges was, "Come up with a replicable process that can start to become a culture of change and succession" because we hadn't had that, and few firms do really have that.

The key to our next succession will be spending the years it takes for talent development at a time when many people are more impatient for advancement than ever before. So, we have carried several things out of that transition five years ago that we're constantly working on. We've put tools and processes in place that focus on developing talent. We have succession planning tools, talent development and training, and a new coaching system in place.   We also are always looking for opportunities to get emerging and high-potential staff in leadership roles or leading initiatives. We are now questioning the nature and need for traditional hierarchy and organizational structure and what role it plays in hindering or helping with a culture of succession.
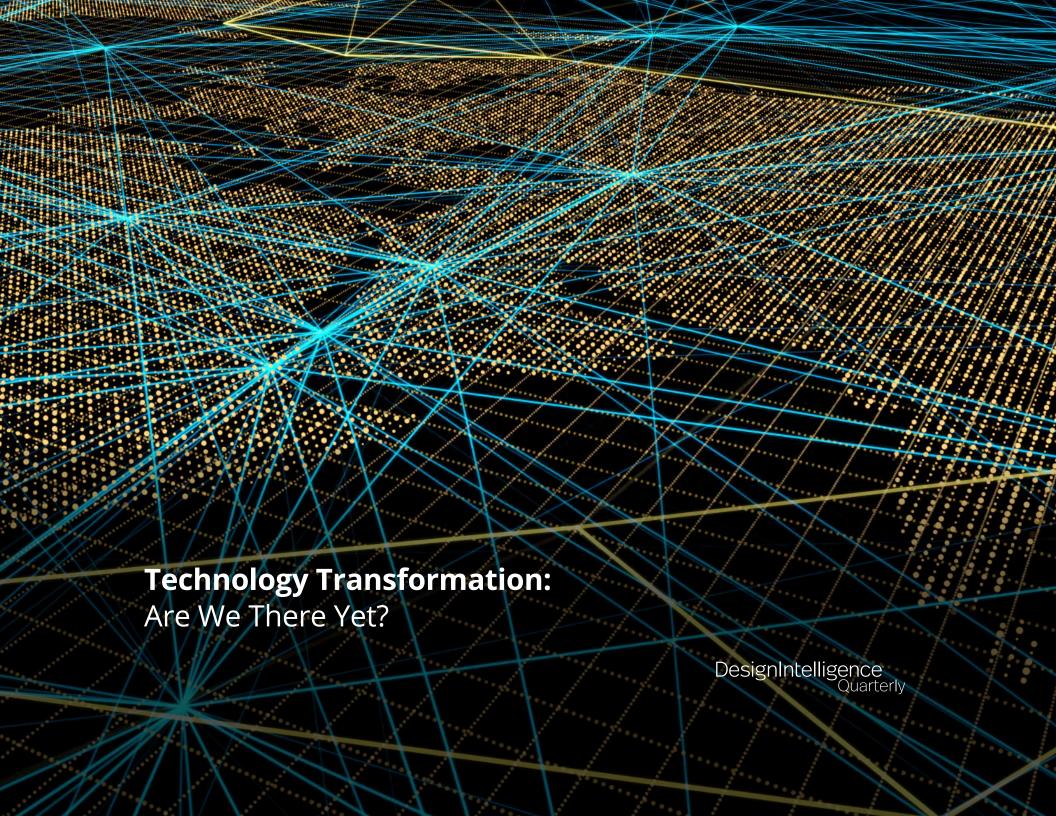
We're starting to ask ourselves: "Where are we going to be in three years? Five years? What does that imply about the next leadership model?" Is it still three people with the same responsibilities we have? Does that model have another generation of relevance because of how we much we still focus on tools, technology, and culture? I suspect our answers to those questions will be different now than if we had finished by February. And, most importantly, whenever our next transition occurs, it will be significantly affected by with the legacy of COVID and will have equity and diversity at its core.

DI: Perspective can't help but be changed by the last eight months. You were rewarded by being in front of it a few years ago. Thank you for an insightful look inside your firm's reinvention and process.

TT: You are absolutely welcome. Enjoyed the chat.

Troy Thompson is one of three Managing Partners leading SmithGroup. From their Washington DC office, he is responsible for innovation and positioning the firm for the future through his focus on design and delivery processes, and tools, research, technology and talent development.

Technology Transformation:
Are We There Yet?

DENNIS SHELDEN

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Science and Ecology (CASE) &
Assistant Professor,
School of Architecture,
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In this wide-ranging discussion, RPI's CASE Director Dennis Shelden shares his journey and vision for industry change.

DesignIntelligence (DI): You've had an interesting career in the technology space. You were one of the early pioneers and leaders at Gehry Technologies, migrating to Georgia Tech to run the Digital Building Lab (DBL) and take over for Chuck Eastman. Now, you have a new opportunity at another leading technological institution, the Center for Architecture Science and Ecology (CASE), and as Assistant Professor in the School of Architecture at Rensselaer Polytechnic Institute (RPI). How did you get into technology?

Dennis Shelden (DS): My personal career trajectory is in some ways a microcosm of the larger evolution of technology in practice and its potential for cross disciplinary integration and value creation. I was very fortunate to have gone to MIT as an undergraduate in the 1980s, when CAD and other digital tools like structural and energy modeling were just beginning to mature to the point of relevance to building practice. Although I went to MIT intending to do something related to computing, I discovered and fell in love with architecture while I was there. Architecture had – and has - this expansive agenda about the world and projections of the possibilities of change through creativity and invention. This possibility is also very apparent the

tech world today, but it wasn't so clear at the time that technology was going to be the profound social driver it has become, and architecture had that appeal.

Computing allowed me to have relevance in numerous aspects of building, not just architecture but also the various associated engineering fields, software and building product firms, and I was able to surf the growing technology wave into experiences across the silos in building space. I worked for a company that was pursuing real time building energy and controls optimization in San Francisco, and then Cyra Systems, who developed the first cloud of points laser scanner that was ultimately acquired by Leica. During grad school I also got a chance to work with Arup in New York on both structural and energy modeling teams. In San Francisco I had acquired a used Sun Unix workstation, which was the hardware platform Arup was using for their proprietary software at the time, so I was the only intern that could access their software on a regular basis. Those early experiences helped me

form an expansive view of how information technology can connect and cut across the distinct disciplines concerned with the development of buildings.

It was during grad school in the mid-1990s that I got introduced to Frank Gehry's practice through an academic collaboration they had with my advisor at MIT – the late William J. Mitchell. The Guggenheim Bilbao was just finishing up at the time. What I saw on visiting the studio was incredibly groundbreaking. At the time they were using the Unix version of the aerospace software CATIA, which had several firsts: the first commercial curved surface modeling, real time rendered navigation of models, and an orientation to design-for-fabrication. They weren't just using CAD to draw and render, they were using the models as a new way of understanding building: lighting, acoustics, and structures, and a way of thinking through how the projects were put together and discussing ideas directly with fabricators and builders. It was clear to me that I was seeing the future of the profession,

precisely in this possibility of digital information connecting design across the myriad of building disciplines. I finished my PhD qualifying exam that semester and left MIT to take a technology leadership position in the firm.

Bilbao created an enormous amount of interest in the Gehry's work and the methods of the firm, and we were able to use that demand for the architecture to drive adoption of the firm's digital tools and methods into collaborating firms on project teams. The tech team that I directed took on a number of services both for the firm and for collaborators, including research and development of new software add-ons as well as specifying, assisting in procurement and training of partners. These services were provided to the teams as part of the firm's architectural services fees and contracts. It eventually became clear that this was both an added complication and risk to the core architectural services, and that ultimately the resources required to support this agenda would exceed what could be "fit" into the firm's design services. And, that there was

an emerging opportunity for the methods and tools we were using beyond Frank's practice. These really were the underlying motivations of the formation of Gehry Technologies: to develop technologies that could connect design, engineering and fabrication together on Gehry's projects and beyond in the broader industry.

It's worth noting that there was, and I think still is, an important back story about the role of technology in the practice. Frank Gehry has always had a passion about re-empowering the architect. Digital technology has been a way of defending the agency, role, and value of the architect in the context of a supply chain where it was increasingly being eroded. Working out the details of the designs virtually – "down to the bolt", and incorporating the knowledge of fabrication and detailing into the design and its documentation, has provided the firm a powerful weapon in de-risking the project, countering the voices of those who have closer control of the project during construction, and defending against "value engineering" the design out of the project.

DI: I don't recall ever hearing about that side of Gehry's motivation. That's not what gets talked about with him. It's always about the art and the form. But I can make the connection because in his early work he used inexpensive common materials — chain link fence, wood studs, corrugated metal siding, and asphalt — as a way to claw out of the diminished architect's role and combat the perception of busting budgets. Likely also to create a brand and a unique materials palette. His later use of technology to adapt standard construction methods is a next generation way of accomplishing that same goal. He reinvented the form, not the familiar means of construction.

DS: Absolutely. That's the story that doesn't hit the Simpsons. First of all, Frank's buildings work. They work because the program is incessantly thought through, and because his designs adhere to budgets remarkably well. I know the lore is everything but that, and the few times there were issues on projects, everybody would shout from the rooftops. But the fact is, there's a point around GMP where pricing is locked in, and the detailing and system strategies have been so comprehensively worked out and vetted across the team that there is very little of the sort of ambiguity that leads to errors and disagreements .

Another remarkable fact of the work is that despite the geometry, under the hood, the projects use relatively conventional building systems and details, just applied differently. Disney Concert Hall and Experience Music project are great examples. The connection detailing is consistent with conventional curtainwall, it just happens to be expressed across different geometry. Being able to use the digital model to convey to these proposals to the trades is hugely valuable as a means of controlling risk and therefore cost. That has been a big part of the firm's success: using digital technology as a way of adapting relatively traditional ways of building to radically new geometries, then aligning and clarifying intentions, and maintaining consistency, control and understanding. And I think that is again a microcosm of the larger

ambitions of building information modeling as it has expanded into broader practice.

DI: When did you return to academia?

DS: I had been teaching at MIT as a professor of practice while I was CTO of Gehry Technologies. After Trimble acquired the company, I got the unique offer to take over Chuck Eastman's program, the Digital Building Lab at Georgia Tech. Professor Eastman has been one of the pioneers of building data and BIM, and the program had a phenomenal heritage as a leader in developing the open data standards around building information exchange. The possibilities of taking what I had been working on in the context of a commercial tech company, but deliver it through an open, not-for-profit organization seemed like a great way to broaden my potential impact on the profession.

In bringing my experience from the professional and the tech worlds to academia, I'm working on a couple expansions of the BIM agenda now. One is about post-occupancy, but it's beyond the narrow definition of the term. One of the things that the tech revolution in the broader economy has shown is that tech advances don't just transform tools and methods of work, they have the potential to connect to and thereby rewire social structures as well. The digital transformation in our industry – of BIM and related technical advances – has been about reworking delivery process, but it hasn't to date fundamentally impacted what buildings are or how people and organizations interact with them. I think there is a dramatic opening right now to see the building model as a part of life of the building and for it to be a lens for bi-directional information flowing between the building and its occupants, and ultimately back to designers.

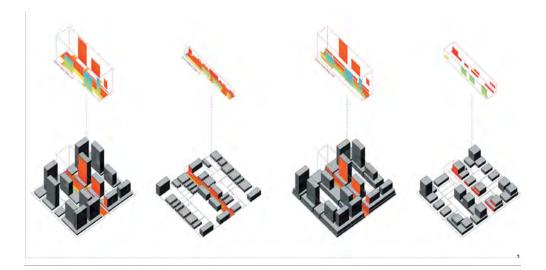**DI: I thought you were going to say the Internet of things.**

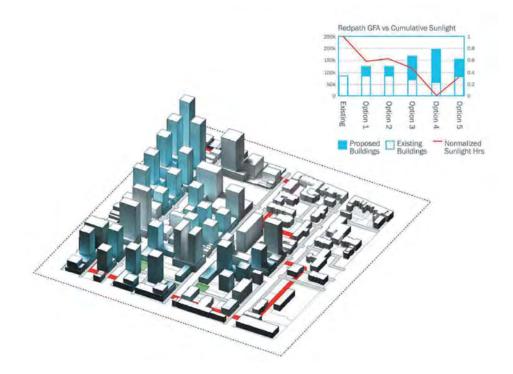**DS:** Yes. IOT is another one of the names for it. The idea is that the building becomes intelligent and it becomes a partner of the people and organizations it serves, not just in terms of energy and maybe lighting or security but to the functions of the organizations and communities directly. One of the areas this is already playing out is in retail. The "Amazonification" of the retail experience is no longer about making everything virtual, but about re-introducing digitally enabled life back into the building and urban context. The digital model and its assets can contribute to the user experience of the built environment, and maybe to hybrid online and in person experience. I think that has tremendous future opportunities for architects– to reconnect to the end users of buildings in an ongoing way that extends far beyond traditional design.

I've also been interested in the possibility of design agency across scales as well as across disciplines. I experienced the ability for designers to drill down in terms of higher fidelity detailing of buildings, but the same technologies offer the

possibilities to expand design to increasingly larger scales beyond the building – to the campus, city and planet.

Traditionally there has been a major disconnect between architecture and urban planning, with very different tools and modes of control associated with each of these disciplines. The difference between BIM and GIS is one manifestation, and these technologies are converging, but I also think the approach to affecting change at the city scale is coming into the sphere of what design looks like from the lens of architecture. Because of the scale and the decentralization of decision making across urban contexts, city planning has had to rely on relatively low fidelity, arm's length ways of understanding and directing the design of urban context – through prescriptive and reductionist tools like zoning regulations. The coupling of BIM modeling developed through generative means with the sort of scalability provided by the cloud, connected to real world data coming from IoT intelligence in the world, suggests that we can design solutions

at the scale of cities – with all their richness and complexity, and with the same level of detail and precision that we can now design buildings. We've done work where we can take zoning and building codes, simulate their full extent at city scale and generate and test those building performance codes, which can then be reflected into more precise and informed planning guidelines.

I started working on some of these ideas at Digital Building Lab (DBL), but the program was still very focused on the pragmatics of using better modeling and data to improve the building delivery supply chain. CASE offers a much larger agenda – to rethink the products of building around much larger societal and environmental agendas, in light of changing tools but also maybe to rethink even what a built project is. We have the ability to tackle humanity's macro-level challenges and the impacts of the built environment with precision and efficacy. We can do this at scale, virtually in the classroom or through associations with professional

projects and real cities. That's my motivation now: we have the tools and the capacity as architects to stand with confidence and hopefulness about tackling the massive environmental and social challenges in front of us.

DI: A much broader agenda and range of tools. It's not a big leap to see the connection between what you just talked about and things like COVID, Black Lives Matter, wildfires, climate change, and floods. Way beyond the notion of BIM, to simulation analysis. Did we miss any other initiatives at RPI?

DS: The agenda of CASE spans from traditional building systems, research, smarter facades, and smarter ways of managing energy sources, to much larger ambitions about ecology, sustainability and humanity, specifically I think around the possibilities for increased design efficacy at scale through connected data, digital tools, and alternative models of project and innovation delivery.

Through my experience as a startup founder I have become passionate and fascinated by alternative models of innovation and social impact coming from the tech world. When we started Gehry

> *…seeing what's happening in other sectors of the world. I am passionate and fascinated by the alternative models of innovation and impact coming from the tech and venture capital worlds. … This other world is offering infinite amounts of capital.*

Technologies, we got a little investment, but we operated under a fairly traditional services business model with existential pressure to make the books balance every quarter. This is true of many of the innovation labs that come out of architecture firms, Architects want to innovate, but their ability to invest in innovation is limited to what they can charge clients under fairly constrained services contracts or out of very limited profits. The cyclicality of projects and the overall building economy makes this investment very difficult to sustain and grow long term.

There is a whole other world of growth driven capital investment that is familiar from the broader tech world vernacular. This wasn't as large a cultural influence and it certainly wasn't available to architecture until recently. Today there are truly unlimited amounts of capital available to pursue transformative innovation that can scale to tackle large and important problems. Revenue is – sometimes - relevant to these business models, but short-

term profitability isn't a significant motivation or constraint. On the flip side, there is innovation happening – by individuals in firms or universities – that has tremendous impact without needing a capital at all. The infrastructure for distribution of innovation over the web is so powerful that individual or small teams can have significant impact.

