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CONTEXT: CONVERGENCE

As long ago as 1962, now more than 60 years, Rachel Carson reminded us:
"In nature, nothing exists alone." "We in this generation, must come to terms with nature, and I think we're challenged as mankind has never been challenged before to prove our maturity and our mastery, not of nature, but of ourselves."
- Rachel Carson, Silent Spring, 1962

But how do we approach this "obligation to endure" as she called it.

As leaders, we face many competing interests. Those of our firms versus larger societal and planetary demands. Self-imposed, yet necessary deadlines as in the AIA's 2030 Challenge. Moral and social imperatives to rebalance the diversity, equity and inclusion within our organizations and profession. But how do we cope with these multiple divergent paths? By bringing them together. By connecting and prioritizing them. In short, by converging.

It is said that writers write. In a parallel mandate, architects design. But we must change our exclusionary ways. In every design decision we make we decide not only what to include but also what to leave out. This has historically been the designer's purview. In making such decisions, the designer brings "order from chaos." But the writers have written. The words are on the wall. As we designers design into the future, we must get better at the art of being inclusive, connective and synergistic. We have too long suffered from the fascination with the current of our own emotions and the allure of design. Without letting go of design's draw when the white lights of design call, we must see clearly and no longer be blinded. Think of it as a consolidation of skills and responsibilities.

Many leaders of the built environment have yet to assume such broader challenges. They don't think they are their responsibility. Far from it. But that must change.

The questions are many in our quest for convergence. Do we have the audacity? The panache? Can we control our emotions to mark ourselves in that way? Can we grant reciprocity to alternate views and constituents outside our circles? This is life. Things circulate. They evolve. Can we use our holistic skills to stop being – and causing others to be – victims? To synthesize our broader set of challenges through a design ethos? I believe we can, and so we explore Convergence in this issue of DesignIntelligence Quarterly.

This Q3 compilation continues our yearlong investigation of six annual DesignIntelligence focus areas. They are:

1. **Leadership**
   The Business of Design, Resilience
2. **Technology Futures**
   Artificial Intelligence, Applied Research, Innovation
3. **Organizational Futures**
   New Organizational Forms, Alliances, Work, Workplaces, Value Propositions & Business Models
4. **Responsibilities**
   Global / Regional / Local, Motivations & Incentives (Group & Individual), Housing, Homelessness, Society, Civility, Income Gaps, Climate Change Dynamics, Sustainability & The Environment
5. **Academy / Practice Gap**
   Trans industry & Transdisciplinary Collaboration, Professional Education, Development & Continual Learning, New Skills, Talent)
6. **Economics & Investment**
   Finance, fiscal responsibility, geopolitical issues

...to remain relevant and resilient.

As always, we invite a strong slate of industry thought leaders to contribute. Some chose to tackle more than one of these subjects. The common idea in this Quarter's offerings? Convergence. Specifically, here's what you'll find inside this issue of DI Quarterly from our DesignIntelligence contributors:

DeeDee Birch leads off with an essay entitled *Convergence: Buildings, Biology and Symbiosis*.

In *The Tortoise and the Hare*, economist Bob Hughes provides a midyear update and analysis on financial and geopolitical events.

Scott Simpson looks at long-term horizons and buildings as storytellers in *Taking the Long Term View*.

Erika Moody's interview *Leading Lines* looks at discipline convergence and the future.

From CO architects, Chikara Inamura shares case studies of his firm's recent office expansion in his analysis, *The Digital Twin: Planning the Future of Workplace Design*, an account of how BIM converges with 3D scanning, a game engine, and the internet of things to create a highly adaptable office informed by quantifiable metrics.

> "Without letting go of design's draw when the white lights of design call, we must see clearly and no longer be blinded. Think of it as a consolidation of skills and responsibilities."

In Disasters, Dictators or Data? HOK Chairman emeritus and cofounder of the buildingSmart alliance, Patrick MacLeamy suggests data and AI as the way forward for smart cities.

DI CEO Dave Gilmore gives us *Interdependent Convergence*, an examination of intention, synthesis, systems and inclusion as value sources for the profession.

Rob Otani examines "the new electricity" and its applications his article entitled *The AI Revolution in AEC*.

Paul Hyett posits a desperately needed new building type to house the homeless in his essay *The Myth of the Undeserving Poor*, and asks: Can we do the right thing?

Enarche CEO Dez Joslin shares her advice on the integration of business development, marketing and practice in her piece *Three-Part Harmony: The Winning Dialogue*.

My essay, *Coming Together* examines decision scales ranging from individual to global and beyond in our quest to integrate thinking.

With the best these remarkable thinkers have to offer in hand and in mind, let's embark on a journey of discovery - and convergence - together.

Michael LeFevre, managing editor

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

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INTERDEPENDENT CONVERGENCE

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INTERDEPENDENT CONVERGENCE

Dave Gilmore

President and CEO
of DesignIntelligence

DI's CEO examines intention, synthesis, systems and inclusion as value sources for the profession.

The idea of convergence is derived from the readily described visuals of things on individual paths redirecting to come together, forming a result. Be they alike or diverse, complementary or conflicting, these disparate elements come together in a common direction or flow. Such convergence may be anticipated or wholly surprising. Their coming together may yield positive or negative outcomes. In most cases, convergence by itself is not correlated to predefined outcomes. But, in some instances, designed convergence for a targeted outcome is a fulfillment method that can result in cohesion, unity and positive environmental, social and economic outcomes.

Though the theme of convergence has been the subject of writing and speaking, planning and execution over many decades, it has lost its meaning, impact and power in the chopped-salad confusion of "more is more" contemporary life. The "more is more" mentality has dominated global economies for so long that we seem to know no other way. Our myopic consciousness excludes most anything outside the context of immediacy. As such, we are now marked by shallowness, shortsightedness and general stupidity. (By the way, stupidity is "showing a great lack of intelligence or common sense." Does this resonate?)

Convergence At Its Best

Convergence in its best and most meaningful context results in powerful happenings that extend beyond a single result. The multi-oriented, multi-disciplined and multi-perspective power of many factors coming together to inform and empower design is the stuff of magnificence, miracles and metanoia. When humans come together to accomplish what is best for most, inclusive of the myriad species beyond humans, just about anything is possible.

Convergence can empower and catalyze the realization of this m triplet. Magnificence is that quality of being exceptionally beautiful or impressive. It captures our attention and often our gaze. Miraculous is that quality of being assigned to divine interaction or involvement. It lifts us out of ourselves into a different, mysterious realm of reality, perhaps more real than our mundane physicality. Metanoia is the quality of changed direction from one state to another. It confronts us with transformative change that requires the better and best of us.

Convergence can also catalyze negative outcomes. When myopic thinking converges with fear, uncertainty and doubt, the catalyzed outcomes are often exclusion, marginalization and destructive dynamics. Negative convergence occurs far too often simply because we allow it to, rather than engineering a decoupling of contrary contributors. Convergence can occur naturally or be engineered. Responsible humans must choose to design positive convergence resulting in positive forces that catalyze transformation.

> “Designed interdependent convergence is the fundamental nature of what is often referred to as a “system of systems.”

The best expression of designed convergence is marked by interdependency between multiple contributors coming together. Decoupling of positive contributors results in independent contribution—by itself, not negative, but a yield that falls short of interdependence’s positive power. Designed interdependent convergence is the fundamental nature of what is often referred to as a “system of systems.”

The human body is a thing of wonder. One ancient said, “We are fearfully and wonderfully made.” This writer celebrates the magnificent design of the human species, not as a primordial accident or happenchance, but rather as the intricate outcome of the miraculous noted earlier. The human body is the ultimate system of systems, one designed and operating on the elemental principle of interdependent convergence. Everything is connected to everything else.

I remember as a child the sing-song ditty, “The foot bone’s connected to the ankle bone. The ankle bone’s connected to the leg bone...,” and so on. Everything’s connected to everything on a primary, secondary or tertiary hierarchy. It’s why an understanding of the interdependencies of the body’s systems is fundamental to the practice of medicine and health care.

My father was a medical general practitioner for 50 years before he passed. I recall him speaking often about system-interdependency in medicine and how medical education had shifted from understanding general holistic systems to specializations that neglected a comprehensive understanding of the body as a whole. As such, he warned that medicine would devolve to hyper-specialization and the neglect of a holistic understanding. This would then lead to fragmentation in education and practice and ultimately result in escalated effort and cost in health care delivery. He was neither a prophet nor the son thereof, but he was prophetic. We now live in an era of hyper-specialization with hyper-cost and degraded outcomes.

Design Parallels

These days I’m observing how design education and practice parallels this dynamic in medicine. How much of the overall design curriculum is dedicated to the holistic understanding of the system of systems that results in functionally healthy, effective and sustainable buildings? How much study and discussion are given to the intricacies of interdependence and then modeled in the studios and labs?

What holistic practices operate under this same understanding of interdependent convergence and demand of their talent a working knowledge of the system of systems that comprises a building and its greater contexts?

In today's architecture and interior design economy, practices are often market-sector oriented. Specializing in health care, hospitality, workplace, education and more, architecture and design practices have steadily progressed toward hyper-specialization as a commercial strategy. Though viable for marketing and business development effectiveness, care should be taken to not abandon the essential nature of design as applicable to any and every context. Carrying the powerful transformative awareness of design as the holistic unifier of interdependent convergence into every engagement has the potential to elevate the design professions from a commodity provider to their place at the center of value. Design beyond buildings – leveraging system of systems understanding into holistic solutions – alters the value orientation of the architect and designer from a diminishing trajectory to an ever-elevating one.

As new and reinforced disruptors challenge the status quo of traditional design ways and means, nothing is more essential to sustainable outcomes, measured and perceived, than embracing the truth of interdependent convergence as the essence of the value the design professions offer the world.

Are you embracing the truth?

Dave Gilmore is the president and CEO of DesignIntelligence.

COMING TOGETHER

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August 2024

COMING TOGETHER

Michael LeFevre

Managing Editor, DesignIntelligence

Michael LeFevre explores decision scales and convergence.

"It really boils down to this: that all life is interrelated. We are all caught in an inescapable network of mutuality … a single garment of destiny. Whatever affects one destiny, affects all indirectly."

– Martin Luther King Jr.

As we contemplate our editorial threads for the year, issues such as leadership, artificial intelligence, organizational and technological futures, the academic/practice gap, responsibilities and economics and investment, the question of how these ideas are connected seem unavoidable. How do they connect? As we consider these connections and the essays and interviews we share here, it seems appropriate to consider the scales we operate within and the way we make decisions. As design professionals our task is often to diverge and explore uncharted possibilities, but in the end, true design synthesis occurs only when we turn the corner and bring things into unity. Each such act eliminates options and is a convergent act. But how do we accomplish them and what should we consider?

Decision Scales

Most of us who have had a design education of any kind are taught to think at multiple scales. Designing a house? Don't forget to consider its site and community context. What about its regional impact or global repercussions? Moving inward to smaller scales, have we imagined the impact on the building users or next generation occupants? Even more minutely, have we looked at the details, furnishings, equipment and objects that will activate and enable the house? For designers, builders and users, all these scales deserve our attention. Much of the context has to do with how we make decisions. After all, making decisions, narrowing searches and moving divergent information into converged solutions is what we do. But how should we go about it in a connected world?

As each new input or decision enters our frame of reference, a nested set of moral, ethical and tactical questions emerges. To build a mental model of this framework, think of a series of nested concentric circles (or spheres, in three dimensions). Geographically, each circle potentially yields larger influence on a greater number of people in realms of increasing size and are farther away from us as individuals. But even if we understand the different realms and relatedness of each of these decision scales, how we integrate them constitutes the magic of good decisions – and good design.

You

At the core of this mental scalar galaxy is each of us. At each turn, you, as an individual, must assess each possible thought or its related impact on you, your health and mental well-being, your core values and outlook on life. Is it right or wrong? Will it suit you? Will you like it? Will you enjoy it? Is it something you must do? Is it a priority, urgent or important? Is it part of your long-term vision or a distraction? At a Maslov-ian level, is it required for survival or self-actualization? If so, which? None of these decisions are purely rational nor exclusively intuitive. That's where the conflict – and fun – comes in.

Family and Friends

At the next-larger scale or sphere of influence, nested around the first one, lies each action's potential impact on family and friends – those we hold close and dear. If we do this thing, what would it mean to them? What would its effect be on the people we love? Should we make this choice or take this action knowing its potential effect upon those we care about?

Team, Project, Department or Work Group
The next scale affects those you work with, are charged with, or a team you are a member of. Of major import in your and their daily work and personal lives, does the decision to demand overtime, reject their design scheme or critique their work have project merit? What about its personal and professional cost to them and their teammates?

