Q1

LEADERSHIP

TECHNOLOGY FUTURES

ORGANIZATIONAL FUTURES

CONNECTION

RESPONSIBILITIES

ACADEMY / PRACTICE GAP

ECONOMICS & INVESTMENT

DesignIntelligence®
MEDIA

Q1 2024

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CONTEXT: CONNECTION

DesignIntelligence unfreezes our music and embraces a new editorial mindset in 2024.

The profession of architecture has long been referred to as "frozen music." As we turn the calendar year in 2024, DesignIntelligence's editorial team turns to music—jazz and other forms—as a model for the future. To practice what we preach we have examined our own strategy to renew and re-validate our focus. In contrast to the prescribed themes of our DesignIntelligence Quarterlies over the last quarter century and in response to the changing world pace, we are shifting our approach to become more connected, agile, and integrated in our content. It's time to thaw the frozen music. To chip away at the ice and drink its vital waters. We do this in concert with the themes of our Design Futures Council physical events, podcasts, webcasts, our feedback and firm work through DI Advisory, DI Learning and DI Foresight, and through listening to clients and the professions at large.

Our desired outcomes? A more responsive editorial stance for the road ahead. A curatorial method free to consider timely events and topics as they occur in the built environment we seek to influence. A move away from static plans to become nimbler. In the call-and-response tradition we seek the flexibility to develop riffs and weave fugues, recurring topics, and themes back into the discussion—and the action—to effect change. We seek to connect.

Reading context and climate as we go gives us the ability to change tempo, address discord and find harmonies. With our ears and minds open (and instruments in hand), we can sit back and listen to beautiful arias when they occur or offer cool instrumentals. In uncertain times, we can lay down a steady backbeat of content from experts around the world to move our global band in relevant directions.

In our intent to influence, do we wish to become yet another news source in a world teeming with data? Decidedly not. Reporting tweeting, blogging and responding in the moment to the minutia of events in the design professions is not our plan. Rather, as we have for 30 years, our focus remains to survey, assess, and share developing issues. We wish to influence leaders to stay relevant and resilient, so they are better able to lead their firms into uncertain futures. As one of the few organizations on earth with this mission we eschew prescriptive solutions in favor of letting our readers chart their own paths. In journalistic circles it is said: "Story Leads." Thus, it is our perpetual quest to find and share those stories and meaningful content from the best minds in the business and let you, our readers, mold those ideas into your own.

Themes

Our 2024 annual focus is Connection, an ever-present mantra that allows us to explore connection, synergy, transformation and the shape of things. Under that umbrella, our six primary themes, each with the freedom to be considered in any of four DI Quarterlies, have connections to our physical events across the country and the world in 2024 and to our other content via webcasts, podcasts and other publications. They are:

- **Leadership** The Business of Design, Relevance and Resilience
- **Technology Futures** Artificial Intelligence, Applied Research, Innovation
- **Organizational Futures** New Organization & Business Forms, Alliances, Work, Workplaces, Value Propositions & Business Models
- **Responsibilities** Evolving Professional / Global / Regional / Local, Motivations & Incentives (Group & Individual), Housing, Homelessness, Society, Civility, Income Gaps, Climate Change Dynamics, Sustainability & The Environment
- **Academy / Practice Gap** Trans-industry and Transdisciplinary Collaboration, Professional Education, Development & Continual Learning, New Skills, Talent
- **Economics & Investment** Drivers of change[1]

As in symphonic works, we seek elaborate musical compositions in multiple movements, inclusive of the full orchestra of professionals and constituents. As in jazz, we wish to be characterized by improvisation, syncopation, and a regular forceful rhythm via our weekly articles and periodic podcasts, webcasts and events. To make our music we invite the best voices and players to come alongside and sit in.

Thus, DesignIntelligence embraces a new editorial approach by tailoring our content to allow greater responsiveness. In this first Quarterly of the year, we have asked more than a dozen "musicians" from the built environment professions to join our ensemble. Selected from current thinking and conversations, they are:

- Scott Simpson, who speculates on the impact of artificial intelligence on design thinking and the profession in his essay, *Where Do We Go From Here?*
- Paul Hyett's look at *Crushing Agendas* in which he urges the convening of politics, sustainability and architecture in our greatest challenge yet.
- Paul Finch, who explores our Leadership thread by reminding us: *Leaders Need Followers*.
- My own look at technology's march and the dawn of AI entitled, *All For Intelligence.*
- DeeDee Birch, whose article, *The Biological Paradigm in the Technological Future* explains the interrelationships of how artificial intelligence, immersive technologies and nature-based design can drive human-centered solutions.
- Julie Kim, program chair at Georgia Tech, who examines the gap between the academy and practice and offers practical solutions for what can be done about it.
- Gustav Magnusson, whose essay *In The Making* shares excerpted urban conversations and offers key insights into emerging issues from his soon-to-be-released book.
- Maisie Sargent Auld, from global consultancy Arcadis, who, in *Shifting Decisions: Incorporating Embodied Carbon Emissions in Early Design*, advocates for science-based targets and early carbon awareness.

- The self-avowed "old guy in modular construction", FullStack Modular's Roger Krulak, discusses modular construction in *Changing the Game.* In a discussion of a movement that has lingered in our industry's shadows for decades, his approach brings together a deeper understanding of the issues in bringing a Lego-style mentality to the profession.
- Dena Prastos, whose interview *Life at the Edge*, examines her work at the land / sea intersection.
- A look back at January's Leadership Summit on AI and innovation by Dave Gilmore entitled *A Gathering Intelligence*.

And finally, and most importantly, through these written syntheses of mind and hand, we hope that we connect with each of you, our community of leaders. As ever, our goal is to influence and inform your actions to lead and keep your organizations renewed, relevant and resilient.

We look forward to listening well, to bringing the right notes to life, and to hearing from you.
Join us as we play on.

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[1] Regarding our sixth theme, economics and investment, our own Dave Gilmore recently justified its perennial inclusion by paraphrasing dialogue from the film Godfather III:
"All I am is the hammer."
"Money is a hammer. Politics is deciding when to use the hammer."

Michael LeFevre, FAIA emeritus, managing editor, DI Media Group; principal, DI Advisory; senior fellow, Design Futures Council

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A GATHERING INTELLIGENCE

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A GATHERING INTELLIGENCE

Dave Gilmore

President & CEO of DesignIntelligence

Opening Remarks from La Jolla

As in most things, the quiet, steady progress of nascent thought gradually finds its footing in influence, product, or service. And so it was and is with what we refer to as artificial intelligence. Centuries of conceptual ideas, built upon then abandoned then taken up again by later generations, the idea of a thinking machine, an inanimate creation taking on and expressing sentient consciousness, generating its own thoughts, and making antonymous decisions outside the strict

programming of mechanisms or code to bound its output. We continue to speculate when such a full expression as this will be realized, but suffice it to say, it's drawing closer with each tick tock of the clock.

The transdisciplinary mix of philosophy, psychology, biological sciences, computer science, social science, and more have contributed to the body of knowledge we now categorize as artificial intelligence. The rapidly expanding science of decision-making best understood through observation and study of human brain mechanics and chemistry is still a deep well whose depths have yet to be delved beyond speculative hypothesis to objective understanding. Nonetheless, human interest coupled with tools and knowledge unlike any other prior period is advancing our knowledge deeper into this well with hopes of finding the clarity all seek towards this seeming union of humanized technology.

The built environment industry and its myriad participants, continue to be behind the innovation and adoption curve. We are only now, in these past 5 years, dipping our collective toes into the AI water. We're toying with the themes of acceleration and efficiency but have limited the horizon of possibility to narrowed application. How AI will wholly disrupt the design professions in both positive and negative ways are not being deeply considered towards positive transformative outcomes. A working philosophy of intelligence is wanting and the essential germ of culture as the organizational rudder of such is not earnestly being considered nor developed. Yet other industries have been riding the digital data waves for several years now and see the latest iterations of AI as natural extensions to what they've already foreseen and actioned.

The last two convenings of this DesignIntelligence gathering here in La Jolla focused on how the pervasive and ubiquitous nature of digital transformation coupled with the circular fuel of ingestible data has changed how businesses define their internal and external value, how businesses and their consumer clients redefine their interactions, how industries and societies understand transactions and economics, and the list goes on and on. We challenged this audience with a pragmatic pursuit of data clarity towards a holistic strategy that holds the promise of authentic transformation on multiple dimensions.

What we've realized since meeting last is there's a critical gap in functional digital and data literacy. That's not to suggest we are collectively illiterate as being unable to read. It is stating that we

don't hold the ready competence or knowledge required to leverage digital and data towards transformational outcomes. Why is this important? Simply because without such foundational understanding, the legitimate value of artificial intelligence will be unrealized. AI is wholly dependent on digital and data to yield the outcomes we seek for the betterment of the human condition and natural world. As AI mainstreams into the built environment, the fundamental economics of design will alter. Gone are the days when the design community owned design conceptualization. Fading are the days when the gap between the disciplines was fixed . . . convergence is accelerating through AI competency, and it had disruptive promises being manifest in how value is perceived and understood.

As we enter these two days, let us commit ourselves to deeper and broader responsibility. Let us give ourselves to the scholarship of reading and research, of history and application, of philosophy and logic. Let's distance ourselves from false expedience that seeks shortcuts without foundations. Let's measure thrice before cutting once. Let's be the responsible leaders our firms, our institutions, and our industry at large hope we will be.

> **We encourage risk awareness coupled with gauged risk taking. We urge cross-entity collaboration to raise the collective intellect that yields responsible outcomes for all.**
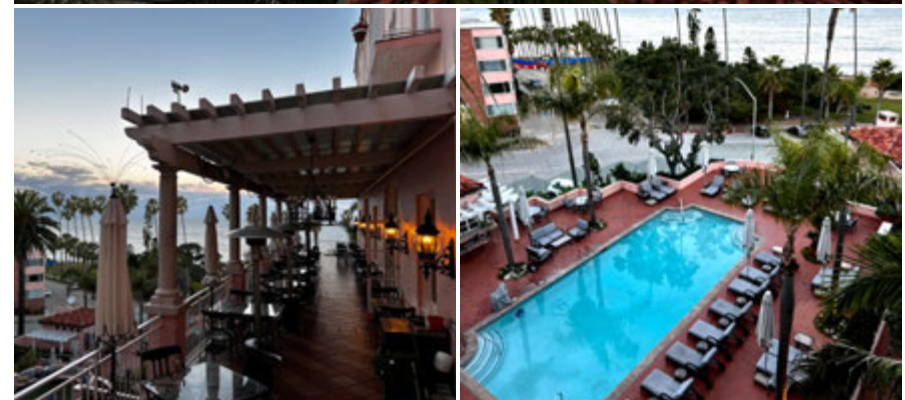
Ours is to find the pace we can run in this race. To not take the lead, but certainly not to bring up the rear either. We encourage risk awareness coupled with gauged risk taking. We urge cross-entity collaboration to raise the collective intellect that yields responsible outcomes for all.

We hope you've come ready to engage, to lean in, to ask honest questions, to vulnerably share where you are and where you aspire to be. Sometimes through these two days you'll be tempted to check-out, to give into brain fog or brain pain, but don't do it! Stay in this and emerge better than when you arrived.

Welcome to this gathering of DesignIntelligence Futures. We're glad you're here!

Dave Gilmore is the president and CEO of DesignIntelligence.

WHERE DO WE GO
FROM HERE?

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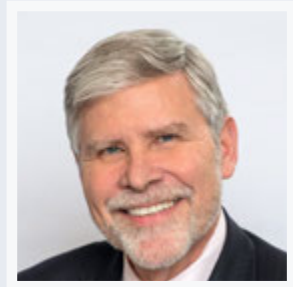
WHERE DO WE GO FROM HERE?

Scott Simpson

Senior Fellow, Design Futures Council

Scott Simpson speculates on AI's impact on the design professions.

Not that long ago, architects focused principally on the design of static objects called buildings. Primary attention was given to the interplay of form and function. Budgets were seen as something of a nuisance – necessary but often at odds with the goal of creating "good design" (as defined by the architect rather than the owner). Scant attention was given to how materials were sourced, how labor was compensated, how much energy a structure consumed or the long-term costs of owner-ship and maintenance over the life cycle of the project. What did matter was creating eye-catching design that would attract public attention (and hopefully magazine editors as well).

Things are very different today. In just a few decades, we have learned a great deal about the impact of the built environment on ecology, economics, public health and safety, productivity and even politics. While design is still about the creation of "things" and "places," it also concerns itself with processes. We live in a world of design. Nearly everything we see, touch or use has been designed and fabricated to serve our needs. Even our drinking water and food are processed. In a very real sense, it is no longer possible to live a life that has not been profoundly shaped by design, and this includes not only what we do but also how we do it.

Design's power is a double-edged sword. The good news is that in a remarkably short time humans have learned how to wield considerable influence over their environment, making it safer and healthier for most people. The flip side is that there is still a lot that we don't know, and we have seen plenty of evidence that good intentions can easily create unintended consequences. An obvious example is the invention of refrigerants that led to the widespread use of air conditioning but also contributed to creating a gaping hole in the ozone. That problem, now much better understood, has been successfully addressed, and the hole in the ozone is shrinking. So we've demonstrated that while we are capable of creating big problems, we are equally capable of solving them.

Design thinking is at the heart of these creative problem solving. It's about recognizing conditions that are problematic and then devising ways to address them. Everything that moves us in a positive direction is an act of design, whether it has to do with "things" (the nouns) or "processes" (the verbs). For example, a smartphone is a "thing" in and of itself, but its real value is in process innovation. By providing a means of connecting people to a vast repository of shared knowledge at essentially zero cost, it opens huge new opportunities and, in turn, creates enormous value that was not previously possible.

The surprise is that most people do not think of design in terms of value creation, but that is the essence of what good design is all about. Remember that clients do not build buildings to spend money; they build buildings to make money. Design provides both the medium and the means to make that happen. In design, there are always more answers than questions, and no problem is unsolvable—even a problem that did not exist previously. When President Kennedy committed the nation to go to the moon, he had no idea what would have to be invented to make that happen because nobody knew what the problems would turn out to be; space was literally unexplored territory. However, in the process of making that dream come true, plenty of problems were discovered and then were solved, one by one. Design thinking enabled the moon landing to be a huge success, and it was achieved ahead of schedule.

By now, it should be obvious to all architects that our shared definition of "good design" is much too narrow. Ours is a profession steeped in tradition (which is not necessarily a bad thing) but also one that remains profoundly suboptimal. At about $1.5 trillion annually combined, design and construction are the third biggest segment of the national economy after government services and health care. Yet fully one-third of all projects do not meet budget or schedule, and the same percentage of construction materials routinely wind up as waste. A mere 10% in process improvement would result in savings of $150 billion per year – about three times the total compensation paid to all architects. The good news is that money is not the problem – there is clearly plenty of it sloshing around in the system. It just needs to be put to much better use. If we apply design thinking to the design profession itself, we can find ways to become significantly more creative and effective.

So why don't we do this? Because human beings all too often default to the familiar and are blinded by convention. We have encoded an archaic design process – one that we know does not deliver optimal results for clients – into our standard contracts, which focus more on risk mitigation than value creation. We follow the predetermined footsteps from Schematic Design (SD) to Design Development (DD) to Construction Documents (CD) to Construction Administration (CA), as if doing so will teach us how to dance, but, in fact, those time-worn processes simply reinforce conventional thinking.

External influences now at play are leading to a revolution in how buildings are conceived, designed, constructed and operated. The revision of building codes is an obvious example. There is a clear trend to move in the direction of zero-carbon buildings which use renewable energy.

> " It is a supreme irony that architects, a class of people so good at inflicting change on others, are so reluctant to embrace fundamental change in the ways in which we work. "

Many municipalities have already implemented new regulations that prohibit the use of fossil fuels to heat and cool new projects. Of course, there is a big gap between good intentions and actual outcomes, but the long-term trends are clear.

With the advent of AI, the design community is facing its most profound challenge yet. The first thing that should be said is that nobody really understands AI's full implications, but we can all read the tea leaves. In a typical architect's contract, only 35% of the fee is devoted to the creative aspects (SD and DD) with fully 65% devoted to processes that can and should be substantially automated (CD and CA). What happens to conventional practice when much of that 65% can be produced more quickly and accurately at much lower cost by machines rather than people? The same thing that happened to bank tellers when ATMs were invented in the 1970s. There are still bank tellers, to be sure, but significantly fewer of them. In essence, we have all become our own bank tellers; we can take care of our financial needs with just a few taps on our smartphones. We carry our banks in our pockets.

Make no mistake: design is not going away any time soon. There is no limit to the creativity design thinking offers. It will just have to be applied in different ways. There was a time when expert draftsmanship was a highly valued skill set, but those days are long gone, and they are not coming back. Instead, we inhabit a much more complex and challenging profession that is tech-driven and requires a full measure of communication and collaboration skills with multiple team members to produce the desired results. This enables us to create ever more daring and inventive structures that would not be possible using more conventional means.

It is a supreme irony that architects, who are so good at inflicting change on others, are so reluctant to embrace fundamental change in the way in which they do their work. Yet change is inevitable. Our ability to provide valuable services to clients absolutely demands that we remain nimble. After all, routine is the enemy of innovation. Society is demanding that architects provide different kinds of solutions for new kinds of problems, and we should welcome that challenge.