The second part of this is to see the built environment as the vehicle for the sorts of cultural impact that have to date occurred in the on-line world. I'm convinced the built environment will be one of - it not the - platforms for next generation technology innovation. As part of the work that I started at the DBL and have taken to CASE, I'm interested in thinking about how we can create analogs in architecture for the sort of value creation driven by the internet and world wide web, using the physical environment as the platform.

The technology we developed at Gehry Technologies that really interested Trimble in the acquisition was a cloud-based tool called GTeam,

now called Trimble Connect. It's a BIM and project data management system wrapped with social network constructs, which offered a new take on how cross project collaboration could be supported. At Georgia Tech I was able to learn from some of Chuck Eastman's work around open data standards. In this connected work of building information, IOT and digital twins, there's an opening to create for the building industry what the Internet and Web data have done for technology companies.

DI: It's fascinating to hear you talk about the scale. Maybe it's finally time. After 40 or 50 years of slow gestation, being last in the industry productivity race – flatlined on Paul Teicholz's productivity graph — it's not a surprise. Why is that? Because we didn't have the money to invest. We didn't have the scale. And we didn't have the motivational DNA to be innovators or entrepreneurs. For all those reasons, it's no surprise the architectural community has lagged. Now, maybe these external chaos events are converging. The rest of the world is

finally seeing our potential and how we might connect — and vice versa. Maybe we're finally at the tipping point. Are we there yet?

DS: I think we are, and maybe have been for the past five years. Part of the limits to innovation in building has simply been the inability to leverage advances beyond the individual project. That has created a barrier to the scales of innovation

experienced in mass produced manufactured products and software. But as we all know the cost of digital firepower keeps dropping exponentially, and at some point in the past decade it crossed a tipping point where the cost of technology adoption ceased to limit architecture's potential as a first tier innovation industry. One example of this is the use of drones on construction sites. The price of drones quickly dropped

after their introduction. Soon they appeared in two places as commercially viable technology: in the movie industry and on construction sites. For me that had a powerful message – that the building industry no longer had to wait for the aerospace and automotive manufacturing or entertainment industries to mature technologies before we had access to them as was the case for BIM. Augmented reality

is another example. Technologies are coming to the built environment first, and the entry price of these innovations is low enough that we can afford them in the context of project budgets.
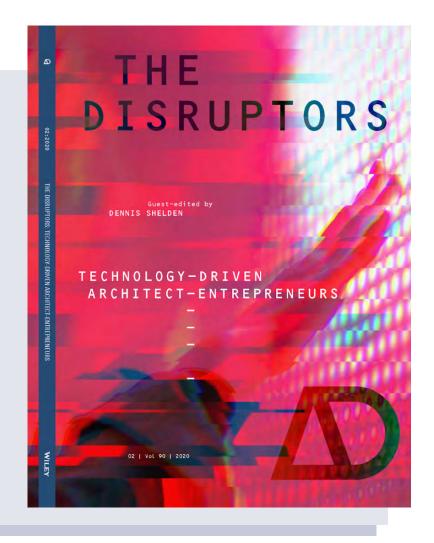
I think the industry transformation is finally happening, but it may happen more through alternative delivery structures and companies that re-organize to create value at multiple points in the supply chain. The risk is that traditional firms may incrementally get pushed out. We're seeing this already. There's competitive pressure through alternative business models and business entities, some coming out of manufacturing, some coming out of integrators. The traditional mentality: "I work in this defined role, and I'm going to keep my head down and shed risk to others because I don't have the fees or scope to assert control," is going to face more threats from other delivery models and companies. This opportunity is bi-directional. Architects can now take on roles they traditionally weren't able to do because they didn't have the credentials, the tools or the

capital. Digital modeling and the large sets of easily accessible tools are creating opportunities to take on some of these broader roles. Architecture firms are reaching out and taking on these broader services opportunities, but other entities are also saying, "Hey, can we just in-house the architect? Do we need an external firm?"

I recently guest edited an issue of AD called "The Disruptors: Technology Driven Architect Entrepreneurs", to take a broad look at the types of new firms emerging and the new agendas

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To me, it's a call to action, because the traditional models will continue to erode. The position of architecture as a contained place — with defenses around it in the building delivery value creation chain — will be pressured to rethink the boundaries of the discipline.

being taken on by existing practices. There is huge variability in the ways innovative practices are taking on these emerging cross disciplinary opportunities. You see this most in manufactured construction because the traditional, "You draw something and we'll figure out how to build it," doesn't work in manufactured building. The design must intrinsically be part of not just the product, but the system you're building within. To me, it's a call to action because the traditional models will continue to erode. The position of architecture as a contained place — with defenses around it in the building delivery value creation chain — will be continually under pressure, requiring us to rethink the boundaries we impose on the discipline.

DI: That's powerful. Have you read George Johnston's new book, Assembling the Architect yet?

DS: I have not yet, but I think highly of his work, so I look forward to seeing it.

DI: It's a fascinating history of what

the profession did to itself, in constantly building walls and defensive posturing. Licensing and other issues. Whining rather than doing something about it. What you're saying now is reinforcing the need for change. Maybe things have converged. Maybe it's finally happening.

DS: Technology is the wild card in this. The history of the last half of the 20th century was a sense of the technical complexity of buildings getting beyond what an architecture firm and their fees could manage. As buildings got more complex, the process became harder to control with the available instruments of service. That's where risk shedding and building bigger teams came in. But technology has upended that, because now we have the capacity for a broader reach, a more detailed understanding, and ultimately more control without overwhelming our abilities to manage information and our associated contributions to the project.

DI: Let's talk about the human element. How do we change the

minds of non-change-ready principals, the people afraid of technology? How does a technology guy like you learn to become a change agent?

DS: Take Geoffrey Moore's technology adoption curve. There are good reasons to be anywhere on that curve, including being a late adopter. But if you are anti-technology long-term, you're at risk because the history of humanity has been intimately intertwined with technology, not just the digital technology of last 50 years.

DI: To be against tools is hard to accept.

DS: I'm starting to work with architectural practices who see this exciting future and are keen to at least explore new opportunities in this expanded world of practice. How do you, as an internal change agent in a firm, move the next generation — the digital natives and future leaders —to take advantage of emerging opportunity in a way that manages risks? Yet every firm has great people who grew to create the central value of their firms using certain pre-2020 methodologies, and the unique differentiation of the firm is intimately intertwined with that existing process. The question is: how do you evolve that process and yet preserve the unique things that differentiate? The good news is today's software development is obsessed with usability by "normal humans". There are very mature technologies to be brought to bear in developing a firm's approach, and they do tend to interoperate with one another. You can craft an approach that's uniquely yours and supports the unique qualities of the firm without having to create from whole cloth or rely on excessively technocratic workflows. You ought to be able to go to a designer that works in colored pen and show them technologies that can integrate or replace, make their work easier, faster, more compelling, and give them a better, maybe bi-directional connection between design and final product.

DI: Great point. If you can't relate it to their world and make it be about them and their culture and language you have no hope. Has COVID impacted your work?

DS: Absolutely, in that I think it points to the urgency and market interest in built environment innovation. When COVID first hit in March and April, there was a lot of interest in people declaring what is the future of architecture held, given what we knew at the beginning of the crisis. Like many, I didn't feel like I had a clear idea of what the future held, but the obvious answers - suggesting an architecture of distancing and sequestration, and a flight from the urban social context - didn't make sense as a long term conclusion. The lesson to me has become about resilience and reconfiguration. I see COVID, and hurricane Sandy, and the incredible impacts of climate change and globalization we're seeing, telling us that architecture can no longer assume the built environment is static. When we build buildings, there's very little sense that the world will be different in five or 10 years. We don't design for future proofing or radical change in program or context. Maybe it's aspirational, but I

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think the takeaway is that developers, owners, investors and governments are going to need to take a more dynamic view of the future of the environment.

We've all seen some amazingly positive responses in the last couple of months. The first is the reconfiguration of cities. Take New York City. Streets are starting to move from everything being about cars and parking, to bicycles and outdoor dining. Things you see in other parts of the world more than in the U.S. I think we're going to need to see the urban context in different ways. We might have to design cities so that they can be partly shut down, but as part of this they should have ways of, re-opening, re-using and reconnecting themselves. It points to a dynamic about the built environment you can read everywhere in the current narrative. It's a view of resiliency — not about putting up walls, but about creating a dynamic reconfigurability and adjusting the urban and building fabric.

It's not just an aspirational, ethical, or philosophical problem. Futureproofing is becoming a business value proposition. And that's one of the most exciting, positive things happening. These things were happening before the pandemic, but we're seeing reactions now that must happen in months, and this won't be the last one. We have to understand that's part of architecture now.

DI: How is CASE organized to take on this mission?

DS: The exciting thing about CASE is that is a completely integrated design, research and professional collaboration with an integrated agenda and team. It is a unique place to rethink the relationship between design, science, engineering, and research, and between education and the professional world. Because we have a charter that's endemically about the relationship to the city and the professional community, we have the opportunity to rethink the rules of engagement of academia and research with professional practice. The dynamics of the business model of academia are changing. The baby

boomer children and undergraduate population was at its highest in a generation in 2009 and has been declining since. But at the same time, it is becoming clear that learning and innovation training is going to be a lifelong imperative for working professionals. We're starting to work with some architecture firms by offering our classes to staff in these firms. Because everything's online now, they can just dial into our courses. Reciprocally, we see a way of engaging students and firms in an applied research model where students go out into firms not just as interns but as embedded innovators and researchers, and we are working on building programs that support these students and firms in connecting back to CASE.

We are looking at the redevelopment of the educational model into something much more applied. A model in which we're blending professional life, student life, research, professional practice, and education. CASE can be the vehicle to pursue this. Applying this new approach is imperative to solving issues of environment, resilience, and rethinking professional practice through technology. We can take this on through an education and innovation delivery model with intimate bidirectional ties to the professional community and to the environment itself. In some ways this pandemic — by virtualizing everything — has opened doors to working in more fluid ways than we had just a year ago.
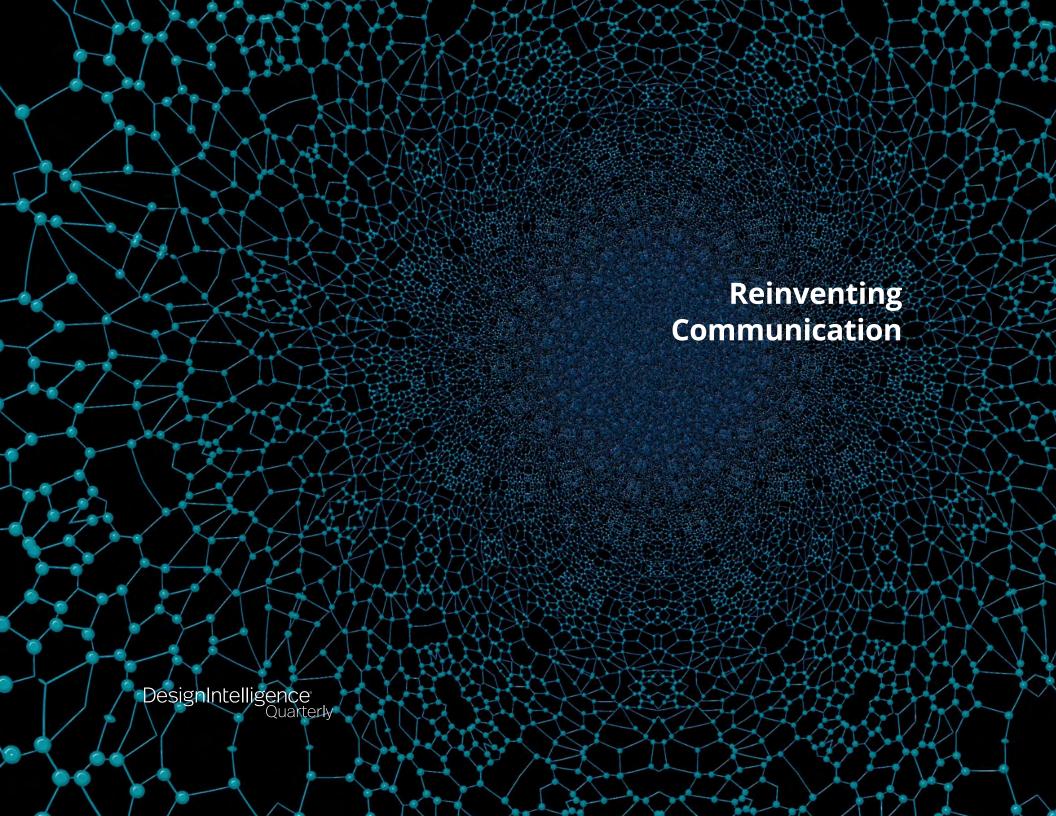
DI: That is compelling. A case for reinvention. The advantages of starting anew in a self-contained way where you're in control rather than to trying to change centuries of inertia in the traditional institution. Dennis, this has been fantastic.

DS: Always a pleasure. Good to talk to you.

Dennis Shelden is the director of the Center for Architecture Science and Ecology (CASE) and Assistant Professor in the School of Architecture at Rensselaer Polytechnic Institute. He is a licensed architect, entrepreneur, and author whose experience spans architecture, engineering, and computer science applications to professional practice and the built environment. He holds three degrees from MIT: a Bachelor of Science in Architectural Design, a Master of Science in Civil and Environmental Engineering, and a Doctor of Philosophy in Design and Computation.

His publications have appeared in Architectural Design, Technology and Architectural Design, and the Journal of Construction Automation. He has been interviewed in publications including the Economist, New York Times, Design Intelligence, and Engineering News Record. He is editor for the forthcoming book series Practical Revolutions: Professional Applications of Disruptive Technologies to Building, published by Wiley.

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HAMISH CALDWELL

Partner, Wireless Insiders Network

Hamish Caldwell discusses the evolution of wireless networks, careers, agility, and communications – and their implications on strategy and practice.

DesignIntelligence (DI): 25 years ago, you left design practice to redirect your career into technology convergence, joining AT&T. It was a strategic refocusing, a reinvention of sorts that now brings design and construction types an informed, external perspective about technology. What did you see that led you to make that change?

Hamish Caldwell (HC): In the late 80s and early 90s, I was tasked with the complete digital transformation of the practice and business operations of Lord Aeck and Sargent Architects. That was not a common role for someone in a design firm in those days. As an extension, through the vision of Larry Lord for architects to expand the value they create for clients and for profitability, I initiated the practice of providing clients with strategic technology consulting services. That meant that I got to help healthcare clients, like the world's largest AIDS research center and Dr. David Ho at the Aaron Diamond AIDS Research Center in New York City.

DI: Time Magazine's Man of the Year, back then.

HC: That's right. And I'm glad to still see him on TV today talking about COVID. But I also advised higher education clients — another Lord Aeck and Sargent market

segment. I helped clients like Emory University integrate emerging internet and communications technologies into their building programs, for which my colleague architects would then shape building designs to accommodate those inputs.

From that experience I could see digital technology — what we were doing in our practice, and what our clients were having to deal with in their technology adoption — was the way of the future. As a result, I pursued a master's degree in computer science at Georgia Tech. I wanted to leverage that education to make a career shift. That degree enabled me to get a job at BellSouth and get involved in the delivery of communication services. I rode the exciting wireless wave that would become cellular communications — the worlds of wireless voice and data, smartphones, the Internet of Things, and the many incredible things we now take for granted.

5G and IoT Will Be Leading a Paradigm Shift in M2M Communication Management

DI: You were using that expression, "the Internet of Things" in the 80s?

HC: No. That didn't exist in the 80s. What did exist was telemetry. That was, you could connect your copy machine or other device to a phone line. If it gave some fault, it could send a simple signal. Telemetry became machine-to-machine in the early 2000s. Tying it to design practice, a thermostat could be a machine connected to an alarm system. If a fault was measured, it would send an alarm. Then with the internet, things evolved from analog communications, like fax machines — you heard the bzzz, bang, boom — to packet and digital, where you heard nothing. Finally, it has become the Internet of Things, simply meaning a network of internet-connected devices. All that has been similar technology, just newer versions.

