



DESIGN QUAR- TERLY

ISSUE 07



ADAPTING TO CHANGE

Creating lasting designs for a dynamic and unpredictable world

DESIGN QUAR- TERLY

ISSUE 07

**THOUGHTS, TRENDS AND INNOVATION
FROM THE STANTEC BUILDINGS GROUP.**

The Stantec Design Quarterly tells stories that showcase thoughtful, forward-looking approaches to design that build community.

IN THIS ISSUE: ADAPTING TO CHANGE



As designers, we strive to create spaces, buildings and communities that thrive for decades to come. And yet, we live in a time of rapid change—due in large part to technological innovation, but also in response to a changing climate.

City life is desirable again. But how can cities transform their languishing assets into amenities that enhance community, economy, and culture? How can we strike a balance between designs that fit life today, while remaining flexible and responsive to changes we can't foresee?

In this issue, we look at the rapid pace of change and how it's influencing innovative design and engineering solutions from Sacramento to Perth.

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Ready for the **next** shock

Seven ways we must shift our thinking about urban resilience to be prepared.

BY LAURA SACTLEBEN



St Bernard Kayak Launch
New Orleans, Louisiana



Urban resilience is a hot topic in Houston, Texas. At the peak of the flooding caused by Hurricane Harvey, one-third of Houston was underwater.

WHEN ALL WAS SAID AND DONE, HURRICANE HARVEY CAUSED \$165B IN DAMAGE TO THE AREA.

In the aftermath, much has been written about design or planning that could make Houston more resilient to future stressors and storms.

Houston is actively looking for solutions with the launch of its Houston 2020 Visions Competition and upcoming plan for resilience. A recent Stantec-hosted Houston Resiliency Innovation Workshop was designed to foster the development of new ideas and strategies that could make Houston a model for future urban resilience. The idea of the workshop was to gather architects, urban planners, engineers, city and county officials, Army Corps of Engineers, educators, research and advocacy organizations, private industry partners and others to frame the challenges and initiatives facing Houston and to generate ideas for a future vision of Houston as a model resilient city.

In light of our workshop and various discussions I've engaged in on the topic, there are some broad lessons about resilience that are emerging. Rather than list specific solutions and technologies, however, I've found that achieving resiliency requires us to profoundly shift the ways we think.

Here are seven ways our thinking about resiliency must change for it to succeed.

1. SHIFT SCOPE

Build Social Infrastructure

Resilience isn't only about infrastructure. And it isn't just about critical facilities. When our communities face shocks and stresses, the first line of infrastructure might not hold, critical facilities might fail, and even if they do not fail, there may not be a way to get much needed help to every citizen. Average community members will likely become first responders. So, we must think about what elements of the city become the infrastructure and critical facilities if that happens.

Of course, we have to look at the infrastructure, but we also need to look at educating the population about resilience and enhancing communication within the community. We must build and implement social infrastructure, put networks in place that can respond in times of crisis. A community that has strong social infrastructure is inherently more resilient. >