It's what design thinking is all about.

Scott Simpson is a senior fellow in the Design Futures Council and a regular contributor to DesignIntelligence.

CRUSHING AGENDAS

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CRUSHING AGENDAS

Paul Hyett

Founder of Vickery Hyett Architects

Paul Hyett examines history to explore the inexorable connections between politics, architecture and sustainability.

Ever since the early cave settlements, building was about protection from enemies and the environment. The Middle Ages saw the zenith of defensive structures and settlements, but thereafter, in Europe and afar, artillery power would gain a superiority that rendered castles and walled cities redundant. Meanwhile, the scale of military conflict continued to escalate, culminating in the two World Wars of the twentieth century.

But however dangerous the enemy or savage the conflict, from the last Ice Age onward, our host environment consistently offered a benign and stable context for humanity's development and growth: clean air and water with an abundance of flora and faunae.

In ecological terms, we lived sustainably.

A New Era – and a New Challenge

Until, that is, the Industrial Revolution, which, through its carbon emissions and pollution, marked the beginning of the greatest threat to the environment ever faced by humans: humans.

Now, despite the sophisticated technologies that are rapidly making sustainable living possible, a new menace has emerged: Our socioeconomic and political system has faltered, and democracy is threatened.

Western politics are moving in the wrong direction: Witness the shifts away from collaboration toward isolationism and populist governments. Witness the confusing rhetoric from would-be leaders who irresponsibly strike fear into electorates by demonising their opponents under the collective taunts of "fascist, Marxist, communistic, socialist, liberal and radical-left thugs." Witness the dawn of a new age of political chaos.

Such politics provide nothing in the way of solutions. But we must save democracy, or architecture and city planning will fail their most substantial challenge: responding to the ecologically responsible design agenda. It is time to crush individual agendas in favour of collective, connected ones. This new common agenda is, and will be, architecture's greatest challenge.

Politics Shape Architectural Endeavour

The recent past offers robust lessons about enlightened politics. Let's start with Cordell Hull, secretary of state under Franklin D. Roosevelt, who wrote in his 1948 memoir:

> "I saw that … wars were often largely caused by economic rivalry conducted unfairly. … If we could get a freer flow of trade … thereby eliminating the economic dissatisfaction that breeds war, we might have a reasonable chance for lasting peace."

> It is time to crush individual agendas in favour of collective, connected ones. This new common agenda is, and will be, architecture's greatest challenge.

Hull and Roosevelt were ardent adherents of the progressive Wilsonian belief that free trade would promote not just prosperity but also peace. Woodrow Wilson, America's 28th president whose ultimate legacy was the League of Nations, would not live to see the maelstrom that would again consume Europe so soon after World War I. He died in February 1924.

But remember what followed: the Wall Street crash of 1929, the parallel "uncertainty effect" that so constrained consumer spending, the bank failures and collapses that followed, and the Smoot-Hawley Tariff, which triggered the awful web of international controls that would reduce world trade by a monstrous two-thirds in the three years to 1933. All these, together with the errors of the Federal Reserve, would herald the Great Depression and the 10 years of international economic woe that provided the backdrop to, if not the pathway into, World War II.

Through all this, architectural endeavour was strangled.

Architecture's Contexts

Wilson's vision of "liberal internationalism," which supported the formation and development of international institutions, open markets, cooperative security and liberal democracy, would thus be shelved until a new generation of leaders could affirm, upon securing the submission of the Axis powers, that economic cooperation was the only way to achieve global peace and prosperity.

The first massive steps in that process, formally articulated as the Atlantic Charter, were the MacArthur and Marshall Plans, which led to the major restructuring of the German and Japanese economies, the revitalisation of their industries and the reengineering of their socio-political cultures. Never had the victors in war been so generous to the vanquished. Never had architecture, in facing the challenges of post-war reconstruction, been so tested.

Those were the contexts against which we have enjoyed freedom, relative peace and prosperity, and against which social, commercial and cultural conditions architectures have for decades flourished. There have, of course, been some bumps and hiccups along the way. And there has also been a steady shift away from state-sector delivery and operation of so much of our infrastructure: In the U.K., health care

and housing have increasingly been serviced by the private sector. But, courtesy of Wilson's influence, we have also transitioned to globalised supply chains.

Global Markets: The Delivery Focus

Regrettably, despite its benefits in terms of Wilson's agenda, globalisation has all too often curtailed local manufacturing and supply, whether that be furniture, computers, cars or clothes. Even food: During my grandparents' lives, ingredients travelled just eight miles before arriving at the table. Today, in the U.K., the average food item journeys 1,837 miles to get from farm and vineyards to plate. That same metric is 1,500 miles in the U.S., 1,864 in Canada and a staggering 43,496 miles per dish in Melbourne, Australia!

I am not seeking to make a case here for greater ecological awareness, or the role architecture and urban planning should play in reducing our carbon footprint. You understand that! It's on delivery I want us to focus. That is where economic context is activated.

For years, it was fine to promote Wilsonian global trade as the platform from which international peace could develop. But the problems that have arisen along the way are now easily visible, and herewith, the ultimate irony: Because of their adverse impact on home employment, the very economic programmes that facilitated the spreading of wealth and opportunity across international boundaries – all in pursuit of harmony and peace – now threaten sociopolitical order, democracy and even peace in our own homelands.

Architectural Relevance

But what has all this got to do with architecture? Precisely this: A nation's health is inextricably linked to the provision and quality of housing and employment.

In Britain, this was recognised by Neville Chamberlain, who in 1938 promised "peace in our time." Prior to serving as prime minister, he had been Minister for Health. With an acute understanding of local government and social services (his father, Joseph, is often hailed as the "father of local government"), Chamberlain was convinced that the health of any community was "ruled by housing" and that "housing was made up of social strands which could not be separated: wage standards … employment and transportation."

> " The very economic programmes that facilitated the spreading of wealth and opportunity across international boundaries — all in pursuit of harmony and peace — now threaten sociopolitical order, democracy and even peace in our own homelands. "

Fast-forward to today and we see the mighty machinery of international trading markets destroying local employment in so many of our towns and cities. How easy it is for international corporates to shift finance, ideas, management and even raw materials around the world in pursuit of cheap, obedient and deregulated workforces, so often to devastating effect.

In a kind of reversal of the Wilsonian imperative of levelling the playing field to the benefit of all, international trading is now disadvantaging our home economies to a point of social disorder, as large manufacturing communities are deserted by corporates who shift production offshore. This fuels the rise of the unsavoury populism that now confronts us centre stage.

Architecture's Challenge: Political Cooperation

The biggest crisis humankind has ever faced – and architecture's historical imperative – is the agenda for ecologically responsible living and design. If we destroy our environment, which we are perilously close to doing, the essential purpose of architecture – safe shelter – is redundant. One of the most important contributors to the alleviation of that damage is the reduction of our carbon footprint through environmentally responsible architecture. Achieving that needs focus by enlightened governments and international cooperation at the highest level, big-time and fast.

That means a reversal of current sociopolitical trends. Denial, misinformation, conspiracy theories (global warming is real!), an inability to achieve accord around truth within our own communities, isolationism and opposition between governments across the world stage all combine to get us nowhere and derail any chance for architecture to serve its fundamental purpose: to provide the ecologically responsible infrastructure and built fabrics within which our communities can exist in harmony with their host environments.

Without that larger purpose – and its pursuit – our world faces unparalleled chaos and strife.

Paul Hyett is the founder of Vickery Hyett Architects, past president of the RIBA and a regular contributor to DesignIntelligence. He is a senior fellow in the Design Futures Council.

LETTERS FROM LONDON

LEADERS NEED FOLLOWERS

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LEADERS NEED FOLLOWERS

Paul Finch

Programme director of the
World Architecture Festival

Paul Finch looks at collaboration and the
designer's broader responsibilities.

I was once asked at a public meeting to define the different roles of
architects and engineers (a more connected relationship in the U.K.
than it is in the U.S.). In a probably too flippant response, I invited the
audience to think about the on-screen relationship between Fred As-
taire and Ginger Rogers. How did two distinct personalities manage to
become more than the sum of their (as it were) parts? An answer is that
he gave her class, and she gave him sex appeal.

One hesitates to pursue this analogy too far in the context and respect
of architects and engineers, but all one can say is that the leader in a
dance routine is as dependent on their follower partner as the other
way round. And if both are working in perfect harmony, you do get mag-
ic moments of the sort that, if they are lucky, architects and their fellow
professionals will joyfully experience occasionally during their career.

Nevertheless, it is a fact of life that architects are seen by the public
as the people who take the lead on the creation of buildings. Biogra-
phies of Frank Lloyd Wright are far more numerous than those (where
they exist at all) of his many clients, and the history of architecture and
city-making are geared heavily toward the individuals perceived as
having been the "leading lights" of the huge teams responsible for any
built project.

> " Find a way of reconciling the apparently irreconcilable, the architect's fees becoming the wages of synthesis. "

This tendency to regard the architect – and with a few notable exceptions they have typically been men – as automatic team leaders is only partly justified. There are many examples of projects where the architectural name attached to the final product gives no indication of how it came into being or who was the true project leader. Architectural history, like art history, often views buildings like paintings – it makes "authorship" a simple, singular and supremely important matter. Of course, paintings do not need planning permission and may require no human intervention other than that of the artist and, occasionally, a human subject.

Creating built environments, rather than artworks, requires an extraordinary degree of collaboration, quite apart from the inevitable negotiation of regulatory processes that would be anathema to any self-respecting artist. This collaboration makes leadership more and less important at the same time. On the one hand, the more people and organizations involved in a project, the more that clear, transparent leadership is required. On the other hand, the idea of the single presiding genius responsible for design and production becomes less and less convincing the more you review the multiplicity of agents responsible for our many built outcomes.

One thing is certain: Whatever the size of team or complexity of project, without a committed client, a decent site and an appropriate budget, nothing of any quality or significance is likely to emerge, whatever the architect's quality. On the other hand, if the architect lacks sufficient skills or imagination to fulfill the potential of programme and site, then a successful outcome is inherently unlikely. All this assumes construction competence, without which no project is safe …

So, where might we look for leadership in the generation of successful projects that satisfy client, user and some notion of public interest? Who might take the lead in ensuring a project does something for its neighbours, street, area, city, rather than to them? This is not a simple matter, because it involves the politics of planning and city development. There are many examples of city planners who have been far more influential than any design team that delivered developments under their umbrella. Monster though he may have been in some respects, who can deny the amazing contribution Robert Moses made to public amenity in the form of infrastructure, parks and landscape in New York and its environs?

That form of civic leadership, which unhappily bordered on dictator-ship, alerts us to the balance required of true leaders, with the inter-ests of a wide group in mind, but conscious also of the needs of those paying the bill. Ignore the context and the brilliance of the design may become an irrelevance, as in the case of the 1984 AT&T headquarters designed by Philip Johnson in the emerging postmodern manner, com-plete with its broken pediment, "Chippendale" rooftop. (I once asked Johnson what the AT&T directors said when he revealed the design for the first time. His response: "They said thank God it's not another one of those steel and glass things.")

Whatever the building's merits, as the symbolic powerhouse of a mighty corporation it became irrelevant because of regulatory changes soon after the building's completion that forced AT&T to abandon its monopoly in various markets. No longer was there a requirement for a commercial cathedral trumpeting its occupant's universal power. Per-haps appropriately, it is now occupied by Sony, which felt the need to meddle with the iconic design, no doubt to make clear who is in charge of its architecture and, hence, image.

A really great team leader on that project, as opposed to a great de-signer, might have asked what changes might take place that would undermine the programme for the first use – and ensure the building would be flexible and adaptable enough to embrace new ways of doing the same thing in the building, possibly flexible enough to be capable of accommodating entirely new uses without major demolition.

This is the difference between the statesman and the politician: The latter is concerned with short-term considerations, the former with the implications of what is proposed in the round and over the long term. There is no reason why architects cannot aspire to, and successfully emulate, the characteristics of the statesman – that is to say, find a way of reconciling the apparently irreconcilable, the architect's fees be-coming the wages of synthesis.

Paul Finch is the programme director of the World Architecture Festival

and a regular contributor to DesignIntelligence.

THE BIOLOGICAL PARADIGM IN
THE TECHNOLOGICAL FUTURE

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January 2024

THE BIOLOGICAL PARADIGM IN THE TECHNOLOGICAL FUTURE

DeeDee Birch

Sustainable Design Consultant and Writer

How artificial intelligence, immersive technologies and nature-based design can drive human-centered solutions.

Artificial intelligence and immersive technologies hold enormous potential to help practitioners design buildings that work in symbiosis with the natural world, mitigate the climate crisis and better serve building occupants, particularly when they support the application of nature-based design. These design methodologies – biophilic design and biomimicry – are inherently human-centered design, and their ability to concurrently address the climate crisis and human health is unparalleled. As architect Michael Pawlyn stresses in his text, "Biomimicry in Architecture," "The biological paradigm, translated into architecture, means putting people at the center."[1] While it will demand that design practitioners embrace new roles in the development of the built environment, leveraging artificial intelligence and immersive technology to expand the ways in which we can apply nature-based design will result in a profoundly regenerative world.

Designing for Multiple Human-Centered Realities

Psychologist Paul Bloom once wrote, "When it comes to nature, we want the real thing; we are uncomfortable with substitutes."[2] But perhaps the greatest danger in the rise of artificial intelligence and immersive technologies is their ability to blur the line between the real and the unreal. In a comprehensive literary review of immersive technologies in architecture and design, A. Prabhakaran et al. describe how these devices create a "reality spectrum" with fully virtual reality isolating the

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user entirely from their physical environment and mixed (augmented) reality technology combining multiple real and non-real environments into one viewpoint.[3] In either scenario, the users' perception and awareness of their physical world decreases as they fluctuate on their self-imposed reality spectrum. Social ecologist Daniel Stokols conceives of our interior environments as ecosystems, and he argues that the rise of technology – among other social, political and environmental forces – has destabilized the spatial and temporal boundaries of the many ecosystems housed within our built environment.[4] Virtual reality will intensify this effect.

A 2017 national report spearheaded by biophilic design expert Dr. Stephen Kellert and written in collaboration with DJ Case and Associates examined recent changes in the human-nature connection in the United States. The report found "a profound interest-action gap in Americans' relationship with nature."[5] The authors cite five distinct yet interrelated societal forces as major factors in our growing disconnection from the natural world: the built environment, competing priorities (time, attention, money), declining dependence on the natural world, new technologies (particularly electronic media) and shifting expectations among adults about how much nature is satisfactory.[6] The report also underscores that "experiences in nature are deeply social" and recommends emphasizing "regular, recurrent, and routine engagement with nature, the outdoors, and wildlife" in addition to deepening local experiences in nature.[7]

Virtual reality technology may further disintegrate an already tenuous human-nature connection and drive us further from one another. The Apple Vision Pro virtual reality headset is set to hit the U.S. consumer market in 2024, which will make virtual reality even more ubiquitous. In its release film, Apple boasts of the Vision Pro's spatial audio system that makes sound feel "like it's coming from the world around you" and goggles that contain more pixels than a 4K television screen in each eye, "giving you jaw-dropping, lifelike clarity."[8] The features replicate the experience of being in the physical world with astounding accuracy without actually forcing a person to engage with the world at all. If one can pull on a headset and visit the Grand Canyon in the blink of an eye and see it in three dimensions with lifelike clarity, the motivation to travel there in person logically decreases.

With an uptick in virtual reality usage comes concerns about the health impacts of such devices. A. Prabhakaran et al. cite health concerns ranging from unnatural postural and immersion injuries to eye strain,

ARTIFICIAL INTELLIGENCE & VIRTUAL REALITIES IN DESIGN

GENERATE
AI will generate new forms for biomimietic buildings.

MERGE
VR will merge our physical world with multiple digital realities.

RELEARN
AI will help designers relearn the biophilic elements of pre-industrial architecture.

SYNTHESIZE
AI synthesizes diverse data sets across various areas of research faster.

DISLOCATE
VR dismantles the culture-place paradigm of biophilic design and creates placelessness.

DEPRIVE
VR deprives people of sensory inputs and frays the human-nature connection.

Author diagram

addiction and psychomotor performance shifts.[9] This is in large part because virtual reality has significant multisensory limitations. In its current state, virtual reality relies too heavily on visual and auditory inputs; it deprives users of sensory information that is found in nature and foundational in biophilic design. Terrapin Bright Green's 14 Patterns of Biophilic Design integrate olfactory, gustatory, haptic and stochastic connections with nature into their framework as a means of improving human health outcomes. Furthermore, people employ embodied cognition when navigating through the built environment, meaning we understand our world through the sensory information we gain from occupying a body in space. Every physical place we encounter triggers a multitude of emotions, biochemical reactions and conscious and unconscious thoughts that shape our behavior. Virtual reality offers us only a fraction of our typical sensory experience. In such contexts, we must ask ourselves: How much will our brains and bodies believe?

Multisensory experiences run parallel to the culture-place paradigm that defines biophilic design. Biophilic buildings reflect and embody the climatic conditions and native materials of a place and the cultural identities of its occupants. Buildings embed us in the world, reinforcing a sense of self that encourages well-being. Immersive technologies threaten this culture-place paradigm by creating a sense of placelessness and rendering our physical world much less grounding and useful.