DI: How long did you stay with BellSouth?

HC: I had 16 years in the telecom space with BellSouth, Cingular Wireless, AT&T Wireless, then

AT&T — all one corporate family that evolved through mergers, acquisitions, and rebranding. I gained experience in creating new business models, designing, marketing and selling new communication solutions. AT&T wanted me to move to Dallas, but with my wife being a chaired professor at Emory University, that was not an option we wanted to pursue. So, it was time for a reinvention.

DI: What are you doing now? Who are your customers, and do you still engage the design and construction industries?

HC: I left the corporate world in 2013. I spent the next year or two as a Chief Marketing Officer for hire and consultant. I worked in some software turnaround businesses funded by private equity firms and with some startups. That evolved into our current partnership, the Wireless Insiders Network. We're a boutique firm of peers — there are eight of us. Each of us was an executive inside companies like AT&T and Verizon.

We help clients access, sell, and build relationships — particularly channel relationships — with the likes of AT&T, Verizon, and T-Mobile. Our clients tend to be based in North America, Western Europe, and Israel, and they provide anything these large telecom and cable companies need to run their businesses or sell to their customers. Whether they're consumers, enterprises, or government or higher ed customers, we help with strategic executive relationship development to accelerate sales and revenue.

DI: Does that serve the built environment industry?

HC: Yes. Some of our clients are selling Internet-of-Things solutions for smart buildings. Those solutions require communications networks underpinning things. The internet is just a set of communication connections, in different forms. Some are wireless on WiFi, some are cellular, some are on fixed networks with cables, some are fiber. It doesn't matter. There are connections of some kind, and there are devices of

some kind. Those devices sometimes are a smartphone or a thermostat with a SIM card inside it. Just a cellular-connected thermostat. Then there's an application, a dashboard or an interface somebody can use to control the smart building or get reports on the performance of the HVAC system within the smart building.

Another design and construction industry use is in remote field workforce applications. You now see people running around jobsites with cellular-connected tablets. They have software on them. My client might be the provider of the software or the tablet. Or they might have something that goes in the network to manage the Internet-of-Things solution. It could be the solution. It could be the platform on which the solution is built. It could be the billing system the construction company uses for that Internet of Things. Our services can be anything within that end-to-end solution.

DI: Can you talk more about your organization and team?

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...what we have in common is flexibility, adaptability, optimism, and enthusiasm.

HC: I'm fortunate, because my partners have also reinvented themselves. All of us worked in software startups and small businesses before we worked in corporate telecom. Each of us had corporate roles in various countries. One was Verizon's representative in Greece, running a Greek telecom business. In their reinvention journeys, everybody brings a unique background. But what we have in common is flexibility, adaptability, optimism, and enthusiasm. We don't know what the answers are going to be. If we did, we wouldn't want that job. We like the discovery, the creativity. We have confidence in ourselves and in each other.

As a team, we've got each other's back. We have trust. We started working together without all meeting in person. We're spread around North America, US and Canada. But as you become experienced, it doesn't take long in a conversation to know: can I trust this person or not? Do they really have the skills they think

they have? As you meet people like that, you know you can work together, so you don't worry or feel you have to be an expert in everything. You feel confident you'll bring in experts if you need them. It's liberating to have the confidence to admit you don't know. I sometimes tell clients, "Sorry, I can't do this job for you. Because I only want to do jobs I'm confident I can do. I'm sorry. I wish I could do it, but I can't." With that kind of candor, you build trust relationships, and that opens a world of opportunity where anything is possible. And you're not cutting yourself off — only repeating yourself to do what you already know how to do.

Staying open-minded has been an important reinvention lesson. But you need judgment about what you can do. In our company we bring different expertise. Some have expertise in sales, others in marketing. One partner is a former network operations leader at AT&T. Others are strong and experienced in

diversity, leadership, and cultural leadership of teams. We know our strengths and what we enjoy, then find the right fit and skillset.

DI: It's one of the great ironies: the world of technology is largely about sociology. What technologies are you working with now? Things we don't know about yet that will converge to reshape life in design and construction and the built environment at large? For example, can you expound on 5G?

HC: 5G is a hot topic these days. But it's just the newest version of a whole set of technologies that underlay the world of cellular communications. It's called 5G because in the late 90s, what was available was 2G. 2G was just analog communications. It had crackly noise quality and was inefficient and costly. And you had these big bulky things that looked like bricks you called mobile phones that weighed a ton.

The next thing was 3G, and the next was 4G. Now we're coming to 5G. The Fifth Generation. Every one of these evolutions has 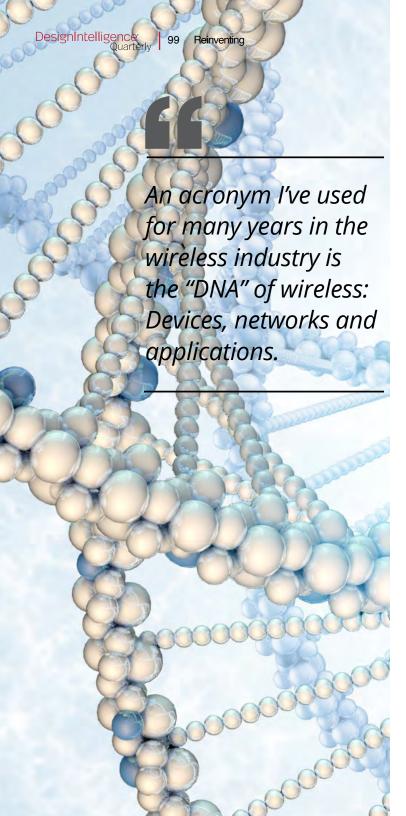been an improvement of throughput, the speed of communications, and a reduction in the latency, or delay. So, when you send something, does it take a long time to get there or not? Also, the volume, or capacity. It used to be, in Atlanta, a limited number of people could make a phone call at one time on a cell phone. Nowadays, millions of people can make a cell call simultaneously. With the Internet of Things, it'll be billions of devices and people communicating at the same time and at a lower cost per unit. We could have made it 20 years ago that millions of people could do it, but it would have cost so much that market adoption would have not happened.

What does that mean for the design and construction industry today? You've got folks all over job sites looking at tablets. They can request a document, and it arrives quickly whether it's a spec, a drawing, or whatever. That's great, and that's on 4G, and it's on an amazing device, a tablet. It's not heavy, and it has great screen resolution. It's not that big. With 5G, maybe you'll be doing augmented reality on the job site. You have your hard hat and glasses, looking at an actual field condition and overlaying the design document in real time. Maybe the client avatar walks through the building. And they're simultaneously doing it with high-resolution imagery. You may notice over time with these technologies — everything's shrinking, getting lighter, with longer battery life.

5G brings a more real-time seamlessly integrated, high-speed virtual world. You can imagine what people can use that for on the job site. Maybe you have design teams around the world collaborating. As we've found by necessity due to COVID, we're able to do things we didn't know we could. I heard of someone doing Zoom sessions sitting in a kayak on a lake, and that's on 4G. Imagine what we'll be able to do with 5G.

DI: Such potential. 5G's speed and throughput has the power to take us from representation — drawings and BIM — to simulation and analysis of complex, connected systems. Things like COVID and wildfires.

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An acronym I've used for many years in the wireless industry is the "DNA" of wireless: Devices, networks and applications.

HC: Very much so. Some of what 5G gives us isn't going to be visible. The value is what 5G does at lower cost and higher volume. Now, it's affordable, because the cost of the communications — transportation of data over wireless networks — will be so cheap we can do a lot more of it. One example in consumer worlds is autonomous vehicles. As a wireless technology, 5G is good when you want to cover a wide area like a city. Inside a building, you might use a wireless technology like WiFi. They have different performance conditions and abilities to reach different surface areas. They use different approaches. But when you want to be able to keep doing it while you're driving a car at high speed you need 5G cellular technology.

If you want to do something like smart buildings keeping track of HVAC, temperature and air quality, and building occupancy, and nobody's moving at 60 mph down the hallway, WiFi works. You choose different wireless technologies for different applications, and they operate at different cost points.

Construction and engineering can have autonomous backhoes and tractors on job sites working 24 hours — if there are no noise problems for the neighbors, of course! Drones are already measuring material quantities and surveying progress on job sites. Because their cost has gotten so low, they can move from being science projects to being scaled commercial industrial solutions.

An acronym I've used for years in the wireless industry is the "DNA" of wireless: Devices, Networks and Applications. Whether we're talking 2G, 3G, 4G, 5G, WiFi, WiFi 6, it doesn't matter — you need to think about all parts of the DNA. What's the device? Because it's great, if I've got 5G network. But if I don't have a 5G-capable device, then I'm not getting the benefit of the 5G network. You need the device, the network, and the application. For example, in a smart building with thermometer and video camera, it's not the camera alone. All the data the camera captures has to come back into an application that maybe uses cloud-

based machine learning or AI to recognize what's happening inside the image captured by the camera. The data transmitted over the building WiFi, then, needs an access point where it goes on to the fiber or cellular. You have to think of the D, N, and A, the whole thing, not just one or the other.

DI: beyond 5G, are there any major technological movements afoot, or that you're seeing near term, through a design and construction lens? What's the next big thing?

HC: On the network side, it's 5G. On the application side, the A, it's about the cloud. When you and I started our careers we had IBM PCs, and the data was on our desks. The drawing was on your desk. Then, we'd connect them with networks, and they were on the network in the server at the end of the hall. Nowadays, the data is in the cloud. In the AEC industry, the building management industry, surely the data is in the cloud.

DI: You'd be surprised. There's still a surprising amount on people's desktops.

HC: Why should the AEC industry care about the cloud? Well, if you're working with Renzo Piano's firm in Italy, and the building and contractors are in China, having it all on the cloud connected with high-speed communications, means the whole design operation of the practice is no longer just one group in one location coming in at 7:00 in the morning and leaving at 8:00 at night. You run your business knowing you've got a multi-time-zone team collaborating, leveraging shared data, simultaneously accessed or not, but safely, accessibly, in the cloud. You need security and privacy, but there are plenty of advances there.

If we've got all this data and it's in the cloud, we can begin to look at artificial intelligence, also known as machine learning, to constantly assess that data. This software — not humans — can look at data, maybe across multiple projects, and learn. For example, we can learn from the project we did two years ago. Now I see today, this young architect seems to be repeating a similar design from two years ago that ended up in a change order. Maybe I should flag

that architect immediately. "Warning! Two years ago, a change order came out of this detail." Now we're augmenting the skill base of architects and engineers, based on machine learning that has been using the existing data set for customized training and risk management. What is the AEC industry doing to adopt machine-learning methods to improve the practice and the quality of buildings?

DI: What has been game changing for you?

HC: One thing is the speed of change, and how globally interconnected we all are. I worry there may be more friction injected into the world of communications. It may be good for some, but bad for others. We're all used to one internet. In truth, China has always had its own internet. Its own Chinese wall. Russia also has their own internet. They have had a spigot on what they let through. We are at risk in the future of having different "internet continents". The Western world, the Eastern Europe world, the Asian world. That will be unfortunate. It might become walls going up again, a

> *We are at risk in the future of having different "internet continents."*

new kind of Iron Curtains going up again, in a technological sense. I'm not for that, but that is a risk I see ahead.

It's very unpredictable, and it's changing rapidly. None of us, certainly not me, is good at predicting the future. Near term, you get some sense of what's happening. We've seen barriers go up, so that's no prediction. We just saw TikTok get a deal intervened visibly by the US government. If I've had any success, it is by constantly observing and questioning, and making informed guesses, and usually getting it wrong. But if you have a path, you have momentum. With momentum you can adjust your direction based on the new reality. Rather than sitting it out and waiting to see what the new reality will be, you've got to be in the

game, because you lose background too quickly if you think you can just take a break for a while and not keep informed.

In a design practice you've got to be doing something rather than nothing. You've got to be investing. You may pull back the amount and rate of investment, and you have to manage and plan for change. But you can't just say, "We'll just put it off and look at that again a year from now." You have to keep your toe in the water, particularly for the adoption of new technologies. You don't need to go all in at the deep end. But don't do nothing because it seems unclear how it's going to play out. Because you can probably transition from where you land to somewhere better more easily than if you wait and miss the window.

DI: Situational awareness is a new leadership skill. Constantly looking. Maybe that's always been the case, but in a world that changed slowly, you could get away with setting direction and commanding from on high and looking about less frequently. No more.

HC: The trick is to be elastic. Don't stretch yourself and your team to the breaking point but acknowledge you're not a loose rubber band. You need tension in the elastic. Stretch, and know you're stretching it, and involve people in being part of the stretch.

DI: Can you think of any other non-traditional service paths, post-COVID?

HC: If I was in the AEC community, I'd look at what the building occupancy rates are doing. What are they forecasting actual occupancy rates are going to be? What are property values and lease rates going to be? Because I think a lot of businesses are going to find they need less space. COVID is like having a car accident. Nobody said, "Well, I'll just see what it's like, if I have nobody in the office for the next year and a half." But now it got dumped on them, and they're finding the world keeps on moving. As architects, what is the client brief or program of the future? Architects can be the ones to give strategic advice, because clients don't know the answers.

The industry needs to look at how different kinds of use patterns are going to change, because even grandma is comfortable doing a video conference right now. Same for the retail, online shopping, and healthcare industries. Architects can take this as an opportunity to work out how that's going to impact their clients' needs, and how they can adjust, be elastic, and offer new services that relate to those new needs.

DI: How would you advise an architectural client looking to reinvent themselves? Where should they invest to ready themselves for an uncertain future?

HC: It's not easy — the idea of changing the engine while flying the plane. If you're a mid-sized practice in a city like Atlanta, you've got 10 or 15 architects, or 50 architects. You've got some reasonable predictability about how your business operates. How many people you need, how many jobs you've got, the cost, the profit, the benefits to the people. It's a complex system. Why would you voluntarily say, "Let's change it?" Well, it's not going to be voluntary. Something's going to force you to change more than likely.

A few suggestions. I'd look for analogs on how to operate. One parallel that comes to mind is the software world's transition around 2000. Software developers used to write code, then test it, debug it, fix it, and test it again. This was called the

> " It's not easy - the idea of changing the engine while flying the plane.

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If I had told them, "We're not going to even try and get it right before we go talk to the client. We're going to admit to the client we know some of this is wrong. We don't know which part yet. But we're going to quickly iterate and keep iterating," they would have freaked out and fired me.

waterfall, a serial process. But then they transitioned, because they were doing bigger projects — and designing and building buildings is a big project. A lot of different people and information types are being brought together, and it all has to come to a point at the end where the building works and doesn't leak.

In the software world that pivot became what is called "agile." There's an entire agile methodology, where you have scrums. You don't try and do the whole thing, get it right, and correct a few bugs. You do a little bit at a time. You chunk it down into smaller manageable pieces, and you're constantly using scrums. A big part of the transition is the mentality and the behavior of your people. I remember and respect greatly some of the architects who were near retirement when I was a young professional coming into the business. If I had told them, "We're not going to even try and get it right before we go talk to the client. We're going to admit to the client we know some of this is wrong. We don't know which part yet. But we're going to quickly iterate and keep iterating,"

they would have freaked out — and fired me. But maybe in today's world, clients are also adapting their expectations.

DI: It's paradigm-busting. Those with that old mindset can't even entertain that kind of thinking. They were taught to "draw it once, right."

HC: Yes. Maybe the industry needs to look for new paradigms in other industries that have made transitions. What are the similarities to look for? It's like looking for flexibility. You recognize errors are there, but you're going to quickly fix them. It's a different dynamic. That would be a suggestion for firms: look for new paradigms from other industries. Learn from how they made their transitions from big monolithic projects, down to many small modules that are then integrated together.

DI: What are you worried about?

HC: I'm worried that despite all the technology, and all the mass consumer and business adoption by

younger people, there's too much individual experience and isolationism happening. A growing demographic is so conversant and comfortable with smartphones and social media, virtual reality, and online gaming, but are they losing the basics?