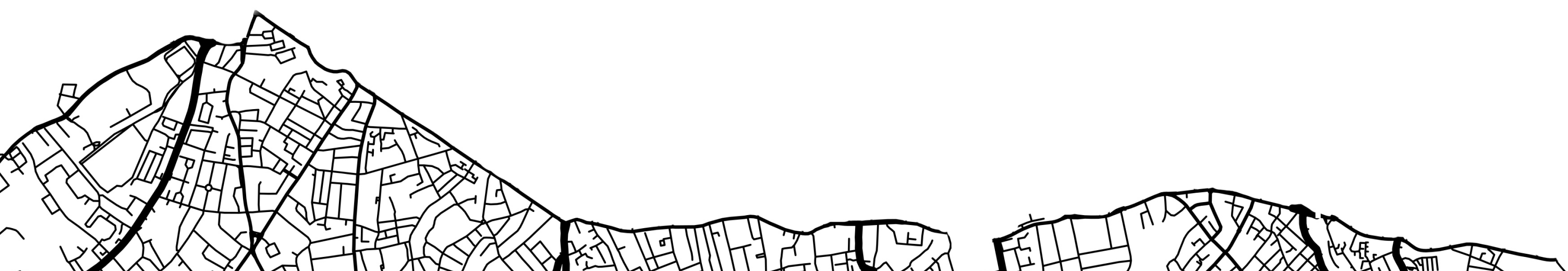


**HISTORY CHANNEL'S PROJECT IMPOSSIBLE
FEATURES STANTEC-DESIGNED NEW ORLEANS
FLOOD DEFENSE SYSTEM**

The Permanent Canal Closures and Pumps Project

New Orleans, Louisiana

The City of New Orleans was devastated by Hurricane Katrina in 2005. In response, the U.S. Army Corps of Engineers embarked on the \$14.6 billion Hurricane and Storm Damage Risk Reduction system to repair the damage and improve resiliency for the city and surrounding communities. The final piece is the \$700 million Permanent Canal Closures and Pumps project designed by Stantec's architects and engineers. PCCP is the second largest drainage pumping system in the world. Three massive pump station and flood gate facilities stand at the end of the City's key outfall drainage canals at Lake Pontchartrain. During a major storm event, the 18-foot high flood gates will lower to prevent lake surge from entering the canals (as happened, catastrophically, with Katrina). At the same time, the pumps will be activated to remove water from the canals into the lake. This new critical infrastructure piece means New Orleans will be better prepared to keep residents safe the next time a major storm event threatens them.





2. SHIFT IN ECONOMIC HAZARDS

Develop Economic Resilience

The world is changing rapidly. A city might thrive today, but one-dimensional economies may be obsolete by 2050. We need to ask ourselves, do we have the required diversity of economy to navigate and thrive through economic changes? Take one example. Houston's economy has always had a strong oil and gas foundation, and in the past was heavily dependent upon this industry. When the oil bust hit in the 1980s, Houston was hit hard and the impact on the local economy and Houston was staggering. Since then, we've significantly diversified our economy. When the most recent oil and gas downturn took place, we still felt the shockwaves, but they were much more manageable.

3. SHIFT IN OPPORTUNITY

Consider Social Equity

Social and economic resilience ties to equity. Social equity, broadly speaking, means access to infrastructure, transportation, opportunity, and communication across the population. Social equity makes cities more resilient. Achieving it means making sure every community within the city has equitable access to resources and the opportunity to thrive. This notion fits in alongside investments in infrastructure, education, community as essential elements of resiliency.

The more social diversity cities can achieve, the more potential they have to provide equity in the population through access to diverse job opportunities.