Yet there are some cases in which the ability to dismantle one's sense of place is helpful. Virtual reality expands the scope of potential positive solutions for systemically and chronically underserved communities because it is nearly instantaneous and much less expensive than construction in our physical world. A headset transports someone to a new place in a matter of seconds, for a fraction of the cost. Take, for instance, Studio Elsewhere's Recharge Rooms, which were developed for frontline workers during the height of the COVID-19 pandemic. While the project does not utilize virtual reality headsets, recharge rooms were branded as voice-activated "immersive biophilic private spaces."[10] The designs incorporated expansive digital displays of calming nature scenes paired with various potted plants, lighting, olfactory and auditory conditions.

For biophilia aficionados, these spaces are relatively controlled environments that lack robust connections with the actual natural world and a tangible connection to place. There are no operable windows with natural light; no gardens with birds, bugs or butterflies; no way to

> In such contexts, we must ask ourselves: How much will our brains and bodies believe?

witness changing weather conditions or seasonal shifts in the landscape; no thermal variations or deeply tactile local materials. But studies have shown that even images of nature produce positive responses in people. These recharge rooms were implemented where they were needed most, serving people in dire need of respite and refuge while occupying spaces that were severely disconnected from nature. These installations stand as some of the most highly effective Band-Aids we've ever placed on our built environment because of their accessibility, considered application of digital technologies and immediacy. Virtual reality technology can fuel more innovative solutions such as these, reaching some of the most vulnerable populations with solutions that will improve their well-being instantly, while the logistics of building in the real world— funding, permits, community buy-in – can be addressed properly.

Artificial Intelligence, Biomimicry and Biophilic Design

Biophilic design has the power to return us to the conditions for which evolution prepared us by fostering our innate connection to the natural world through architecture. People have done this successfully for centuries. Now, adding the power of artificial intelligence stands to boost the rate of biophilic buildings around the world by recalling those methods. Nikos Salingaros, a mathematician and theorist whose work on fractals and networks has had an indelible impact on biophilic design, argues that architects and designers up until the Industrial Revolution had unwittingly discerned and constructed healing architecture grounded in biophilia:

"Historical selection driven by countless design choices – a sort of Darwinian process among architects and builders – reveals an unvarying set of configurations that trigger the biophilic effect. Traditional forms and structures evolved precisely in this manner, over time, in architecture and urbanism. The biophilic design of buildings therefore mimics the evolutionary growth and multiplication of natural organisms. The multitude of potential geometrical configurations of healthy design, over succeeding generations, "computes" adaptive solutions that are instinctively healthy and attractive to humans. Geometrical configurations that possess a healing effect represent biophilic design's genetic material. This information was embedded over millennia into the pre-industrial built environment."[11]

Before the first and second Industrial Revolutions, buildings were inherently biophilic because we built according to our instincts about what was beautiful and functional in the context of a given climate and culture. Then, industrialization resulted in the abandonment of an evolutionary design process that reflected the living world around us and our place within it. The design and construction of buildings took cues from mass production, machines and standardization. If developed with diverse data sets about the preindustrial built environment, artificial intelligence may help architects and designers relearn the language of healing architecture while taking into account today's unique climatic and social conditions.

Artificial intelligence allows architects and designers to operate with an unprecedented degree of complexity, which in many ways brings us closer to nature's complexity. Pawlyn, a proponent and pioneer of biomimetic architecture, acknowledges that "while fascination with nature undoubtedly goes back as long as human existence itself, now we can revisit the advances in biology with the massive advantages of expanding scientific knowledge, previously unimaginable digital design tools and aesthetic sensibilities that are less constrained by stylistic convention."[12] His work examines the intricacies of a camel's nasal structure as a blueprint for better water-recovery heat exchangers, the microstructure of the iridescent Morpho butterfly as a potential way for glass to color itself without added colorants and whale tubercles as a form for more productive and efficient wind turbines.

Biomimetic architecture borrows nature's function, not simply its form, and applies those functions to the built environment. It requires that we understand how an organism or ecosystem functions well enough

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> Central to biomimicry is a willingness to step outside what is possible.
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to translate and replicate it on a different scale. Artificial intelligence lends itself to biomimicry because it can "process massive amounts of data, recognize the pattern, and … build large-scale statistical models."[13] All projects stand to benefit from the expertise of biologists and polymaths, but not all have the bandwidth for them. As it advances, artificial intelligence will help architects gain value from biological expertise and alleviate designers of the burden of data collection and processing. AI already has the ability to gather and sort massive amounts of data about our unimaginably biodiverse planet in the blink of an eye. Even AI's text-to-image capability – which many view as a threat to the architectural profession – will serve as a fountain of biomimetic thinking because of its ability to embrace the avant-garde. Central to biomimicry is a willingness to step outside what is possible. As Pawlyn instructs, "Never start with reality: always start by identifying the ideal and compromise as little as necessary."[14]

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> — Michael Pawlyn
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IN THE MAKING

IN THE MAKING

Gustav Magnusson

Founder of For Elize,
Urban Planner, Urbanist Philosopher
and Author

Let us not lose sight of our own existence within the recipes for change.
Selected reflections and essential insights on conversations with 100 urban thinkers.

In this article I offer some insights from my current work-in-progress, an urban anthology book entitled: "Keynote Conversations – 100 interviews for Reinventing the City."

A collection of interviews, each condensed to one page, it resembles a Pecha Kucha-style urban planning festival in written form. Featuring interviews with directors of urban planning, urban advisers to mayors and world organizations, esteemed professors, award-winning architects, urbanists and world experts, it also includes the perspectives of planning students and children.

Far from a summary, this article offers a baker's dozen of reflections inspired by these conversations on what the collected viewpoints may teach us about innovation, technology, urban environments and those who live and work in them.

Being Present: First Life, Then Buildings
In "Keynote Conversations," a singular wisdom emerges: We must remember to be present. Society and its planners often forget our human essence, but we are more than abstract, passive, theoretical narratives – we exist here and now. We make decisions and take actions that, in turn, shape future context.

Urbanist Jan Gehl's globally recognized notion, "First life, then buildings," embodies this sentiment, shared by many of the book's thinkers, while affirming the priority of our human existence over other structures.

Collective Responsibility

Beyond integrating ourselves into this human-centric world, many of the book's thought leaders argue for our collective responsibility. Our commons encompass all we share: for example, our culture, the air we breathe, the water we drink and our essential natural resources. To lead a truly meaningful, sustainable and fulfilling life, we must acknowledge the importance of more than just our individual humanity.

Human-Planet-Centered Perspective

From Mette Skjold, the head of the global landscape practice SLA in Denmark, to Michela Magas, adviser to the president of the European Commission and many others, a recurring theme emerges: the shift required from human-centered thinking to a human-planet-centered perspective. This transformation transcends linear, human-centric views and recognizes our role as interdependent contributors within a complex ecosystem.

Nature and city are the same – author image

> **We must remember to be present. First life, then buildings.**

Hybridization Possibilities

I had the pleasure of conversing with Djamel Klouche, a renowned French landscape architect, urbanist and recipient of the prestigious "Grand Prix d'Urbanism" awarded by the French national government for outstanding contributions to urban planning. Klouche urges us to abandon compartmentalization and explore the possibilities of hybridization. Are rural and urban landscapes truly distinct, or are they interconnected? Klouche compellingly illustrates this point with a fresco painting from Sienna, Italy, dating back to 1337-1339, revealing our historical interdependence on a unified landscape.

Must we emphasize the distinction between the digital and analog realms? he asks. Let's contemplate how to blend scales, from vast metropolitan regions to close details. Perhaps we inhabit a singular, interconnected world?

Mindfulness

Higher-level urban design is fundamentally about mindfulness. Isn't planning essentially the art of creating a space for our shared existence to flourish?

Too often our fixation on the details positions them at the forefront. For instance, we might initiate neighborhood street design by obsessing over how a garbage truck can navigate smoothly. The garbage truck's convenience and "life" becomes the foremost concern, potentially relegating the human experience to a secondary or more distant priority.

Is it city or is it rural lands, past or present?
Author AI-generated image via WOMBO Dream

> **Good planning is about "designing with purpose to our needs."**

The architecture industry is filled with these kinds of scenarios: prioritizing floor space ratios for maximum profit, followed by the realization that the newly constructed district lacks space for a school, necessary community services or green spaces. As growing families soon relocate to areas with schools and services, these same shortsighted development companies, driven solely by profit maximization, suffer financial setbacks as a result of their own short-term gains, and long-term community costs are far greater as the vicious cycle continues.

Constraints vs. Objectives

"First life, then buildings," might be a better order of thinking, as Jan Gehl suggests.

Alain Bertaud, formerly a principal urban planner at the World Bank, wisely observes the need of a clear understanding of the distinction between constraints and objectives. According to him, mixing the two can lead to unintended and even disastrous consequences - such as pursuing poverty as a means of reducing carbon emissions. Instead, if we recognize greenhouse gases as constraints, we gain the freedom to craft more meaningful objectives. One such objective could be fostering a brighter future, providing the conditions for our societies to thrive and flourish.

Aspirations and Perceptions

Renowned Chilean architect Alejandro Aravena, a Pritzker Prize laureate, enriches these notions by highlighting that a prosperous society doesn't result from urban development and progress. Rather, urban development and progress arise from the foundation of a good society. Shouldn't this be our aspiration?

As we enter a new era often characterized as one of innovation, artificial intelligence, digitalization and a more intelligent future, it begs the question: Is such a future really about innovation, or is it, in essence, about our perception of our existence?

In truth, innovation has been our constant companion for thousands of years. As humans, we've long been accustomed to adapting and creating groundbreaking solutions, opening new "worlds" through innovation – from harnessing fire to inventing the wheel – and extending our senses by taming animals or crafting new means of software and technological support. Innovation is a timeless endeavor, but have we focused it properly?

One aspect we've largely overlooked is questioning our place in the world. Our self-perception has consistently revolved around a human-centered universe, evident even in the portrayal of gods across diverse religions worldwide, so often depicted as human-like.

We now inhabit a society where we consider our entire ecosystem as forming the bedrock of existence. As our role shifts in this ecosystem, we transition from isolated human bonds to interconnected aspects of our surroundings. In this transcendence, our world takes on deeper significance, moving beyond mere consumable resources. Through new perceptual modes, we can even regard new technology as integral to these interdependencies, possessing its unique cultural heritage.

Balanced Existence

In my conversation with Professor Guillaume Ethier at the Université du Québec, in Montreal, Canada, he suggests that the history of digitization spans the past 10, 20 or 30 years. Examining the evolution of digital public spaces reveals a trend of growing disconnection from ourselves coupled with a concurrent increasing connection to the digital realm. He advises that this trend will continue with smart cities, as constant connectivity intensifies this shift.

Ethier envisions a world where technology isn't our opponent. Instead, he seeks a harmonious coexistence between the digital and the analog city. In this vision, the analog city complements our already established digital experiences by additionally offering us the means to reestablish connections with ourselves and our surroundings. Our goal is to live in a world where we can embrace both the digital world and inner mindfulness, fostering a balanced existence.

Integrating Humanity

Carl Heath, a researcher at Sweden's RISE Institute and an educator for the Psychological Defence Agency in Sweden, points out the coexistence of digital and physical public spaces in our urban landscapes and lives as well. Notably, these two realms share common challenges and questions around accountability:

- Who constructs our environments?
- What motivates their actions?
- Are these spaces created with transparency in mind?

The objective, Heath says, should not revolve around accumulating attention, whether measured by social media clicks or the height of skyscrapers. Instead, our aim must be to integrate our humanity into the equation. What constitutes a meaningful existence in these spaces? In his words, good planning is about "designing with purpose to our needs."

> " We construct society with our time, and we need to have time to be shy, to shape the relationship we need in order to build society. "

Caring for Our Commons – and Emotions

In a concluding workshop, I joined Ewa Westermark, a director at Gehl Architects in Copenhagen, to delve into the shared themes emerging from the book's interviews.

Our still-ongoing discussions emphasize the importance of caring for our commons – our shared resources encompassing nature and culture. This idea extends beyond mere ecological sustainability. It's about uncovering the fundamental requirements for our collective existence.

Within our commons, we may give space for community, with a leadership rooted in inclusivity. Many of the book's speakers, such as Fredrika Friberg, a Swedish expert in urban creation, emphasize the importance of guiding this process with emotional intelligence, recognizing the significant role emotions play in our actions.

As elegantly exemplified by Ellie Cosgrove from the London-based practice Publica, if many women express feeling unsafe in a particular environment and their actions reflect these emotions, those emotions serve as self-evident proof. Why, then, do we persist in requesting surveys to confirm their sense of insecurity?

The Commons – downtown beach Maimo, Sweden, author photo

Time

Leading with empathy and emotional intelligence can, in turn, unlock our human spirits, revealing our most valuable resource: our time. We often say, "Time is money." But time exists in concert with initiative, incentives, culture, movements, politics, community and much more. In dialogue with the Dutch architecture firm ZUS in Rotterdam, they underscore that development frequently encompasses all these motivations. As emerging architects, ZUS made their mark in the Dutch architectural landscape by demonstrating their ability to creatively transform an extensive office complex amid the economic crisis of 2007-09, all without relying primarily on financial resources.

In truth, time is scarcer and more potent than money. As the insightful seven-year-old girl Elize wisely puts it:

"We construct society with our time, and we need to have time to be shy, to shape the relationship we need in order to build society." This is an attitude later echoed by English economy professor Guy Standing.

"In the Making": Creating an Environment for Growth

Ewa Westermark summarizes many of these principles by saying: "the essence of it all is in the making."

("In the making." Hmmm, I wonder.)

Westermark quotes environmental activist and author Joanna Macy to offer more insight:

"Action isn't a burden to be hoisted up and carried like a weight on our shoulders. It's an intrinsic part of who we are. The work we engage in can be seen as a form of awakening, a realization of our true essence, a release of our innate gifts."

"How do we make together?" Westermark rhetorically asks. "We play our way forward. Toward what? A commons connected to our human spirit." she continues.

(I look at her, perhaps still a bit confused.)

"I don't know, it's in the making," she repeats, emphasizing that the answer is not the key concern here. Sometimes, residing in the landscape of the unknown might be an integral part of it all.

The beauty of urbanism can be inspired by UCL strategy professor and expert Vaughn Tan, who deals in "the unknown and uncertainties." He believes that, rather than defining and deciding what will grow, planning and design should create an environment for growth. Tan believes we should view planners not as deliverable-producing workers, but as enablers, adapting to uncertainty and valuing the unknown with equal evidence as the known, unfolding the unknown future of every citizen.

(I contemplate; maybe that sounds like "in the making.")

Could such an open-ended approach signify design as the art of enabling our active involvement in shaping our lives? A mindful and present presence, empowered to take action in the moment?

Perhaps the answers will come as we conclude these discussions and finish the book.
Perhaps the answers are "in the making"?

Gustav Magnusson, FPR/MSA, is the author of the forthcoming book "Keynote Conversations – 100 interviews for Reinventing the City." He is an urban planner and urbanist philosopher who lives and works in Sweden, Denmark and France. The third generation in a family of architects and journalists, Gustav holds a master's in spatial planning from the Swedish School of Planning and the Hafen City University in metropolitan development in Hamburg, Germany. He has experience with international architecture offices across Europe, 10 years with the celebrated French/Swedish architectural office Erik Giudice Architects, where he was responsible for urban planning in the Nordics, Benelux and beyond, as well as managing the firm's research and development and the transatlantic urban network.

He is currently on a sabbatical to write "Keynote Conversations" and is the founder of For Elize, an urban practice inspiring the creation of more meaningful living environments spanning from urban design and conceptualization to theory. Educated in intercultural communication, creative processes and leadership, with experience in visionary, award-winning and international planning, analysis, strategy and communication, he teaches at universities, exhibits, writes and advises EU programs and boards and presents regularly on planning issues. Inspired by having lived in seven countries, he is driven toward an interdisciplinary social commitment to create conscious, present choices for the planet and people together in nonhierarchical collaboration.

LIFE AT THE EDGE

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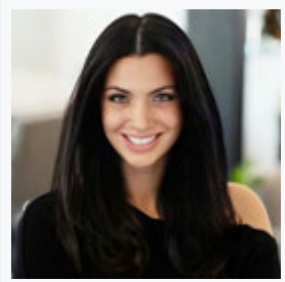
LIFE AT THE EDGE

Dena Prastos, AIA

Founder & CEO of Indigo River

Dena Prastos discusses issues and opportunities in waterfront and infrastructure design.

DesignIntelligence (DI): We're honored to have Dena Prastos, AIA, a woman driven to transform the built world at the water's edge. As founder and CEO of Indigo River, she is the first "waterfront architect" focusing on architecture, resiliency and climate adaptation. A leading authority in New York Harbor and beyond, she specializes in climate adaptations. In addition to working with clients like the Trust for Governors Island, Scenic Hudson and NYC Economic Development Corporation, she is also working on Robert De Niro's new Wildflower Studios in Astoria. Waterfront architect, civil engineer, futurist, climate adaptation expert and entrepreneur, she is fueled by the intersection of design, technology, community and nature. Welcome, Dena.