Business leaders, principals in architecture firms, have to swim against that trend. They need to ensure people are truly active listeners with one another, that their human interactions and communications are actually understood, so they learn. Because a lot gets missed as people become more isolated. They increasingly think they are independent. I'm worried about diminished active listening and thoughtfulness. Just because communications can happen rapidly over a network, doesn't mean that a human is actively thinking about it. It just means they've got more to think about in less time. They need an attitude of being thoughtful. To consider the pros, cons, and risks. Think it through. Check with other people. Check their assumptions. Do some tests. You can't skip these steps. Otherwise, quality's going to suffer. That's what I worry about — people not doing enough active listening, true communication, and collaboration.

> *Just because communications can happen rapidly over a network, doesn't mean that a human is actively thinking about it. It just means they've got more to think about in less time. They need an attitude of being thoughtful.*

Hamish Caldwell is a Partner in Wireless Insiders Network, providing strategic advisory services. He also serves as a visiting scholar at Georgia Tech's Center for the Development and Application of Internet of Things Technologies (CDAIT.) Formerly, he spent over 16 years with Bellsouth/AT&T and was the IT director at Lord, Aeck Sargent Architects championing the firm's digital transformation in the 1980s and 90s.

He has extensive consulting and leadership experience in creating, delivering, and growing high-technology product and service businesses in consumer and enterprise segments. He is accomplished in technology, mobile broadband and converged solutions, mobile computing and devices program strategy, marketing, product management, business case development, lifecycle operations, mergers and acquisitions, corporate strategy, and developer/supplier partnerships.

A Conversation with
A Global Citizen

DR. CALVIN KAM

FAIA, PhD, PE, LEED AP, Founder/CEO Strategic Building Innovation, bimSCORE, BIM Supporters Group, and PlanMeetDone.com

Dr. Calvin Kam talks about his journey in technology evangelism: to reinvent and integrate the industry

DesignIntelligence (DI): You've been a technology evangelist for more than two decades, wearing multiple hats. At any given time, you maintain your role as an Adjunct Professor at Stanford CIFE, a Vice President for Strategic Innovation at Optima. You continue at the General Services Administration (GSA) where you pioneered and wrote their industry-leading BIM adoption program. You were one of the chairs of the AIA TAP knowledge community. As an entrepreneur, you've founded several companies to consult on BIM adoption, metrics and technology: bimSCORE, Strategic Building Innovation, and PlanMeetDone.com. What is your mission internationally?

Calvin Kam (CK): Thank you Mike—we've had a great friendship and a fantastic journey. We've seen how the profession and the world have changed so much in that time, yet many aspects are still the same. I do think of myself as a global citizen, passionate in digital practice and industry transformation - for the AECOO professions, the built environment industry. Charles Matta and Steve Hagan and I worked at the GSA, spreading these ideas broadly throughout the organization, and supporting adoption.

Once concepts get out there, we need global evangelists and ambassadors to make sure we appreciate the global intelligence and nuances of digital practice.

Sometimes we need global warriors to fight the battles and the skeptics and to lead the work - one project, one enterprise, one country, one agency at a time.

18 years ago, with the GSA, we could have easily said: "Well, 10 pilots in a year, we've got a mandate, we've done all that, mission accomplished." But guess what? 18 years later I'm still working with the GSA to make sure those concepts and pilots we developed – the innovations – are things we can sustain. Can they withstand leadership changes? We have seen different budget and management directions. The work is still in its teenage years, but can it weather those changes?

DI: You've been an ambassador for technology, describing yourself as a "global citizen." Can you talk about that?

CK: Yes, I am a global citizen. Wherever I am, whatever it takes. My focus now is on owner-driven innovation. I'm working with public owners like the GSA, and in recent years with other federal agencies who have a significant footprint. Also, with various private entities in the U.S. from Optima, a development company, to pharmaceutical companies, to theme park owners/operators, and globally with a number of public and private owners/operators.

In addition to owner-driven innovation, for the last 10 years I've brought management science - so much of the DNA of business - to our industry. Having an objective management perspective is not something we often find in design. Things like Key Performance Indicators and metrics.

I have email addresses that end in .com, .edu, .gov, and .org. And over the last 10 years or so, I've formed several business ventures. From serving as a management consulting firm to startup solutions, and a web service delivery firm. For 20 years, I've been at Stanford University and I'm currently serving as an adjunct professor there. I'm also still with GSA after 17 years. I now serve as a senior program expert consulting for their National BIM Program. In more

> *Yes, I am a global citizen. Wherever I am, whatever it takes.*
>
> *... Evangelist, ambassador, warrior.*

recent years I've been increasingly active with buildingSMART International. relaunching the USA chapter we have in the US and serving the global open standard movement more broadly.

DI: It is a journey, because the work is never done. Your focus on owner-led innovation is so needed because we've heard it at the conferences over the last 20 years. Inevitably, owners lead the charge. They have the gold, so they make the rules, and if we don't change their minds, change won't come. And metrics are so valuable. We need to keep score.

CK: Bringing management science mindsets and methodologies into the world of BIM, VDC and AI is key. Too often we get into technology blindfolded or with blinders on, without asking about the objectives. Why are we doing this? What are the goals? What will we measure? How are we doing?

DI: Congratulations on your AIA Fellowship. The breadth of your exposure - the boundaries you cross - are wide. It makes me wonder - as someone who began with an architectural education, you made an early decision to transcend traditional practice and devote your career to technology adoption and integration. What steered you there, and to cast such a wide net? Not everybody has such broad interest.

CK: I'm honored and humbled to join you and the other great leaders in the AIA College of Fellows. My wide reach may be part of my DNA. I'm inspired by my elder sister. She got a triple major in college. College came early for me – I was a freshman at the University of Southern California at age 16. I came to a decision point: what major should I declare? I was passionate in building, architecture and construction, yet was also attracted to the problem-solving aspect of civil engineering. Civil engineers made sure things would stand and withstand earthquakes. I had a hard time choosing between the two. I thought: "If my sister could go for three majors, surely, I can go for two. It should be easy." So, I declared a double major in architecture and civil engineering as a freshman at USC and never turned back. That meant I had to take well over 200 units during college when most of my friends needed only half as many. Today, I'm a licensed engineer, a licensed architect, and I still enjoy the added perspective that we should appreciate more than the forms and aesthetics – the engineering, mechanics, science, and management behind things.

My architecture education was during the early days of digital practice — when ink-on-mylar, 2D-CAD, and 3D were all available. The emerging 3D software appealed to me the most, that I could develop 3D models, cut sections, get perspectives with all interlinked in the same data set. I have never turned back and have been engaging in the field ever since.

A key part of my drive is persistence. To continue with the journey, never give up, nor say mission accomplished. You wonder: "How can I handle so much? Can I juggle all those?" But in the end, they all are converging and complementary. Appreciation of architecture and

engineering has opened my mind and is why I appreciate integration and computer-aided BIM and VDC.

I landed at Stanford after my undergraduate years because of CIFE, the Center for Integrated Facility Engineering. The I of CIFE, which stands for integration, struck me. The integration of people, process, information, and technology. CIFE is an amazing hub that attracts global peers and experts. We speak different languages. We come from different time zones and parts of the world. For the last 20 years and counting, working with CIFE has allowed us to bring all those aspirations together.

Maybe I was naive to think I could handle architecture and civil engineering together. It wasn't easy. The toughest years in my life were being an undergraduate. But once I signed up and got into it, I never wanted to give up. I wanted to enjoy the amazing possibilities it offers. I still do.

When I declared a double major all the academic advisors said, "No way. Nobody had done that before. It's not possible. You are out of your mind." I ended up going to three colleges at the same time because they were running out of courses at USC. I went to UCLA. I went to a local community college to get all my units and stay on course. I've learned to never say never and never take "no" as a response. Those experiences shaped my role as an evangelist, ambassador, and BIM and digital innovation warrior.

DI: Clearly you were in a different place than I was at that age. That you were focused on integration, despite having never even been in the industry is amazing. The lack of integration remains one of the biggest issues in our industry - ongoing fragmentation. "I'm just an architect, I'm a mason, I do my job, we're separate, we're fragmented, we don't share data." Your early interest in integration and your desire to take on those kinds of challenges is quite a story.

Let's look to the future. I can't think of anybody with more global exposure to the technology world than you. What's the next big thing, the next great force in AEC.

Technology or beyond we should look to?

CK: The next big thing for AEC is likely to come from outside the industry. Something other than the AEC industry adapting and finding the sweet spot and penetrating from within. So far, we have seen translational technology coming in to disrupt our industry. We have more adoption of technologies and innovation because of commodity electronics and computing powers from our cell phones to our daily electronics, and mobile networks.

But AEC has not generally proven to be at the forefront of innovation, due to underfunding and a host of other reasons. That's something we hope will change. To me, it's about resiliency, climate change, this changing world with COVID-19, and everything else. How will our industry adapt to the new and unfolding normal? Even before COVID-19, we had climate change, and we have many other major challenges ahead. Natural disasters, like the California wildfires, earthquakes, floods and similar challenges, hopefully can motivate us

to address and solve these systemic problems.

The next big technology needs to help us better adapt to this new normal, better respond to natural disasters, and be more resilient to climate change. It's a huge opportunity. I hope that the focus on those big problems can promote exciting new technologies.
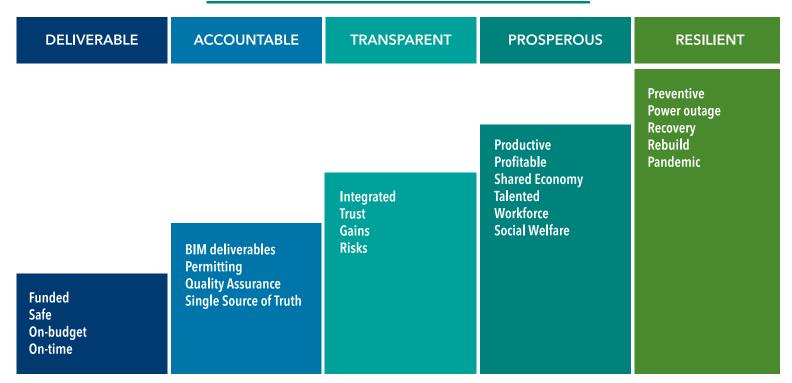
5 TIER INNOVATION

To illustrate this, I've developed a five-tier innovation diagram that offers a maturity framework that outline the drives for innovation.

The First tier, **DELIVERABLE**, is about project delivery, how we can leverage construction innovation technology to help us deliver our projects better.

The Second Tier, **ACCOUNTABLE**, is how we can be more accountable with our delivery, and depend on the information, the single source of truth. Not only do we deliver it well, but we can rely and be accountable on the information for the project lifecycle or longer.

The Third Tier, **TRANSPARENT**, is about the trust and interpersonal dynamics – the people side. Yes, the

5 TIER INNOVATION DIAGRAM COURTESY OF SBI

DELIVERABLE	ACCOUNTABLE	TRANSPARENT	PROSPEROUS	RESILIENT
				Preventive Power outage Recovery Rebuild Pandemic
			Productive Profitable Shared Economy Talented Workforce Social Welfare	
		Integrated Trust Gains Risks		
	BIM deliverables Permitting Quality Assurance Single Source of Truth			
Funded Safe On-budget On-time				

information may be reliable, and may be a good single source of truth for the lifecycle of the project. But, can we also trust one another, can we be more transparent about the IPD approach?

The Fourth Tier asks whether we are becoming more **PROSPEROUS**? It may be about diversity and inclusiveness, but I was calling that more prosperous. Yes, it's about productivity, but can we also be more prosperous? Can we attract, recruit and retain the younger generation?

The Fifth and the final tier is **RESILIENCY**. Can we be more productive, profitable, efficient, and prosperous, but can we also leverage innovation in construction, in the building industry, to make our world, and society more resilient?

So, I hope the next big thing is approaching the far right-hand side of that diagram. We do see more and more automation and optimization from robotics and AI, but we're also hoping those can land with a good purpose. Driving that towards

resiliency and prosperity is something I'm hoping that we will see.

Right now, we cannot easily nor reliably simulate a building or our infrastructure with water leakage or wildfire risks. But imagine if we can fast forward that and allow digital design to help us to better understand from an urban scale, climate change, natural disasters, and wildfires. That can help us predict or simulate the effects with buildings, power grids, wind, and weather simulations. My hope is that we can move more rapidly to integrate BIM into urban scale simulation, and that it will give us amazing analytical power.

DI: Over the years we've talked of BIM moving from representation to simulation and dynamic, data-rich systems with, connected systems analysis. The tools are finally moving that way.

Has COVID had an impact on you and your organization and how you work?

CK: Thankfully, we have been COVID-free and are grateful for that. You and I both traveled a lot before COVID-19. Suddenly we are all grounded.

We are thankful we can keep being productive. We may even be more productive because we spend less time going through airport security or commuting. We can spend more time with work if we choose to. But we all miss the opportunity to have those face-to-face social moments. I look forward to a future mode in which we can still travel by choice and not have to be either traveling or working from home by necessity.

DI: How is the technology outlook different in China, India, the UK, and other places from what we're doing in the US? In his book, Tom Friedman wished the United States could turn into a dictatorship for one day so we could force everybody to connect all the power grids and share, and then go back to being a democracy. The same could be said for data sharing. Are you seeing any different mindsets

internationally than we have in the US with our capitalistic, free-market, every-software-for-himself approach?

CK: The other Tom Friedman notion I espouse is: "Think big. Start small. Act now." It's something I follow and practice a lot. We are driving open BIM and thinking about digital design with federal agencies in the US. Conversely, for the last 20 years or so, we are constantly reminded that there are tens of thousands of federal, state, and local jurisdictions across the US, and each jurisdiction has a different idea about technology and digital review.

Although the GSA or other federal agencies champion BIM, open standard, and beyond, they still only represent a minority in moving the needle to embrace change. In the US, the AECOO ecosystem supply chain certainly doesn't have that "one day of dictatorship" (to imagine in Tom Freidman's world) and so we don't have a shared electrical grid, a common shared BIM platform, or a standard permit approval process. On a global scale, the US has seen amazingly innovative owners, design firms, construction companies, subcontractors and supply chains all innovating and driving change without much government leadership or involvement. In the US, if the government is not getting in the way by asking for more taxes, or red tape then we are happy. In the US we see that, especially with the startup community we see in Silicon Valley, Atlanta, Boston, and many other parts of the country.

On the other hand, I would say that Scandinavian countries such as Finland and Norway, are in a sweet spot. They are influential enough, but also have a small bubble of community and industry around them that gives their leadership more leverage than do the major public clients in the US.

For those European countries where their public agencies have mandated open BIM digital delivery requirements, we have seen better adoption of open standards than we see in the US. The US is still a little bit too unique and one-off. The European union is embracing certain standards like ISO and open standards. Some have public leaders

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who look for technical driven companies to drive change. In the Netherlands we have seen good examples of digital twins, and BIM and GIS integration. Other countries have embraced BIM for facility management, open standards and VDC are strong there.

In the US, we tend to see more project-driven delivery methods and innovation changes. More wild-west, cowboy, one-off innovations. We can easily replicate such practices.

It's ironic, because we go to industry events across the US and hear major construction or design firms doing amazing things. But often, even within those firms - depending on which project team you work with - we have witnessed a forefront example of BIM, VDC or IPD on one jobsite and then see the same firm doing something opposite on other projects. Diffusion and implementation across a firm is one thing, let alone across the country. It remains challenging, but we have seen some good pockets of innovation influencing things globally.
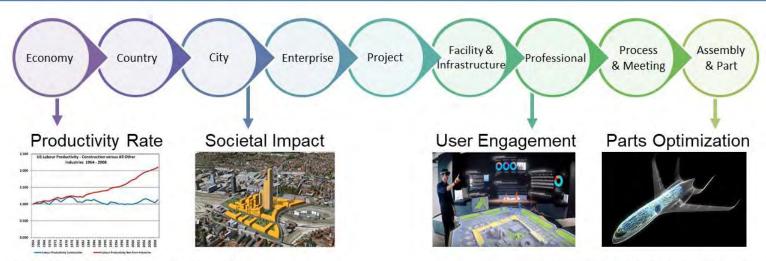
I've been traveling and working with the Asian communities quite a bit. Government leadership and government mandates in Asia are not at the same level as they are in Europe. Singapore, Hong Kong and certain countries have come up with mandates: you must use BIM, you must embrace VDC. You must use certain forms of industrialized construction or you cannot get government approval, or you may not be able to get a piece of government land, for example.