Organization
The next scale to consider is your company, university, church – the organization to which you belong and devote most of your energy. Beyond your project or team, how does your action affect your larger organization? If you are truly committed and convicted to the organization's mission, you care deeply about these impacts.

Partners, Collaborators and Clients
To grasp this next category, architects and engineers can imagine their consultants, subconsultants and clients, upstream and downstream. Contractors might think of trade contractors, manufacturers or suppliers. Other businesses will immediately think of the customers, manufacturers, vendors and suppliers that constitute their supply chain network.

Communities and Constituencies
In today's world we have myriad constituencies to which we are beholden. Regardless of contractual or project scope limits, our work will go on to affect a host of others beyond our project work. Now, we must ask: How do our design decisions and actions affect them?

Planet and World
Most of us have our hands, minds and hearts full simply dealing with our own terra firma – good old Planet Earth, our own site and its nearby, tangible limits. In the years before global telecommunication, the internet and frequent air travel, our lives were much more locally based. Now, how does our work affect downstream ecosystems, both natural and manmade? A few sage civilizations had outlooks that transcended time and space; they understood the connectedness of things and valued preserving resources for future generations. Now, aided by technology, most of us have a broader global view. We feel responsible for the global reach and consequences of our actions, or at least, we should.

In a recent issue of Noema, Editor-in-Chief, Nathan Gardels expands on this new mentality in what he calls The Third Great Decentering, a paradigm shift from globalization to planetary governance. Citing authors Blake and Gilman, Gardels explains:

> Globalization was about markets, information flows and technology crossing borders. The planetary is about borders crossing us, embedding and entangling human civilization in its habitat. That, in a nutshell, is the core thesis of a new paradigm-shifting book by Jonathan Blake and Nils Gilman titled "Children of a Modest Star: Planetary Thinking for the Age of Crises."
>
> The concept of planetarity describes a new condition in which humans recognize not only that we are not above and apart from "nature," but that we are only beginning to understand the complexities of our interdependencies with planetary systems.
>
> "If Copernicus's heliocentrism represented the First Great Decentering, displacing the Earth from the center of the heavens, and Darwin's theory of evolution by natural selection the Second Great Decentering, then the emergence of the concept of the Planetary represents the Third Great Decentering, and the one that hits closest to home, supplanting the figure of the human as the measure and master of all things," Blake and Gilman write.
>
> … "the Planetary as a scientific concept focuses on the Earth as an intricate web of ecosystems, with myriad layers of integration between various biogeochemical systems and living beings – both human and non-human. Drawing on earth system science and systems biology, this holistic understanding is being enabled by new planetary-scale technologies of perception – a rapidly maturing technosphere of sensors, networks, and supercomputers that collectively are rendering the planetary system increasingly visible, comprehensible and foreseeable."
>
> The open question is how, and if, human governance in the late-stage Anthropocene can align with the knowledge we are now attaining.

But Gardels observes a paradox:

> … planetary-scale connectivity is also what divides us. Convergence entails divergence because the universalizing and rationalizing logic of technology and economics that ties the world together

operates in a wholly different dimension than the ethos of politics and culture, rooted in emotion and ways of life cultivated among one's own kind.

Such grand scale thinking might leave the average design firm leader stunned. It does me. And we are not yet at the end of the decision scale continuum.

Beyond?
With a few exceptions, most of us don't extend beyond Earth in our daily lives. Save for scientists, philosophers, theologians and space travelers, most of us are content with limiting our actions to life on our planet.[1] But then there are the ozone, global warming and other interplanetary questions. Yikes!

Decision Mechanics

Operating in and between these various decision realms and scales is a dynamic proposition. As each decision presents itself, information migrates quickly from its external source, penetrating these outer protective layers until it makes its way to you. You mull it over, all the while contemplating its impact on and relationship to the other surrounding scales. The idea moves quickly as you evaluate it, dashing from one scale to the next, and back, morphing between causes and effects. Should I take this commission? you wonder. It would be a highly visible and profitable undertaking, one good for me, my team and family. Perhaps we could buy a nicer car. (Do we need one? What are the hidden costs?) But the fact that it would require designing a building for a company that releases toxic waste into the environment or that is a well-known racist organization sheds a different light on that decision. What would our partners think? Accepting this job goes against all our values, so the answer is no. After bouncing around in several of the scale rings, in the end, the decision came to weigh heavily on the outer scale rings – those affecting others more than ourselves and, because of its clash with our core values in the inner ring, was rejected.

We make thousands of these kinds of decisions daily of varying magnitudes. How do we include other humans and their perspectives in the decisions we make? Do we value our encounters with them even if they come from different worldviews? Do at least listen to and consider them?

Scrap Metal (or Interpersonal Gold?)

Shifting scales significantly to the human scale, I share a personal anecdote. On a recent morning walk with a friend in Atlanta we passed an auto repair shop. Just as we walked by, an old man with a long, scraggly, white beard appeared, pushing a wheelbarrow filled to overflowing with scrap metal. Moved by his visage, I decided to reach out despite his apparent position in a different social circle.

"Are you retooling those, or are they scrap?" I asked.

"Scrap," he said. "High-value stuff raht cheer," he confided, as he loaded a brake drum into his truck with oil-stained canvas work gloves.

"Been doin' it for 20 years. First for my stepson when he run it, but he passed away. Now, I does it for my grandson. He done took it over."

"Do you take it down to Central Metals?" I asked.

"Nope, I got a loop I do. I take it over by Hiram."

"You ever been to Wallace BBQ?" I queried, remembering it near Hiram, Georgia.

"Oh sure," he replied, smiling broadly. "Have a good un," he bid us.

"You too, sir," we answered.

Our engaging him created a connection. In the space of a single random question, we had mined a gold nugget of interpersonal shared experience from a bedraggled man hauling scrap metal. He smiled, and so did we, as we resumed our walk. In recycling metal for reuse, he was making connections in several ways:

- Connecting with his grandson to remove the metal waste he didn't have time to deal with.
- Completing the supply chain for reuse.
- Connecting with us, two other old fellows out for a walk, trying to stay connected to their health and to other interesting people they discover during their explorations.

Granted, this brief encounter didn't necessarily help me make any decisions that day, but our convergence left me with a brightened outlook and a hopeful attitude about humanity with which to make them.

Laud is in the Details

Even at the most minute scale of architecture, seemingly apart from the human interface, at the connections and junctions of materials and humans, there are opportunities to express – or not – how they're coming together. At each juncture, a decision must be made: Should the connection be expressed, flushed, trimmed, suppressed or exploited in some way? Perhaps even celebrated and highlighted? These inexorable decisions are ever-present in structural connections, convergences of interior finishes and materials and even in the treatment of mechanical, electrical and plumbing systems and human experiences. Each has the opportunity to transcend one scale and take us to another, enhancing the appreciation of the whole. Connection and convergence, it seems, are everywhere. At the least, their potential is.

You see, in design and construction, and in life with other human beings, working at multiple scales and bringing them together is the thing. That's where the good stuff happens.

My wish for you is that things are coming together.

[1] I do have a nephew actively working on building a network to bring unmanned drones (think Jetson-esque flying cars) to the market in the next few years. Need to get to LaGuardia in a hurry? Got cash, digital or actual? Call AirUber, or SkyJetson, you'll be there in no time. I also have a professional acquaintance who is working on the design of extra-planetary facilities, but those are clear exceptions.

Michael LeFevre, FAIA emeritus, is managing editor at DesignIntelligence; senior fellow in the Design Futures Council; and author of Managing Design (Wiley 2019) an Amazon #1 bestselling new release.

TAKING THE LONG VIEW

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TAKING THE LONG VIEW

Scott Simpson

Design Futures Council Senior Fellow

Thoughts on the convergence of architecture, storytelling and social values.

When we think of the broad sweep of architectural history, what comes to mind first are enduring monuments such as the Great Pyramids in Egypt, the Acropolis in Athens and Notre Dame in Paris. Each required tremendous imagination, huge resources and decades to construct. They also served a specific purpose. These are buildings that people literally looked up to. They functioned as a daily reminder of the power of centralized authority, be it church or state. Despite their incredible technical sophistication, none of them required a computer or a building code to construct, and none was handicap-accessible or had exit signs. Today, even as we build megaprojects such as airports and sports stadiums, replicating such monuments beggars belief. How did the ancients pull it off, especially without modern technology? And even more importantly, what inspired them to try?

The answer is deceptively simple: Buildings are the way we tell stories to ourselves, and stories are what bind societies together, allowing them to function. One glance at a pyramid and the Egyptian farmer knew immediately who was in charge. The subtle proportions and exquisite craft of the Acropolis inspired the Greeks to invent things, like drama and democracy, social constructs that had been previously unknown. The sublime light that suffuses Notre Dame is proof, if any is needed, there are things beyond human comprehension worth striving for. As for telling stories, what better device than a cathedral's stained-glass windows, which speak with great power while having no words of their own?

> Buildings are the way we tell stories to ourselves, and stories are what bind societies together, allowing them to function.

If today's buildings are how we express our values, what messages do they have to offer, and how should they be interpreted? As humanity has evolved, so has our capacity to build. While each structure must stand on its own, each is also part of an increasingly complex infrastructure. The urban fabric buildings create is like a life-form unto itself, growing over the earth like moss. Just imagine the stretch from New Haven to Philadelphia. Is it one city or several? From an airplane at 40,000 feet, it's impossible to tell.

As authors of the built environment, architects play both a creative and an interpretive role. There is an increasing appreciation not only for the influence the built environment has on our daily lives (after all, people spend far more time inside than out), but also the pervasive influence it has on the overall health of the planet (some 45% of all carbon emissions are construction related). Architects, engineers and designers of all stripes have the ability (some would say the responsibility) to be good stewards as well as good storytellers.

Most people think about buildings in terms of place and space; a building is a "thing" unto itself, static in nature. Others see buildings primarily as containers or backdrops to support the activities that transpire within; they are stage sets that can be modified and reconfigured as needed. Still others understand buildings primarily in terms of their financial impact: What are the capital costs, the operating costs and the resulting ROI? A good building, like a good actor, plays all three roles well.

In this context, architects make a big mistake when they see their role as primarily transactional. In short: Get hired for a specific project, draw the lines, collect the fee (and then submit for publication or a design award!). End of story. Under this paradigm, the relationship between the architect and the building essentially concludes when the ribbon is cut. However, that is precisely the moment the building comes alive, welcoming its new occupants and supporting their various activities while providing shelter from the elements. Too often, architects see their role as prenatal, but their long-term impact is postnatal. That is why design thinking should focus on strategy as well as tactics. It is the long-term value of the work that matters most. This perspective is often overlooked or ignored entirely when pursuing new work, negotiating contracts and charging for professional services on the basis of "deliverables."

The cost-to-value ratio of a building is determined in large measure by the length of time it remains in useful service. The longer it lasts, the less expensive it becomes on a cost per year basis. Real estate investors understand this concept and make their decisions accordingly. By contrast, long-term owners view things through a different lens. Often a building will be put to different uses, sometimes dramatically, over its useful life. A former industrial space can be reborn as a high-tech research lab. Such changes may not have been anticipated by the original designer or owner, but the value embedded in their work makes it possible. How should that embedded value be recognized or compensated?

As times change, the role and nature of an architect's work needs to be reevaluated, as has been the case for many other professions. The usefulness of an architect's services lies not in the lines drawn, but rather in the thinking those lines represent. As an analogy, it is the reasoning, not the typing, that makes for a persuasive legal brief. Design is inherently a value-added enterprise. After all, owners don't build to *spend* money; they build to *make* money. Design thinking makes that possible. The buildings that result contribute not only to the client's enterprise value but also to larger social goals.

Design is a universal language. One needn't be Egyptian to be awed by the Pyramids, nor Greek to appreciate the many stories the Acropolis has to tell. It's not necessary to speak French to love Notre Dame, as the recent outpouring of affection in the wake of its devasting fire amply demonstrated. Architecture speaks eloquently in all cultures and climates without needing an interpreter, which is why it is such a powerful communicator. Great design just needs to be seen to be experienced. Plazas and piazzas are the living rooms of cities. They have many stories to tell, just like libraries and museums. In fractious times, design can be a binding force because it provides a frame of reference everyone can relate to. Every building, large or small, has something to say, and much to teach us if we are only willing to pay attention.

> The long-term value of the work matters most. This perspective is often overlooked or ignored entirely when pursuing new work, negotiating contracts and charging for professional services on the basis of "deliverables."

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

THE MYTH OF THE UNDESERVING POOR

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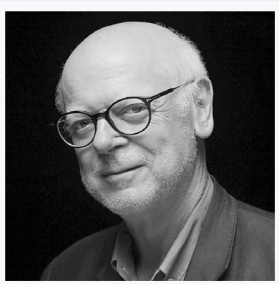

THE MYTH OF THE UNDESERVING POOR

Paul Hyett

Co-founder of Vickery Hyett Architects,
Design Futures Council Senior Fellow

Can we create a new building typology and do the right thing?