Dena Prastos (DP): Hi Michael. Thank you for having me!

DI: You have created such a unique niche for yourself and your firm. How did you get there? What shaped you? What was the journey like?

DP: I'm a firm believer that our differences are what make us interesting. And how we respond to challenges are often key opportunities to differentiate ourselves. I have developed my mindset to reframe challenges as opportunities almost automatically, which has largely gotten me to where I am. For example, upon completing my architecture degree, I leaned into an area where I felt challenged: the technical. I addressed this by completing a master's degree in civil engineering.

Then, I started my career at a heavy civil construction firm that cast a wide net in terms of my areas of interest. In this role, I could start digging into the practical things like construction and field execution. During the early days before launching Indigo River, my career shifted from construction to engineering to architecture to a combination of those disciplines. I have worked from New York to Key West and Tel Aviv to Tbilisi. Eventually, I hit a glass ceiling in the corporate world and realized the clearest way to retake control of my career was to launch a company of my own.

In many ways, my career outlines how obstacles can go on to become the way. Some experiences I look back on as pivotal in shaping me as a professional were adversity in the work environment, working abroad and establishing and maintaining professional relationships.

Author photo

DI: What events or experiences – maybe motivation is a better word – drove you to practice at the edge of the earth, where land meets water?

DP: I have always had a deep love and admiration for nature, and specifically for water bodies. I believe it is by nature that we can learn, advance, replicate and scale our actions to address goals. Sixty percent of humanity (three billion people) live on or near a coast, which makes protecting and adapting infrastructure where land meets water one of the most complex and pressing issues of our time.

The waterfront is a dynamic zone. As a result, coastal regions have inherent vulnerabilities, repeatedly and constantly exposed to raw, often unpredictable natural forces (which are expected only to get worse as we progress through the 21st century). So, it deserves specialized attention. For these reasons, I have found gratitude and purpose in focusing my career and company on this typology.

DI: With such an exciting, unique practice, how are you looking at the world these days?

DP: Top of mind is to educate the public on the evolving and critical role architects should be playing at the earliest stages (and all stages) of any project in the built environment. It saddens me when I see failings in our infrastructure that could have been avoided.

DI: What gets you up in the morning?

DP: My sacred morning rituals: Waking early. Enjoying a hot cup of coffee outside while watching the sunrise and walking my two dogs. Practicing yoga and getting my cardio in early, most often by cycling. That way, whatever the rest of the day holds, I start it by feeling energized and accomplished.

DI: With the discussions around climate change – often political – have you needed to develop any strategies for persuading potentially resistant clients and constituents of necessary or complex issues in your projects?

DP: Yes. In today's rapidly changing world, discussions around climate change have become increasingly prominent. As a waterfront architect, I believe it's our responsibility to integrate sustainable and resilient design principles into our projects. It is not uncommon to encounter resistance from clients and constituents who may have differing concerns, but I make it a point to listen and engage with all perspectives.

DI: What is your approach to those difficult conversations? For example, traditional short-term, first-cost thinking vs. long-term infrastructure investment for future generations and beneficiaries?

DP: My approach involves a combination of education, collaboration, economic reasoning, local context and advocacy to persuade clients and constituents of the necessity to address complex issues like climate change in our projects. Our goal is to create aesthetically pleasing and functional spaces and contribute to a more sustainable and resilient future for waterfront communities through these strategies:

Education
One of the most effective ways to overcome resistance is through education. I provide our clients and stakeholders with up-to-date information and research on the impacts of climate change, not just globally but specifically in the context of the waterfront projects we're working on. Sharing data, case studies and examples of successful projects can help illustrate the urgency and benefits of sustainable design.

Collaboration
I emphasize the importance of collaboration throughout the design process. By involving clients, community members and other stakeholders early on, we can ensure their concerns and perspectives are considered. This collaborative approach fosters a sense of ownership and can lead to more receptive attitudes toward sustainable and resilient design solutions.

Economic Benefits
Climate-resilient and sustainable design can be financially advantageous. I work to demonstrate how these strategies can lead to long-term cost savings, improved property values and reduced operational expenses. Providing a clear financial incentive can often persuade even the most resistant clients.

Local Context
Understanding the unique needs and priorities of the community where the waterfront project is located is crucial. I conduct thorough research to tailor our designs to fit the local context and address environmental and social concerns. This approach helps build trust and support among constituents.

Advocacy
As a progressive architect, I'm also an advocate for climate-adaptive design. I actively engage in public forums, share my expertise and participate in discussions about climate change and its impact on the built environment. This not only raises awareness but also helps shape public opinion, making it easier to garner support for forward-thinking projects.

Flexible Design
I emphasize the flexibility of our designs to adapt to future changes. By acknowledging the uncertainty surrounding climate change and designing for resilience, we can reassure clients and constituents that their investments will stand the test of time.

DI: Are there any new economic models and investments that can leverage myopic ways of thinking?

DP: I recently had a discussion over coffee with a climate expert on precisely this topic. The consensus was that finding profit in "avoided losses" is not compatible with our investment community's current way of thinking. If someone were to design a way to directly invest and profit from these avoided losses, the flow of capital toward resiliency and adaptation investments would likely change quickly.

DI: Because of the scarcity and shared nature of coastlines, do issues such as private ownership vs. public access and riparian rights come into play? To date, it seems money and power shape those rules.

DP: In many cases, the rules and regulations governing coastlines result from ongoing negotiations and conflicts between various stakeholders, including private property owners, public access advocates, environmentalists and government authorities. Achieving a fair and sustainable balance between these competing interests is a complex process my company "navigates" daily.

DI: Are you investigating any new systems based on larger-scale planning, such as PPP, to benefit from scale and broader change in legislation and economics only achievable through holistic vs. individual projects?

DP: Yes. We endeavor to achieve this through transdisciplinary design. Transdisciplinary design is our approach to climate adaptation work that brings together professionals from different fields, such as architects, engineers, planners and scientists, to collaborate on solving complex problems related to climate change.

In the context of climate adaptation, transdisciplinary design involves designing and implementing solutions at different scales that address the social, economic and environmental dimensions of climate change. It involves a holistic approach that recognizes climate change is not just an environmental problem but also a social and economic requiring multipronged solutions.

For example, our transdisciplinary design team may work on developing a climate-resilient community that integrates green infrastructure, such as bioswales and green roofs, with traditional engineered infrastructure, such as drainage systems and wastewater treatment plants. The team may also work on creating public spaces that serve as both recreational areas and flood protection zones.

We recognize the importance of collaboration and integration across multiple disciplines and at various scales to develop sustainable solutions that address the complex challenges of climate change.

DI: Since water invokes a vast set of natural and biological issues (e.g., ecosystems, biological, wind, plant and animal life) in addition to traditional architectural forces, have you armed yourself with scientists and experts to inform your work?

DP: Absolutely. For precisely those reasons, we have developed quite a multidisciplinary team in-house, including traditionally trained architects, landscape architects, naval architects, urban planners, climate adaptation specialists and civil, geotechnical, structural, marine, coastal and dive engineers. In addition, we often engage outside specialty consultants, like ecologists and species-specific scientists, to augment project- and site-specific needs.

DI: Your website talks about the intersection of design technology and nature. Specifically, how does technology factor in? Are you talking about your toolset in design or the influence of technological forces on society?

DP: Both. There is no question technology has become integral in our design process. From common uses such as digital models to complex simulation models, advances in material science, aerial and submarine drone deployment and, finally, keeping it all together with the latest project management solutions, technology touches nearly everything we do.

> " Sea level rise, storm surges and unprecedented flood events are a daily occurrence; we must reconsider the relationship between nature and the built environment. "

DI: Beyond the technical execution of the work, outside your firm, who do you consider on your "team" – others that inspire you and fuel your fire?

DP: My family, friends and industry peers. Most notably, my husband, business partner, parents and brothers.

DI: Practicing in New York must entail a set of considerations unfamiliar to most design professionals. Beyond that, working on high-profile, high-visibility, high-impact projects with recognizable clients like Robert De Niro must involve a set of contexts few will be familiar with. Can you share some of those? Perhaps they are scalable and helpful to others.

DP: Certainly! Practicing waterfront architecture in New York City is a privilege. On any given day, I could be having discussions with famous architects, designers, actors, politicians, astronauts, renowned laureates or other public figures. As an introvert, the recipe that has worked for me has been to prepare, rehearse and exercise beforehand – and to ensure I am well-hydrated! Although not always within my control, I also keep screen time before bed to a minimum to maximize my chances for good rest.

DI: What have I forgotten to ask about life at the edge? Final thoughts, actions?

DP: Yesterday's climate extremes are today's new normal. We must adapt to a world in which the climate is less predictable and, in many cases, less favorable than it has been in the past. Sea level rise, storm surges and unprecedented flood events are a daily occurrence; we must reconsider the relationship between nature and the built environment.

Because architects are licensed to protect the health, safety and welfare of the public in the built environment, adaptation is essential for the profession and the public moving forward. I firmly believe climate adaptation is our generation's calling, and I have found purpose as a waterfront architect specializing in resiliency measures.

Dena Prastos, AIA, is Indigo River's founder and CEO, the first "waterfront architect" trailblazing a new category at her women-owned transdisciplinary design firm. A leading authority in New York Harbor, her firm focuses on progressive waterfront architecture, resiliency and climate adaptation solutions that seamlessly transcend boundaries. Waterfront architect, civil engineer, futurist, climate adaptation expert and entrepreneur, Dena is driven to transform the built world at the water's edge and is fueled by the overlapping of design, technology, community and nature.

CHANGING THE GAME

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CHANGING THE GAME

Roger Krulak

Founder and President of
FullStack Modular

FullStack Modular President and Founder Roger Krulak discusses modular construction.

DesignIntelligence (DI): We're delighted to have Roger Krulak, president and founder of **FullStack Modular** (FSM), a man determined to solve the U.S.'s housing crisis. Roger is the "OG" in modular, a visionary shaping the future of urban development. A global expert in modular building, he's a guest lecturer at Yale, Harvard and MIT. His company was based in the Brooklyn Navy Yard for years and recently relocated to Hamden, Connecticut. The FullStack Modular method resembles the Lego concept – it clicks together, stack it up and add a roof! Welcome to the conversation, Roger.

Roger Krulak (RK): Thank you so much, Michael. Nice to be here.

DI: It's great to have you. You have taken on one of the great social problems of our time, the housing shortage. Over hundreds of years, many great minds have struggled with this issue – with limited success. Why are you taking this on? Why you? Why now?

RK: I don't know whether I've taken it on or just fallen into the desire to do it. I am extraordinarily passionate about the solution – and the problem. It's inconceivable to me that in a country as wealthy as ours, people are struggling with housing. It makes no sense. From a social perspective, I am also interested in the fact that, as the biggest industry in the world, we fail at achieving efficiency. I have spent time trying

to figure out how to reduce waste and increase productivity. For so long in the United States, the focus has been on lowest cost and return on cost, as well as government handouts to make projects work, even though many don't work economically as assets.

The AEC industry has gone down a destructive path. We've evolved to meet the needs of an industry that has been misdirected for a long time. I'm a self-proclaimed impatient person, and I can't stand waste of time or material. Since 2007, I've been trying to create high-quality, cost- and time-efficient solutions for the dense urban environment. I've spent my career working in the built world in New York, and I believe cities have a huge responsibility – but also a vast capacity – to address housing, climate change and other social issues. That's my motivation.

DI: Tell us about your background, your education, how you got here. Are you an architect, a builder, a manufacturer or all the above?

RK: I tell my engineer I'm a professional hack who tries to solve problems I see without fully knowing how to execute them . I have a business degree and grew up in the construction and development industry. As my career evolved, I was a partner in a company that built and designed data centers, so early on, I saw a lot of construction technology. We were doing BIM modeling in 1992, and I became interested in construction technology. Then, the dot-com industry crashed and there wasn't much industry left. So, I returned to the residential development industry in New York. During that time, the pace was feverish. I was working at Forest City Ratner Companies, which committed to building 6,500 affordable apartments in Brooklyn. Given the construction market volatility at the time, there was no way to build them conventionally, with any time and cost efficiency. Then, the bottom fell out of the economy. It was 2007, what were we going to do? So, I was fortunate to have a world-class team designing a solution to build high-rise modular buildings in dense urban environments. That's how FullStack Modular started.

DI: That explains a lot. You need only be involved in the construction industry briefly before you're ready to devote your life to transforming it.

RK: That's accurate. The good news is there is now a lot of money and evolving technology, creating an opportunity for change that didn't exist ten years ago. A considerable venture capital market specifically

focused on construction technology is currently looking to deploy capital. As we speak, I'm at the Built Worlds convention in Chicago, which has been discussing construction technology since 2014. We spoke last night about how things have evolved. There are enormous opportunities for significant investment if you find ways to meet the current and future market needs.

DI: How did go about building your team with the technical expertise to accomplish your vision?

RK: Don't get me wrong, I'm pretty geeky. In 2014, David Farnsworth from Arup, the structural engineer I've worked with for years and I received the Breakthrough Award from Popular Mechanics magazine. I'm not an engineer or an architect, but I often lecture at graduate design schools like Harvard, MIT and Yale. My view was that we were doing something wrong as developers in dense urban environments. As an industry, we currently pretend every building is different and use an overly complicated and disintegrated process to build buildings which is frustrating.

Everybody in the business is frustrated by its complete disorganization. You would never create anything else in the world the way we build buildings. I was fortunate to get some research and development money to hire a team, which included engineers from Arup, fantastic teammates, a modular consulting company and advice from large plumbing and electrical contractors to create a thesis we could test. We wrote a 600-page research paper on which system is the best to meet the needs of the urban environment. Much of what we focused on was antithetical to conventional construction wisdom.

We turned many things upside down, which is where many of our solutions were born. For example, our buildings are 100% bolted together, whether five or 50 stories. There's no welding done in the field. I remember the conversation with David Farnsworth. He said, "That's going to be a lot of bolts." I said, "I don't care." We want it to be an erector set that can easily be assembled. We can't rely on highly skilled people doing field welding and inspecting it. All the components we've created, including a self-sealing facade, have been focused on increasing the safety, speed and quality, while embracing industrialization - like every other industry in the world.

DI: Construction is the rare industry in which we think every product is different. I'm always asking why. When I went to architecture school, our mindset was that every building starts anew, and we champed at the bit to reinvent the wheel every time. There's lip service paid to modularization, but the minds of the typical architect are clearly on the left side of that spectrum.

RK: 100%.

DI: You are at the right on that continuum, but is there a middle? For people with culture and minds like mine, excited about the one-off, who foolishly think they can come in as a lone wolf, genius first-timer and solve a problem better than all who came before, can those people adopt the principles of modularization?

RK: That's such a good question. I love architecture and most architects. When I speak to graduate students, I say: To create the built environment as an architect, you must adhere to a whole set of parameters, including code, comfort and other program requirements. In the multifamily sector, there are other parameters to adhere to that exist before our solution is even part of a discussion. The developer wants to maximize the efficiency and use. What we do at FullStack Modular is layer on another set of parameters that do not diverge from the project's primary goals.

What we ask upfront is that you share agency with our system designed to have the freedom to create a building without worrying about many of the details, how it goes together, how the MEP is distributed or how the structure's going to work. If the team can embrace that, the process is quite effective. I want every modular building to look beautiful and be as unique as possible. Using a modular system to create the built environment is a different process because it's a set of tools beyond those the AEC industry is accustomed to.

DI: In every case, the unit, the container and the system are set. But are there cases where, having bought into those two ideas, people have added skins or custom-built aspects?

RK: Not every building wants to be modular. Buildings have many uses and applications. Some, like residential spaces or hospital rooms, are easily made using modular solutions. On the other hand, a long-span

> " What we ask upfront is that you share agency with the system designed to have the freedom to create ... "

ballroom is not easily conducive to a volumetric modular solution. Part of the process of imagining the building is identifying the program, just like in any other design process. Then, ask what's the best process to realize the proposed program - it may or may not be a modular solution.

We do plenty of custom work when it's appropriate. In the finishes we use, even the facade is flexible as to what it can look and feel like. The ability to adjust the building through cantilevers and setbacks is broad. Two things must happen. First, the only way this works effectively is in a design-build process. This doesn't work: "I'm using this toolkit, and I'm going to design a building, and then I'm going to send it out to six or seven modular manufacturers and hope it goes well." That's not the way it works. You need to design using shared agency from the beginning with a team you trust.

Once that happens, if the team decides on the primary goals – for instance, "I want it to be the most unique-looking modular building ever" – that's one thing. If the team wants it to be cost-effective, that's another. You must decide what's important.

DI: I can relate. The first time I ever worked with a contractor, I realized how little I knew and how much help I needed. When I finally did my first collaborative CM-at-Risk project, there was no turning back. Working together is a vastly superior method.

You said you're doing multifamily and hospital rooms. Who is your target audience and building type?

RK: Our three primary markets are multifamily (affordable, attainable, or market-rate), student housing and hotels.

Some things fit that process effectively, like hospital rooms. Whether that's to go on top of operating theaters in a hospital or a mobile hospital, you can manufacture and set up anywhere in a few hours and then move to a new location that also fits our system well. Restaurants in parking lots and shopping centers with two or three mods also work well with our process.