Government influence is strong in certain Asian communities. I've also been advising and working with the Singapore government for the last 10 years now. There, the stick and the carrot have been clear. The government is forward-thinking, embracing everything. They would even fund the industry to innovate.

But because everything is more spoon fed, in those countries the industry is less driven to change. There is more inertia for private innovation based on value propositions. That's why technology adoption in the US may be the best

> *In the US, we tend to see more project-driven delivery methods and innovation changes. More wild-west, cowboy, one-off innovations.*

Managing Construction Innovation

Target Values and Continuous Measurements

Economy → Country → City → Enterprise → Project → Facility & Infrastructure → Professional → Process & Meeting → Assembly & Part

Productivity Rate   Societal Impact   User Engagement   Parts Optimization

Concept: Strategic Building Innovation . bimSCORE

Sources: Teicholz | ESRI | fracturereality.io | CNN

hybrid form of public leadership and open innovation. The European Union could be amazing with open standards. In Asian countries, we've seen some locations with strong government leadership, but industry mindset and workflow are not quite adapting to those new normals. The perfect case is if you can combine the ecosystem, innovation spirit, or cowboy creativity of the US, with the balanced approach and diffusion we see in Europe, with the government leadership and subsidies we see in Asian countries. That would be the best of the three paths.

DI: You talked about "project focus". You're an exception, but most of us in this industry have been trained and educated to focus on "our building, or our project." It's a very narrow focus. How do we change those mindsets? This goes across all AECOO: architects,

engineers, contractors, manufacturers, owners, to begin to look, think and act in a more connected way. Are there role models? You've faced this issue. I realize it's psychological and sociological but where's the leverage?

CK: It's a journey and a mindset we all are trying to embrace and remind ourselves of. We have seen the idea of IPD, integrated project delivery. 10 years or so ago, Peter Beck with Beck Group talked about "the integrated enterprise" - to go beyond the projects - and even beyond that. We've seen certain companies forming integrated alliances. Groups of integrated enterprises can also form alliances and look beyond one project and one enterprise.

Thinking broadly is something we have to constantly remind ourselves of. Because we have seen different projects under the same company have such diverse behavior, DNA, and culture. Project team members come and go. So, we don't even maintain consistent processes for a single project lifecycle, let alone for an enterprise, or an industry. That's

why I enjoy working with clients and partners beyond one project - we can see how we can grow over a longer term. And that's why I think by introducing the management science perspective we can measure things. How do you focus on leading indicators and metrics, under the value proposition that it's important and scalable?

I have a spectrum of Key Performance Indicators. On the left-hand side of the slide you see the macro productivity index and GDP. On the right side of the scale is how do we measure a part, or a component within a building, facility or infrastructure? Somewhere along that continuum, we need to be able to measure individual projects, enterprises, and their economic impacts.

By having repeatable, scalable, and universally applicable measures, we can remind ourselves - whether we're talking about a company or a project - there are certain measures and metrics and KPIs we can repeat and follow. It's important to understand how one small action or decision can impact not just a project but also an

enterprise or the industry's bottom line in the long run. That's why I'm often working with government agencies on policies on a broader scale.

An offshoot, to measure progress, is our solution called PlanMeetDone.com. It's a web service that focuses on a meeting – one commitment and one action at a time –so we can track meeting efficiency results and progress. Have we been thoughtful about the meeting agenda, the invitees, the actions, and the follow-up? After the meetings, can we focus on the commitment reliability? Because we often don't even get a meeting or commitment follow through right. Then, things start to slip and snowball. In the AEC industry we have metrics and controllable factors, but we've had to get by using lagging indicators, say, whether a project is profitable, or on time. Too often we become aware of those outcomes too late. Tracking leading indicators is something we still need to bring into our industry — and our team proposes that we focus on one meeting and one action at a time to begin doing that.

DI: What are you thinking about these days?

CK: I enjoy being a global citizen because in this industry, we need to unite every country and all professionals because the problem is so huge - and we are so far behind in terms of our current performance. It's heartbreaking to see how our world may be unfolding geopolitically and with respect to COVID-19. I hope we will not become more isolated and can keep finding means for positive collaboration.

That's why in recent years I have been involved with buildingSMART International, working with Patrick MacLeamy, Ian Howell, and many other volunteer leaders to revive the US chapter. I also enjoy working with the buildingSMART International headquarters team in Europe. They have their own isolation issues with EU and Brexit. Globally we all need to pay attention to digital twins, IOT, BIM, and having a standard we can all conform and contribute to. I hope that will grow our industry and that we can maintain the energy and expertise to collaborate and go forward.

DI: Noble aspirations: unity, hope, more collaboration, and forward movement. You're teaching and training your replacements. What does the next generation look like? Do they give you hope?

CK: At Stanford, it has been exciting to see the diversity, gender balance, and sparks from the newer, younger generation. We still have a huge gap in terms of needing to recruit and retain more diverse talents in our industry. But beyond the younger generation, let's not forget about all the amazing knowledgeable friends and experts we have. People like yourself, Mike. Amazingly experienced, knowledgeable, retired and reinvented, in a lead role contributing to DesignIntelligence while having published a book of your own! That's an inspiration and role model for me to follow.

Our industry shouldn't forget about our senior leaders since wellness and healthcare are increasing life expectancies, perhaps to 100 or 120 years old. What are we doing with all these amazing sources of intellectual capital who may be leaving their firms? People on sabbatical from the profession, or transitioning into new roles in the profession they love? How do we retain and continue to engage all these knowledgeable, passionate, still-capable individuals?

To name a few in the technology space, people like Patrick Macleamy recently retired from HOK after five decades rising from a junior architect and retired as the Chairman and CEO, but still driving, and thinking passionately, and CIFE's Paul Teicholz and John Kunz. Arto Kiviniemi, is another great friend of mine. He's 70-some years old, but still extremely sharp and knowledgeable. They may all be retired but we can tap into them more. How can they continue to inspire others within the profession?

So yes, I'm excited about the newer generation, but let's not forget our experienced colleagues. You may hear my children in the background - I'm working from home. It makes me reflect on the ways to bring those mindsets, DNA, and aspirations to my own son and daughter. That's something that I've got to learn and be reminded of every day.

DI: That's wonderful. Thank you for those kind words. We old dogs are not done yet, and there are a lot of us out there. Your discussion spanning the gap from the 60, 70 and 80-year-olds, all the way to your children is a wonderful thought. I'm going to end with one final question. What's your secret? You have so many balls in the air. You're the energizer bunny, your reach is vast, and you show no end in sight. How do you keep it all going?

CK: Constantly prioritizing is something I've been doing since college. There's always so much going on I need to remind myself how to prioritize. I thought I would be more up to speed during COVID-19. I'm not. The to-do list is shorter, but it's still too long. The means and methods may be different. I used to do it by paper and pen, and then with various software, but it's still about prioritizing tirelessly to see how I can best spend my time. Then, how to do that with my team. I also have an amazing family - my sister and my wife in particular - who care for the family. That gives me a boost to focus on career issues. I'm so appreciative of that.

DI: I thank you for sharing with us, and for what you've already accomplished to better our industry - and your quest to reinvent it. I'm certain you still have miles to go and I look forward to your journey - and our continued journey together.

CK: Likewise, thank you so much, Mike. Thank you for talking to me.

Dr. Calvin Kam, FAIA, PhD, PE, LEED AP is the Founder/CEO of Strategic Building Innovation, bimSCORE, BIM Supporters Group, and PlanMeetDone.com—the "GPS Navigator" for construction innovation. He is Adjunct Professor at Stanford University's Center for Integrated Facility Engineering (CIFE), specializing in strategic innovation - Management Scorecards, Building Information Modeling, Virtual Design and Construction (VDC), Sustainable Developments and Smart Cities Evaluation. He was a Co-Founder and Senior Program Expert of GSA's award-winning National 3D-4D-BIM Program since 2003 and is an appointed international expert for APEC, Singapore and the United Kingdom. Calvin serves on the Executive Committee of buildingSMART USA and Chairs its Education and Professional Certification Committee. An elected member of the Board Knowledge Committee at the American Institute of Architects, Dr. Kam is a former national chairman of AIA's Technology in Architectural Practice and Center for Integrated Practice. Elevated to the AIA College of Fellows, Dr. Kam has received various AIA, ASCE, SOM, Stanford University, and USC Alumni Awards and Fellowships, as well as the ENR's "20 under 40" and the BD&C's "40 under 40" awards. Calvin received his Master's, Engineer Degree, and Ph.D. from Stanford University. At age 21, he became the first and youngest to receive dual bachelor degrees in Architecture and Civil Engineering from the University of Southern California (with the highest honor bestowed on a graduating senior for distinguished leadership and excellent scholarship). He has given many keynote and plenary speeches, published multiple book chapters, journal and conference papers, and has presented at over 100 industry events, conferences and universities in 20 countries.

Economic Review:
Reinventing in 2021

BOB HUGHES

Senior Economist,
DesignIntelligence

Historic. Unprecedented. Catastrophic. Disastrous.

In today's hyperbolic, inflammatory world, extreme adjectives are frequently overused and inappropriate. Unfortunately, when it comes to the economic events of 2020, these descriptors are often appropriate. In some cases, they are inadequate.

CHRONOLOGY

Towards the end of 2019, economists, policymakers, and business leaders were generally focused on labor shortages as a record-long economic expansion had pushed the unemployment rate to around 3.5%, a fifty-year low. Economic growth was moderate by longer-run standards, in the 2 to 2.5% range. Yet despite a record-long expansion and low unemployment rate, inflation was lingering around or slightly below 2%, the Federal Reserve's medium-term goal. Overall, a goldilocks economy.

December 2019 brought the outbreak of a novel coronavirus in Wuhan, China. This new virus turned out to be highly contagious and virulent. The virus spread quickly around the world, filling hospitals and intensive care units. Fatalities rose.

By March 2020, widespread lockdown policies were implemented to restrain the spread

of the virus. March and April saw the most dramatic collapse in the U.S. economy's history. Twenty-two million people lost their jobs, pushing the unemployment rate to almost 20%, and economic activity as measured by real gross domestic product fell at a 31.4% annualized rate in the second quarter. Retail sales were down 22% in March and April, and unit-auto sales fell by half – to 8.7 million at an annual rate – in April. Manufacturing output dropped by 20% while commercial construction fell 2.7%, and residential construction (housing starts) were down 34%.

By May, the spread of COVID-19 was starting to slow, some restrictions were being eased, and parts of the economy were starting to reopen. Some areas had sharp initial snapbacks in activity while other areas recovered more slowly. In aggregate, the economy was expanding.

By early fall, clear distinctions were emerging among the different sectors of the economy. Retail spending was recovering remarkably well though there were wide disparities for the different types of retailers. Online shopping and spending related to home goods (DIY projects and home activities) were relatively strong while clothing and accessory spending and restaurants remained very weak. Single-family home sales and construction were booming while urban occupancy rates and rents in some of the most expensive cities were falling. Large portions of payroll job cuts were rehired, but new claims for unemployment benefits were stubbornly high – almost four times the pre-pandemic level.

THE BIG PICTURE TODAY

As of early December, about 13 million jobs have been recovered, but that still leaves payrolls down about 9 million jobs from the peak. Those numbers translate into an unemployment rate of 6.9% in October vs. 3.5% before the pandemic. Despite the loss of 9 million payroll jobs, retail spending – both bricks and mortar and online - is back above pre-pandemic levels to a new record high. Unit auto sales are back in the normal range of 16 to 18 million, though they are close to the bottom of that range. Manufacturing has recovered about ¾ of its two-month plunge but is still about 5% below February levels. Housing – specifically single-family housing – is one of the brightest areas of the economy, with single-family home sales and new construction not only back above pre-pandemic levels but at the highest levels since late 2005/early 2006. Nonresidential construction expenditures, however, remain down about 5.5% from the prior peak. Unfortunately, a resurgence of new cases of COVID-19 and renewed restrictions on consumers and businesses are again threatening economic growth.

CHANGE IS THE ONLY CONSTANT

Around 500 B.C., Greek philosopher Heraclitus was quoted as saying, "change is the only constant in life." It has only taken two-and-a-half millennia, but some economists have finally caught on to his wisdom. An exciting new area of economic thinking rejects the more widely accepted analytical framework that

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...not only is change the only constant, but the pace of change is accelerating... For flexible and adaptable businesses, this becomes an extraordinary opportunity. For the inflexible and rigid, it becomes an existential threat.

assumes an economy is a closed system always moving towards equilibrium. Instead, this new paradigm sees an economy as an open system made up of evolving networks of agents constantly reacting to change. These tenets of the broader idea of Complexity Theory are exemplified by proponents such as The Santa Fe Institute and W. Brian Arthur.

This alternative framework has major implications. Perhaps most important is the acknowledgement that forecasting, particularly longer-term forecasting, is impossible. For businesses, that means instead of a business plan with medium and/or long-term goals and targets, the emphasis should be on increasing flexibility and adaptability to adjust to whatever economic conditions emerge.

ACCELERATING RATE OF CHANGE

A second point to drive home the importance of emphasizing flexibility and adaptability is this: not only is change the only constant, but the pace of change is accelerating.

Technology has already been a major structural economic change driver over the last century and a half, as the U.S. economy evolved from primarily an agricultural economy to an industrial economy and now to an information economy. With each new technological achievement, the pace at which subsequent technologies are developed and deployed has increased, thereby accelerating the rate of structural change in the economy. The pandemic will compound that effect, at least temporarily.

This new framework emphasizing flexibility and adaptability is especially relevant as consumers, businesses, and policymakers grapple with the novel coronavirus. The scientific community is racing to better understand the behavior of the virus and the implications for humanity. As consumers and businesses adapt their behavior, both the types of goods and services they consume and the way they consume/interact (sometimes by their own choice or sometimes under new government regulation) in order to minimize the risk of infection,

structural change for the economy is inevitable. For flexible and adaptable businesses, this becomes an extraordinary opportunity. For the inflexible and rigid, it becomes an existential threat.

EARLY CHANGE SIGNS

Progress against the virus remains the biggest challenge and the most significant force influencing the economic outlook. Developing a vaccine and effective treatment is crucial for minimizing the human cost, while developing and implementing preventive measures and public health policies are likely to be crucial for the short-term path of the economy. Historically, pandemics resulted in major changes to society, including the built environment (i.e. sewerage systems) and social and cultural behaviors (i.e. personal hygiene). Post-9/11 changes to travel security may be the best recent analogy, though the changes brought about by the pandemic are likely to be much more widespread across the economy.

SHORT TERM: RETROFITTING SPACE FOR DISTANCE AND HEALTH SAFETY WILL BE BIG

Current understanding of the coronavirus suggests face masks and distance are a first-line defense against contagion. Among the most obvious places already undergoing changes related to density for public areas are retail stores, restaurants, and commercial spaces such as offices and elevators. Limited occupancy, mask requirements, distancing, plexiglass barriers, and frequent sanitizing have already been implemented in most critical businesses, but further upgrades and retrofitting are likely.

LONGER-TERM CHANGES ARE LESS CERTAIN

While current conditions seem rather dire, a critical question for the potential and extent of longer-term structural change is whether this pandemic is an isolated event or the first of many, the new normal. Should more novel coronaviruses with similar virulence emerge, the more

likely structural changes will be significant, broad-based, and enduring. Should this prove to be a one-off event, then major structural changes as a result of the coronavirus are less likely.

POSSIBLE TRENDS

With the future inherently unknowable, the best strategies remain flexibility and adaptability combined with a constantly refreshed knowledge of emerging trends. Recent data highlight possible new trends to monitor in response to the pandemic:

Lower Living Densities
First, consumers are actively seeking lower density geographies for living. Rents in major urban centers such as New York and San Francisco have seen sharp declines while prices for suburban single-family homes have risen rapidly. Consequently, new construction of single-family homes has surged, hitting the highest levels since the housing bubble. Should that trend continue, there are major implications for infrastructure –

water, sewerage, electric and power, roads, transportation systems, and public education facilities, to name a few.

Migration Patterns

Along with the move to suburbia, there are broader questions about migration patterns, especially retirement: will retirees move far away from family? Will assisted living facilities still be popular or will multi-generational families become the norm?