As a child I well remember the fear my grandmother expressed for “the workhouse.” One of fourteen children born into a rural community, she had been “put into service” at the age of thirteen in the nearby house of a wealthy family. This relieved her own family of the burden of maintaining her. Back then, large families who could not manage financially lived in constant fear of being “sent to the workhouse” as a consequence of homelessness.

The 19th century had seen rapid urbanisation across the U.K., and in the Victorian era virtually every town and city across the land had a workhouse wherein conditions were fearsome, as was so well described in Charles Dickens’ novel “Oliver Twist.”

Poverty per se was not new, and notably, throughout the long history of Christianity in the U.K., the church, in its various forms, had always been active in caring for the poor and the sick.

By the Middle Ages, the Catholic Church had formalised medical and social support for the needy through the monasteries, but, following the break-up of the monastic communities consequent on Henry VIII’s split with Rome, the state began to assume responsibility for the poor.

Thereafter, Queen Elizabeth I’s Poor Law legislation of 1601 effectively created a national system of care by raising taxes from parishes and homeowners for use in alleviating suffering related to poverty. Those funds saw the early construction and operation of almshouses,

hospitals, orphanages and workhouses, which brought with them a variety of bespoke new forms of architecture.

However, despite the formalised management of those in need (broadly categorised within four groups: children, the aged and infirm, the genuinely unemployed and the so-called "wilfully idle") a social stigma would attach to the poor, who would increasingly come to be seen as "blameworthy of their plight."[1]

Such attitudes would be challenged by the "New Jerusalem Movement," which sought a new and better "deal" for those from the working classes who had given so much to Britain's efforts during two world wars. By this time, the Established Church had distanced itself from the workhouse system but, along with other churches, particularly the Methodists and the Salvation Army, it had never lost sight of its duty toward the poor, the destitute and the sick.

Indeed, Christian leaders made an invaluable contribution to the structuring of the new and unprecedented initiative the welfare state would represent, its most ambitious component being the National Health Service, which brought the best in health care at no cost at the point of delivery to the entire British population. In anticipation of its formation, William Temple, as head of the Church of England, had raised public consciousness of society's responsibility for the poor and of the evils of the extreme inequalities of wealth across the nation in his book "Christianity and Social Order" (1942). Temple was a close friend of William Beveridge, whose report formed the blueprint for the Attlee government that would introduce these programmes in the aftermath of World War II.

The U.K. scene was thus set (as sociologist Thomas Marshall would write in 1965, "the overall responsibility for the welfare of citizens must lie with the state") and throughout the 1950s, '60s and '70s, the main political parties within the U.K. remained committed to maintaining the essential components of the welfare state: free education and health care for all, pensions for the elderly and financial assistance for the vulnerable and unemployed.

Sadly, however, even though the intention had never been to create a culture of dependency, a growing perception emerged in the later '70s that the "benefits system" all too often provided good lifestyles for those too lazy to work. The popular press, particularly the Daily Mail, would come to fuel those concerns even after successive Thatcher governments had set to with various initiatives to "roll back the state."

> "Thus, we now witness the crushing convergence of multiple agendas that combine to create an exponential increase in poverty and homelessness in our own homelands as two of the world's leading democracies prepare for elections."

Thus, a renewed hardening of attitudes to the poor, not seen since the Victorian era, has again emerged as reflected in recent surveys of "British Social Attitudes" that have found "support for additional spending on welfare benefits for the poor is considerably lower now than it was when the question was first asked in 1987." Much of the decline in sympathy had apparently occurred in the 1990s, just as the main beneficiaries of the welfare state (those who had enjoyed its support all their lives) were coming toward retirement.

The hollow ring of Titanic and ladders there!

That apparent decline in sympathy seems to have been inversely proportionate to the improved fortunes of the well to do. By 2015 the gap between the rich and the poor in the U.K. was widening faster than in any of the so-called developed countries, with the wealthiest 10% by then earning some 12 times that of the poorest 10% of our society. Today, it is common to see company leaders receiving, with bonuses and profit share, sums well over 50 times that of the lowest-paid full-time employees within their companies. Indeed, it is shameful that some in full-time employment can only make do with the charitable help of foodbanks.

> We must find a new building typology through which the problems of poverty can be alleviated.

But help, in the form of handouts and welfare, is inadequate in the long-term. The underlying causes of such poverty in the cities of the developed world can only be addressed by integrated socio-economic-political thinking – of which we currently have a dearth.

In DesignIntelligence Q1 2024 I referenced Cordell Hull and Franklyn D. Roosevelt, both of whom were ardent adherents of the progressive Wilsonian belief that free trade would promote not just prosperity, but also peace. However, I am sure that neither Woodrow Wilson nor those from the western democracies who promote the free trade agenda had ever anticipated that our home manufacturers would (sometimes with cynical disregard for their employees' interests) pursue competitive advantage by outsourcing production of everything from clothes to kitchen utensils to far-off lands where labour is cheaper and, all too often, unregulated.

Thus, we now witness the crushing convergence of multiple agendas that combine to create an exponential increase in poverty and homelessness in our own homelands as two of the world's leading democracies prepare for elections: the U.K. on 4 July (ironically Independence Day in the U.S.) and the U.S. on November 5 (ironically, Guy Fawkes' Bonfire Night in the U.K.). Do we have leaders with the sophistication to respond to these complex issues? Perhaps more poignant: Do we have electorates willing to demand and tolerate policies that will alleviate, and ultimately solve, such problems?

As a child I occasionally witnessed our town's "vagrant," who used to sleep in shop doorways. Today, such unfortunate people can be found by the thousands across the streets of our towns and cities. Many are refugees, some are mentally ill. All suffer terribly, especially in our winter periods.

Most are harmless, some are threatening, and some take to crime, but together their impact on our streets, and upon the public places within our towns and cities, is becoming increasingly noticeable. Not just by their presence, but by our society's newfound architectural response to the perceived problem: Ever larger parts of what was the "public realm" (commercial districts and shopping arcades) are being policed by private security firms by day and being shut at night.

Most noticeable of all, individual houses within our suburbs are, with increasing frequency, being cocooned within high security fences and locked gates, whilst new "up-market" residential estates languish behind security gates to be accessed only through closely guarded entrances.

All of which is generating an ever-grimmer architecture and a significant departure from the culture those who love cities and city life should be seeking to protect.

In DesignIntelligence Q1 2023 I referenced Harvard Philosopher Michael Sandel's book "The Tyranny of Merit," in which he argues convincingly that the impoverished not only have a right to resources, but also a right to contribute to our society. This takes us to the heart of the problems of unfettered and unregulated capitalism: If the jobs are no longer there by virtue of mechanisation, or simply of offshore outsourcing of production, how can the workers so affected provide for themselves and their families or contribute?

Unsolved, these problems will lead to ever more defensive, even fortress-like architectures as our city districts evolve into "no-go" zones or "protected areas" preserved by force for the privileged. Meanwhile, stepping over our brothers and sisters living in cardboard boxes and flimsy tents in freezing shop doorways is shameful to a supposedly civilised society, and the threat that some of the destitute pose to the well-being of all will ultimately become intolerable. So, the nettle must be grasped, and we must find a new building typology through which the problems of poverty can be alleviated.

We still have old people's homes and assisted living, and we have prisons and hospitals, but I sense a new building typology is required to offer what the workhouse (the last of which shut in 1948) failed to provide. I would call this the "faircampastery" – a word derived from "welfare," as in the welfare state, with all its connotations of fairness; from "campus," as in places of teaching and learning; and "monastery," borrowing from the monastic tradition of helping the destitute and homeless back into health and self-sufficiency. Such "faircampasteries" would, like the old monasteries, be located around the country to meet the needs of those who have simply been unable to compete any longer.

Expensive? Of course, but a small price to pay for doing the right thing.

[1] Martin Charlesworth and Natalie Williams, *The Myth of the Undeserving Poor* (Surrey, UK: Grosvenor House Publishing, 2014), 10–11.

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THREE-PART HARMONY: THE WINNING DIALOGUE

DesignIntelligence® MEDIA
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THREE-PART HARMONY: THE WINNING DIALOGUE

Dez Joslin

CEO, Enarche Design

Aligning marketing, business development and practice for success.

A Call for Change

After years of asking firm leaders their priorities, the same themes consistently rise to the top:

- Fill the pipeline and win more work.
- Create a culture that attracts and retains great talent.
- Establish brand recognition that goes beyond select individuals.
- Produce impactful work that makes people's lives better.

At the core of it, we all want to create something that matters and lasts.

Why, then, do many firms unknowingly sabotage their ability to achieve these goals in a scalable way? Perhaps it's because leaders are empowered to solve firm challenges without understanding or considering the entirety of how their firms function. With good intentions, silos are constructed, and many initiatives and systems are designed to serve one or two disciplines rather than all the parties who might benefit from them.

It doesn't have to be this way. Firm leaders can connect typically disparate disciplines – marketing, business development (BD) and practice – to optimize their efforts and foster more collaborative

working environments. Not only does this create more consistency throughout a client-engagement or project life cycle, but studies reveal that highly aligned firms *grow up to 19% faster and are 15% more profitable* than nonaligned firms.[1] Many other industries have figured this out and have dedicated resources to improving these connections. So, what is holding us back?

How We Got Here

Historically, marketing and BD disciplines were frowned upon in our industry. So much so that in 1909, the American Institute of Architects (AIA) banned architects from competing based on fees and using even the most basic forms of marketing and BD.[2] As McGraw Hill Construction put it, "It was as if Starbucks were forced to charge the same amount as Folgers but could not state why their brand was unique." Instead, they relied purely on word-of-mouth—a philosophy based on "the work should sell itself."

Architects weren't the only ones affected by this mentality. In 1962, the National Society of Professional Engineers implemented a code of ethics that prohibited its members from listing their names in the newspaper.[3] It later placed extreme limitations on which marketing practices were permitted.

In 1980, these restrictions were lifted when the AIA repealed its code of ethics (almost a decade after the US Department of Labor deemed them a restraint of trade). Even still, many firms didn't change their stance on the topic due to the stigma. It wasn't until pressure mounted from the recessions in the late 1980s and early '90s, along with changes in client cultures, that architects started taking marketing and BD more seriously.

Progress has been made since, but it's been slow. In fact, you may still hear the phrase, "The work should sell itself," thrown around. In today's firms, practice is often seen as a sacred cow, with all other functions merely there to support their efforts. Because of this, many AE professionals have a hard time accepting the contributions of others as critical to their business. While BD (because we still dare not say *sales*) is more widely embraced within many firms, it is still underleveraged. Conversely, marketing remains deeply underappreciated and misunderstood – typically relegated to BD support and proposal generation.

> "To remain relevant, we must recognize the power of looking at marketing, business development and practice as equally important and mutually reinforcing. Aligning these functions closes integrity gaps, optimizes holistic solutions and accelerates the achievement of firm goals."

However, a changing of the guard is taking hold, and emerging leaders are increasingly advocating for new ways of working. Let's look at how.

Creating the "Winning Dialogue"

Despite differences in approach, marketing, BD and practice can and should align to create and establish value in the market. At Enarche, we call this the "winning dialogue" – when all three areas of a firm break out of their silos and embody a shared brand identity to reach firm goals.

Here is an example of how this might play out in a different environment. Imagine interacting with a public figure, let's say, a famous public speaker named Kevin. The first interactions with Kevin are from a distance, primarily through social media, blogs and online videos (marketing). You find him incredibly insightful and immediately seek out more of his content. After following him for several months, you decide to attend a conference where Kevin happens to be speaking. After his talk, you bump into each other and really hit it off (BD) – he's personable, leans in and shares invaluable advice on a topic you're struggling with. Through your short interaction, you decide to hire Kevin to speak at your next leadership retreat. This is where the rubber meets the road – the third and final step in affirming Kevin's value. In preparing for the retreat, you and Kevin build a meaningful relationship (practice). Not only is his perspective sharp, but you can also tell he genuinely cares about the success of your firm and team. Ultimately, the leadership retreat is such a hit that you book him to speak again next year and immediately start recommending him to all your peers.

Why did this story have such a fairytale ending? Because Kevin is the real deal. Your experience with him was consistent *and* engaging in all three forms of interaction. Instinctively, you want to tell everyone about it. Of course, this is an example of when it's done right, but you could envision the same scenario with a different outcome.