We shine at building above eight stories because you can't build that out of wood in a non-high-seismic location up to 45 stories. Eight- to 20-story buildings are our sweet-spot, but we have a lot of variability.

Right now, we're building on both coasts with factories in Hamden, Connecticut, and Portland, Oregon.

DI: There have been attempts at industrialized, mass-produced housing since World War I, both in the private sector and under governmental guidance, with limited success and momentum. Yet, you tackle it. Why is your system, FullStack, a solution? How it is different, and what are the advantages?

RK: There are so many answers to that question. The reality is that the industry is failing to meet a need. In the U.S., we need at least seven million housing units today. As an industry, we don't build a million housing units a year, not even close to what is currently needed. My answer to your question is that necessity does create innovation if somebody's paying attention. The technology in our industry has now evolved to a point where it is possible to build efficiently in a factory and be aware of the metrology, the theoretical size and shape of the building in a way that wasn't possible a decade ago. Ten years ago, if you were building aerospace products, you would spend the energy and money necessary to check the metrology, the model-based surveying. Today, you can buy a $30,000 laser, take a YouTube class and get a precision layout within two thousandths of an inch and know your X, Y and Z coordinates are accurate within microns.

With the addition of AI, you can say, "This is how I want the rooms," and it'll complete the details for you. A modular building has thousands of pages of documents, even for a relatively small building, and it is expensive to create. But now it doesn't have to be because you can run Dynamo scripts, and you don't need 40 drafters, you need four. That's happening simultaneously and accelerating opportunities with less required investment to create the information needed.

Manufacturing itself is not complicated. Creating the rules, the system and the process to manufacture and implement the quality assurance and program is complex. We manufacture almost everything around the world without highly skilled people. Finally, the AEC industry also has the tools to support this effort.

The other day I was in a meeting, and I said, "You are reticent to embrace modular construction, but what in the building is not manufactured? What tool is not manufactured? Who says the building can't be manufactured as well?"

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The reality is that the industry is failing to meet a need.

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DI: The development of the new digital tool set has been a catalyst. You mentioned people. Who are your mentors and your tribe? Do you have a team of like-minded experts who inspire, aspire and push you to higher levels?

RK: I have an incredible team at FullStack Modular, a chief operating officer and controller who's been with me forever and a fantastic construction technologist on the manufacturing side. I was fortunate enough to spend some time in the early days with a manufacturing expert, Roger Breedlove, who was a fantastic teacher. My grandfather was involved in a modular company in the '70s and he understood the value. David Farnsworth and the whole team at Arup have been with us in lockstep since 2007, working on this solution, evolving it, improving it, and adjusting it so that it is responsive, intelligent and logical.

DI: It's incredible to see how often there are generational roots that drive people who have the courage to change the industry.

RK: I've been thinking about that a lot.

DI: We talked about tools, process and people. Another word that comes to mind is policy. You probably didn't get into this business because you were a politician, a legislator or a crusader, but what percentage of your time is spent trying to change policy and delivery approaches versus running your business to implement your vision?

RK: I'm trying to change policy, but the process we use is not meeting the market needs, and as such, it needs to evolve. But I'm not sure it needs to evolve by pressuring jurisdictional authorities to change. After years of effort, I think it's a better shot to lead by doing, to simply show how it's done and demonstrate solutions in ways beneficial to all stakeholders. Then, I hope policy will change to meet it. The way we finance affordable housing right now is not working. We create some affordable housing but not nearly enough, and it often requires using the credit of the jurisdiction, which decreases the potential funding available for others.

The buildings built under this system generally yield low to no value. They don't help the communities they're built in. Policy is going to adopt whatever creates a solution, and we're forging ahead trying to do that. Communities have money, but they don't know how to spend it. The amount of money available to create affordable housing where they

can't figure out how to spend it effectively is astounding. As a businessman, if I have a solution that makes things better, faster, safer, and more cost-effective I will pursue it.

DI: I'm with you. Politics is not why I got into this business. I love the doing and the problem-solving. Politics aside, let's talk about persuasion. The aesthetic of shipping containers can carry a stigma to conventional audiences. How and where did you develop your skills in presentation and persuasion?

RK: We've decided to march ahead and do it ourselves with partners because I don't want to try to convince anybody. We're just going to do it ourselves to show how it's done and bring others along with us. We're not trying to do it as mavericks, alone. That's our view as an industry of what drives the modular movement forward.

My elevator pitch on why you should use modular construction is good, but there are so many stakeholders in a broken process that even if you get the head developer who has the money, he still has to listen to many skeptical stakeholders. The more modular buildings we build, the more exciting it is for everybody. They're all watching and anticipating failure.

DI: You're taking control of your destiny by using a more integrated process. Your team is in control of more aspects, so you maybe have to do less convincing. In that light, breaking some of these systemic disintegration problems, are any new economic models and investments

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> You are reticent to embrace modular construction, but what in the building is not manufactured? What tool says the building can't be?
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accelerating what you're doing? If we're continuing to pursue one-off solutions, we're solving the wrong problem. Do we need to be looking at new strategic alliances, new economics and new incentives?

RK: Our process is highly sustainable, repeatable and effective, and several U.S. finance programs are now focused on those things. We are trying to collaborate with these funding programs, whether it's the Department of Energy's desire to decrease kilowatt hours or the Department of Transportation's encouragement to build transit-oriented developments. These programs are incented to find solutions because the status quo is not working. We're talking to several states right now whose housing departments are interested in solutions that create what they need because they hear about the need every day. Hopefully our process is a tool in their toolbox to begin chipping away at solving the overwhelming need for more housing.

DI: Working in the modular sector must entail a set of considerations unfamiliar to most design professionals, the one-off architects and builders. What lessons would you share with that community? Principles that might be scalable or useful to others not practicing in the modular world? What new ways of thinking do they need to adopt, from your perspective?

RK: It's clear that the only real way to design and build effectively is through a design-build process. As a design professional, you must be willing to share agency within a system, and that system often includes many opportunities. It includes the flexibility to design, but also structural systems designed and coordinated and MEP distribution that is already designed and coordinated. They're not inflexible, but they are established systems. We build from the inside out. Each of our modules is a piece and part of the whole building, structurally, mechanically, electrically, and plumbing and it relates to all the adjacent pieces.

How do all those pieces come together to make something that will meets the users' needs, satisfy the architect's creativity and be responsive to the environment? That's a huge opportunity for the design professional and an efficient process. In the last year, I have had conversations with potential design team members. At the end of those conversations, I've called the developer and said, "You're welcome to use this architect, but I'm not going to be part of it." Not that they're not good architects, they're just not willing to embrace this design-build process.

DI: Having practiced for decades, I find it shocking how hard it is to get the design community to adopt and embrace what I would call "design-systems thinking." One of my last projects was the new Atlanta Falcons Mercedes-Benz Stadium. We were under the gun for cost and schedule. All the toilet rooms and concession stands in that building could have been modularized and set in place to save time, but the mindset and the desire were absent. What a missed opportunity. Yes, we want them to be beautiful and function, but they're bathrooms! The needs are familiar and so are the solutions. In school, we're indoctrinated to believe that we're the choreographers of the band and we should be able to use systems thinking, but it's just not taught. If we're not capable of thinking it or wanting it, we aren't going to do it.

RK: There's more to it than that, Michael. FSM has worked with companies that have already designed a modular bathroom system with nine interchangeable components they can customize. The problem in the AEC industry is that there are always one or two team members going through the motions, who are really using subterfuge to stop this from happening. For instance, the MEP engineers design a system that could never integrate with a modular solution and forge ahead because they don't embrace the modular approach.

It's not as innocent as you say it is; a lot of subterfuge goes into trying to kill the process. I'm fortunate enough to be in New York, so I see a lot of big players and projects. Too often, part of the team is not interested, and they do everything they can to kill it. For example, why not utilize modular bathrooms in a commercial building where all the plumbing is stacked? It makes no sense.

DI: Your point is so good. It starts with the mindset and the desire, but beyond a theoretical level, there are counterincentives and motivations. They don't want to do it because they're not going to be able to line their pockets as much or because of inertia or their belief systems, and all kinds of conflicting forces get in the way of full buy-in to a modular approach.

What's your dream? A vision for your company or its impact?

RK: We are a fully volumetric steel-based modular solution, focused on mid- to high-rise. The wood world of modular construction, five stories or under, is a mature industry happening everywhere all the time. Our

segment of the industry is growing and is a viable solution to problems society has not been able to solve. I encourage people to embrace that idea so we, as a society, can find solutions to the problems we've been chronically plagued with and have not yet solved.

My vision for FullStack Modular is that sometime in the not-too-distant future, we would like to be able to provide support for designing and manufacturing buildings anywhere – for lack of a better term, a franchise opportunity where we could allow manufacturers in Africa, for example, to build a factory using our systems and processes and manufacture using local labor. The idea of being able to do this locally is a huge opportunity. If you involve, train and hire local workers in the areas where the housing is needed, there's a huge opportunity.

DI: Noble goals indeed. I wish you luck and continued success, sir.

RK: Thank you so much.

DI: It's been fascinating to talk with you, Roger. I really enjoyed it. I hope I didn't throw you any curveballs …

Steinberg Hart Treehouse Rendering, photo courtesy FullStack.

RK: I love curveballs if I can hit them.

DI: When you're changing the game like you are, you must be hitting a few of them. Well done.

Roger Krulak is the founder and president of FullStack Modular, an award-winning, pioneering company at the forefront of mid- to high-rise modular construction. With an unwavering 35-year commitment to innovation and sustainable building practices, he has transformed the construction industry with his progressive approach to design and manufacturing. Recognizing the inefficiencies and environmental impact of traditional construction methods, Krulak set out to revolutionize the industry by leveraging modular construction techniques and founding FullStack Modular in 2016. Driven by his belief that modular construction holds the key to creating sustainable, affordable and high-quality buildings, Roger has established the company as a pioneer in using advanced technologies to elevate modular construction. Under his visionary leadership, the company has emerged as a leader in off-site modular construction. It has been recognized for forward-thinking solutions, including BuiltWorlds' 2023 Building Tech Top 50 list, Civil + Structural Engineer's 2023 Rising Stars, and Popular Mechanics' 2014 Breakthrough Award. Significant development projects include Starwood Group's first Treehouse Hotel in the U.S. in Sunnyvale, CA; 461 Dean Street — the tallest modular building in the Northern Hemisphere; the Grant Avenue Municipal Lot by New York City's Department of Housing Preservation and Development (HPD) and many more.

An industry thought leader, Roger is a regular speaker at the country's top design schools and universities, including New York Law School, MIT, Harvard and Yale, and with various industry organizations, including BuiltWorlds, Modular Building Institute and the NHP Foundation. He has been featured in top media outlets, including the New York Times, Wall Street Journal, Forbes, Fast Company and Wired. Before founding FullStack Modular, he was part of the leadership team at Forest City Ratner Companies (FCRC), where he spearheaded the company's first R&D modular construction project in 2008. As SVP of modular construction and development, he focused on incorporating technology into construction workflows using modular building systems and oversaw construction of the world's tallest volumetric modular building. Roger received his degree in Management and Organizational Psychology from Babson College and lives in Westchester, New York, with his family.

FullStack Modular is the leading modular innovator in the design, manufacture and construction of mid- and high-rise multifamily buildings, hotels and student housing in urban environments. Tech-driven, fully integrated, sustainable and radically efficient, FullStack Modular is revitalizing the urban housing landscape — taking modular design and construction to new heights.

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SHIFTING DECISIONS: INCORPORATING EMBODIED CARBON EMISSIONS IN EARLY DESIGN

Maisie Sargent Auld

Associate Global Technical Director for Sustainability Measurement at Arcadis

Arcadis' Maisie Sargent Auld extols science-based targets and early carbon awareness.

The building sector currently contributes nearly 40% of global energy-related carbon emissions (World Green Building Council, 2023), highlighting an issue to be addressed as well as a significant opportunity. As a result, and in response to mounting pressures for emissions reduction, changes to regulations and emerging market drivers are transforming the building sector. For example, the World Green Building Council's recent paper "Bringing Embodied Carbon Upfront" calls for coordinated action in driving the reduction of embodied carbon in the building and construction sector. No longer is the focus only on operational emissions. The Science Based Targets Initiative has released building sector guidance, necessitating many companies to set targets for both operational and embodied carbon emissions. With close to 4,000 companies across the globe already adopting science-based targets, the momentum for others to follow suit is rapidly growing. This shift in focus compels companies to consider not only operational emissions but also the embodied emissions of their buildings.

Current design and construction processes often overlook the assessment of embodied emissions until significant design decisions have already been made. This retrospective approach can limit our ability to influence emissions reduction. To truly make a difference, we must shift our mindset and prioritize carbon emissions considerations from the outset – and at every stage – of the design and construction process.

Imagine if designers could visualize the emissions impact of their designs in real time. By integrating emissions evaluation into design programs, designers would have immediate feedback on the environmental consequences of their decisions. This level of awareness and accountability would undoubtedly lead to a reduction in embodied emissions.

To bring about these positive changes, we must redefine the design process. At Arcadis, we have started incorporating the embodied emissions of different pavement and road furniture choices directly onto design drawings. On one recent project, this led to a 10% reduction in embodied emissions simply by choosing to proceed with high modulus asphalt in place of business-as-usual asphalt. This approach was still cost effective as the quantity of material required was reduced. By integrating carbon metrics into the design process, we can catalyze innovation in the design mindset and challenge the designer to explore lower-impact options. This approach enables more informed decision making and ultimately leads to better outcomes for society.

As Ken Lunty, Arcadis' national sustainability lead in Australia, says, "We now have designers coming to us with low-impact ideas that fit within the design specification, rather than the sustainability professional trying to convince the designer to do things differently. It's a subtle but significant change in mindset." Bringing a visual carbon metric front of mind during decision making not only brings carbon into the designer's conscious mind, but it also inspires them to take ownership of the associated carbon impact. While this is an infrastructure-based decision approach, its application and potential are broad.

This is not to say that embodied emissions are never considered under current models. Embodied carbon is a key criterion across many certification schemes, such as Green Star in Australia and the Living Building Challenge and LEED in the U.S., among others. But we still have a long way to go. Many existing schemes require the measurement of embodied carbon, but this typically happens toward the end of the design process. Carbon considerations should be integrated early, where they can best influence design.

Achieving a sustainable built environment requires interdisciplinary collaboration. Sustainability should not solely rest on the shoulders of sustainability professionals; it must become an integral responsibility of all industry professionals. By making embodied carbon considerations standard practice, we can collectively work toward positive outcomes for society and establish sustainability as the norm in our everyday work.
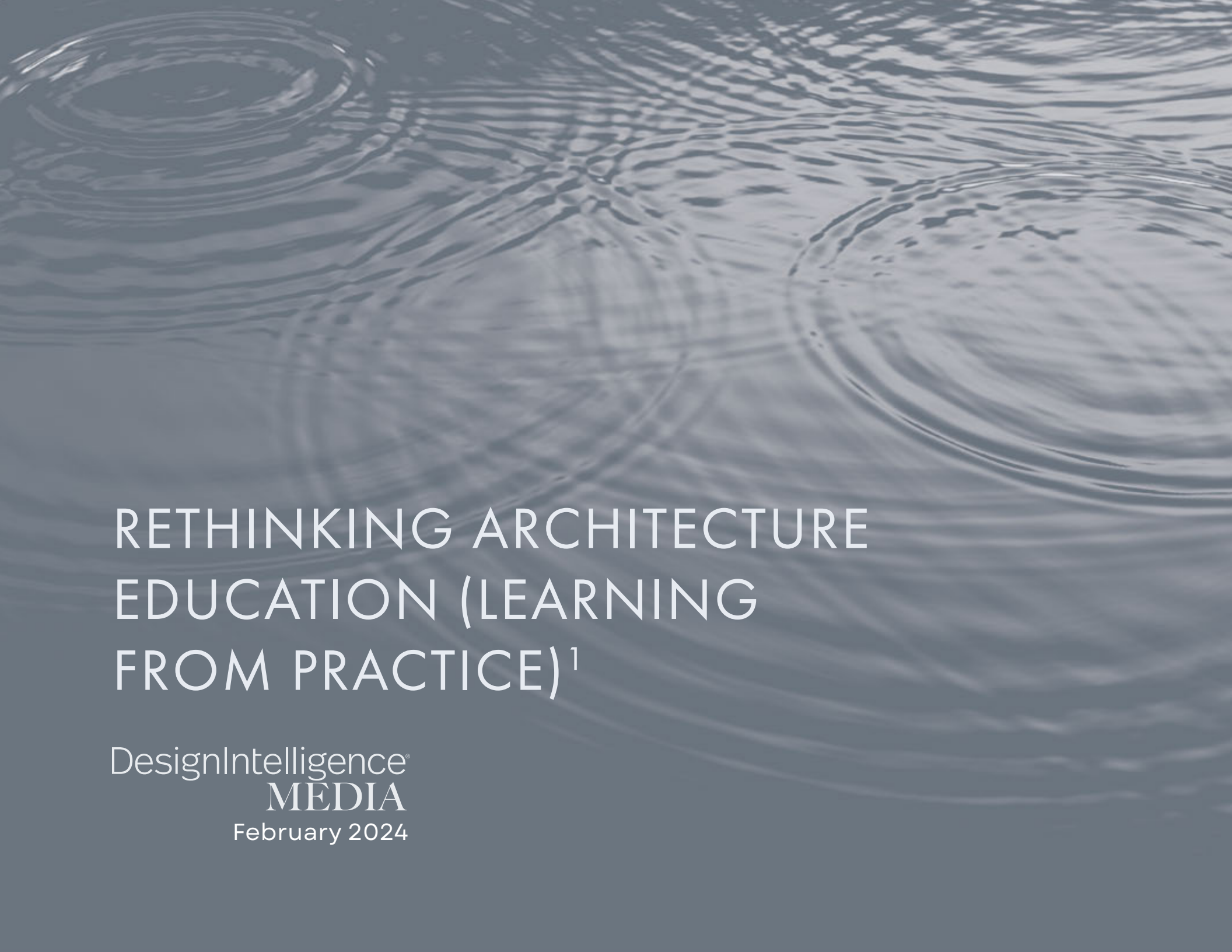
To effectively reduce the embodied emissions of the built environment, we must shift our focus from simply switching out materials late in the game to influencing design choices from the beginning of the programming and design process. By integrating real-time embodied emissions evaluation into design programs and emphasizing early design decision-making, we can accelerate progress in mitigating our global environmental impact.