Hybrid Learning Modes

The opening of schools at all levels was one of the bigger challenges. Many schools are offering a hybrid of in-person learning and remote learning. Will remote learning be more common and permanent, and what are the implications for existing educational facilities?

Health Care Policies and Facilities

A critical dynamic early in the pandemic was the lack of capacity and equipment at medical facilities. Will new public health policy dictate increased capacity and inventories at medical facilities? Will medical facilities need to be redesigned to safely handle infectious disease patients while still safely serving the medical needs of non-contagious patients?

Health, Sustainability, and Climate Design Impacts

For the built environment (particularly when considered in the context of broader environmental conditions and climate change issues), will the pandemic accelerate the incorporation of healthy living, sustainability, and climate impact on future design of buildings and public spaces?

Supply Chain Contingency Planning

For nearly all businesses, a renewed focus on contingency plans and supply chains is likely to occur. Developing plans to deal with outbreaks among staff, including dealing with shutdowns and developing plans to continue production and operations should supply chains be disrupted, will be ongoing challenges.

These are just a few of the early trends emerging. Some are new, and some are accelerations of existing trends. The implications are multifaceted but suggest a positive outlook for the built environment industries, with opportunities for new construction as well as for repurposing of existing space. Overall, businesses will need to quickly adapt to changes in consumer preferences, the political climate, and virus prevention regulations to survive and thrive. Members of the built environment industries will play a critical role in implementing many of these changes.

THE YEAR AHEAD

For many economists, policymakers, and business leaders, the focus will be on getting back to pre-pandemic activity levels, especially for important measures like revenues, profits, and employment. But changes to the structure of the economy are more important for the long-run success of most businesses and some entire industries.

While forecasting may be futile, some existing economic trends are likely to continue.

- *First, inflation is likely to remain low. The pandemic combined panic buying with temporary shortages to drive up some prices. However, with unemployment still high and incomes growing slowly, price pressures are likely to remain muted. Money supply theories are in question at the moment. Despite the first rounds of QE (2008-09), no significant price increase acceleration occurred. There are some new interpretations floating around regarding money supply and velocity (as well as questions on the Philips curve). It's hard to make the case that we will now see faster price increases given the money supply expansion when it didn't happen before and there is now slack in the economy.*

- *Second, with low inflation and elevated unemployment, interest rates are likely to remain low. Federal Reserve policymakers have been vocal about the risks to economic growth and have fully committed to support the economy with all means available. These include keeping short-term interest rates near zero while maintaining security-buying programs in order to facilitate smooth functioning in capital markets. Those buying programs will effectively keep longer-term interest rates at or near historically low levels.*

- *Third, overall unemployment levels may remain elevated but specific industry shortages may also continue. The downside to the changing structure of the economy is it tends to work against a rapid return to pre-pandemic employment conditions. Structural changes will likely lead to a slower pace of rehiring, especially for some industries such as retail workers, food services, and leisure and accommodation. These areas are among the most obvious to be subject to structural change as consumers shop online instead of going to brick-and-mortar locations or choose staycations instead of traveling. Unfortunately, it's not easy to retrain retail workers for skilled labor jobs such as construction.*

KEY UNKNOWNS

Among the most important unknowns is whether the virus mutates or not. Will vaccines provide permanent protection? Will the general public take the vaccines? Will there be any serious long-term side effects from the virus or the vaccines? Will this be the first of many outbreaks or a one-time event? Only time will tell.

The other major unknown at the moment is who will be leading the country and setting federal policies. Will there be one-party control of Congress and the White House or will there be split power? The current prevailing view is that Vice President Biden will be inaugurated on January 20, 2021. Democrats are expected to retain control of the House of Representatives, though by a slimmer margin than before. Control of the Senate is less clear and is likely to be determined by special runoff elections in Georgia. It appears that Republicans have a slight advantage in retaining control, though they may also have a slimmer majority.

If these do come to fruition, split control would likely mean more partisanship and gridlock. Historically, a degree of gridlock was considered by many as a good thing, a type of check and balance against extreme policies. That may not be the case today, as political gridlock has devolved into political vengeance – not just preventing progress on dealing with emerging issues and crises (which is dangerous enough) but undoing prior accomplishments.

Even so, a Democratic White House and House of Representatives would likely mean a renewed focus on spending, particularly on the environment and infrastructure, some higher taxes, and additional regulation in some industries such as health care, finance, and energy.

WHAT TO WATCH

Keeping up with economic developments isn't easy. Key areas to focus on include:

- *the labor market (weekly initial claims for unemployment benefits on Thursdays) and*
- *the monthly jobs report (usually the first Friday of each month)*

- *levels of activity (retail sales, new orders for manufactured goods, industrial production, home construction, nonresidential construction expenditures, and real gross domestic product)*
- *prices (the Consumer Price Index, around mid-month)*
- *policy (stimulus spending programs and Federal Reserve policy announcements).*

Furthermore, in the current environment, financial metrics such as debt delinquency and defaults as well as bankruptcy filings may be particularly important. Consumer delinquency and foreclosures as well as small businesses are particularly vulnerable as are some industries such as brick-and-mortar retail, leisure and hospitality, and travel.

BOTTOM LINE: CAUTIOUS OPTIMISM

Despite some extraordinary challenges, the economic outlook is tilted to the upside. Science has made great progress against the novel coronavirus and COVID-19, and both consumers and private businesses (and business leaders) have proven time and time again to be amazingly resilient and adaptable, despite what often appears to be dysfunctional and ineffective government. Clearly, the economy and society would be far better off with two political parties that can find ways to cooperate and compromise on critical issues of the day rather than undercutting and destroying prior legislation. Nonetheless, the American economy will likely succeed despite the increasingly bitter and intense partisanship that is destroying government effectiveness.

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Bob Hughes is a Senior Economist at DesignIntelligence

DESIGN FUTURES COUNCIL SENIOR FELLOWS

In our continued quest to connect the DI community, we share an update on a long-standing DesignIntelligence tradition. Since the late 1990's we have annually recognized Design Futures Council members who have distinguished themselves based on the following selection criteria:

- Practiced for a minimum of 20 years
- Outstanding individuals who have provided noteworthy leadership to the advancement of design, design solutions, education, and/or the design professions
- Significant contributions toward the understanding of changing trends, new research, and applied knowledge that improve the built environment and the human condition

To date, more than 150 industry leaders have been recognized with this honor. They are:

- Ava Abramowitz, *Professional Lecturer in Law, George Washington University Law School/ Founding fellow of the American College of Construction Lawyers/Principal, The Offices of Ava J Abramowitz*
- Harold Adams, *Chairman Emeritus, RTKL*
- David Adamson, *Lecturer, University College London & Cambridge University, former Director of Smarter Construction in the Office of Government Commerce (UK)*
- James Barker, *Architect & Former President, Clemson University*
- Peter Beck, *Executive Chairman, The Beck Group*
- Janine Benyus, *Biomimicry & Sustainability Expert, Author, Faculty Arizona State University*
- Robert Berkebile, *Founding Principal, BNIM Architects*
- Phil Bernstein, *Assistant Dean, Yale University; formerly VP Autodesk*
- Friedl Bohm, *Owner, White Oaks Partners, Former Chairman of NBBJ*

- Penny Bonda, *Interior Designer, Author, Partner at Ecoimpact Consulting*
- Joann Davis-Brayman, *VP Marketing Score Lancaster, Director Business Development Central Focus, Former Vice President, Armstrong World Industries*
- Barbara Bryson, *Associate Dean for Research, The University of Arizona CAPLA*
- Joseph Burns, *Managing Principal, Thornton Tomasetti*
- Carrie Byles, *Managing Director & Partner, Skidmore, Owings & Merrill*
- Rosalyn Cama, *Author & Designer, Cama Inc., Evidence-Based Design Authority (Healthcare)*
- Robert Campbell, *Architect, Author, and Architecture Critic, The Boston Globe, Pulitzer Prize*
- John Cary, *Public Interest Design Advocate & Author, Design Ambassador, TED talk*
- David Childs, *Partner Emeritus, Skidmore, Owings & Merrill*
- William Chilton, *Architect, Educator,*

Founding Principal, Pickard Chilton
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- Daniel Coffey, *Founder & President, Daniel P. Coffey & Associates, Ltd.*
- Cindy Coleman, *Strategic Planner, Gensler, Professor, Art Institute of Chicago*
- Carol Coletta, *President and CEO Memphis River Parks*
- Sylvester Damianos, *Architect, Sculptor, Damianosgroup, Former President, The American Institute of Architects*
- Nigel Dancey, *Senior Executive Partner, Foster + Partners*
- Jack Davis, *Dean Emeritus and Reynolds Metal Professor of Architecture Virginia Polytechnic Institute*
- Clark Davis, *Principal Consultant, Cameron MacAllister Group*
- Lauren Della Bella, *President, SHP Leading Design*
- Paul Doherty, *Founder, The Digit Group, Inc.*
- Trudy Dujardin, *Founder, Dujardin Design*

- Williston Dye, *Architect, Former Disney Imagineering, Williston Enterprises*
- Phil Enquist, *Partner, Skidmore, Owings & Merrill*
- Del Eulberg, *USAF (ret.), formerly Booz Allen Hamilton, CEO Eulberg Consulting*
- Edward Feiner, *Principal, Perkins + Will, Former Chief Architect, General Service Administration*
- Curtis Fentress, *Founding Principal, Fentress Architects*
- Scott Findley, *Design Partner, 10 Design*
- Martin Fischer, *Director, Center for Integrated Facility Engineering, Stanford University*
- Tom Fisher, *Design Educator, Director, Minnesota Design Center, University of Minnesota*
- Steve Fiskum, *Former Principal, Hammel, Green & Abrahamson*
- Jim Follett, *Co-founder and former Architect & Organizational Growth Pioneer, Gensler*
- Lord Norman Foster, *Founder & Chairman, Foster + Partners*
- Harrison Fraker, *Professor Emeritus, University of California, Berkeley*
- Neil Frankel, *Partner, Frankel + Coleman, Endowed Chair in Design Excellence School of Architecture and Urban Planning, U of Wisconsin Milwaukee*
- Roger Frechette, *Managing Principal, Interface Engineering*
- Cindy Frewen-Wuellner, *Professor & Futurist*
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- Jeanne Gang, *Principal, Studio Gang Architects, MacArthur Fellow*
- Lisa Gansky, *Author and Digital Entrepreneur, The Mesh: Why the Future of Business is Sharing, Co-Founder, Grasshopper Ventures*

- Group
- David Gensler, *Former Co-CEO, Gensler; Board of RocketSpace and NextSpace*
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- Robert Greenstreet, *Urban Designer & Dean, University of Wisconsin - Milwaukee*
- Robert Grupe, *Grupe Gypsum Consulting*
- Phil Harrison, *President & CEO, Perkins + Will*
- Craig Hartman, *Senior Consulting Design Partner, Skidmore, Owings & Merrill*
- Edwin (Ted) Hathaway, *Principal, EB Hathaway & Co., Former President & CEO, Oldcastle BuildingEnvelope*
- H. Hawkins, *HKS Chairman Emeritus*
- Barbara Heller, *CEO, Design + Construction Strategies*
- Bill Hellmuth, *Chairman + CEO HOK*
- Steven Holl, Principal, *Steven Holl Architects Shown on Wikipedia*
- Nicholas Holt, f*ormer Director of Digital Design Innovation, Skidmore, Owings & Merrill; Manager Holt Architecture*
- Diane Hoskins, *Co-CEO, Gensler*
- Robert Ivy, *Executive Vice President & CEO, The American Institute of Architects*
- Dr. Jackson, *Professor Emeritus, University of California, Berkeley*
- Valerie Jacobs, *Chief Growth Officer, LPK*
- Mary Jones, *President & CEO, Hargreaves Associates*
- Don Kasian, *President & CEO, Kasian Architecture Interior Design & Planning*

- James Keane, *President and Chief Executive Officer, Director, Steelcase Inc*
- Stephen Kieran, *Founding Partner, Kieran-Timberlake*
- Eugene Kohn, *Founding Partner & Chairman, Kohn Pedersen Fox Associates*
- Norman Koonce, *Architect & Former CEO, The American Institute of Architects*
- Vijay Kumar, *Illinois Institute of Design, Author of 101 Design Methods*
- Ray Kurzweil, *Inventor, Futurist, and Author, The Singularity is Near*
- Theodore Landsmark, *Distinguished professor and director of the Kitty and Michael Dukakis Center for Urban and Regional Policy in the School of Public Policy and Urban Affairs in the College of Social Sciences and Humanities at Northeastern University.*
- Gary Lawrence, *Vice President & Chief Sustainability Officer, AECOM*
- Mary Lazarus, *Founder, Sustainable Design Initiative, Former HOK, Consultant, Cameron MacAllister*
- Laura Lee, *Professor, Carnegie Mellon University (former), Former Thinker in Residence, South Australia*
- Debra Lehman-Smith, *Partner, Lehman Smith McLeish*
- Vivian Loftness, *Professor, Carnegie Mellon University, 2020 AIA Director*
- Amory Lovins, *Author, Chief Scientist & Founder, Rocky Mountain Institute*
- Chris Luebkeman, *Author & Former Global Foresight Leader, Arup; Advisor to the President and Board, ETH Zurich*
- Janet Martin, *Principal Stantec, former President, Communication Arts, Inc.*
- Ed Mazria, *Environmental Advocate & Founder, Architecture 2030*

- Steve McConnel, *Managing Partner, NBBJ*
- William McDonough, *Architect & Author, William McDonough + Partners, former Dean, University of Virginia*
- Alisdair McGregor, *former Engineer & Global Sustainability Leader, Arup (now consults)*
- Steve McKay, *Managing Principal, Global Design Leader DLR Group*
- Jason McLennan, *CEO, International Living Future Institute*
- Richard Meier, *Managing Partner, Richard Meier & Partners Architects*
- Sandy Mendler, *Author, Former Sustainability Leader & Principal, Mithun; formerly, Gensler*
- Raymond Messer, *Engineer, Chairman Emeritus Walter P. Moore; Senior Consultant*
- George Miller, *Former Managing Partner, Pei Cobb Freed & Partners*
- Gordon Mills, *Architect, Former President, National Council of Architectural Registration Boards, former Chairman and CEO Durrant Group*
- Betsy Del Monte, *Southern Methodist University, Cameron MacAllister Group*
- Glen Morrison, *Former President and CEO, Tarkett North America*
- Vini Nathan, *Dean and McWhorter Endowed Chair, College of Architecture, Design & Construction, Auburn University*
- Dan Noble, *President and CEO, HKS*
- John Ochsendorf, *Massachusetts Institute of Technology, and MacArthur "Genius Award" Fellow*
- Liz Ogbu, *Former Public Interest Design Expert and Design Director, Public Architecture; Designer and Social Strategist, Founder and Principal of Studio O*
- Lynn Osmond, *President/CEO, Chicago Architecture Foundation*

- Neri Oxman, *Professor of Media Arts and Sciences, MIT Media Lab*
- Doug Parker, *Former Managing Principal, Greenway Group; Chief Business Designer, Design Business Advisors*
- Thompson Penney, *Chairman of the Board, Former President/CEO, LS3P*
- Joseph Pine II, *Branding Strategist & Author, Strategic Horizons LLP*
- Daniel Pink, *Author*
- Jane Poynter, *Former President, Paragon Space Development Corp., Founder & Co-CEO at Space Perspective*
- Antoine Predock, *Architect & Partner, Antoine Predock Architect PC*
- Jane Rathbone, *Chairman of the Board, Design Principal*
- Luis Rico-Gutierrez, *Dean, College of Design, Iowa State University*
- Raymond Ritchey, *Senior Executive Vice President, Boston Properties*
- Witold Rybczynski, *Author & Myerson Professor, Wharton School of Business, University of Pennsylvania,*
- Moshe Safdie, *Architect, urban planner, educator, theorist, author, Moshe Safdie and Associates*
- Jonathan Salk, *Psychiatrist, Private Practice, author*
- Ken Sanders, *Former Principal and Managing Director, Gensler; Board of Directors NELSON, Clarus*
- Adele Santos, *Former Dean, School of Architecture & Planning, Massachusetts Institute of Technology; Professor MIT Architecture, Principal Santos Prescott and Associates*
- Edwin Schlossberg, *Founder and Principal Designer, ESI Design*

- Kenneth Schwartz, *Former Dean of the Tulane School of Architecture; first Michael Sacks Chair in Civic Engagement and Social Entrepreneurship, founding director of Phyllis M Taylor Center for Social Innovation and Design*
- Kate Schwennsen, *Chair, School of Architecture, Clemson University, Former President, American Institute of Architects*
- Terrence Sejnowski, *Brain Scientist, The Salk Institute*
- Stephen Senkowski, *Former President and CEO, Armstrong Building Products; Former CEO, Camino Modular Systems; Management Consultant*
- Scott Simpson, *Co-Author, How Firms Succeed, Chair, DFC Senior Fellows, Senior Director at KlingStubbins*
- Cameron Sinclair, *CEO & Co-founder Worldchanging Ventures*
- Adrian Smith, *Principal, Adrian Smith + Gordon Gill Architecture*
- Sheela Søgaard, *CEO and Partner, BIG*
- Alex Steffen, *Co-Founder, Worldchanging, Author*
- Karen Stephenson, *Professor, Rotterdam School of Management, Erasmus University & Founder, NetForm International; corporate anthropologist*
- Robert Stern, *Former Dean, Yale University School of Architecture; Founder & Senior Partner, Robert AM Stern Architects*
- Cecil Steward, *Emeritus Dean and Emeritus Professor of Architecture, University of Nebraska - Lincoln; President/CEO Joslyn Institute for Sustainable Communities*
- RK Stewart, *Architect, Former President, The American Institute of Architects; Principal Consultant RK Stewart; Associate Adjunct*

DESIGN FUTURES COUNCIL:
SENIOR FELLOWS RECOGNITION

2020 SENIOR FELLOWS

In this issue of DesignIntelligence Quarterly we are proud to announce 17 industry leaders recognized as this year's Design Futures Council Senior Fellows who have expressed their voices via thoughts and actions.