The "Winning Dialogue" is about closing integrity gaps – the difference between an organization's values, brand promise, code of conduct and what actually happens in day-to-day behavior and decision-making.[4] A client's experience should be cohesive at each stage of their journey with your firm, from navigating your website to completing a project with you. Maintaining this consistency is the key to creating loyalty and advocacy.

The Challenge to Act

Marketing in the built environment industry is no longer just about name recognition and beautiful portfolios. It's about clarifying, communicating and proving the value that only your firm can deliver – over and over again.

To remain relevant, we must recognize the power of looking at marketing, business development and practice as equally important and mutually reinforcing. Aligning these functions closes integrity gaps, optimizes holistic solutions and accelerates the achievement of firm goals.

Let's start a new chapter, together.

[1] Phill Harrell, "Perspective on Alignment: Outdated Stereotypes, Pipeline and Revenue Goals for Marketing," Forrester 2020, https://www.forrester.com/blogs/sales-executive-perspective-on-alignment/.

[2] Jane Kolleeny and Charles Linn, AIA, "Marketing: Lessons from America's best-managed architectural firms," Architectural Record (2002), https://www.architecturalrecord.com/ext/resources/archives/practice/pdfs/02marketing.pdf

[3] Scott Butcher, "A Brief History of Professional Services Marketing," Aecumen, April 24, 2019, https://aecumen.com/2019/04/24/a-brief-history-of-professional-services-marketing/.

[4] Ralph Schneider, "Closing the Integrity Gap: How to Build a Healthy Culture," LinkedIn, January 27, 2020, https://www.linkedin.com/pulse/closing-integrity-gap-how-build-healthy-culture-ralf-schneider/.

Dez Joslin is the founder and CEO of Enarche, a firm focused on bringing holistic marketing and business development expertise to the built environment industry. With a background in and out of the A/E space, she is passionate about developing unconventional solutions that help her clients think beyond the what to infuse the why, cast vision, scale their organizations and build stronger, strategic brand identities. As CEO of Enarche, Dez leads a team of strategists, operationalists and creatives who rally behind one goal — connecting you with your ideal client.

THE AI REVOLUTION IN AEC

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THE AI REVOLUTION IN AEC

Robert K. Otani, PE

Chief Technology Officer
at Thornton Tomasetti

Rob Otani examines "the new electricity" and its applications.

The Wave Is Upon Us

Artificial Intelligence (AI) has powered its way into the world's minds in the last two years, largely due to the emergence of ChatGPT and Large Language Model (LLM) technologies. Its simplicity of use for all levels of professionals and its overwhelming capability to learn from millions of reports, texts, images and other media and generate well-written responses has gotten our attention.

While AI has been reshaping industries and daily life for many years in companies like Google and Amazon, its latest LLM and foundation model technologies are now developing new and more powerful capabilities at an unprecedented pace. This poses significant risks and opportunities. From health care to finance, from production staff to executives, AI's swift integration has revolutionized processes, enhanced decision-making, spurred innovation and created new markets, marking a transformative leap in technological advancement and societal impact on businesses at large. In similar fashion, the architecture, engineering and construction (AEC) industry is equally ripe to be transformed by AI. The question is: Can we harness the power of an apparent new utility? One that transcends "basic" services such as power, light, water and the internet?

We believe we can. At Thornton Tomasetti's CORE studio, the firm's R&D technology incubator has been deploying a team of technologists, software developers and data scientists using our own dedicated AI team called CORE.AI, to research how to best leverage AI technologies to automate processes and scale knowledge transfer to accelerate our company's business.

Diving In

My journey into leveraging AI and machine learning (ML) ML for structural engineering was sparked by a curiosity about AI/ML in 2014 when "Big Data" was a buzzword at all tech conferences. How we might untangle the Big Data "hairball" was a frequent topic in those days. By accessing and sorting it, perhaps we could find the "stars" in its midst. But there was only one way to find out.

Despite AI's great promise, it wasn't yet clear to me how big data was going to help our engineering business until I started to research and understand how AI/ML works myself. Ten years ago, at AECTech 2014 (Thornton Tomasetti CORE studio's annual technology symposium), I gave a presentation entitled "Symbiosis." It shared my speculative view about how "Big Data" could add significant value to business enterprises, based on having the capability to filter big data and extract the "intelligent" aspects of our consulting practice from the corpus of past and present deliverables (e.g., technical reports, drawings and Enterprise Resource Planning/Customer Relationship Management data). Being able to store and share that intelligent information with everyone at the firm at the right times in a project offered great potential, I posited. The symbiotic aspect of this premise and its potential is that harnessing intelligent data from experienced engineers would offer a means of knowledge-sharing with young engineers. Moreover, the global shared intelligence of the firm would grow exponentially with every generation, and the process – and its virtuous, self-reinforcing cycle – would continue. After all, engineering consultancies are valued based on our intelligence and quality. Drawings and reports are only byproducts.

What I know in retrospect is that I was conjecturing about a data-crunching tool that could learn from those smart bits of filtered data and store them in an application to enable scalable access by the entire firm.

Welcome to the age of AI/ML.

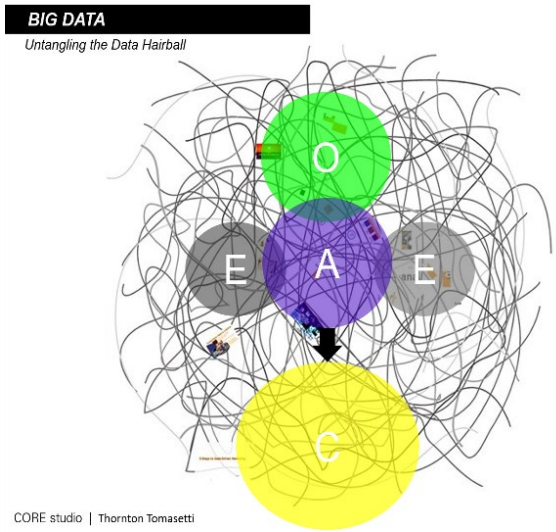

Image of a Data Hairball in AECO (2014)

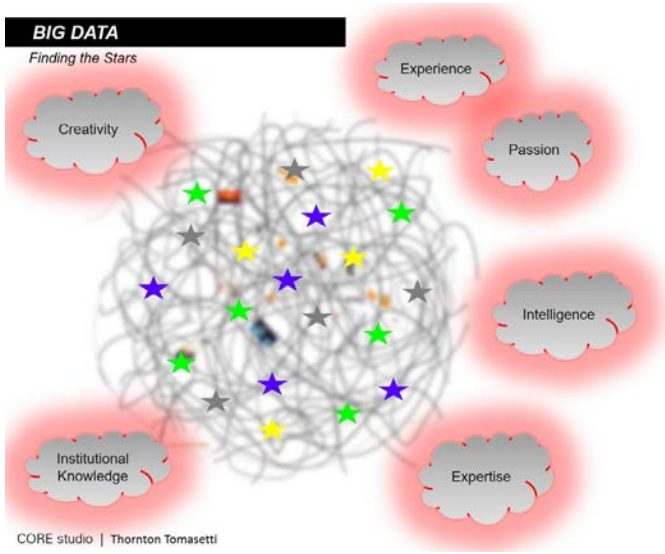

Image of the Intelligent Aspects of a Project's Data (2014)

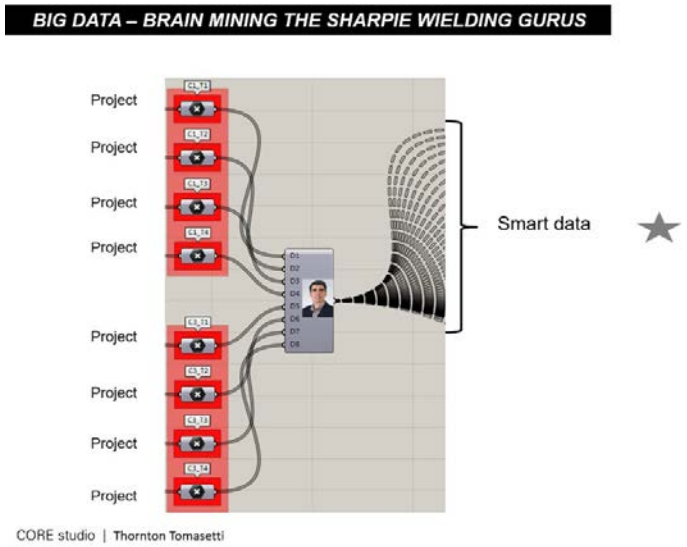

Image of Our Then CEO Illustrating the Parsing of Knowledge (2014)

The Power of Learning

We can now see that AI's ability to process and "learn" from vast amounts of data quickly, accurately and computationally in minutes or hours with similar intelligence (accumulated knowledge) as a person who learns over many years has the power to transform AEC business practices. How buildings and infrastructure are designed, analyzed, constructed and maintained will be reimagined by AI processes and, at the least, will accelerate early design phases by a minimum of 20-30%. Beyond making these phases faster, they will simultaneously enable better quality by using AI-powered, synchronized, multidisciplinary design predictions with connected dependencies.

Lessons Learned from AI/ML R&D: Asterisk 1.0

In our early investigations, CORE studio's AI/ML R&D team started developing machine learning models for structural member sizing and developed one of the first, if not the first, fully automated ML-powered building design web applications called Asterisk (Asterisk (thorntontomasetti.com), which was released in 2018. Asterisk predicts structural member sizing for steel and concrete high-rise buildings with approximately 90% design "building code-level" accuracy in under 30 seconds. The equivalent manual task would take a team of engineers at least two weeks to complete the same level of design on a single option with 100% accuracy. Asterisk's underlying concept was not to replace what a human does, but to leverage the automation of building ML "designs" to perform a multitude of schemes and provide the design architect and client with a multi-objective solutions array that weighed cost, embodied carbon and materiality.

Despite Asterisk's groundbreaking nature by any standard, our engineers at Thornton Tomasetti were reluctant to adopt an ML-powered tool for several reasons including a lack of trust of the results (i.e., ML automations tend to be mysterious, black box operations) and, in 2018, engineers were not prepared to accept a fully automated tool. However, with AI/ML's current rising awareness in the industry, Asterisk has become a much desired and highly accepted tool.

In 2021, Asterisk's concrete column machine learning model was integrated into Testfit (TestFit: Real Estate Feasibility Platform), and in 2023 the second generation of ML models were integrated into Skema. AI (Skema), an AI program similar in nature to Asterisk.

AI/ML Models with Speed and Accuracy: Asterisk 2.0

While the first series of structural ML models in Asterisk 1.0 were effective, their accuracy relative to code-based designs needed improvement. It also took a bit too long to execute them. Asterisk's ML models were created by generating a "synthetic" dataset, by computing millions of optimized solutions with numerous independent variables using encoded structural code-based algorithms or by using a commercially available finite element program and running analyses in batch runs using a Cartesian product of sets. The combination of non-optimized methods our team originally used, as well as the limited computing power of early CPUs and GPUs made the creation of structural ML models a slow process – on occasion lasting months.

But over the last three years, we have been optimizing our end-to-end process and can now train most structural ML models in less than a week. In some promising studies, we can train multi-parameterized models using reinforcement learning in an hour. Data generation and training optimization is a prioritized goal for economy and model tuning, as well as supporting our firm's goal of carbon footprint reduction. As a benefit, our target ML model accuracy is 95% or better for all our ML models. This means with minor tuning, models will almost always predict design options that exceed minimum building

> Enterprise-level chatbots using LLMs will now be standard protocol for access to expertise from past and present sources.

code requirements, and that design parity is achieved when studying various materiality or system options (i.e., cases in which qualitative optioneering is only possible when accuracy among all possible design options is similar). For engineers, accuracy level is paramount from a safety standpoint as well as for enabling trust in our ML models' predictions.

Scaling Enterprise AI: CORTEX-AI.IO

An equally powerful optimization of end-to-end ML applications CORE studio has recently developed is our MLOps (Machine Learning Operations) platform called CORTEX-AI.IO. Asterisk 1.0 had all the ML models locked into the web application code base. This meant that modifying the logic or changing or adding ML models to the web application were arduous coding processes that would take weeks or months depending on whether any of the inner logic or dependencies within the application needed modification.

According to the website Databricks, "MLOps is a core function of machine learning engineering, focused on streamlining the process of taking machine learning models to production and then maintaining and monitoring them."[1] CORTEX-AI.IO stores datasets, experiments (trained models with tuned hyperparameters and algorithms) and allows a simple deployment of a trained model to a REST API to be used by an external web application. In lay terms, CORTEX is essentially an app store for ML models at scale.

Internally, we can now link a multitude of ML models (i.e., steel beam framing, columns, braced frames, foundations, etc.) to be logically connected with dependencies to create a complete ML building configurator, similar to Asterisk 1.0, or simply to serve as a single micro app for any of our singular ML structural framing member models. The flexibility of this ecosystem using CORTEX.AI allows us to configure our ML structural apps to nearly any level of complexity, building typology, structural materiality, wind or seismic zone, building height and combination thereof.