Let us work together, across disciplines, to ensure sustainability becomes an inherent part of the job for all professionals involved, ultimately shaping a future where embodied carbon is considered every step of the way.

> " To truly make a difference, we must shift our mindset and prioritize carbon emissions considerations from the outset — and at every stage — of the design process. "

Maisie Sargent Auld is the Associate Global Technical Director for Sustainability Measurement at the global design and consultancy Arcadis. She has over 10 years of international experience in environmental economics, decarbonization, climate change resilience and sustainability advisory. Trained as an environmental economist, Maisie couples her sustainability expertise with an economic lens, examining and quantifying related social, economic and environmental impacts to support decision-making and improved outcomes for her clients and society.

As the daughter of the late architect, Terry Sargent, appreciation for design and a sustainable built environment was instilled from a young age and these concepts continue in her work today. She lives in Valla Beach, Australia with her husband and son.

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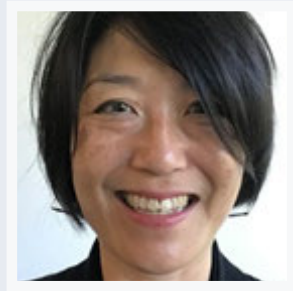
RETHINKING ARCHITECTURE EDUCATION (LEARNING FROM PRACTICE)[1]

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Abstract

By interrogating the nature of architectural education, we can investigate opportunities for the discipline of architecture to engage culture and society in more significant ways beyond skills preparation. Connecting ideas of design as a creative pursuit with integrated knowledge from various disciplines, the academic design studio carries tremendous potential in preparing students to address increasingly multifaceted and complex problems, expanding the role of architects as facilitators, choreographers, strategists, directors and leaders. While design studios and interdisciplinarity are well-represented in scholarship, the relationship between practice and education set within the interdisciplinary framework is nascent territory. Opportunities exist to exploit the overlaps where practice may enter the discussion about interdisciplinarity in relationship to education. Sharing her assumptions, Julie Kim wonders if by remaining "in our lane" in discipline, we impose false limits on our capacity to radically rethink architecture education and bridge the gap the between the academy and practice.

Setting the Stage for Interdisciplinarity

"The strength of all things comes from the in-between." – Sanskrit saying

In my own work as an educator and architect, I remain intent on building capacity in critical thinking and thinking across disciplines – even as I continue to refine my own clarity on what constitutes disciplinary thinking. A productive opportunity exists in education – one that offers students a platform to engage in interdisciplinary problem-solving in the pursuit of seeking one of many possible solutions. We know that in a truly interdisciplinary project each participant has a different perspective on the problem. Each contributor brings their own respective disciplinary expertise to the conversation. Although each expert may not challenge their own assumptions about their disciplines, the hope is that they each negotiate the differences to work toward a collective shared approach. In fact, established approaches in schools of architecture curricula tend to model interdisciplinary exercises in the design studio. In the interdisciplinary design studio, we bring together students from different schools to collaborate on shared problems. We imagine optimal outcomes with the belief that exposing students to this methodology early on will pay off later as they become the leaders in practice. The premise here is that as they engage in learning by doing, they will build a fundamental understanding of the critical role the architect plays in the process of collaborating and seeking solutions.

Is This a Fiction in My Own Mind?

In the academic arena, students and faculty are traditionally defined by their disciplines. In other words, we might have a School of Architecture, a School of Mechanical Engineering, a School of Biology and so on. On the other hand, we recognize in practice that we will collaborate with a wide range of disciplinary experts. So, in the academy, we set up the aforementioned interdisciplinary studios, a fictional collaborative framework. We imagine students will bring their relevant disciplinary expertise to bear, and we imagine that one plus one will equal more than two.

The truth is we are fortunate when one plus one actually equals two.
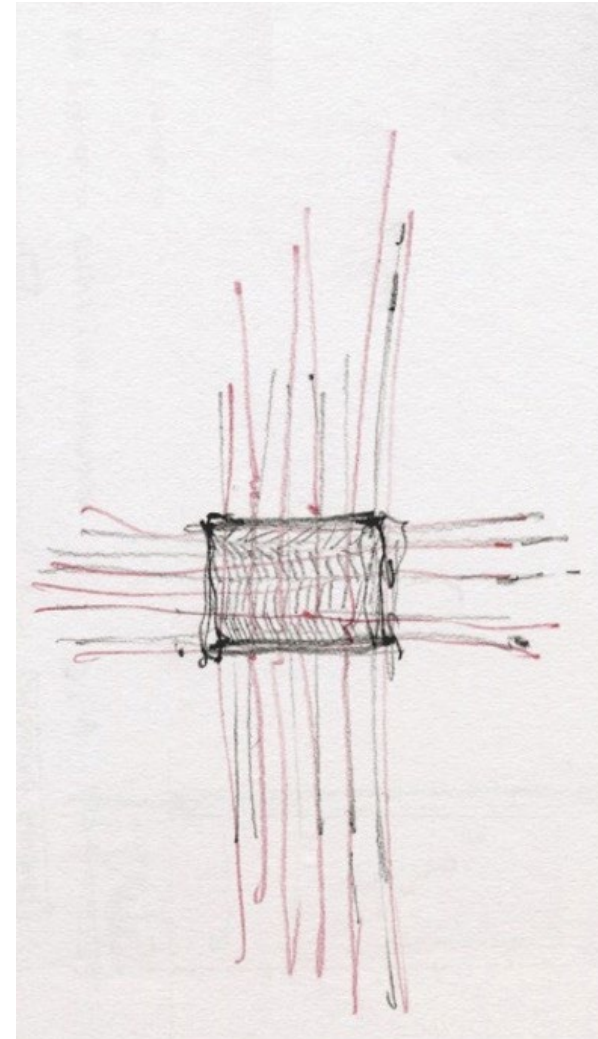
Author Sketch

The terms multidisciplinary, interdisciplinary and transdisciplinary are often used interchangeably. While each describes different engagement modalities, all are connected by the actions of producing, expanding and advancing knowledge – in our case, architectural knowledge. As architects in practice, we are familiar with modes of interdisciplinary engagement, conventionally played out in project team structures that include architects, engineers and other consultants all collaborating on a single project with a shared aim. As an architect in education, I am deeply invested in positioning platforms for students, helping them see acts of design as creative pursuits that require integrated knowledge from various disciplines organized by structured collaborative teamwork. I see students collaborating in the design studio as a platform for our future leaders in practice to build critical lifelong skills. I imagine, then, that our students are prepared to address increasingly multifaceted and complex problems, expanding the role of architects – as facilitators, choreographers, strategists, directors, leaders. I, however, recognize that I, myself, have not truly questioned the role architects play or the disciplinary expertise they offer. I find myself wondering … *by remaining "in our lane" or discipline, do we impose false limits on our capacity for radical thinking?*

In the academy, we can agree on shared aims to build students' capacities in critical thinking and to encourage strategic and smart thinking across disciplines. Clear design thinking through structured methodologies grounds such collaborative engagement. Faculty and related stakeholder partners offer the exploratory questions within a structured pedagogical framework to prepare our students to critically confront relevant contemporary challenges. In response to an initial set of defined provocations, faculty carry an embedded expectation for the students to take initiative to search available literature, evidence and relevant precedents so they may develop their own lenses to understand the problems. As schools continue to redefine and redescribe the nature of architectural education, we must also ask other questions about the possibility for the discipline of architecture itself to engage culture and society in more significant ways, beyond skills preparation. And, for architecture to maintain its relevance, we must establish its placement more broadly between the arts, sciences and humanities – engaging in discourse beyond itself. In my own experiences at Georgia Tech, as program director of the Bachelor of Science in Architecture from 2015-2022, I was explicitly interested in testing ideas of interdisciplinarity and collaboration across the curriculum. In 2016, I introduced a new curricular model for interdisciplinary design studios in the undergraduate program in the School of Architecture at Georgia Tech. Establishing annual engagement with the Capstone Design Expo – a hallmark at Georgia Tech with a long tradition in engineering – I expanded and nurtured cross-campus relationships to include interdisciplinary architecture teams in this culminating experience, opening the conversation across disciplines to extend the social structures of collaboration between divergent voices.[2]

Across and Through the Space Between the Academy and Practice

In his "Manifesto for Transdisciplinarity" (2002), Basarab Nicolescu asserts, "Today, even two specialists in the same discipline must make a serious effort to understand their respective results." He continues with this assertion:

> "Even a group comprised of the best specialists from all the various disciplines would only be able to develop a generalized incompetence, for the simple reason that the sum of total competencies is not competence: on a technical level, the intersection between different domains of knowledge is an empty ensemble."

This sounds dire: "Intersections between different domains of knowledge are an empty ensemble." But we also know that the intersections between different domains of knowledge can be pregnant with potential. We know diverse sets of voices and perspectives can impact the outcome of a project. We also recognize, even within our own discipline, there may be misalignments in approach, methodology and general competence. This is all true; however, I see this as a call to action. Learning to effectively collaborate with people who hold expertise in one's own discipline as well as other specialties – including engineering, construction, real estate development, building technology and other allied disciplines – is essential to the success of the next generation of architects. As important, the architect's ability to accommodate the external pressures of clients' desires and stated aims will also require them to understand, interpret and synthesize inputs from multiple perspectives and disciplines. We – the architects – hold the potential to operate through, between and across disciplines. Preparing our students to be leaders in this regard is one of the core visions of interdisciplinary approaches to architectural design and inquiry in schools of architecture.

While the pressures of such integrated discussions are more prevalent in advanced graduate studies, I believe we must start earlier, offering such opportunities to students at the beginning of their careers. By establishing an interdisciplinary curriculum in undergraduate degree programs, we offer opportunities for architecture students to deliberately build and foster partnerships with others outside their own conceptual space. By doing so, we extend creative and intellectual capacity for students. Moreover, we offer the scaffold for building leadership skills, supporting students to strengthen their abilities to communicate and collaborate effectively. We help sharpen their agility as design thinkers. We emphasize design as a creative pursuit that requires integrated knowledge from various disciplines, with a common shared focus toward the resolution of a design project.

I have been asked why include undergraduates at all? Undergraduate students are arguably only just beginning to shape their leadership skills. Is an inexperienced, beginning student ready to engage in interdisciplinary exercises when they are only just learning their own discipline? Perhaps not. But these students are also ready to challenge boundaries and constraints. For undergraduate students especially, we can entertain broad definitions of design inquiry and experiences precisely because we are not constrained nor limited by accreditation requirements overlaid on professional degree programs. Free of such constraints, undergraduate programs can enjoy greater flexibility in design-focused curricula to leverage the critical creative thinking of our students.

But should we not also apply the same revolutionary thinking to our professional degree programs? The aim of most, if not all, professional degree programs is to prepare students to be competitive, skilled and versed in professional practice. To be deliberately provocative here: Are professional degree programs forward-thinking, and, by extension, is professional practice likewise forward-thinking enough? Certainly, programs like the Integrated Path to Architectural Licensure (IPAL) define a strict conduit between academic and professional spaces. With specific pressures like IPAL, as well as those imposed by the normative external accreditation review, does this compel programs, in turn, to churn out students who can competently and capably navigate conventional professional practice but are not necessarily equipped to aggressively and assertively initiate or lead necessary change to address big, global challenges?

One of the core values shared by the National Architectural Accrediting Board (NAAB), the American Institute of Architects (AIA), the Association of Collegiate Schools of Architecture (ACSA) and the National Council of Architectural Registration Board (NCARB) centers on knowledge and innovation. This notion of advancing knowledge and innovation suggests a rich and generous space that allows risky experimentation. We know, however, that risk is a double-edged sword. In other words, we want to test the limits, but are equally constrained by external and internal limitations. Herein lies the tension. If we embrace and welcome this pressure, the question facing us is how we might shape our professional degree programs to prepare our students – the next set of practice leaders – to boldly impact critical change in the profession.

The profession is arguably slow to change. Likewise, the lines between building and construction can seem unyielding. As we reflect on the relationship between education and practice, we can see the intractable links between architecture education, external accreditation and professional licensure. Educators are caught between competing tensions – that is, are we teaching for the profession, or are we teaching to address complex challenges and current crises? The answer lies in both. In my mind, education is not solely the responsibility of the academy – the profession has a role to play here as well. Returning to another core value shared by the NAAB, AIA, ACSA and NCARB, lifelong learning is embedded in the practice of architecture. Indeed, lifelong learning is a shared endeavor between the academy and practice. Yet, why are the worlds of the academy and of practice often perceived in binary opposition? While design problems framed in the academic studio tend to be hypothetical – "fictional" – the problems are "real" and students test solutions against set parameters. Through these exercises, the expectation is that students hone and sharpen skills in design thinking and apply that design thinking toward coherent resolved spatial propositions. In practice, additional pressures such as budget and client inputs differentiate and complicate the design problem, not to mention the relationship dynamics. But both the academy and practice share the concern for solving problems in our built environment. It is worth considering how we may operate in this collective space for bold and risky experimentation in the pursuit of advancing knowledge and innovation – in both practice and in education.
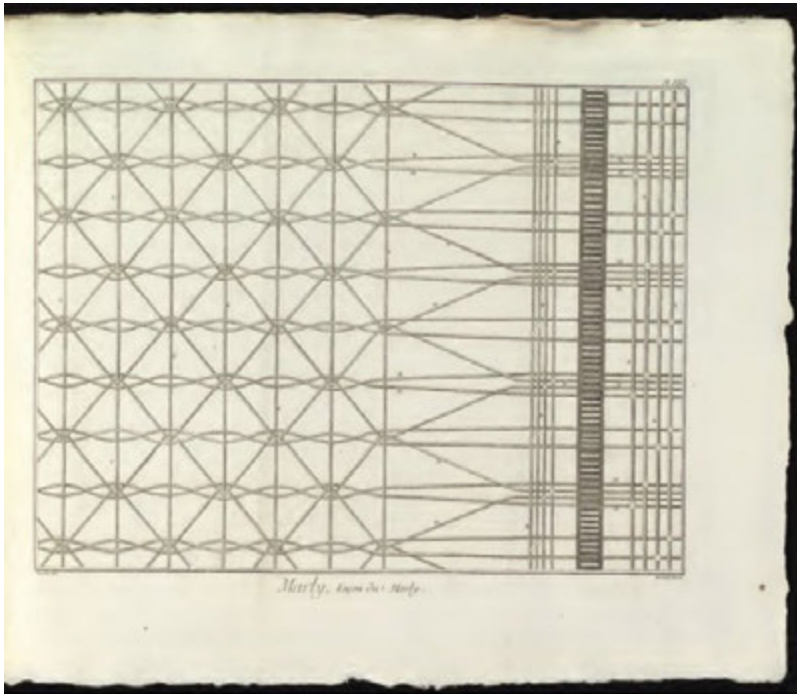
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Let's consider the ways in which we can challenge the perceived constraints of external accrediting agencies to yield future-forward educational thinking that can possibly impact the future of practice. Let's imagine where and how professional degree programs might deliberately question the lines – to skirt the boundaries. How might the bridge be strengthened between the academic studio and the professional one, and how might we establish relevant and reciprocal models of curricula that exploit the shared space between the academy and practice? Education and practice are intertwined: Education can inform practice and, likewise, practice can inform education.

What Now?

We can all agree that architectural practice requires the integration of different kinds of knowledge and expertise to succeed. As design teams address increasingly multifaceted and complex problems, the roles of architects – as facilitators, choreographers, directors, leaders – have never been more important. The academy sets the table, so to speak, to prepare students to be the transformative leaders of profession. As Herbert Simon aptly describes,

> "The real subjects of the new intellectual free trade among the many cultures are our own thought processes, our processes of judging, deciding, choosing and creating. We are importing and exporting from one intellectual discipline to another ideas about how … a human being … solves problems and achieves goals in outer environments of great complexity"[3]).