They are:

JIM ANDERSON
Principal, Chair, Dialog Design

As an architect at DIALOG and chair of the partnership, Jim Anderson has two driving passions: working on projects that make a meaningful difference in communities and leading an integrated and multidisciplinary firm. As leader of a diverse group of professionals, Jim is committed to creating a collaborative environment which is well equipped to directly tackle today's complex design issues. Jim prides himself as a champion for DIALOG's mission to do great work, enjoy the journey and make a difference.

NILES BOLTON
Chairman and CEO, Niles Bolton Associates

Niles Bolton is Chairman and CEO of Niles Bolton Associates, Inc. (NBA), a multi-disciplinary design firm founded in 1975. Headquartered in Atlanta, Georgia with an additional office in Alexandria, Virginia, the firm has completed projects in 48 states and 16 countries. Niles and his 20 partners direct a staff of over 150 and together have developed a national reputation for work in mixed-use developments, multi-family housing, student housing, transportation, retail, universities, clubhouses, senior housing, general aviation facilities, hotels and resorts.

After graduating from the Georgia Institute of Technology with a degree in architecture, Niles was an instructor at the United States Engineering Center at Fort Belvoir, Virginia and served in Vietnam with the Army Corps of Engineers (1st Lieutenant, 69th Engineering Battalion).

He is a Director and Past Chairman of the Buckhead Coalition; an Emeritus Trustee of the Georgia Tech Foundation; trustee of the Rabun Gap-Nacoochee School, former Urban Land Institute Governor, a member of the American Institute of Architects, the National Multi-Housing Council, and the Society of College and University Planning (SCUP), the 300 Club, World Presidents Organization (WPO) and Rotary Club of Atlanta, Past President of Cherokee Town and Country Club and serves on the Georgia Tech College of Design Executive Advisory Board. Niles' past service includes 10 years on the State Architects & Interior Designers Licensing Board. In 2015, he received the Joseph Mayo Pettit Alumni Distinguished Service Award, the highest award conferred by the Georgia Tech Alumni Association and was recognized by the Atlanta Business Chronicle as a 2020 Most Admired CEO.

Niles and his wife Kathy reside in Atlanta.

PATRICK E. CERMAK
President & COO, Wight & Company

Patrick Cermak joined Wight & Company in 2001 and became President and Chief Operating Officer in 2006, leading the firm's daily operations, overseeing its financial management, and ensuring that clients remain at the heart of every decision. As a lifelong "coach" and role model for civic engagement, Patrick is a champion for the development of the next generation of A/E/C professionals. During his tenure, he has helped bolster Wight's pioneering Integrated Design-Led Design Build model, an innovative approach that transformed the industry by setting a new standard of design and delivery excellence with unrivaled schedules and budgets. With a focus on cultivating and nurturing client, partner, and governmental relationships on behalf of Wight, Patrick has played an integral role in helping the firm expand into new markets, broaden its service offerings, and achieve steady growth. Patrick, together with Chairman and CEO Mark Wight and a visionary team of more than 200 design, engineering, and construction specialists, is dedicated to forming lasting, mutually beneficial partnerships that merge design innovation with environmental responsibility. His Professional/Civic Involvement includes: The Associated General Contractors of America, Chicagoland AGC, Board of Directors, Member;

Government Relations Committee, Member; Chicagoland and Chamber of Commerce; Board of Directors, Member; PAC Board, Member; Public Policy Committee, Member; Design Futures Council, Executive Board Member; University Club of Chicago, Board of Directors.

Memberships and recent recognition include Chicago Area Public Affairs Group (CA-PAG); Chicago Central Area Committee (CCAC); City Club of Chicago; Urban Land Institute (ULI); 2019 Signum Fidei Award, Lewis University

DILIP CHOUDHURI
President & CEO, Walter P Moore

Dilip Choudhuri, PE, F.SEI serves as the President/CEO of Walter P Moore, an international company of engineers, innovators, and creative people who solve some of the world's most complex structural and infrastructure challenges. Founded in 1931 the firm employs 700+ professionals working across 21 U.S. offices and five international locations. Dilip is a member of the board at Walter P Moore and leads their executive committee and strategy council. He is a Fellow of the Structural Engineering Institute (SEI) of ASCE. The SEI Fellow (F.SEI) grade distinguishes SEI members as leaders and mentors in the profession. A

dynamic leader, Dilip has led the company's strategic growth since taking on the role of CEO in 2015. He is a big believer that leadership is the ultimate team sport and the firm has experienced a 75% growth in revenues over the last six years under the stewardship of his leadership team. He is focused on culture-building and maintaining an extraordinary employee experience, which translates into an extraordinary client experience. The firm continues to provide industry-leading solutions in the areas of aviation, education, healthcare, sports, and sustainability. Dilip is also committed to his engagements outside the firm and actively participates on several boards and community organizations such as the ACE Mentor Program, Design Professionals Coalition, Construction Industry Round Table, Central Houston, Inc., and Design Futures Council.

FISKE CROWELL
Principal, Sasaki

For more than four decades, first with Kallmann, McKinnell and Wood Architects, and in the last fifteen years with Sasaki Associates, Fiske has been directing the successful implementation of significant, award-winning projects at a national and international level. His notable influence has

been felt through widely disseminated innovations in professional practice and education.

Fiske's achievements have been recognized broadly as both a consummate professional designer as well as an ardent educator. As a practicing architect, Fiske has been responsible for the design of more than 150 major projects for institutional and government clients, totaling in excess of 10 million square feet. The focus of his practice has been for college and university clients, providing innovative solutions addressing sustainable building strategies around the creation of innovative learning communities.

Fiske earned his undergraduate degree from the University of Pennsylvania and a master of architecture from Yale University. He was a Fulbright Scholar at the Politecnico di Milano and a Visiting Scholar at the American Academy in Rome. Elected to honorary membership in the National Institute for Architectural Education, he remains active with the Council for International Exchange of Scholars as a peer review specialist for the Fulbright Scholar program. Fiske is an Affiliate Graduate Faculty member at the University of Hawaii's School of Architecture focused on the dual degree/global track program with Tongji University in Shanghai. He is active with the American Institute of Architects, the Boston Society of Architects, and other professional organizations. He has participated on AIA chapter awards juries nationwide and in 2003 was elected to the College of Fellows of the AIA.

DON DAVIES
President, Magnusson Klemencic Associates

Don Davies is President of Magnusson Klemencic Associates (MKA), a 190-person international, award-winning structural and civil engineering firm headquartered in Seattle. He is an recognized leader in high-rise design and an industry champion for the promotion of urban density and low-carbon construction. Sought out for his creativity, international expertise, and sustainably-driven innovations, Don's projects are located in over 50 major metropolitan centers and 18 countries. His portfolio includes over 47 Performance-Based Seismic Design towers in areas of high seismicity and towers up to 105 stories tall. He mentors MKA's Sustainability Technical Specialist Team and frequently lectures on bio-mimicry and resilience in structural design. He is a founding member of the Carbon Leadership Forum, an Advisory Board member of the Council on Tall Buildings and Urban Habitat (CTBUH), and a Board Member for the International Association of Life Cycle Civil Engineers. In addition, Don is a key member of the MKA Foundation and part of the leadership team helping to create the Embodied Carbon in Construction Calculator (EC3) tool.

RANDY DEUTSCH
Clinical Associate Professor, University of Illinois at Urbana-Champaign

Randy Deutsch FAIA, LEED AP is an educator, author, international keynote speaker, AI researcher and a licensed architect having designed +100 large, complex sustainable projects for which he received the AIA Young Architect Award Chicago. Since 2011 Randy has authored six books, most recently Convergence: The Redesign of Design (AD, 2017); Superusers: Design Technology Specialists and the Future of Practice (Routledge, 2019), Think Like An Architect: How to develop critical, creative and collaborative problem-solving skills (RIBA, 2020) and Adapt As an Architect: A Career Companion (RIBA, 2021). In addition to teaching at University of Illinois at Chicago starting in 2001 and University of Illinois Urbana-Champaign starting in 2012, until 2019 Randy served as Associate Director for Graduate Studies in the School of Architecture. Randy previously served on AIA Chicago Board as Director and Vice President; on ARCHITECT Magazine's 2018 R+D jury; and led an annual Executive Education program at Harvard GSD. Randy is part of a team that in 2020 received an NSF Grant and DPI Seed Grant for planning a first-of-its-kind institute for the application of AI in design, construction and operations of buildings and infrastructure. Earlier this year he was made a Fellow of the American Institute of Architects. More about Randy here www.randydeutsch.com

PETER DEVEREAUX
CEO, HED (Harley Ellis Devereaux)

Peter Devereaux was born in Allentown, Pennsylvania and received a BS in Architecture from Penn State University and a Master of Architecture from Yale University. Cesar Pelli was Dean of the Yale School of Architecture and hired Peter to work for him upon graduation. In 1985, Devereaux left Pelli's office in New Haven, CT to take a design leader role with a nine-person firm in Los Angeles where he eventually became a Principal. Under Peter's leadership as CEO, that small firm, Fields Devereaux, grew to 175 people and expanded into three cities in California. In 2006, Fields Devereaux merged with HarleyEllis, a Michigan-based corporation established in 1908, to form Harley Ellis Devereaux, an integrated practice of architects, engineers and planners. Today HED has 450 employees in eight cities nationwide and Peter serves as Chairman and CEO. Following the creation of HED the firm acquired several smaller firms to expand its service offerings and geographic reach, including: Palladia - Detroit, 2007; Rodie Scherer - Chicago, 2008; VDK Architects - Oakland, 2012; BHFL Architects - San Francisco, 2014; Deems Lewis McKinley- San Francisco, 2016; and Integrated Design Group - Boston and Dallas, 2019. Peter was elevated to the College of Fellows of the American Institute of Architects in 2006, and currently serves on the Executive Committee of the AIA's Large Firm Roundtable.

TED HYMAN
Managing Partner, ZGF Architects

Ted Hyman is Managing Partner at ZGF Architects. His 36-year professional career has been concentrated in technical design and project delivery of a broad range of academic and research buildings, hospitals, courthouses, and other civic facilities nationally. Since joining ZGF in 1989, Ted has taken responsibility for many of the firm's most challenging and technologically complex projects, encompassing programming, management, coordination, production, and construction administration. Many of these projects have involved overseeing multidisciplinary teams and working with multiple client user groups in a highly collaborative manner. Ted's passion for developing sustainable strategies that integrate high-performance systems, materials, and technology, maximizes the economic and environmental performance of buildings and enhance occupant comfort and health. During his 26 years at ZGF, he has played a key role in guiding firm development while successfully directing and mentoring project teams for premier institutions. He was named Managing Partner in January 2014 and now oversees the firm's strategic and overall performance.

As a LEED AP®, he has a passion for sustainability, and has played a key role in the design of a number of the greenest buildings in the United States, including the LEED Platinum®

certified J. Craig Venter Institute La Jolla - the first net-zero energy biological laboratory in the world, and the Conrad N. Hilton Foundation Headquarters, also LEED Platinum® and net-zero energy. He continues to share his strategies and approach to creating innovative solutions with the professional community at national and international conferences and remains involved in various committees with the American Institute of Architects. In 2016, Ted was one of a handful of U.S. architects invited to participate in a historic forum in China to address China's commitment to signing the Paris Agreement and establishing Zero-Net Carbon (ZNC) as a necessary and achievable goal for buildings and developments. Ted earned his Bachelor of Science in Architecture from California Polytechnic State University, San Luis Obispo.

PETER MACKEITH
Dean and Professor, Fay Jones School of Architecture, University of Arkansas

Peter MacKeith is dean and professor of architecture at the Fay Jones School of Architecture and Design at the University of Arkansas. Appointed in July 2014, and reappointed for a second term in 2019, he is the fifth dean of the school and a nationally recognized design educator and administrator. From 1999 to 2014, MacKeith was associate dean, professor of architecture and associate curator for architecture and design at the Sam Fox School of

Design & Visual Arts at Washington University in St. Louis. He was the director of the Master of Architecture – International Program at the Helsinki University of Technology Finland from 1995-1999 and held previous appointments at the University of Virginia and Yale University. He received his Bachelor of Arts in Literature and International Relations, with distinction, as an Echols Scholar from the University of Virginia (1981) and his Master of Architecture and the Alpha Rho Chi Medal from Yale University (1985).

He has been recognized twice by DesignIntelligence as a "design educator of the year" (2017 and 2019) and twice by the Association of Collegiate Schools of Architecture with national awards for "creative achievement in design education," for his design studio teaching and curatorial work. He is the recipient of research and exhibition grants from the US Forest Services Wood Innovations Programs, the Graham Foundation of the Advancement of the Visual Arts, the National Science Foundation, The Museum of Modern Art and The Finnish Cultural Foundation. He is the author or editor of twelve books, most recently Louis I. Kahn: The Nordic Latitudes (authored by Per Olaf Fjeld and Emily Fjeld) and Housing Northwest Arkansas: A Challenge, An Initiative, A Response (with Stephanie Foster), and has served as editor of Perspecta, the Yale Architecture Journal (issue 24, On Materiality) and The SOM Journal, a journal of professional history, theory and criticism (9: Collaboration/Teamwork and 10: Leadership/Authorship).

MacKeith chairs the advisory committee for the Northwest Arkansas Design Excellence Program, a regional initiative of the Walton Family Foundation, and is a member of the editorial board of Places Journal for architecture, landscape architecture and urbanism. He also serves as Special Advisor to the Chancellor for Campus Architecture and Design at the University of Arkansas. He is currently overseeing the completion of a $75,000,000 capital campaign for the Fay Jones School and guiding the design and construction of the Anthony Timberlands Center for Design and Materials Innovation.