Business Enterprise and Large Language Models

In 2022, the world – in particular, the business world – changed when OpenAI's ChatGPT was released and went viral. To have an almost real-time chat with the entirety of the internet's data and subsequent "intelligence" is mind-blowing, considering the best information search tools we had until that time were search engines like Google, which only

found links to content as opposed to advanced text generation and responses in well-written paragraphs. In my opinion, ChatGPT is orders of magnitude better than Google, even when functioning only as a search engine.

Serendipitously, one of our data scientists was working on an R&D project to train an AI model to understand and learn from our company's intranet data with years of technical discussions and company news. But when ChatGPT and it's corresponding LLM API were released, the R&D project changed radically. Using a technique called retrieval-augmented generation (RAG), which employs a pretrained LLM with an external data source (in this case, the text was our internal intranet data), our CORE.AI team was able to prototype a custom GPT pipeline we called "TTGPT." TTGPT successfully found and contextualized years of firm knowledge in seconds with a simple prompt.

What this effectively meant was that an engineer could have a conversation with an AI that could read thousands or millions of documents in real time. More specifically, this allowed years of institutional knowledge to be accessed by everyone at the firm almost instantaneously. From a business standpoint, this kind of access is a critical aspect of our existence. AEC firms' "secret sauce" is our collective knowledge learned over many years. Traditionally, it had been passed on through direct, interpersonal interactions, but those traditional knowledge-transfer interactions are not scalable in a multi-office and multi-continent firm. Using LLMs and accessing smart data sources, they are. Enterprise-level chatbots using LLMs will now be standard protocol for access to expertise from past and present sources.

AI/ML, Robotic Process Automation and Augmented AI/ML

Robotic process automation (RPA), also known as software robotics, uses intelligent automation technologies to perform the repetitive office tasks of human workers, such as extracting data, filling in forms, moving files and more.[2] RPA is not new, but our team has been creating RPA applications by combining multiple manual, repeated processes into a single process using AI. Engineering tasks, many of which are rule-based, are prime applications for RPA. CORE.AI's current truss design tool is at least 100 times faster than the best engineer. By our latest validations and tests, CORE.AI is also more precise by using a combination of finite element model simulations (FEM), ML models to predict truss member sizes, encoded optimization routines normally done manually by a person and non-ML code checks for validation. Of course, the design of a truss is only one structural element in a building and may only need to be used occasionally by an engineer. Yet, over time, it will save thousands of person-hours. Even better, since it has been rigorously validated and has an independent, physics-based, self-checking mechanism for quality control, it doesn't make mistakes without informing engineers when it fails! CORE.AI's venture in the RPA space using AI to automate and/or augment multiple manual processes with precision is the future of engineering and AI.

Structural Health Monitoring and Digital Twins

Structural health monitoring (SHM) in combination with digital twin technology that leverages AI's power is on the verge of reducing the overall building and infrastructure costs, improving the overall health of our world's infrastructure and automating how our infrastructure is maintained and prioritized. AI now has the capability to learn from past data, such as years of inspection reports and real-time data from IoT sensors and drones. This allows prioritized and predictive maintenance actions at scale without relying on a multitude of disparate and incomplete resources. Our CORE.AI team is researching AI methods to digitize and correlate past reports and findings with physical assets such as buildings and bridges. Next, we layer on sensory data to allow performance predictions and automated capital expenditure prioritizations based on structural health. Automating those processes and adding real-time intelligence to our aging infrastructure will save costs and extend the lives of our urban assets.

AI/ML Customization and De-Risking Tasks

Of course, any automated software tool like ChatGPT (just as non-AI tools like Excel) can make mistakes from hallucinations or formulaic errors. In both situations, it is difficult to decipher how and when mistakes are made. But in ChatGPT's case, it is always advisable to find a non-AI generated source to double-check its writing. In the case of Excel, it is a norm at engineering firms to always double-check an Excel-generated result independently. At Thornton Tomasetti, we have developed an "AI Guiding Principles" document for the entire staff to put forth a best-practices guide on how to use and how not to use AI. Over time, this document will need to adapt to the ever-changing AI landscape and complexity. In the meantime, every firm needs to

educate their staff about the power and risks of AI. Our CORE.AI team has been customizing our AI apps to be self-checking through non-AI methods and recommending that AI/ML be used only during early design phases, which will serve to de-risk AI.

Future Learning

As AI/ML automates low-level tasks, many of my colleagues and I have legitimate concerns that young engineers will not learn key engineering insights like the older generation did by solving problems manually many times over many years. Instead, an AI/ML tool will complete those low-level tasks automatically. I believe, as younger generations of engineers have grown up in the digital/automated age, they will learn significantly faster than my generation did by playing with those same AI/ML apps, just as they did with video games or by having conversations with those same AI/ML applications directly or through an AI agent. Digital learning has improved significantly as a response to the COVID era. Through my own experience with online resources, certain training aspects would not even be possible without the vast access of digital resources now available. In the near future, every AEC employee will have a smart AI-generated copilot and mentor to provide resources and advice when needed.

The Road Ahead

AI/ML will transform all businesses functions of AEC from technical tasks and administrative functions to accounting, finance and marketing. Multitudes of robots will work in the field in construction with certainty. This is why Dr. Andrew Ng, cofounder of Google Brain, says, “AI is the New Electricity.” It seems we have found our new utility: The power of artificial intelligence is in our hands. It is paramount that all AEC firms begin to leverage AI because it now has the capacity to automate routine tasks and is already transforming how knowledge is shared.

In the future, firms that leverage AI will reap significant gains in bottom-line performance and will discover new business lines that will grow their firms and ensure they are lasting and resilient for generations to come.

[1] “MLOps,” Databricks, https://www.databricks.com/glossary/mlops (accessed June 12, 2024).

[2] IBM.com

> “It seems we have found our new utility: The power of artificial intelligence is in our hands.”

Robert K. Otani, PE, is chief technology officer at Thornton Tomasetti, Inc., a 1700+ person, multidisciplinary engineering and applied science firm, and founded the CORE studio, a digital design, application development, AI and R&D group at his firm. He has 30 years of structural design experience involving commercial, infrastructure, institutional, cultural and residential structures on projects totaling over $3 billion USD of construction and has led numerous software applications, including Konstru, Design Explorer, Beacon and Asterisk, the first ML-powered structural engineering application in the industry.

THE DIGITAL TWIN: PLANNING THE FUTURE OF WORKPLACE DESIGN

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THE DIGITAL TWIN: PLANNING THE FUTURE OF WORKPLACE DESIGN

Chikara Inamura

Director of Digital Technology
at CO Architects

In the age of AI, Digital Twin technology presents a long-anticipated promise for the AEC industry to harness spatial data for human-centric design.

Cloud-based Digital Twin Platform at CO Architects - Images courtesy CO Architects

What Is a Digital Twin?

Nowadays, many of us feel technology is evolving faster than our ability to adapt to the changes it brings. Eric "Astro" Teller, CEO and "Captain of Moonshots" at Google X, explains this phenomenon in New York Times columnist Thomas Friedman's book "Thank You for Being Late." Teller draws a comparison between the exponential rate of

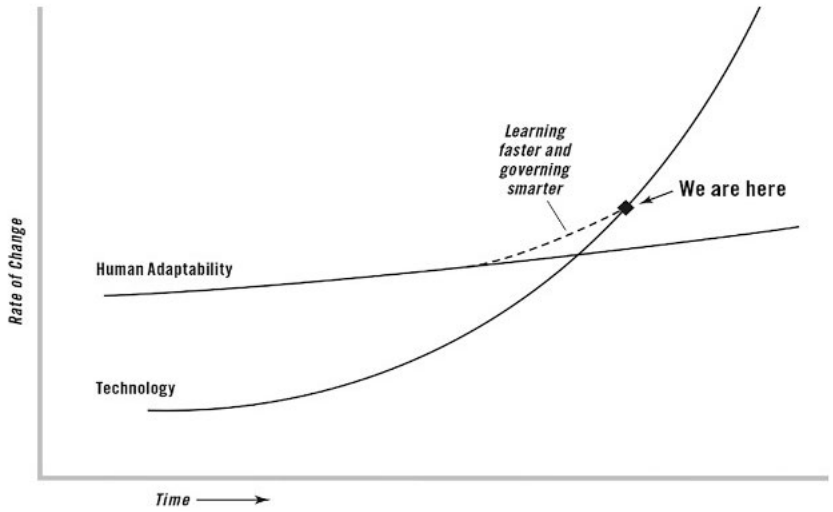

Figure 1: Rate of Change in Technology and Human Adaptability, Thomas Friedman

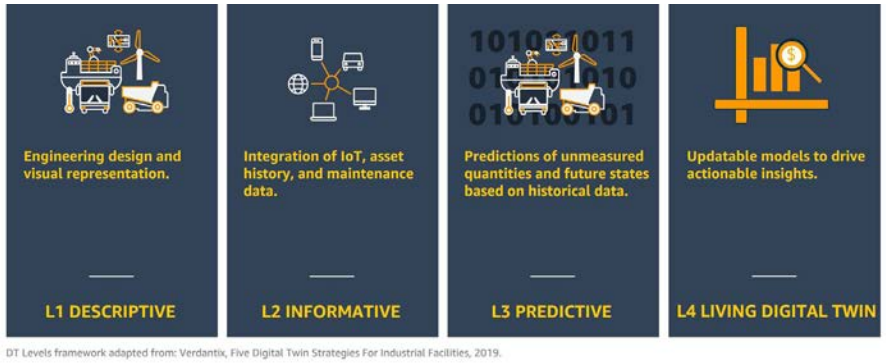

Figure 2: Digital Twin leveling index, Amazon Web Services (AWS)

change in technology based on Moore's law and a relatively constant rate of change in humanity – both individuals and society – to adapt to changes in its environment (Figure 1). The Digital Twin is a good example of this phenomenon, where the development of its enabling technologies and infrastructures is accelerating at such an increasing speed that it is nearly impossible to draw a clear definition of its capabilities, let alone its potential values to our society.

Defining Digital Twin

Dr. Adam Rasheed, the Head of Autonomous Computing at Amazon Web Services (AWS), addresses this challenge and provides the following definition that comes closest to my understanding of the capabilities and values of a Digital Twin: "A Digital Twin is a living digital representation of an individual physical system that is dynamically updated with data to mimic the true structure, state, and behavior of the physical system, to drive business outcomes." With this definition as an overarching framework, Dr. Rasheed identifies the following four stages of development and use cases of Digital Twins (Figure 2):

- L1 Descriptive: Engineering design and visual representation.
- L2 Informative: Integration of IoT, asset history, and maintenance data.
- L3 Predictive: Predictions of unmeasured quantities and future states based on historical data.
- L4 Living: Updatable models to drive actionable insights.

Digital Twins at an Architects' Office

CO Architects recently relocated to a new office space a few blocks from the building it occupied for the last 34 years. Current market conditions allowed us to lease about 50% more space – an increase from our previous 19,000 square feet to more than 27,000, with an expansion option – for only a modest increase over our previous monthly payment. Designed by our own team of architects and interior designers, we became the client as well as the tenant of our own design. This offered a rare opportunity to turn our new office into an experimental sandbox to implement various Digital Twin solutions. Adapting the four-stage description by Amazon Web Services, we identified our initial exploration as the following two case studies:

Figure 3: Time Machine – Descriptive Digital Twin at CO Architects - play video here

Time Machine: A Descriptive Digital Twin

The first case study focused on the concept of a virtual time machine. Designing a new workplace within an existing building requires an acquisition of spatial data of existing conditions and careful coordination with a virtual model that represent the design intent. Harnessing the modern 3D scanning technology with traditional BIM data in a game engine, we developed an interactive virtual environment, wherein a series of time-stamped, 3D-scanned data at various stages of construction was overlayed with design and engineering CAD models.

The idea of archiving spatial data and making it readily available as 3D datasets for future reference is exciting and important for us as we plan on making continuous improvements in our built space to accommodate future growth. For 3D scanning, we used Matterport to capture the as-built condition and construction sequences at monthly intervals. We used Unity as the game engine to map all 3D assets in a timeline and create an interactive environment that was hosted on a cloud.

This interactive set of models became a 4D representation of the built environment with dimensionally accurate 3D point-cloud data from each phase of construction. This initial development of a descriptive digital twin enabled our users to travel forward in time to review design finishes and materials during construction, as well as travel back in time to uncover building structures and service elements behind finished walls as we continued to modify and enhance our workplace (Figure 3).