It is these actions, precisely, of importing and exporting ideas that summarizes the actions we exercise daily in our academic and professional pursuits – in this discipline of architecture. Hence, in the fictions we set in our interdisciplinary design studios, we deliberately position diverse viewpoints in relationships devised to prompt energetic and productive development toward design solutions, with the expectation that we build each student's capacities in critical design thinking and encourage strategic, smart thinking across disciplines. Counter to the position offered by Nicolescu earlier in this essay, we envision that productive intersections between different domains of knowledge hold the potential to be full, not empty, ensembles. We expect misalignments and miscues. This is how we learn: by failing forward.

Lessons from practice carry the potential to inform lessons in education. Advancing innovative curricular models, in turn, impacts models of practice. Ultimately, practicing effective collaboration is essential to the success of the next generation of architects, redefining and redesribing our roles as interdisciplinary thinkers and agents.

In this future-forward world, one plus one will, indeed, equal more than two.

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Footnotes:

[1] Portions of this essay have been previously published in Interdisciplinary Design Thinking in Architecture Education, Julie Ju-Youn Kim, editor (London: Routledge, 2023).

[2] I produced an edited report, "Dialogues in Design Thinking: Reconsidering the Interdisciplinary Studio Experiment in the School of Architecture at Georgia Tech" (Georgia Tech School of Architecture, 2020). This publication offers a retrospective overview of the first five years of the interdisciplinary undergraduate architecture design studios.

[3] Simon, 138

Julie Ju-Youn Kim, AIA, is the William H. Harrison Professor and Chair at the Georgia Institute of Technology School of Architecture, where she founded and currently directs the **Flourishing Communities Collaborative***, an interdisciplinary research and design lab. Incorporating goals of equity and inclusion in scholarship and design pedagogy, Julie received the* **2023 AIA Georgia Educator of the Year** *and the* **2023 ACSA Collaborative Practice Award***, for connecting the academy and architectural practice by creating replicable models of engagement to expand equity through access. As both an educator and a practitioner, Julie's research advances the discourse around the future of the discipline and practice of architecture. With support from the New Venture Fund/Public Interest Technology-University Network and Partnership for Inclusive Innovation, Julie's teaching and research leverages data-driven and quantitative methodologies to solving social and cultural problems in the built environment. Julie is a licensed architect whose publications link her leadership and teaching in pursuit of interdisciplinarity in architecture education, research and practice. As editor and author of four chapters of "Interdisciplinary Design Thinking in Architecture Education" (London: Routledge, 2023), Julie extends the dialogue to a global scale, bringing practice and pedagogy into a single conversation.*

Professor Kim has been featured in international journals including SPACE, Korean Architect and Architectural Record, and her professional work has received recognition from awards programs including an AIA/DC Unbuilt Award, SARA Design Award and an AIA National Honor Award. She is the editor of "Dialogues in Design Thinking: Reconsidering the Interdisciplinary Design Studio Experiment in the School of Architecture at Georgia Tech" (Georgia Tech, 2021); co-editor for "Radical Good Trouble: A Studio Report" (Georgia Tech, 2021); and invited author for a chapter and co-author of the conclusion in "Teaching and Designing in Detroit: Ten Women on Pedagogy and Practice" (Routledge, 2019).

Professor Kim's previous academic appointments include associate chair and director of the Undergraduate Program at Georgia Tech School of Architecture; associate professor, director of the Summer Institute and director of the Comprehensive Building Design Studio at the Catholic University of America; associate professor and director of the Graduate Program at the University of Detroit Mercy; lecturer at the University of Maryland; visiting professor for the Paris International Studio at Lawrence Technological University; and visiting professor at Boston Architectural College. She earned her Bachelor of Arts from Wellesley College and her Master of Architecture from the Massachusetts Institute of Technology. She can be reached at julie.kim@design.gatech.edu.

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Michael LeFevre

Managing Editor, DesignIntelligence

DI's managing editor reflects on technology's march, what is invisible and what is real.

I'm all for intelligence. Most of the time we need all we can get, in many forms: emotional, collective, even military varieties to keep us safe. But I must admit I'm still a bit uneasy about the artificial kind. You see, I've been an architect for 55 years now. I started working in a small office in 1968 at the age of 14 with two other talented mentors. Back then, we worked without access to personal computers and cellphones. We designed and drew by hand, lovingly, with lead drafting pencils on vellum.

Tivadar Balogh, AIA rendering, circa 1968

In those days, we gathered our intelligence about projects, architecture and the world from experience, books and the periodicals of the day. When the monthly issues of Architectural Record, Architecture and Architectural Forum arrived, they fueled our heated discussions of emerging trends in the profession. Debates ensued over the merits of John Johansen's Mummer's Theater in Oklahoma City, Robert Venturi's polemic in "Complexity and Contradiction in Architecture" and the merits of "ducks" and "sheds." Practicing in the Midwest with limited resources for travel and constrained by our limited world views, we were content with our dogma: Modernism was king, and drawing skillfully and beautifully, by hand, was essential! Our network of connected intelligence was small, local and scarcely technological – a small spider's web of personal contacts and experience-based know-how.

The Coming Change

In the early 1980s, when technology evolved to provide us with new means of production, we embraced the change. Making the shift from graphite to plastic lead on mylar was easy enough. The subsequent emergence of pin bar overlay drafting seemed a fine advancement. It offered us the ability to separate layers of information and be more intelligent about data reuse. Drawing the floor background only once on its own layer helped us leverage that information for engineering backgrounds without having to recreate it. Smart. But, as has been well chronicled, this precursor to computer drafting simply enhanced our former process rather than transforming it. Our means of production, now primitively separating and reusing discrete data, began to tug at our shirtsleeves and drag us slowly into the age of automation and intelligence.

When computer aided design and drafting (CADD) entered the scene, a bigger shift shook our shoulders and rattled our brains. Personal computers and local area networks appeared, even in small design firms. The opportunity to leverage machine and computing power to automate and standardize our formerly artisanal practices was touted as "liberating." "Three-to-one productivity" was the cry from software providers such as Autodesk, Bentley and others. "Free yourself from the enslavement of construction documents. More time for the high value, truly creative tasks you love," they promised. Perhaps they were right, but what they neglected to mention was that all the time CADD freed up came with an equal or greater amount of time needed to learn the software, keep up with the hardware, grow the infrastructure, and pay for these digital tools, training and new staff members to operate them. "A black hole for money," many called it. Were we more intelligent as a result of the CADD era? Yes! We had more data (provided we had entered it correctly and in common formats to flow between team members – an asymptotic pursuit). But we were now required to devote huge amounts of time, money and energy to structuring and maintaining that data. An unintended consequence was that most senior practitioners were hardly able to see their projects in progress anymore because instead of lying out, full size in full view on the drafting tables, the "drawings" were now stored inside small CRT screens, viewable only by zooming and scrolling relentlessly, frustratingly. Beyond the purported efficiencies, what intelligence and intuition had we lost in the translation?

The BIM Boom

At the turn of the century, the dawn of the building information modeling (BIM) revolution, we were promised another generational, transformative wave of change. No longer would we simply automate drawing of the "dumb" lines of our past, they said. Now we would work in true, three-dimensional space, placing "perfectly accurate" 3D digital objects in a single integrated model! Laden with data, these objects would now be "intelligent," the software makers claimed, with "attributes," and again they were correct, except for one thing. Despite their promises of "all data in one place" and "a single source of truth," we soon learned that, without standards for data creation, flow, storage and retrieval, we were not much better off than we had been. We saw that models fully loaded with data were too cumbersome to open, use or share. Regressing, we began to break them into bits once again. Our digital storage cabinets and transmission pipes simply weren't big enough.

We struggled to know which data to include. What is "real" and necessary to you, the manufacturer, is better simplified, reduced and abstracted by me the designer to suit my purposes. The contractors' model needs and uses were a far cry from the designers'. Sure, I celebrated the joys of no longer needing to use an electric eraser to grind holes in my drawing sheet when something had to change. I marveled at Revit's speed and intelligence to design and model a stairway in seconds, far faster than the hours it used to take me to do it manually. Love those algorithms. But I also lamented the loss of connection with the medium. It seems all this "intelligence" came with some hidden, unanticipated costs. Somehow the processes of design and drawing seemed less real.

From 2000 to 2019, in a self-created position in a national construction management firm, my role was to liaise between designers and builders. When the digital revolution burst on the scene, thanks to our being well capitalized and risk savvy, my colleagues at Holder Construction were ready to carefully adopt the new technology. During those two decades, I became a renowned BIM evangelist while developing use cases and building our industry-leading team. In a short ten years, we recruited and trained a staff of more than 50 modelers deployed across the country on project sites. With me identifying needs, providing vision, building business cases and scrounging for funding, our team became experts at self-creating

> "Beyond the purported efficiencies, what intelligence, connection and intuition had we lost in the translation?"
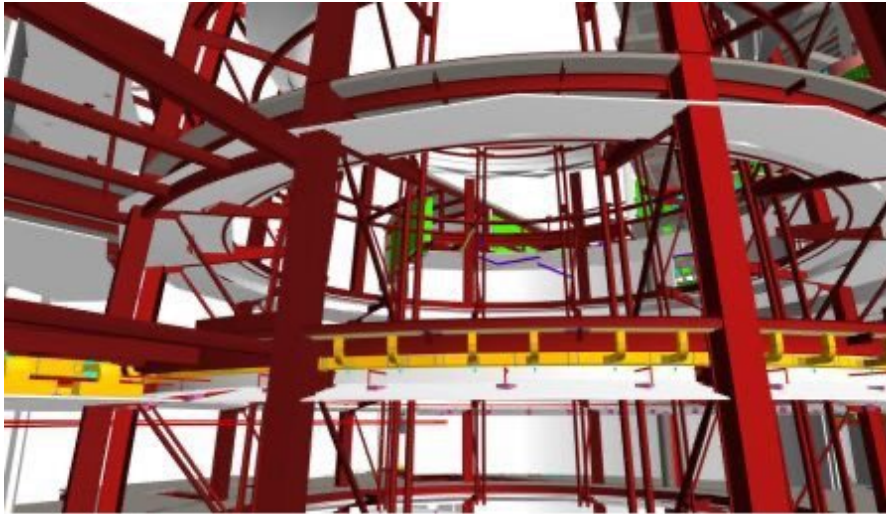
Devon Energy Headquarters BIM, circa 2006, image courtesy Holder Construction

models designed by architectural partners, doing systems coordination and collision detection, and creating 4D time and sequence logistics and sequencing models, even to the point of developing a copyrighted in-house iOS-based facility management program. All the hands-on software use was done by a crackerjack team fresh out of school, all young enough to be my children. It was a heady time. Without question, we were more "digitally intelligent" and facile than many of our peer contractors and architectural partners. But despite the exponential growth of BIM – in our firm and across the industry – tapping into the power of this new tool set has still realized only a fraction of its potential.

Reflection

In hindsight, I have no regrets about the digital journeys we embarked upon in any of these firms. I liken it to what it must have felt like in the early 1900s, in the heyday of modernism, the Bauhaus and the industrial age. Transoceanic excitement and broad sharing of ideas were rampant – for the modernists and for us leading, bleeding-edge BIM believers. Collaboration, sharing and a new attitude were the orders of the day. We were smarter, faster and without question a bit more automated, industrialized (read impersonal, bureaucratic) than we had been. But

through it all, I was always glad someone else was doing the keyboard crashing and software coding – because they just weren't my thing. My intelligence, what little I may have had, was of a different ilk.

And Now, AI?

The current tsunami overtaking the built environment industry (and all of civilization) is artificial intelligence (AI). Some would call it alternative intelligence or machine learning. The power inherent in AI is nothing short of frightening. And having read this memoirish rant thus far (lest you cast me off), I welcome AI's arrival. I'm the first to delight in being able to talk to Alexa to select a movie to stream or to buy an airline ticket on Delta and select my seat, all in 30 seconds. Those smart, efficient, satisfying experiences are minimal examples of AI. I enjoy using intelligence and being efficient. I don't want to return to the days where we didn't have the information we needed to do our projects and were left to guess or approximate. (Let's pool our ignorance!) In the decades since I began practice, it now seems we have too much information. Some of it is even intentionally shaded or shaped with ill intent to deceive or persuade us, whether by evildoers, politicos or simply by commercial or governmental entities with self-serving motives. This rampant propaganda now threatens our ability to be intelligent because we can scarcely tell what is real. Now our challenge is filtering, reducing, evaluating and rendering information so it is manageable and useful. With AI's help to generate rough drafts and do generic research, we can direct our energies to those reductive efforts, to curating and judging.

In these very pages I have interviewed the likes of industry prophet Phil Bernstein, who offered understanding of his new book, "Machine Learning." We at DI have shared an optimistic podcast with prolific author and educator Randy Deutsch, who paints a picture of AI's liberating potential. I edited a scholarly essay by Eric Cesal, who, in his two-part essay: "In The Future, Everyone's An Architect" shockingly, used free software to produce a stunning, AI-generated video featuring a typical architect, owner and contractor. The familiarity of the clichés they exchanged was frighteningly accurate. It's true, it seems: We are creatures of habit, our patterns are predictable. As Cesal showed, even machines, drawing from available data, can design houses and say the exact, clichéd things that we experienced, highly trained design professionals say. Liberating? Perhaps. Scary? Indeed. In need of human oversight and curation? Absolutely!

The Invisible

Students of culture know that the aspects manifest in an organization are what define and comprise it—things like language, artifacts, behavior, beliefs and values. But, surprisingly, even more important to cultures are their hidden principles, those things embedded in a culture that are not talked about or seen.

In most of the world, such tenets include things like the expectation that we wear clothing in public, seek to do the right thing and (except for a few politicians) that we be kind to others. In addition to other, now hidden beliefs in our capitalistic society like the assumptions and expectations of continued economic growth and always available resources, the belief that technology will always improve – and grow – to enhance human existence is now predominant.

Man 2.0

In his bestselling book "Homo Deus," Yuval Noah Harari speaks of humanity's next evolution into a greater mind, a higher level of consciousness through machines, computers and other forms. He calls this aspirational state "Man 2.0." Perhaps this higher consciousness will become invisible, automatic and a part of daily life. Perhaps it already has. The internet – call it our collective intelligence – already knows my buying tendencies on Amazon. Those are clearly being tracked. Related internet feeds are being sent to me through RSS on Flipboard based on my interests and what I follow. To us amateurs, these are forms of machine learning, big data and artificial intelligence.

"What is essential is invisible to the eye."

– Antoine de Saint-Exupéry, "The Little Prince"

When artificial intelligence does become more invisible, integrated and inescapable in daily life, I'll have no problem accepting it. I'll embrace it as I have all other technology to date, provided it's regulated, safe and that the ill-intended are somehow kept at bay. Acknowledging and accepting that that day (along with AI's powerful, generative capabilities) is already upon us is still slightly beyond my comfort zone and ability to make sense of it. In the meantime, I'll watch and wait.

Ability and Responsibility

Charles Darwin taught us that those best able to adapt are best equipped to survive. I'm proud of my ability to adapt to innovation and technology over the years. An ability to anticipate and react to the future, an evolving set of careers and a high level of tech savviness have benefited my career and life to a greater degree than many younger, less adapted colleagues. Starting with humanity's discovery of fire, tools, language and the power of collaboration to improve our lot, we continue to evolve selectively to increase our intelligence.

But it's the natural order of things for our rate of adaptation to slow down in our final decades as humans, and I will accommodate that pace. Do we senior members of the profession have a responsibility to confront, assess and embrace AI's advance? Of course, but that doesn't necessarily mean we must lead the charge. Rather, our value lies in offering perspective and humanity – aspects AI cannot offer.

The primitive and the industrialized, author photos

I am far from a technology denier. I welcome it. I'm sure in short order I'll likely be a daily user of many more AI-based tools and services. I'm no Luddite. My technology adoption and use record supports that claim. But as Clint Eastwood's Dirty Harry famously said, "A man's got to know his limitations," and I know mine. And while I welcome AI's abilities to overcome them, I know others are much better equipped to serve as first-wave enablers in the co-creation role to help the machines find their way to help and serve us.

At this point in my trajectory, I'm happy to enjoy a few of the analog experiences I had to forgo while I was engaged in these last few digital revolutions – you know, the things that aren't artificial, the things that are clearly real. Things like talking to people, writing, going for a walk, petting the dog and traveling our planet with my wife while I still can.

Yes, I don't want to be the guy who bleeds and leads the way in figuring this one out. I'm quite happy to let others manage that charge. When AI can be made safe, easy and harmless for the mainstream, I await the opportunity. You see, I'm all for intelligence, just don't ask me to show the way this time, because I'm not that intelligent.

Or maybe – in knowing that it's not for me – I am.

From Atlanta, Georgia, USA, Earth, in the year 2024, I remain …

Michael LeFevre, FAIA emeritus, managing editor of DesignIntelligence; principal, DI Advisory; senior fellow in the Design Futures Council; and author of the Amazon bestselling new release, "Managing Design" (Wiley, 2019), a person of primarily human — and often limited — intelligence.

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Craig Goldblatt

Creative director of
Living on Purpose Global

In this conversation about leadership and service,
Craig Goldblatt shares his journey to discover
intention and purpose.

Craig Goldblatt (CG): Thank you so much for the opportunity. The first thing I want to say, Michael, is that I'm about a million miles away from being a guru.