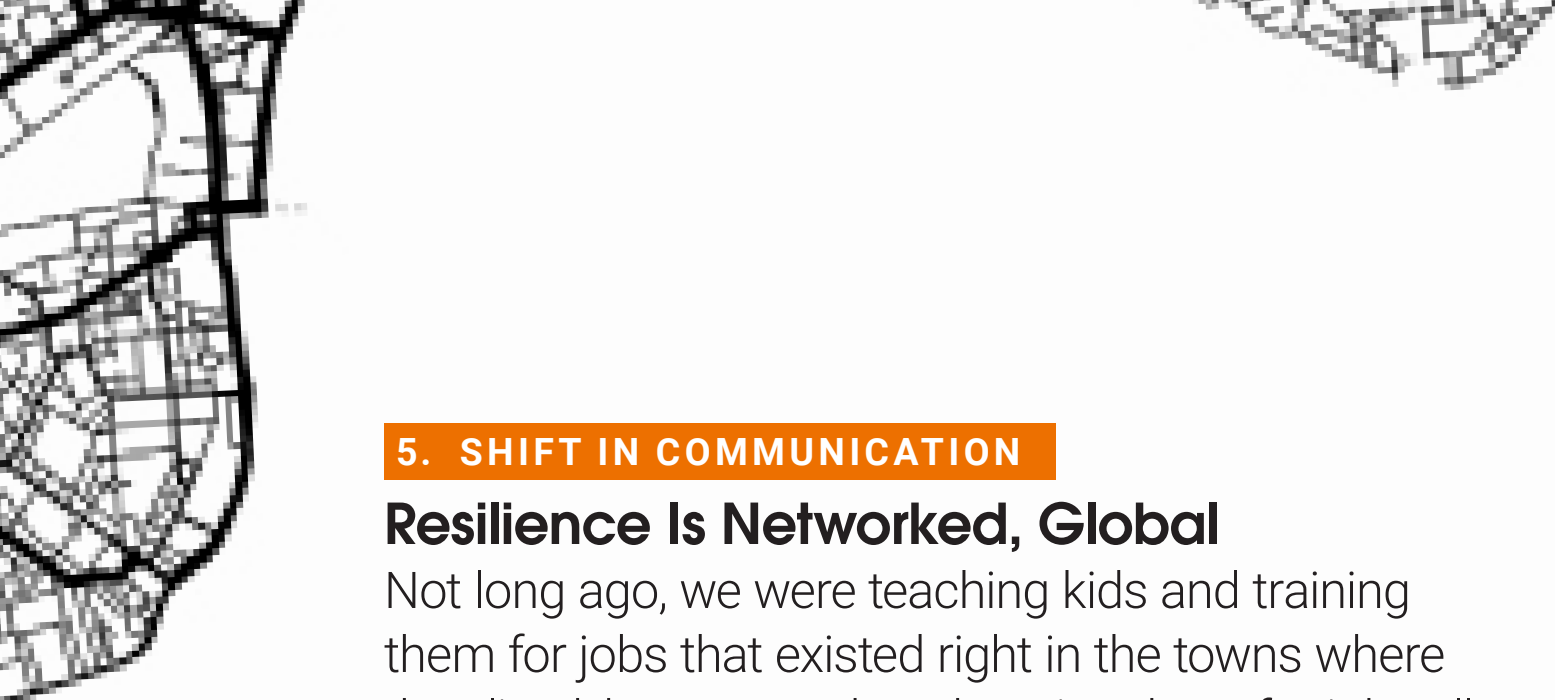
4. SHIFT IN HAZARD IDENTIFICATION

Water As An Asset

In Houston, the Hurricane Harvey experience has informed many discussions about resiliency. The emphasis is often on flooding and the city's ability to weather extreme storms. It seems natural to look at water as a threat in a region where past flooding has caused such vast damage. But, we need to consider both ends of the spectrum. In a city like Houston, it's a very real possibility that water deficits and droughts will be as much a part of the future as hurricanes. Droughts have already done severe damage to our city in my lifetime, and we should anticipate future impacts.

Water is fundamentally a precious natural resource. In many cities around the world, it's water scarcity that is the primary issue. In these regions, communities see water's value. We're misguided if we don't see water that way. It's hard to look through the lens of water scarcity when our experience has been too much water all at once, but to be ready for what's next, we must broaden our thinking. >





5. SHIFT IN COMMUNICATION

Resilience Is Networked, Global

Not long ago, we were teaching kids and training them for jobs that existed right in the towns where they lived, but now we're educating them for jobs all over the world, even jobs that don't exist yet. There's been a shift in the way we educate. That shift applies to our thinking about resilience.

When we think of resiliency, we most often focus on a city, but it's clear that resiliency issues are bigger than any city, or region. Today humans live globally. Our economy is global, our families are global, our connections are global. If one city is failing, that impacts life far beyond its borders.

And the climate obviously doesn't care much for dividing lines on maps. Hurricane Harvey was eye opening in many respects. It spared no communities. Resiliency and extreme weather affect us all. The water doesn't care what your socio-economic status is, your ethnic background, or the value of your real estate, it crosses political boundaries.

If we can make a shift to toward thinking globally, then we see a hurricane or a fire or a tsunami not just as an event happening to other people far away, but as a threat to humanity. At that point, resiliency

quickly takes on a new global dimension. A more global perspective will help us to realize a more resilient world. Every place on the planet has a threat or stressor that's going to come its way. We need to understand the ripple effects from those events. We need to see each event as a threat to us all. By doing so, we raise the urgency level. We must think of our communities as part of a much larger network, working together to build global resilience.