Case 2: "The Live Dashboard" – An Informative Digital Twin

The second case study focused on the development of an informative digital twin by incorporating IoT sensors and web APIs with our descriptive digital twin model to map spatial activities and environmental data. CO Architects' new office provides ample natural light all around a wide range of functional spaces that accommodate various activities from open collaborative workplaces to private offices, meeting rooms and a fabrication shop. One thing we've learned as a tenant of our own design was that repartitioning the floor while maintaining the existing MEP system revealed some local variances in internal temperature and noise levels across different parts of the workplace.

Beyond temperature and noise variations, we started to witness trends in user preferences for specific rooms and locations for certain activities. To better understand these trends, we installed a series of temperature sensors across the floor and overlaid real-time room use data in our digital twin platform. Temperature streaming was established using Home Assistant, an open-source IoT platform, and Postman, a web-based API platform, while room use data was retrieved via room booking interfaces on Apple iPads and Microsoft Graph API (Figure 4). Both data streams were brought into Autodesk Tandem and combined with BIM data to create spatial data visualization and analytics (Figure 5). Our informative digital twin platform connected static spatial data with dynamic performance metrics from the environment and user activities. This data synthesis is an exciting step for us, one in which we can begin to drive the future of workplace design with informed decisions based on quantifiable metrics.

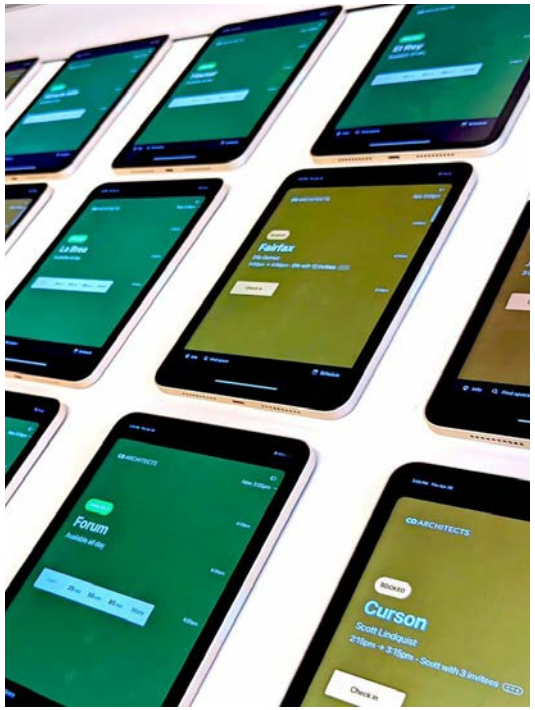

Figure 4: Room Booking Interface on iPads

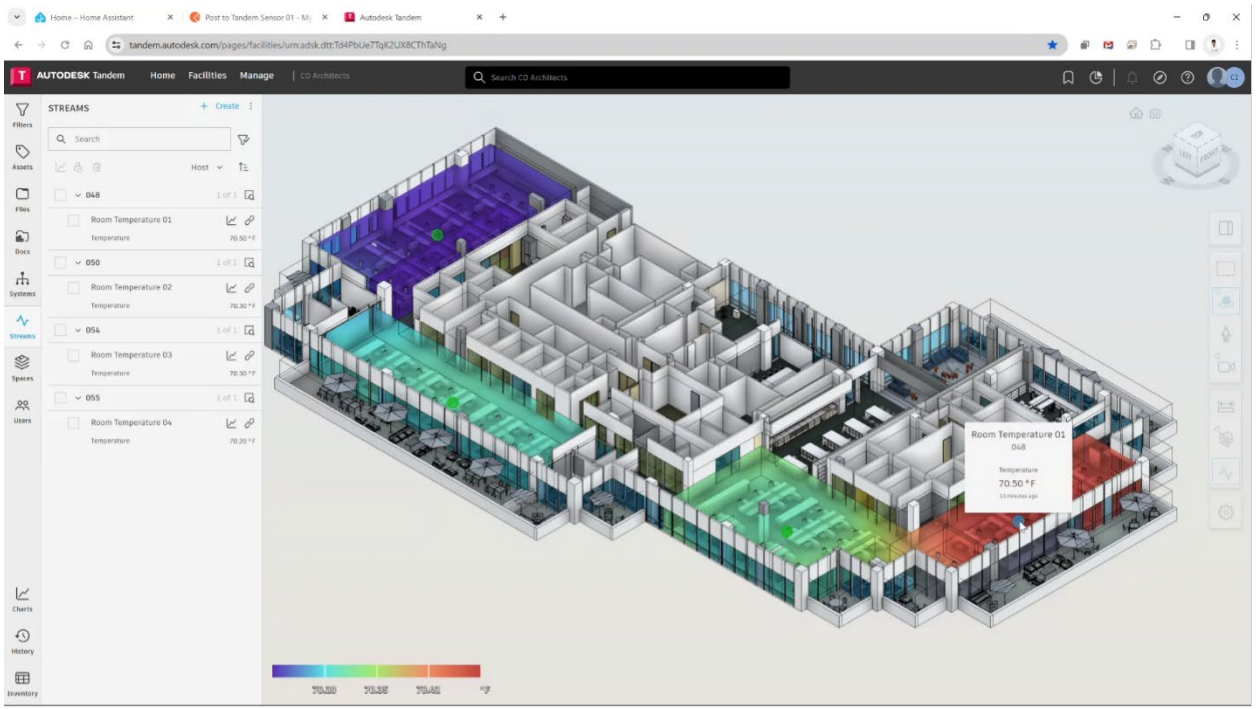

Figure 5: Live Dashboard: Informative Digital Twin at CO Architects - play video here

Next Step: A Predictive Digital Twin

Looking beyond our case studies, we are currently exploring the next phase of our research in developing a predictive digital twin with the use of agent-based simulations. Using on the historical and real-time data from our sensors and user activity logs, we are beginning to encode a sequence of behaviors to virtual agents that will simulate various activities throughout the day and create a repository of synthetic data. We believe that predictive digital twins will uphold a long-anticipated promise for our AEC industry: They will develop intelligent design processes – more intuitive and informative – with performance-based data, grounded in real-world human-building interactions.

We look forward to sharing our discoveries in the next episode.

“Predictive digital twins will uphold a long-anticipated promise for our AEC industry: They will develop intelligent design processes — more intuitive and informative — with performance-based data, grounded in real-world human-building interactions.”

Chikara Inamura is the Director of Digital Technology at CO Architects. He holds a Bachelor of Architecture from Southern California Institute of Architecture and a Master of Science in Media Arts and Sciences from Massachusetts Institute of Technology. He is a former researcher at the MIT Media Lab and an industry expert on computational design, engineering, and manufacturing.

LEADING LINES

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September 2024

LEADING LINES

Erika Moody, FIIDA

President of
Helix Architecture + Design

Erika Moody discusses leadership responsibilities, discipline convergence and the future.

DesignIntelligence/Michael LeFevre (DI): We're talking with Erika Moody, FIIDA, president of Helix Architecture + Design and 2024-25 president of the International Interior Design Association (IIDA). Welcome Erika. Can you please offer a firm overview for the uninitiated?

Erika Moody (EM): Founded in Kansas City, Missouri, in 1992, Helix Architecture + Design's mission is to create beautiful, humanistic design solutions that are responsible to client, community, environment, budget and our own high standards. Our work with visionary clients has contributed to the ongoing multibillion-dollar revitalization of downtown Kansas City, where we have led more than 60 projects, many combining LEED-certification criteria with federal and state historic tax credits to revive existing buildings. Helix's diverse experience includes mixed-use, multifamily, workplace, academic, public libraries, civic, hospitality and cultural facilities, as well as specialized expertise with renovation, adaptive reuse and preservation of historic buildings.

We've been recognized with more than 225 regional, national and international awards for design excellence and thought leadership. I became president in 2021, and in 2023, Helix became a majority-woman-owned firm.

RESPONSIBILITIES

DI: The responsibilities of design firm leaders are greater than ever. Now, we are not only responsible for design and client service, but also to wrap our arms around social, environmental, diversity and economic aspects inside and outside our firms. Within Helix, how are you approaching a redefinition of this ever-broadening scope?

EM: Within the community, we strive to make better places to live and work. This is realized by the breadth of typologies in our portfolio, and even more so in how we create these places. For instance, our multifamily housing projects are responsive to the urban context and the needs of the communities. We've directed the renewal of more than 30 public libraries, transforming them into community centers that fulfill pressing needs in addition to providing the traditional scope of neighborhood libraries. In a time when our region was seeing a shortage of health care professionals, we approached the design of an award-winning university medical education and health sciences building with the intention of attracting students who would later work in the area.

A continuing hallmark of Helix's sustainability practice is a dedication to adaptive reuse. It's the ultimate way to recycle a building. We've extended several older buildings' serviceable lives by modernizing them for viability in the current market. We've retrofitted legacy university buildings with high-tech medical simulation components and are actively adapting abandoned and underutilized office buildings into multifamily housing. Furthermore, we apply our principles to ourselves – both our old and new offices are adaptive-reuse projects. We moved into the new office ecologically as well, making sure that 100% of furnishing, equipment, accessories and such were reused or donated. Thus, nothing made it to the landfill.

In addition to the diversity of our project types, diverse talents and skill sets within Helix are at the core of our next generation, as our current leadership recently took the baton from the firm's founders. We are changing the culture, eschewing the traditional hierarchical architecture and design firm format by developing additional paths for our people to succeed and develop their careers. We want to give our staff the best working experience we can by putting them on interesting projects and offering opportunities to interface with clients and affiliates. We give them the space and tools to become better architects and designers.

> We don't spend time pondering what makes us different. We spend it figuring out what best serves our clients and community.

Socially, we place a high priority on giving back to our communities, particularly in dedicating time to organizations we believe in. While we're active in IIDA, AIA and NOMA, we encourage staff to get involved in local nonprofits and urbanism organizations, such as Big Brothers Big Sisters, Mid-America LGBTQ Chamber of Commerce, ULI and Commercial Real Estate Women (CREW). Helix partner Alissa Wehmueller, IIDA, and I are both graduates of the Kansas City Chamber's Centurions leadership program. Alissa and I, as well as our third partner, Doug Stockman, AIA, sit on varied boards and committees, from professional and civic to philanthropic and educational. We encourage our younger staff members interested in leadership to participate in programs that would broaden their horizons and let them make connections that will sustain them throughout their careers.

The responsibility of leadership will always be assuring the firm is financially sound. We understand Helix is a business that serves clients and staff. However, we are not going to throw out our principles or ethics for a lucrative job.

DISCIPLINE CONVERGENCE

DI: As a combined architecture and interiors firm, how do the two coalesce? What edge does that give your teams, especially when doing an architecture-only or interiors-only project? How do you – as an interior designer – bring a different viewpoint to running an architecture firm?

EM: With a firm name derived from human DNA, Helix Architecture + Design sees the two disciplines as intrinsically intertwined. Helix takes an integrated, people-centric, whole-building approach to projects. This may entail ancillary services, such as feasibility studies, master planning, signage and wayfinding design, and post-occupancy evaluation, among others. Our studios aren't siloed into architecture and interiors. They're arranged by project, so both overlapping disciplines work together simultaneously. We are Helix Architecture *plus* Design, which adds up to better projects.

I've always believed the best result for the client and the users of a space is to fully integrate the design process. We prefer doing both the architecture and interiors, of course, though that doesn't always happen. If we're doing interiors only, our viewpoint and understanding align with the existing architecture because architects will be on that team, and vice versa for architecture-only projects. We are great on our own *and* we play well with others.

ORGANIZATIONAL FUTURES

DI: To cope with a changing context what are your thoughts on new business forms, value propositions, offerings and/or organizational structures to cope – and prosper – into the future? What are the road signs and leading indicators pointing to?

EM: Just as we adapt older buildings to meet current market demands – converting empty office space into housing as a primary example – we're constantly evolving our firm. We have an established local presence in many cities in Missouri and Kansas and recently opened an office in Denver, where we have several multifamily projects on the boards. We have our eyes on Salt Lake City as another emerging market.

Our job is also to bring solutions to markets that can use the help. For instance, designing efficient and desirable multifamily buildings can allow more units to be built and more people to find homes. As one example, our latest Kansas City project brings much-needed affordable housing to an abandoned office building shell. Using a young teacher's salary as one monthly rent benchmark, we worked with our developer partner so the project would make sense with market-responsive rents starting at about $700. The original program called for 117 units, but we optimized the plan to accommodate 139 apartments – a win-win for client and community. The solution was to design micro-unit studios as small as 320 square feet and add community amenities, such as a commercial kitchen, lounge and coworking area, to offset the smaller apartment sizes.