Since receiving a Fulbright Fellowship to Finland in 1990, MacKeith has worked as a liaison between the architecture, art and design cultures of the United States, Finland and the Nordic region, through educational programs, teaching, exhibitions and publications. He has written and lectured extensively on modern and contemporary Finnish and Nordic architecture. With support from the Finland 100 Centennial Fund, MacKeith conceived and curated the 2017-2018 exhibition for the Finnish Embassy in Washington, D.C., The Iconic and the Everyday: Creative Finland in the United States. From 2016 to 2019, he was the Centennial Lecturer in Architecture for the Finlandia Foundation. He was curator for Lighthouses: On Nordic Common Ground, the exhibition of The Nordic Pavilion in Venice, Italy, for the 13th Architecture Biennale in 2012, working with The Museum of Finnish Architecture, the Swedish Center for Architecture and Design and the Norwegian Museums of Art and Architecture. He has also led the organization of exhibitions and conferences in the United States with the National Building Museum; the Cooper-Hewitt, Smithsonian Design Museum; the Brookings Institute; and the Kemper Art Museum at Washington University in St. Louis. He served as Honorary Consul for Finland in the state of Missouri from 2012-2014 and serves as a member of the Finnish Cultural Institute in New York Advisory Board. In 2014, he was installed as a Knight, First Class, of the Order of the Lion of Finland in recognition of his contributions to the advancement of Finnish culture.

ROB MILLER
Director, School of Architecture, University of Arizona

Robert Miller, AIA, is a Professor and the Director of the School of Architecture at the University of Arizona since 2010). After earning degrees from Clemson (1976) and Rice (1979), he practiced during 1980s-1990s, running his own small firm from 1986-2010 while teaching at Georgia Tech, Emory, and Clemson. He was awarded a fellowship to the American Academy in Rome (1997) for his integration of practice with teaching. Miller served as Professor-in-Residence at Clemson's Daniel Center in Genoa, Italy (1997-1999); then Director of the Clemson Architecture Center in Charleston (2000-2010). Under Miller's leadership, the Charleston center won three NCARB Prizes for the Creative Integration of Practice and Education plus the national AIA's Best Mentoring Practices award. In 2009 Miller was awarded the ACSA Creative Achievement Award for a design/build project, the MINImuseum of Richard McMahan.

During Miller's tenure as Director of the UArizona SofA, a new M.Arch has been developed and accredited (2016) and its Bachelor of Architecture degree has been ranked by the Design Futures Council in the nation's top-25 for the last seven years. From 2013-2015 he Co-Chaired HeadsUp, the advocacy and professional development

association of UArizona department heads, and in 2018 was named its inaugural Executive Director. Miller was named Educator of the Year by AIA Arizona (2014) and served as President of AIA-Southern Arizona (2015) and AIA Arizona (2018).

ADRIAN PARR
Dean, College of Architecture, Planning, and Public Affairs, University of Texas, Arlington

Adrian Parr is the Dean of the College of Architecture, Planning and Public Affairs at the University of Texas at Arlington and a UNES-CO Chair of Water and Human Settlements. In her capacity as a UNESCO water chair, Parr was selected by the European Cultural Center to curate an exhibition for the 2021 Venice Architecture Biennale on Watershed Urbanism where she will feature DFW and its current and future relationship to the Trinity River system. She has published extensively on environmental politics, sustainable development, and design in the public interest. She is the author of the trilogy Hijacking Sustainability (MIT Press), The Wrath of Capital (Columbia University Press), and Birth of a New Earth (Columbia University Press) in addition to other books of cultural theory. She is the producer and co-director (with Sean Hughes) of the multi-award-winning documentary, The Intimate Realities of Water, that examines the water

challenges women living in Nairobi's slums face. She has been interviewed for her views on climate change by The New York Times, television news, and other media outlets, and is a regular contributor to the Los Angeles Review of Books. Parr received her Ph.D. in visual culture and philosophy from Monash University in Australia. She earned her undergraduate and graduate degrees in philosophy from Deakin University in Australia.

Parr also holds the UNESCO Chair on Water and Human Settlements. A cross-disciplinary scholar, Parr has published extensively. Her most recent book, Birth of a New Earth (2017), was published by Columbia University Press. She produced and co-directed the award-winning documentary "The Intimate Realities of Water." The film chronicles the complex relationships between water, gender, sanitation and development in Nairobi's shantytowns.

KATHERINE PEELE
Chief Practice Officer, LS3P Associates

Katherine Peele is an architect and serves as Chief Practice Officer for LS3P, a southeast based architecture, planning and interior design firm. A Fellow of the American Institute of Architects, she has served as president of AIA North Carolina. In 2009, she was awarded the

AIA NC William Deitrick Service Medal for outstanding service to the profession. In 2017, she was appointed to the North Carolina Board of Architecture for a five-year term and currently serves as President. And, in 2019, Katherine was awarded the AIA North Carolina Gold Medal, the highest honor for an architect in North Carolina. In her 32-year career and in her current role as Chief Practice Officer, Katherine has focused on elevating design excellence, expertise and innovation for LS3P.

BRAD PERKINS
CEO, Perkins Eastman

Bradford Perkins is founder and chairman of Perkins Eastman, a global architecture, interior design, and planning firm with 20 offices across North America and around the world. He is an architect and planner who has directed a wide variety of projects across North America and in 30 countries overseas. His personal work has focused on healthcare, education, housing for seniors and other special populations, and large-scale planning assignments. His and his firm's work has received over 750 awards for planning and design excellence.

He is a third-generation architect. His grandfather Dwight Heald Perkins FAIA was the founder of Perkins, Fellows & Hamilton and his

father Lawrence B. Perkins FAIA was the founder of Perkins & Will. His first completed project in China was a building on the campus of Nanjing University, whose core campus was planned and designed by his grandfather early in the 20th century.

He is the author of nine textbooks and over 80 articles on a variety of architectural and planning topics. He has taught at many colleges and universities and for the last 10 years has been on the faculty of Cornell University's College of Art, Architecture and Planning. He has a degree in Latin American History from Cornell University, a degree in architecture from Cornell and CCNY, and an MBA from Stanford University.

SCOTT POOLE
Dean, College of Architecture + Design,
University of Tennessee, Knoxville

Scott Poole, FAIA, is dean of the College of Architecture and Design at the University of Tennessee. Prior to assuming his present role in 2011, he was Director of Virginia Tech's School of Architecture + Design from 2004-2011. During his tenure at Virginia Tech, he guided the school's four undergraduate and graduate programs to Top 10 rankings in America 28 times including No.1 rankings in both architecture and landscape architecture. Prior to his administrative roles Poole taught design and

design principles at the University of Texas and Virginia Tech. In recognition of his teaching he was invited to conduct workshops as a guest professor at the Royal Academy of Technology, Stockholm, the University of Texas, Austin, the University of Calgary, and the Royal Danish Academy of Fine Arts, Copenhagen. He was twice named a Most Admired Educator and Administrator in America by DesignIntelligence. Poole's scholarship includes The New Finnish Architecture, a book published in three languages by Rizzoli International. In support of his scholarship, Poole earned a Fulbright Fellowship and has received grants from the Graham Foundation for Advanced Studies in the Fine Arts, the American-Scandinavian Foundation, and the National Endowment for the Arts. In 2016, he was elected to the College of Fellows of the American Institute of Architects.

IGNACIO REYES
Vice President, Chief Development Officer,
Leo A Daly

Ignacio Reyes AIA, NCARB, LEED AP is a Vice President and is the Chief Development Officer for LEO A DALY. He leads the firm's growth plans in all markets nationally and internationally. He is the voice for marketing, business development and strategy for the firm and all its market practice areas. A graduate of Broward

Community College and Florida A & M University, he began his professional career in 1993 and joined LEO A DALY in 2009. After being a project manager for many years, he was asked to lead the development of several smaller markets at the firm. In 2014, his leadership skills, market sector visioning plans, and strategic pursuit of new business resulted in his promotion to his current position. He serves as 2021 President Elect, AIA Florida, 2019 Vice President for Advocacy AIA Florida and is a Member of the Design Futures Council. He is also a member of ULI and SCUP and is a registered Architect in Florida and Texas.

ANGELA WATKINS
Principal, Shepley Bulfinch

Angela is a Principal, design leader, and Chair of the Board of Directors at Shepley Bulfinch, where she focuses on creating environments that support people in healing, research, teaching, and learning. Throughout her career, she has led more than a dozen award-winning projects. She publishes and presents widely, including studies that investigate the impact of light on occupant well-being to better understand the relationship between space and behavior. An advocate for evidence-based design, Angela has demonstrated how understanding projects at a quantifiable level allows

architects to articulate value and create a shared platform for design conversations. She introduced the position of design director to Shepley Bulfinch in 2005, creating a direct connection between research and practice. Through this mechanism, Angela has involved numerous clients in extensive post-occupancy studies that have been recognized internationally. Further supporting the importance of research in practice, Angela has been an active member in the Health Industry Advisory Council at Texas A&M and co-chair of the Healthcare Design initiative at Arizona State University (ASU).

Angela's most influential work with future architects has been in the design studio as an instructor. At ASU, she led a design module, where inter-disciplinary teams—from architecture students to music therapy PhDs—collaborated on design solutions to childhood obesity. At Massachusetts Institute of Technology (MIT), she taught eight mandatory design studios that broke the complex problem of design and representation into distinct components to be assembled in a final project.

In addition to her achievements in research, teaching and practice, Angela has connected all three to create a meaningful, collaborative design process. Her research builds a transferable knowledge base that serves as a foundation for informed design. Her academic work teaches invaluable skills that prepare students as future leaders in practice, and her engaged leadership empowers her clients to be true collaborators.

PLEASE JOIN US IN CONGRATULATING & WELCOMING THIS YEAR'S NOMINEES

Design Futures Council ®

VOICES

In this issue, we introduce a new feature called Voices. In this recurring feature, DFC members are given the opportunity to share thoughts, quotes, and questions, in shorter-than-essay-or-interview format to open the dialogue broadly. To launch this effort and capture what Senior Fellowship means to this year's group of inductees we asked a few of them to share their thoughts on DFC Senior Fellowship.

Here's what they said:

When I was named senior fellow of the Design Futures Council, I was really surprised. It's a blind process so you don't know it's coming until it actually happens. Such an incredible group of people have become senior fellows of the Design Futures Council through the years that it really is a great honor to be considered. The camaraderie and lack of competition that exist within the Design Futures Council and the desire for everybody to help raise everyone else up -- and raise the profession as a result -- is one of the most positive things that exists within the group. There's tremendous value in having so many resources in one location that can bring a wide variety of different ideas together. It never gets old. I still really enjoy participating, and I've seen a lot of people come and go through the years. I'm probably not that far behind in terms of my own retirement -- but it's something I still find tremendous value in. I love contributing to it, and I get just as much out of it.

- Lauren Della Bella, President, SHP

I've been active in the Design Futures Council since 1994 and became a senior fellow in 1999. It was an unexpected honor. The DFC senior fellows are an amazing group of thinkers and doers who have had a lasting impact on the profession. As an added plus, they're all genuinely nice people, always accessible and willing to engage. It's a network I use often when I want to think about problems in a different way, discuss new ideas, or just catch up on what's going on in their world. As a result, many DFC senior fellows have become close friends. It's a wonderful resource to be able to call on my own personal think tank of really smart people.

- Scott Simpson, FAIA & Senior Fellow, Design Futures Council

VOICES:
QUOTES FROM OUR SENIOR FELLOWS

What does it mean to me to be a Design Futures Council senior fellow? First of all, pride. It is an honor to be recognized by an organization so prestigious, so impactful. I'm in good company. Just look at the names of other senior fellows. They are some of the most important design thinkers in the world. I'm humbled on the one hand, and full of new energy to continue my work and contribute to a better tomorrow. It is also a responsibility. When you become a senior fellow, you renew your commitment to the profession, to the environment, to design. You commit never to give up, never stop working on what is best for our fellow humans, our students and future leaders, for our peers, and for the planet.

For me, specifically as a new American, an immigrant, a Latino, a member of a group often underrepresented in the profession, a group often not included at the table, I feel responsible for keeping the door open, and encouraging others to participate and work towards the same goals. They should know if I can be a senior fellow, they can also. Another aspect of that responsibility is making sure as we think of a better tomorrow, we think about it for everybody. Everybody, regardless of their socioeconomic background, language, the God they pray to, or who they love. As a Design Futures Council senior fellow, I am responsible for reminding designers and leaders about social, environmental, and social justice as a critical agenda for future designers.

\-   Luis Rico-Gutierrez, Dean, College of Design, Iowa State University

To be recognized as a senior fellow of the Design Futures Council is clearly an honor and a prestige. It creates a catalytic honor for me. It encourages me to do bigger, brighter, and bolder things professionally in this domain. When I step back and look at what my association with the DFC has been, what that association means, and what it has meant in terms of the culmination of being recognized as a fellow, clearly it's not an end point, it continues. It's four specific pathways or domains. The first is the recognition I spoke about. The second is the access to other top leaders globally. The third aspect is the support that comes from being part of the DFC network, the access to a variety of expected and unexpected sources of information, health assistance, opportunity, and just great ideas. And the fourth aspect is the encouragement to do more and to do better because we are motivated, and I'm motivated to do as well as I can by seeing others who are always on their A-plus game.

\-   Vini Nathan, Dean and McWhorter Chair, College of Architecture,
        Design and Construction, Auburn University

When one receives an honor or recognition of any kind, it is accepted with pride and gratitude. But when I was awarded senior fellowship by the Design Futures Council, I received it with not only pride, gratitude, and surprise, but with... All in humility. All because the Design Futures Council is comprised of the most respected design firms practicing today. And there's an invaluable connector between them. Sharing an invaluable source of knowledge about the future of the profession and the world in which we practice. Humility, because one cannot feel anything but humility when included among the list of senior fellows, true giants in the industry. Throughout the years of our involvement with Design Futures Council, my firm has greatly benefited from DFC's ability to look clearly and deeply into the future and bring that perspective to our firm, to help us transform our present. But it's not only about the immense knowledge and perspective that the DFC offers, but the incredible opportunities to be in the presence of like-minded leaders in the industry and forge friendships that run deeper and longer than any single event. I am deeply honored to be a senior fellow in the Design Futures Council.

- Thom Penney, CEO Emeritus, LS3P

When I think about what it means to be a fellow of the Design Futures Council, it begins with the honor and the responsibility to uphold the remarkable legacy of the Design Futures Council, its values, principles, and mission. It's a collegial forum. A forum that in many ways is about fellowship. Fundamentally, it's a forum that recognizes that our challenge to be relevant to the needs of society and the world exceeds any competitive positioning we might have as peers within the same profession. That if we get that relevance question right, there's tremendous opportunity for all of us. Being part of the Design Futures Council is to gain insight. As a fellow, there's an extra responsibility to engage, participate and be a role model. Together, as we derive insight, we can set strategy, clarify goals, and better map to the destinations we all aspire to. The Design Futures Council is principled and ethical. It's value centered. In that way, being a fellow of the Design Futures Council is to reflect those values. It's a legacy of both professional idealism and realism. It's a legacy of integrity, and being a fellow means being available to professional colleagues of all generations.

- Steve McConnell, Managing Partner, NBBJ

"In a forest, there is no master tree that plans and dictates change when rain fails to fall or when the spring comes early. The whole ecosystem reacts creatively, in the moment."

-Frederic Laloux, Reinventing Organizations: A Guide to Creating Organizations Inspired by the Next Stage of Human Consciousness

"You don't learn to walk by following rules. You learn by doing and falling over."

-Sir Richard Branson

You never change things by fighting the existing reality. To change something, build a new model that makes the existing model obsolete.

-   Richard Buckminster Fuller

I hate rules. I hate 'This is the way things are done'. I hate a lack of reinvention. I hate theatre as an archeological exercise. Theatre needs to be urgent.

-John Tiffany

"That's what leads to a reinvention of yourself - being fully present and in the moment."

-Oprah Winfrey

"It's never too late to be what you might have been."

-George Elliot, Author

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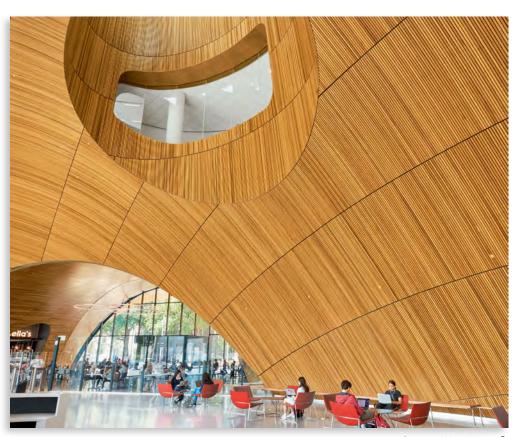
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