6. SHIFT IN RECOVERY

Think About Resilience

As extreme weather events have shown us, our systems for everything from emergency response to insurance and government funding is oriented toward recovery. Our funding mechanisms are set up around an obsolete definition of recovery. If your personal residence or business is destroyed by a hurricane, the funding mechanism targets bringing it back to what it was before. Recovery means replace as it was before.

But generally speaking, that's not always wise. In fact, it's a huge missed opportunity if we want to achieve true resilience.

Resilience goes a step beyond recovery. It asks us if we should go back and build it the way it was before, or rethink. Resilient thinking means >



DAY TO DAY CONDITION



STORM CONDITION

LIVING WITH WATER

The **Blue and Green Corridors** are located in the Gentilly, an area of New Orleans that suffers from frequent flooding due a natural bowl-like topography that directs drainage inward. In the past, rainwater was collected in box culverts and was pumped into the London Avenue canal, but this system was frequently overwhelmed during storm events causing widespread damage. The city realized the solution wasn't more pumps, but to devise a strategy that incorporates water into residents' lives in a non-disruptive manner. A new Stantec-designed strategy uses multiple solutions to create beautifully planted canal and associated public spaces (bike and pedestrian trails and parks) that reduce flooding and filter runoff while creating new connections for residents to work, play, and live.

asking how we rebuild better and stronger and in a way that is going to better weather a similar extreme event, or worse, in the future. That's a big shift—but we need to make it. Not just at the personal level, but in governance, policy, and the funding for disasters that supports recovery and resilience.

7. SHIFT IN SCALE

Thinking Small Is Important, Too

When we hear the word resilience, we naturally think about massive, heavily engineered undertakings; building giant levees and pump systems, big infrastructure projects. Obviously, those are important, but another big shift in thinking has to do with scale.

There's a lot of value in thinking small and realizing that small interventions at the personal or neighborhood scale can add up to make a big difference. With a series of smaller public/private partnerships in communities replicated across the city, for example, all of a sudden we can systematically make larger scale change, thus making the city more resilient.

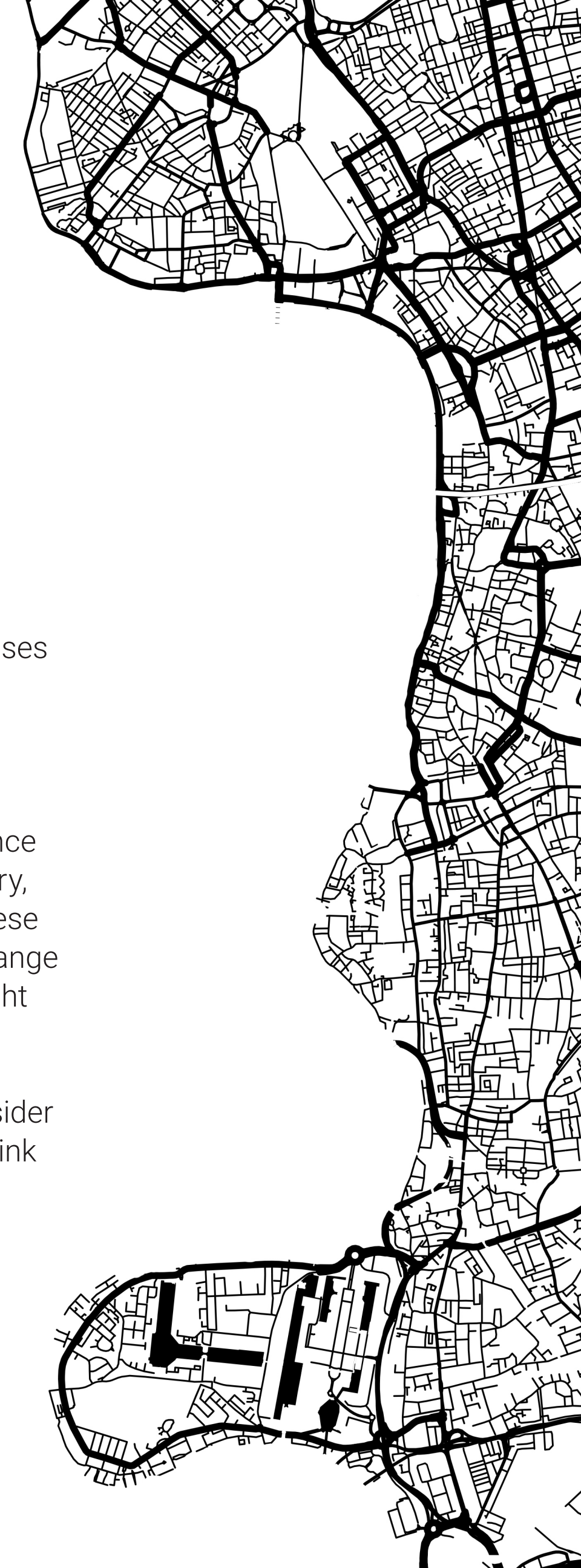
Massive infrastructure projects, as necessary as they are, can take years of effort to get off the ground, get funded and built. Taking small steps today is often better than waiting.