We're seeing increasing demand for shared amenities in workplace design as well. With smaller office footprints and free-address desking, our workplace clients are willing to allocate more of the budget for amenity-rich office spaces. As an example, for our new office, we have three of the nine suites in a building that comprises two 1930s historic Film Row film distribution centers, which Helix renovated. We share outdoor spaces as well as a break room, lobby, mother's room and smaller conference rooms with the other creative tenants. We see this as a great opportunity to connect with the other business owners in the building, while using space more efficiently.

> I want to see a future where designers are at the important tables in municipal government, education, sustainability and culture — making decisions on communities from the perspective of problem-solving and beauty.

FIRM DIFFERENTIATORS

DI: What is it that truly makes your organization unique in the minds of clients? How do you see that evolving?

EM: The firm integration, again, of interiors and architecture from the beginning is a differentiator. Interiors wasn't an add-on, as it is in many architecture firms, where it is sometimes treated as a lesser discipline. It's not at Helix. Two of the partners are interior designers, and we are firmly entrenched in the industry. I recently became 2024-2025 IIDA International Board president. Alissa Wehmueller was president of our local IIDA, and one of our interior designers is next in line.

From the client perspective, our work is not branded to our identity. Stylistically, the project won't scream "Helix." We want it to represent the client's image and needs and be meshed with the context and environment. What makes it a Helix project – the consistency in our work – is that our projects are responsive to what they are, where they are and who they are for. Our design is rigorously well-detailed and intentional – we place intention before style. It's largely that approach that makes the work beautiful, which is a requirement for us.

We don't spend time pondering what makes us different. We spend it figuring out what best serves our clients and community.

CONTEXT

DI: How have COVID-19 and the increasing uncertainty in the world, along with their impacts on interior space, real estate and the predictable markets of the past, changed your thinking, your designs and your and your customers' objectives?

EM: We often use a residential model to inform current office projects. If you can work well at your kitchen counter or grab your laptop in bed to write down a great idea, is there a way to somehow translate those settings into an office environment? Flexible workstations that accommodate different postures throughout the day and plentiful comfort amenities are only two examples to coax people back to the office.

What's more, many people have better access to daylight when working at home. We see this as possibly the most important part of office

design moving forward: Incorporating daylight – with its mental and physical benefits – into interior spaces is especially important in the Midwest. Access to outdoor areas and the ability to work outside – while the weather permits – is part of this approach.

BUSINESS, RELATIONSHIPS AND VALUE

DI: Where are the sources of increased value for design firms and your clients? Are you looking in unconventional places?

EM: We're fortunate that 75% of our business comes from repeat customers. We prioritize maintaining those relationships through post-occupancy debriefs whenever possible, wrap parties, sharing project photography and regular check-ins with clients between projects.

Realizing we needed market diversity beyond our immediate region to grow, we targeted areas within a couple hours' flight of our Kansas City home base. Denver continued to pop up and has an active multifamily development market we're now working in. We decided to open the office there and continue to look at expanding west, where we think Helix will be a great partner for developers who share our values.

THE FUTURE

DI: Describe your mentality for survival and beyond. What does the road ahead look like?

EM: I want to see a future where designers are at the important tables in municipal government, education, sustainability and culture – making decisions on communities from the perspective of problem-solving and beauty.

Erika Moody, FIIDA, is the president of Helix Architecture + Design, a nationally recognized architecture and interior design firm with offices in Kansas City and Denver. Her perspective is marked with leadership and driven by her entrepreneurial spirit. After serving as a principal at a large, international firm, she started her own design studio, which later merged with Helix. In 2021, Erika was named the president of Helix. Under her leadership, Helix has amassed a strong portfolio of sophisticated projects and became a majority-woman-owned firm. In addition to her many varied commitments to the IIDA, including serving as the IIDA Mid-America Chapter president from 2014 to 2015, she was recognized with the 2017 IIDA MADA (Mid-America Design Awards) Vision Award and elevated to fellowship in 2022. Both achievements acknowledge an individual who exemplifies notable qualities in leadership, design and mentorship. In June 2024, Erika was inaugurated as the IIDA International Board president, becoming a stronger advocate for interior design and its invaluable role in shaping environments that inspire occupants and promote their well-being.

CONVERGENCE: BUILDINGS, BIOLOGY AND SYMBIOSIS

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August 2024

CONVERGENCE: BUILDINGS, BIOLOGY AND SYMBIOSIS

DeeDee Birch

Sustainable Design Consultant and Writer

DeeDee Birch looks at language, metaphor and integration.

Language and Metaphor

Language determines the boundaries of the built environment. As a core component of human cognition, words shape the aspirations, intentions, forms and functions of our many designed environments. Language is so fundamental to the human condition that cognitive psychologist and psycholinguist Steven Pinker describes language simply as what "emerges from human minds interacting with one another."[1]

Pinker explains that people use language through a process of abstraction. We learn and evolve language by hearing a word, understanding it and applying it to new contexts. Language stands as a fundamental and collaborative component of our enmeshed cognition. This process of abstraction extends to the built environment. Design scholar Sarah Williams Goldhagen points out that we navigate the built environment through the use of schemas and metaphors, which she defines as "a dynamic whereby we transport any kind of content or meaning–visual, auditory, linguistic, proprioceptive, interoceptive, or any combination thereof–from one place or thing to another."[2]

Metaphor and abstraction, the ways in which humans use language to evolve and share ideas, then, dictate both the relationships between people and the built environment and the interrelationships between elements within a built environment.

If language determines the standards for aspirational and acceptable architecture, then nothing communicates our shared value systems, societal structures and cultures more than architecture. In other words, the built environment reflects the people who design and construct it. Their language, values, knowledge and social and cultural norms sculpt the forms and functions of our buildings in multitudes of tangible ways. To borrow Steven Pinker's words, language "is not so much a creator or shaper of human nature so much as a window onto human nature."[3]

And it is language that signifies the increasing convergence of buildings and biology.

Biology and the Built Environment

The words that define the sustainable design movement have radically shifted in the last few decades. In a post-industrialized society, the term "green" has long served as a catchall phrase that encompassed all efforts to mitigate the impact of the built environment on the climate, most of which focused on increasing building efficiency. "Green" remains one of the simplest and vaguest ways to refer to the natural world. Long associated with growth, the term often functions as a metaphor for all living things and characterizes many contemporary human-nature interactions.

Green is the color of the houseplants in our windows, the grass in our parks and suburbs and the forests from which we extract so many of our resources. Yet "green" is also wildly nondescript. Green could be anywhere, in any context. The scope and scale of solutions that fell under the umbrella of green architecture and design were similarly nonspecific and limited in impact. Since then, the language we leverage to describe and design climate-centered and human-centered buildings has exploded. Evolving language means evolving ideas, which has driven innovative research and technology.

More recently, a host of words and phrases, all rooted in biology, frame the practice of sustainable design. This permutation in language underscores our changing values and highlights an increasingly deep convergence of the built environment with the biological world. This coalescence has transformed our buildings and cities and reshaped the design process – and it has only just begun.

The terms biophilic design and biomimicry, for example, achieve a specificity that leads to rich cross-pollination between nature and the built environment. Biophilic design involves the act of borrowing nature's shapes and materials. It originates in the biophilia hypothesis, which translates to "love of life." Similarly, biomimicry involves the act of borrowing nature's functions and replicating how organisms survive in certain climates and contexts. The concept has generated the integration of hygromorphic materials in architecture. Both biophilic design and biomimicry code the design process in scientific inquiry and carry associative layers of meaning that expand the possibilities and scope of architectural solutions.

Christopher Alexander's "A Pattern Language," a touchstone work in the fields of architecture and urban planning, pioneered the transfer of biological words and concepts to the built environment. For example, he refers to the "eccentric nucleus" when instructing readers on how to optimize the density of cities. In biology, the nucleus is a circular form within a cell's structure that contains DNA, regulates cell functions (like growth and metabolism) and is surrounded by a membrane. To use the word nucleus, with all its biological meanings and associations, is to suggest a great deal about how our cities should operate.

As new words become part of design vernacular, we are simultaneously witnessing the communal shedding of language that no longer serves us or the places we construct. Le Corbusier once famously claimed that "a house is a machine for living in." The phrase reflects the values of his social and cultural context in days of early modernism and industrialism. Then, the design process and the built environment – from the individual building scale to urban infrastructure – were comprised of many siloed systems. Machines connote standardization, mass production and uniformity – the antithesis of nature and its dynamic capacity for survival.

Mathematician Nikos Salingaros and urbanist Michael Mehaffy dismantle the modernist approach and advocate for creating a built environment that shares nature's complexity, adaptive and resilient networks, and diversity in their text "Design for a Living Planet: Settlement, Science, and the Human Future." They carry on Alexander's work and explore how certain ideas and phrases from the biological sciences, from adaptive morphogenesis to embryogenesis, should influence the built environment.

> The line between building and biology will become increasingly indistinguishable.

Life Cycles

Consider the growing awareness and use of the term “life cycle” in the building industry. We now conceive of buildings, and their many thousands of materials, as objects with “births” that begin at the moment of material extraction and “deaths” at the end of a building or product’s useful life, at which point everything can and should be reborn in another form.

The State of Housing Design 2023 report by the Joint Center for Housing Studies of Harvard University notes that “buildings evolve. A dwelling isn’t really ever completed; the end of construction is really just the building’s beginning. How well does it meet the needs of its inhabitants? What impact does it have on neighborhood character, affordability, and resiliency? Does it produce co-benefits?” Such a statement not only echoes the notion of a life cycle but also asks fundamental ecological questions about our homes. It underscores the idea that many architects and designers now approach homes as ecosystems that undergo a process of evolution: Does the home provide ongoing habitat for native organisms? Can it, as a system, withstand disruptions and adapt to changing conditions? How do its many parts interact? Can its components break down and reenter material economies, just as natural materials break down and reenter their material streams?

Living Buildings and Regenerative Design

Some of the most radical examples of successful convergence of buildings and biology are living buildings. The International Living Future Institute’s foundational language lives in natural science. The Living Building Certification is organized into petals, embracing a flower metaphor. The International Living Future Institute’s publishing branch, Ecotone Publishing, takes cues from an ecotone in nature, which is a transition area between two adjacent ecological communities.

Because of how human cognition functions and because of language’s role in our lives, the words used to convey the Living Building Challenge ideals further its mission and spur innovation. It results in buildings that have closed-loop water systems, net positive energy performances, local materials, native landscaping, strong connections with nature and unique, community-oriented solutions that serve residents. This is the crux of the regenerative design movement: to create buildings that are active participants in their ecological and social contexts.

The Living Building Challenge is one example of many that leverage language to drive the convergence of buildings and biology. Brook Muller's book "Blue Architecture: Water, Design, and Environmental Futures" examines how buildings can fully integrate into local hydrological cycles and become ecological infrastructures that improve water quality. Bernard Alonso and Cécile Guiochon's book "Human Permaculture: Life for Resilient Living" explores how we might organize human society to jump-start meaningful individual transformation and collective change in the face of the climate crisis.

As our language evolves and we learn how to imagine and articulate new methods of design and construction, the results of our efforts become increasingly functional components of our ecosystems. Thankfully, the line between building and biology will become increasingly indistinguishable.

Integration and Symbiosis

Buildings are no longer machines for living. Faster than we realize, they are transforming into resilient, adaptive, responsive ecosystems and habitats, and forming reciprocal relationships with organisms within and around them. As words accrue and retain additional layers of meaning, the intersections between buildings and biology will become more comprehensive and nuanced. Such an expanded vocabulary emphasizes expanded value systems and shifts social structures for the better. Built environment practitioners who can integrate these knowledge and language types will continue to foster the meaningful convergence of designed and natural worlds – and we will all reap the benefits.

[1] Steven Pinker, "What Our Language Habits Reveal," filmed July 2005 at TEDGlobal, Oxford, UK, video, 17:15, https://www.ted.com/talks/steven_pinker_what_our_language_habits_reveal/transcript.

[2] Sarah Williams Goldhagen, *Welcome to Your World: How the Built Environment Shapes Our Lives* (New York: HarperCollins, 2017), 75.

[3] Pinker, "What Our Language Habits Reveal."

DeeDee Birch is a frequent contributor to DesignIntelligence on scientific and ecological matters.

DISASTERS, DICTATORS OR DATA?

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DISASTERS, DICTATORS OR DATA?

Patrick MacLeamy, FAIA

CEO Emeritus of HOK,
Co-founder and Chairman Emeritus of
buildingSMART International

Digital information can converge to help residents improve their cities.

Urban areas often seem unmanageable, with enduring problems of traffic congestion, crime and poor quality of life. Something needs to change for cities to become healthy and welcoming places to live, work and play.