DI: Fair enough, but it's relative. Our themes for this year include leadership and burgeoning professional responsibilities. As your work pertains to those topics and contexts, I'd say you are well ensconced in guru territory. How did you get there?

CG: I'm passionate about my life and how we can serve. It's a privilege to be in this world and be serving as I am. I'm 50 years old, born in South Africa in 1973. My parents emigrated to the U.K. in 1977, in the middle of the winter of discontent, a fascinating time to arrive in the U.K. My parents weren't fans of apartheid, and they struggled with the inequality

building within it. There were so many problems in South Africa in those days. Many said the late '70s could have seen a civil war there. My parents looked at their four- and five-year-old kids and felt England would be a better place to bring us up.

Dad was academically gifted. He was a Cecil Rhodes Scholar. He achieved great things in that world, studied social sciences at Oxford University and then returned to lecture about law in South Africa. He was offered great accolades in the world of constitutional law in South Africa, but we decided to emigrate. I grew up in Surrey, 35 miles southwest of London, and earned some business diplomas. Unfortunately, my mom got very sick and passed away when I was 18. Like so many youngsters that lose a parent young, I didn't deal with it well, and I blocked her death out. Mom was spiritual in her orientation. She was a Nichiren Buddhist and spent many hours every day in meditation.

It was a strange time because, as a kid, I felt my mom's spirit. Her heart was growing, yet her body was shutting down all at the same time. As I reflect on Mom's life, she was an incredible light for me. She taught me about strength and how to live with those difficulties. After she died, I poured my heart into my sales work and went on the road as a foot soldier selling capital equipment to industries. I got a job in the world of international freight development in London, which had a vibrant sales environment in the early 2000s. I was fortunate and got promoted. But I always say I got promoted to the level of incompetence because, as I got more senior, they put me behind a desk and asked me to crunch numbers and look at business strategy when all I wanted to do was inspire the sales team.

By my late 20s, I realized my only real business gift was in communication. I was great at developing the sales folks, but not at sitting behind a desk. By the time I was 29, I left the corporate world. I started teaching basic sales rudiments such as how to plan, prepare and introduce yourself, how to ask questions, how to present with integrity and power and how to build a pipeline. I enjoyed teaching and realized my future was in professional speaking. At 30, I found my way onto the European conference circuit and started trotting around the continent, delivering talks to corporate organizations.

I was never a great student in school, but when I hit 30, I became a voracious learner. I dove deep into neuroscience, neuro-linguistic programming and quantum physics to understand how we tick emo-

> "When you look at a village in Africa that can hardly eat and they're still joyful, it's because they'd live and die for each other. They know exactly who is standing next to them, and they trust them."

tionally, internally. Inside ourselves, how do we learn about the clarity of our intention for our life, our purpose and how we meet our emotional needs? I had some great teachers, many from the U.S. I followed Jack Canfield, Mark Victor Hansen, Anthony Robbins and Deepak Chopra from a spiritual perspective. I read everything I could in my early 30s. I was lucky. In those days I was speaking at 100 conferences a year and was learning a lot.

At 35, I was tired and burned out. I'd been on the road speaking full-time for five years, and I had an opportunity to go to India to study. I met a lady in India doing incredible work in the heart of the Ecuadorian part of the Amazon rainforest. She was part of a charity working with Indigenous communities in Central and South America. She invited me and some others to visit these communities in the Amazon rainforest. There, I had an opportunity to sit quietly and understand more about my mom's life and grieve for her, because between the ages of 18 and 35, I wasn't ready to accept what had happened to her.

DI: Were there any other catalyzing events?

CG: I went to places like India and the Amazon to learn about Mom's legacy. I had an epiphany there and came home and told my wife and friends I wanted to build a charity in Africa. That's where my architectural journey started, when I decided to build a school for 800 kids in the north of Burkina Faso in West Africa. Burkina Faso is a landlocked, sub-Saharan country. If you look at the Human Development Index laid out by the United Nations, it's one of the poorest countries in the world from a literacy perspective.

If you want to build using vernacular architecture in an extremely poor country and give its communities opportunities to live and learn in houses and schools and have decent hospitals, Burkina Faso is an amazing place to deploy architectural abilities to make a difference. Coincidentally, I found an amazing architectural charity run by wonderful architects in London called Article 25.

I persuaded their CEO, Robin Cross, to do it. He worked with the likes of Jack Pringle, Sunand Prasad and other great architects. Robin came to Burkina Faso and kindly took us on as a partner and built us an amazing school with laterite stone from local quarries. The architects in his office designed us a wonderful building that was fit for purpose. That allowed us to run great vocational programs for the kids and support farming, woodwork and sewing, and it was a fantastic platform and introduction to the world of architecture for me in real time.

After building that school, the community learned how to build from these great architects and project managers, so much so that they're now building other schools based on the principles laid out by those architects. That was a great project for me. At the same time, we managed to raise enough money to invite other people to come and run the charity, and that gave me an opportunity to go back to full-time speaking. Fast forward, and I've now been fortunate to be speaking for the last 21 years.

DI: What is your focus? Your message?

CG: My absolute focus for audiences now is to serve them in a way to focus on our internal psychology. I help audiences meet their emotional needs through four major elements of our internal world. I talk to audiences and work with people first on our emotional legacy. What's our

intention for our life? The second thing I focus on is our purpose. What's our reason for living, and how do we meet our emotional needs? The third thing I focus on is our identity, to remind people about their magnificence and unique talents. As the foundation of this work, the fourth thing I work with people on is their beliefs and values. The charity gave me the opportunity to learn about the cultural diversity that exists in different parts of the world, in India, Africa and different places. Building from that foundation, now I speak at conferences, I train and coach people, and we take people to remote environments to give them an opportunity to be introspective and learn more about their own personal leadership. In a nutshell, that's my life story.

DI: Fascinating. Is it safe to say that what transformed your traditional career into your current higher calling was a broad worldview entry point, being from South Africa and the U.K.? I'm embarrassed by how little we Americans know about the world when I travel and talk to others. You had perspective as a benefit. Then you tried some of the more traditional career roles and found they didn't suit you.

CG: No question.

DI: The negative experiences can be even more valuable than the positive ones by telling you what you don't like. Then, your two significant life-shaping events, your mother's passing and your opportunity in Burkina Faso. Are those the major shapers?

CG: Yes. Absolutely.

DI: Those were the forces that helped you transcend a traditional career and find your true purpose?

CG: You've hit the nail on the head. It's mostly my experiences. Unfortunately, for whatever reason, we've evolved as we have because we learn so much more from our suffering and difficulty, don't we?

DI: Yes, it's new so we notice it. It's furthest outside our learning curve and comfort zone. It hurts more so we remember it.

CG: Exactly.

DI: I wish I would've figured that out earlier in my career. I would've taken more shots. I would've failed more often.

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> Every generation has to learn the lessons again. There's something endemic in human beings that says that we have to create and destroy things again. It's part of our evolution.
> "

CG: Yes. I was so fortunate to be able to travel early in my development to places like India, West Africa and the Amazon, because the more intense the environment, the more we get out of it. In neuroscience, I was taught that two things impact our brain the most. One is intensity and one is trauma. From a chemical perspective, a shock or an intense experience – it can be a hug, a kiss, jumping out of a plane, telling somebody we love them or anything intense – helps stimulate our nervous system to the point where we look at our belief systems again. We look at our neurological pathways and our lives in a different way, and so our beliefs in a different way. We change our beliefs based on intense experiences. I happened to be lucky enough to visit some very intense environments.

DI: To hear you say that is reinforcing. In our current world of dis- and misinformation, what fuels the media and their quest for dollars is emotion and extreme content. If you love a certain politician, they feed that to you to evoke emotions of fear, anger and misguided certainty. The extremes and the trauma push people to the edges and become polarizing – a vicious cycle. It's emotion-driven motivation. What motivates you?

CG: A sense of contribution. As you say, most of us end up in this place, don't we? What motivated me in my 20s was to know that I was enough, enough for my dad, to be significant and have a deep connection. To know that I was enough and was loved. I always knew that, but I didn't actualize it. To create a sense of certainty for myself and know I had a career ahead of me. Early in my career those were the important things. As you get older and more experienced, you become more certain as to who you are. You've absorbed life's knocks and difficulties. Now, my absolute motivation is to grow and to give back, to contribute.

DI: You talk a lot about finding your true purpose, and that starts with intention. Obviously, you didn't start with that intention when you were 18 or 20.

CG: Certainly not.

DI: But it has since manifested itself through your life path. You talked about having presented to groups of architects. At DI, that's our world. Creators of the built environment are who we serve. This is a huge generalization, but that group is stereotypically egotistical, very much about themselves. Yes, we have a higher calling and a duty to society,

but we are an egotistical lot. What's your experience been in trying to transform those kinds of groups? Those "enamored of their own inherent specialness" to realize this higher calling of serving others? Any reflections on that challenge?

CG: I'd like to generalize even further. We're living in a world where media stimulation is so extreme, and we're so overloaded as to who we should or can be or that we're wrong in this and we're right in that and we need to look this way and we need to do that.

DI: Too many false binaries …

CG: Yes. Our media stimulation is extraordinary – almost superhuman or beyond our ability to absorb or cope with it. As a result, most people are living in a reactive place, trying to swim against the tide. People are desperate to know who they are. That causes us to become self-centered. We're trying to look after ourselves. When we go further away from a deep community, we lose our sense of certainty. When you look at a village in Africa that can hardly eat and they're still joyful, it's because they'd live and die for each other. They know exactly who is standing next to them, and they trust them.

What's happening, not just in the architectural community and its related industries but at least in the Western world where I live and operate in conferences and with companies, is that we're so disparate now as human beings. What we need is a deep sense of community and belonging. When we lose that now, as kids, and we go to the dollar, to more money and the belief that we need a bigger house and a bigger car, and we need, need, need, need to be enough, then we become self-centered. We don't even realize that's what we're doing, but that's what's happening. My wish, my intention, is to support people to have enough time to create a sense of community with those they love around them and those they feel can give them an opportunity to grow and develop themselves.

DI: That's the perfect segue. I just read a book by Yuval Noah Harari. His first book was "Homo Sapiens." His second book is titled "Homo Deus," meaning "Man Version Two." That is, as we aspire to the next evolution of humankind, or the convergence of man, machine and artificial intelligence to a potentially higher plane, how do we go about that? I found

this fascinating. He talks about our core economic assumptions. Ever since we stopped being hunter-gatherers and began farming, division of labor and economics and ownership began, and power crept in.

At least in the Western world, there has always been this assumption of capitalism as a default mindset. We must accumulate more. We must make more money. The assumption is about growth and greed. "We must grow. There are always going to be more resources." It's been a fixed-pie, win-lose mentality. As Harari explains, we did fine when we operated as communal groups. If there was one great tool for killing tigers, we shared it. It wasn't owned by any one person. Connecting this to our current world of design and construction, the projects we do, stupidly, are based on first cost rather than life-cycle cost or impacts on a broader constituency.

CG: Yes.

DI: When we are trapped in that capitalistic paradigm, if you're like most clients, you're going to say, "My job is just to deliver this project on budget, world impact be damned." So, the whole set of rules we're playing by is insane. My question, wish and hope is: How do we change that essential paradigm? Per Thomas Friedman, China is trying to embrace that defunct mindset now. They want to drive SUVs and have McMansions just like the U.S. They want to be as grossly energy consumptive as we are in the U.S. How do you get us off that mindset to see more broadly? It's a huge question, obviously, but surely you've grappled with it.

> " Where I've ended up is that we have to start with self. "

CG: Oh my goodness, absolutely. When I studied NLP, they taught us about communication filters: how we communicate between our subconscious and conscious minds and how we then experience the outside world through our senses. How do we make sense of everything?

DI: NLP?

CG: Sorry. Neuro-linguistic programming.

DI: Thank you.

CG: NLP was built primarily by two gentlemen in the 1970s, Richard Bandler and John Grinder. One was a mathematician, and one was a linguist. They were fascinated by how we communicate internally and how we make sense of our maps of the world. What does the world look like in our eyes? They built an extraordinary psychology. It's not new, either. Hitchcock was using it in his films way before they looked at it. It's thousands of years old, but they packaged it in a clever way.

One of the filters they taught us was the spectrum of granular versus universal thinking. What makes a difference to the person in front of us, and how does that make a difference to the wider world? Some of us are micro-focused, they called it, and some of us are macro-focused. What's our focus? Is our focus making a difference to our two or three children? Or is our focus to help the whole of Africa? What's our focus, and how are we going to make a difference there? How are we going to bring people back to balance and community? How do we do this?

I used to have a macro filter. I used to try and help with bigger systems. Whether I was any good at it, I don't know. But we did some good projects. Christ didn't solve all the world's problems; Mandela had more power and even he didn't solve South Africa's problems. All these people have immense power. Martin Luther King made an enormous difference to America, but America's still got its racial and social problems. Every generation has to learn the lessons again. There's something endemic in human beings that says that we have to create and destroy things again. It's part of our evolution.

My truth now is having the courage to deeply serve and positively impact one person at a time. We have to recognize that, for the person inside us, we were born with our own lungs and our own heart. We have to be the best person we can be, and we have to shine. Therefore, if we focus on ourselves a bit more and meditate a bit more and breathe better and look after our health better, then we have the energy to be able to love the person in front of us more. That's where it all starts. I might be wrong because there are people that can truly change the world through their millions. But where I've ended up is that we have to start with self.

DI: So true. I hate to derail a wonderful inspirational conversation with something pragmatic, but I'll do it anyway to ground us, bring us home and convert this to applied, applicable knowledge.

CG: Please do.

DI: How do we start with self? Your website talks about intention and leaving a legacy, but let's get practical. You share a blueprint to make that happen. Without giving us your entire body of work, is there an overview you can offer on how to make this tactical?

CG: In NLP there's something called levels of change. How does a human being change? I teach seven different levels of change. The first is intention, the second is purpose, the third is identity (who we are), and the fourth is belief and values. They are what we call internal levels of change. In the Western world, in England, we don't measure those elements, those levels of change. What makes it practical is the three lower levels of change, which are our skills, our behaviors and the environment we create. And when I talk about those being lower levels, they're not less or more important than the higher levels of change, they're simply external levels.

In other words, what makes change practical is to look after our environment first. The second thing that makes real change is how we behave within that environment, our day-to-day behavior and daily practices. And the third is our level of skill. Our capabilities and being able to work on improving our weaknesses and harness our strengths. My answer at a practical level is to focus on being aware of looking after the environment around us, which is the most important thing we can do these days. The second is: how do we breathe? How do we read books? What books do we read? How do we treat others?

Where do we choose to spend our time? At the gym or drinking alcohol? What are our daily practices? Are we meditating every morning? There are ten practical behaviors we can instill in our daily practice that our

grandparents had more time to foster than we have, but they're vitally important. I'll finish my answer by saying what's practical. Gandhi said this: Our behaviors stimulate our beliefs, and our beliefs create our purpose. What does our daily routine look like? Are we waking up in the morning and breathing in the right way for 15 minutes? Are we holding our heart and setting an emotional intention for the day? Are we remembering to look at nature and love a tree every day and love the sky and love our children and spend time watching them play? Are we reading the right things and staying off too much social media? Are we eating the right things? Are we filling ourselves with vegetables and water? Are we doing the basic things to make our life practical? Because they end up being our destiny.

DI: Such a wonderful answer, Craig. I've enjoyed this conversation immensely. In a short time, you have illuminated a path to serving well and finding a higher purpose. I can't thank you enough. It's great to be able to meet you., I sincerely hope we will continue the conversation and I look forward to our next one – and to sharing this with our DI audience and beyond.

CG: Me too. Thank you for the opportunity.

> ## "Our behaviors stimulate our beliefs, and our beliefs create our purpose. "

Craig Goldblatt is creative director of Living on Purpose Global, a man on a mission to bring clarity and purpose to one million people over the next 10 years. He is a master at unlocking and unleashing purpose, building on the principles of neuro-linguistic programming. As a world-renowned transformational speaker, impact coach and philanthropist his work is embraced by leaders, businesses, charity enterprises, NGOs and nonprofit organizations who want to make world-changing contributions with massive results. As founder of Giving Africa, he has been responsible for construction of new schools and transformative work for many.

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OBSERVATIONS

"You may say I'm a dreamer, but I'm not the only one. I hope someday you'll join us. And the world will live as one."

— John Lennon

"I'm increasingly inclined to think there should be some regulatory oversight, maybe at the national and international level, to make sure that we don't do something very foolish. With artificial intelligence we're summoning the demon."

— Elon Musk

"Artificial intelligence would be the ultimate version of Google. The ultimate search engine that would understand everything on the web. It would understand exactly what you wanted, and it would give you the right thing. We're nowhere near doing that now."

— Larry Page

"The real question is, when will we draft an artificial intelligence bill of rights? What will that consist of? And who will get to decide that?"

— Gray Scott

"Before we work on artificial intelligence why don't we do something about natural stupidity?"

— Steve Polyak

"Do stuff. be clenched, curious. Not waiting for inspiration's shove or society's kiss on your forehead. Pay attention. It's all about paying attention. Attention is vitality. It connects you with others. It makes you eager. Stay eager."

— Susan Sontag

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