Historical Precedents

Transforming cities is not easy. In fact, the causes of significant historical changes to cities have often been catastrophes. The Great Chicago Fire of 1871 and the San Francisco Earthquake of 1906 are two examples of disasters that reshaped cities. Each led to the creation of vibrant new neighborhoods, parks and waterfronts. Each also led to new fire safety and building codes.

Dictators can also affect change. Napoleon III (Louis Napoleon Bonaparte) ordered that the crooked medieval streets of Paris be made straight to facilitate cannon fire in case of uprisings. The Paris of today is the result. Renaissance-era Pope Sixtus IV began the transformation of Rome from a medieval to a Renaissance city. Much later, Benito Mussolini decreed that the Colosseum be repaired and the Forum be uncovered to restore the glory of the Roman Empire. Rome today is a delightful blend of ancient and Renaissance construction.

Sometimes dictators are not the drivers of change. Some cities remake parts of themselves in order to host the Olympics or a World's Fair, but such changes are not as widespread or enduring.

Paris is one of the best examples of how a dictator reshaped a city. For military reasons, Emperor Napoleon III had visionary urbanist George-Eugene Haussmann redesign the city's medieval crooked streets into a star pattern. This allowed cannons to be positioned at the current location of the Arc de Triomphe for straight shots down the twelve radiating streets that converge at L'Etoile.

> We can harness data from Building Information Modeling (BIM), Geographic Information Systems (GIS) and the Internet of Things (IoT) to improve our cities in broad-based, democratic ways.

Another Way

Today, we have the opportunity to use data to transform cities on a similar scale to the transformations that occurred in the aftermath of disasters and dictators; we can harness data from Building Information Modeling (BIM), Geographic Information Systems (GIS) and the Internet of Things (IoT) to improve our cities in broad-based, democratic ways.

Digital data, combined with organizing and advocacy, can empower citizens to redesign their cities. To make this possible, we must harness, combine and make readily available all data gathered by cities' planning, public works and other municipal departments – including zoning, engineering, utilities, traffic, crime and more. This information is usually scattered and often obscure, but it is time to democratize that data and make it accessible online to the public.

Citizens equipped with information can influence urban design to focus on the needs of people instead of prioritizing public utilities and special interests. Civic-minded, personally invested residents with access to real-time, comprehensive data can become major contributors to the design and future of their cities. In fact, data accessibility should be a key metric when ranking cities: Good cities have good data.

Successful implementation requires making live data available at no cost. As business gurus say, "If you can't measure it, you can't improve it."

Democratizing Data

For example, citizens could use traffic accident data to see how features common to low-incident areas can make dangerous intersections safer. Are there correlations between police calls and congestion? Could areas with poorer air quality be improved with greenbelts?

Data-based planning would also make neighborhoods more equitable by identifying food deserts, limited health care facilities, brownfields and similar infrastructure systems. In such a future, planning will be based on data, not politics or prejudice.

Patterns will become more identifiable once real-time civic data is merged with BIM, GIS and IoT, along with satellite and drone images. This information can support grassroots design efforts to improve quality of life in any number of ways: adding shade trees on hot, barren city streets; replacing abandoned buildings or vacant lots with pocket parks; installing new street or traffic lights for greater safety.

Democratizing data holds great potential for cities and urban areas. Amsterdam, Barcelona, Stockholm and Columbus, Ohio, are examples of cities that have digitized data and made it widely available. More cities should follow their example as fully integrated, fully accessible information becomes widespread.

By now, we know that the process of digitizing, centralizing and updating data can be daunting. Many cities lack the resources to format existing and incoming data in ways that allow merging all the information – the ability to overlay emergency call maps with air quality maps, for example.

One solution is public/private partnerships that include universities and local businesses. Security concerns are particularly relevant for IoT data collected from personal devices. However, improved access to public data and the ability for it to be integrated with other public information will reap rewards toward creating smarter, safer cities.

Making proactive change via democratized data is infinitely better than waiting for reactive improvements following disasters or dictators – or both.

“Making proactive change via democratized data is infinitely better than waiting for reactive improvements following disasters or dictators — or both.”

Patrick MacLeamy, FAIA, is CEO Emeritus of HOK, where he enjoyed a 50-year career at one of the world's largest design and engineering firms. He is a co-founder and currently serves as Chairman Emeritus of buildingSMART International, a not-for-profit organization that fosters standards for data exchange in the building industry.

THE TORTOISE AND THE HARE

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THE TORTOISE AND THE HARE

Robert Hughes

Design Futures Council Senior Fellow

Bob Hughes reviews midyear economic indicators.

The famous Aesop fable “The Tortoise and the Hare” has garnered varying interpretations over the years, but the most widely recognized one is that slow and steady wins the race. The admirable hare with unyielding determination and abundant optimism might be the perfect role model for policymakers at the Federal Reserve.

Fed policymakers have the unenviable task of attempting to be preemptive while simultaneously being adaptive to current conditions. Each new data point on economic activity, inflation measures and labor market conditions help form Fed policymakers’ views on the economy and the appropriate path for monetary policy.

Capital markets (and perhaps the abundant number of pundits as well) play the hare to the Fed’s tortoise, instantly reacting (or maybe overreacting) to the constant flow of new information. The challenge for businesses is understanding Fed policymakers and capital market behaviors when formulating business plans and growth strategies. Compounding the challenge of understanding the Fed and capital markets is the fact that both can have varied and sometimes opposing impacts on the economy, creating an incredibly complex system.

As discussed in the first quarter outlook, the last of the Fed's 11 rate increases occurred in July 2023, with the target rate set at 5.25 to 5.5%. With a significant deceleration in inflation since the peak, speculation had been focused on Fed Funds rate cuts. However, some of the most recent information has been mixed, leading numerous Fed governors and regional Federal Reserve Bank presidents to make comments discouraging speculation on imminent rate cuts. The recent catchphrase has been "higher for longer" when discussing interest rate policy, meaning short-term interest rates may stay at higher levels for a longer period than expected. As always, policymakers continue to reaffirm their commitments to reducing inflation to their 2% target.

Inflation

The total Consumer Price Index (CPI) was up 3.3% for the 12 months that ended May 2024, well below the peak near 9% but still above the Fed's 2% goal. The 12-month change has been holding relatively steady since June 2023, leading many to be disappointed in the progress against returning to the Fed's 2% target.

The Core CPI, which excludes food and energy prices because of their volatility, is up 3.4% over the same period. The core continues a slow deceleration since hitting its peak of 6.6% in September 2022, but this too has been disappointing.

Conversely, my preferred measure, the CPI excluding energy and owners' equivalent rent (OER), is up 1.5% through May, its ninth consecutive month below the Fed's 2% target. **Continued progress toward the Fed's 2% objective remains likely** given that our preferred measure of CPI excluding energy and OER accounts for about two-thirds of the total CPI and is already under 2%, while the OER (about 27% of the CPI) continues to slowly decelerate. However, complicating the inflation outlook, my proprietary inflation conditions index has risen over the last few months, suggesting an increase in underlying price pressures. Historically, sustained increases in my proprietary gauge tend to predict accelerating inflation, but the increases so far have not been sufficient to raise significant concern. Still, they are worth noting.

A key question I asked in my last article (DesignIntelligence Q2, 2024) pondered Fed policymakers' willingness to trust the deflationary trend. In the first scenario, if the Fed were to wait until the CPI or Core CPI has returned to 2%, then the Fed Funds rate may remain at current levels for an extended period. In the second scenario, if the Fed were to be

> "Slow and steady wins the race. The admirable hare with unyielding determination and abundant optimism might be the perfect role model for policymakers at the Federal Reserve."

satisfied with a disinflationary trend – even though the rate of increase was above the Fed's target – then, rate cuts could come sooner. A third possibility would be if the Fed decides to begin rate cuts before inflation reaches the 2% target but spreads them out over an unusually long duration. Recent comments favor the first scenario.

Growth

Real Gross Domestic Product (GDP) rose at a 1.3% annualized rate in the first quarter of 2024 versus the fourth quarter and 2.9% from the first quarter of 2023. Our preferred measure of domestic demand, real final sales to private domestic purchasers excluding owners rent (aka real core GDP), rose 2.9% at an annual rate in the first quarter of 2024 and is up 2.8% since the first quarter of 2023. Among the components of private domestic demand, consumer spending rose 2.0% in the first quarter while residential housing surged 15.4%, business fixed investment in structures ticked up 0.4% following five consecutive quarters of growth, business investment in equipment rose 0.3% and business investment in intellectual property grew by 7.9%. The most significant areas of weakness in the first quarter were the change in business inventories (subtracting 0.5 percentage points from GDP growth) and a jump in imports (which lowered GDP growth by 1.0 percentage points). **Overall, core domestic demand remains robust, suggesting a recession is unlikely.**

> Risks for the economy remain tilted toward global events and ongoing Washington dysfunction, with significant growing concern over the upcoming presidential election.

Labor

Data through May suggest **the U.S. labor market remains healthy.** The unemployment rate came in at 4.0% in May, up from 3.9% in April and 3.4% in early 2023, but still low by historical comparison. As of the end of March 2024, there were about 7.5 million open jobs in the private sector, resulting in an openings rate of 5.3%. The March openings rate is down from 7.9% in March 2022 but still above the 5.2% level of November 2018, the peak prior to the last recession. Furthermore, initial claims for unemployment insurance remain at levels consistent with a tight labor market and solid economic growth.

Outlook

If money is the lifeblood of the economy, then interest rates, or the cost of money, are the economy's blood pressure. As with people, blood pressure that is too high or too low can be harmful, and it's the Fed's mandate to keep the economy healthy.

In general, short-term interest rates are more directly influenced by Fed policy while longer-term interest rates are influenced not only by Fed policy, but also expected inflation, supply and demand, and risk appetite, just to name a few.

For the economy, short-term interest rates can have a major impact on consumer credit card rates (interest expense) and interest on savings (interest income), while many businesses rely on short-term financing for operations – receivables and inventories, for example. Longer-term rates drive residential mortgage rates (and therefore sales and construction activity) and have a significant impact on commercial mortgages and business investment.

Despite short-term rates being relatively high (somewhat restrictive, in Fed jargon), the economy, as noted above, continues to grow at a solid pace. Part of the reason is that longer-term interest rates haven't risen as much as short-term rates and therefore haven't been as restraining for some of the segments of the economy that depend on long-term rates.

Though the outlook for Fed rate cuts has drifted to the "higher for longer" spectrum, eventual rate cuts is still the likely path. The combination of solid current growth, disinflation (and inflation below the Fed's target for my preferred measure), a solid labor market and eventual Fed rate cuts suggest **a favorable outlook for the upcoming quarters.**

Risks for the economy remain tilted toward global events and ongoing Washington dysfunction, with significant growing concern over the upcoming presidential election. Hostilities continue in the Ukraine and in the Middle East, and while flare-ups can happen at any time, the risk of expansion of either conflict seems low at the moment. Meanwhile, Congress remains mired in dysfunction, in-fighting and partisanship, and public perception of, and confidence in, the Supreme Court is hitting shocking lows. Finally, **it would not be unreasonable to prepare for potential civil unrest around the election.** Political rhetoric has decreased confidence in the election process and likely is being amplified by foreign agents seeking to wreak havoc among the U.S. population and to destabilize the U.S. economy and government. While outright civil war is highly unlikely, temporary instability around the election is a growing possibility.

Bob Hughes is a senior fellow of the Design Futures Council and contributes regularly to DesignIntelligence on economic matters.

OBSERVATIONS

"The universe is a single atom: the convergence of science and spirituality."

— Dalai Lama

"Today more than ever, the traditional boundaries between politics, culture, technology, finance, national security and ecology are disappearing. You often cannot explain one without referring to the others, and you cannot explain the whole without reference to them all."

— Thomas L. Friedman, The Lexus and the Olive Tree

"Synergistic convergence is the most important idea we have at our disposal to prevent collapse scenarios and move forward in a nonlinear manner toward an evolutionary society."

— Barbara Marx Hubbard

"Don't dismiss the synchronicity of what is happening right now finding its way to your life at just this moment. There are no coincidences in the universe, only convergences of Will, Intent, and Experience."

— Neale Donald Walsch

"A human being becomes human not through the casual convergence of certain biological conditions, but through an act of will and love on the part of other people."

— Italo Calvino

"Everything in business is converging with technology. The more you can understand how that convergence is happening, and the more you can steward that change into your organization, then the more you'll be sought after as that strategic partner."

— Stephen Gillett

"Isolation is a blind alley ... nothing on the planet grows except by convergence."

— Pierre Teilhard de Chardin

"Ultimately, it is the convergence of artificial and human intelligence that will enable manufacturers to achieve a new era of speed, flexibility, efficiency, and connectivity in the 21st century. "

— Joe Kaeser

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