In Conclusion

We need to turn empathy into action. Today, we are challenged with how to communicate the urgency and importance around an issue that can often sound like a technical and distant matter for authorities to resolve. When we witness a catastrophic climate event or disaster, our empathic response comes quite naturally. We want to help fellow humans in need. But creating a broad effort on resiliency will require us to turn the large, empathetic responses to disasters into something more sustained. How can we turn empathy into action to make change? That's going to remain a big question for all of us.

As a resident of Houston, I have seen how important resilience can be—it's real to me. In my chosen field, the design industry, I am privileged to help the industry play its role in solving these resilience issues. As a design community, we can be the change makers, to be the ones to initiate the conversation, to highlight the challenges, and the opportunities inherent in resilience.

My challenge to clients and designers everywhere is to consider resilience—large or small—in every project we undertake. Think about these seven aspects of resilience and how they might affect your project, city, or community. It's only by thinking broadly, that we will design a resilient future. **D**



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MORE DESIGN FOR RESILIENCE

Architect **Laura Sachtleben** leads the Stantec Research and Benchmarking (R+B) program which inspires and supports learning from our Houston office.



Sacramento Waterfront
Sacramento, California

Down by the water

How thoughtful approaches to a riverfront revitalization can drive the creation of livable urban places.

BY BRIAN CRILLY AND AMY SEEK





Sacramento Waterfront

Sacramento, California

In our concept, the new river-oriented waterfront will feature an amphitheater, outdoor cafe, wetlands, transient berthing, and an "accordion deck" that rises and falls with seasonal river conditions.

In the 19th Century, a city's waterfront was where industry, commerce, and shipping converged. Rivers were highways for goods, and sometimes they were industrial dumping grounds. In the 21st century, cities around the world are starting to rediscover their riverfronts and shape them into publicly accessible amenities for recreation, culture, and play. Just as many cities seek to tap the potential in languishing historic neighborhoods, civic leaders are realizing that riverfronts have enormous untapped potential for transforming their downtowns and cities. Waterfronts are high visibility projects with the power to transform a city. In our work for the city of Sacramento, we >

have the privilege of redesigning the city's historic district and riverfront. Our team won the Sacramento Waterfront Ideamakers Competition last spring, and we're in the process of realizing elements of our competition proposal in the design, which is currently in progress.

Projects like the one for the Sacramento waterfront have further broadened our perspective on what it takes to revitalize an urban waterfront—to make them spaces that serve a wide population of residents and visitors.

Nested between a river and a highway, Old Sacramento is hard to get to. Visitors from downtown must either drive over a highway overpass to arrive by car, or trek through a long, dark pedestrian tunnel to reach the district.

While a popular tourist destination, evoking Sacramento's history as a gold rush town and a stop on the Transcontinental Railroad, the district caters to tourists interested in railway and Old West history. Tourist-oriented shops don't draw city residents back for repeat visits, and there is little to hold the attention of first time visitors beyond a few hours. Though Old Sacramento sits on the Sacramento River,



Sacramento Waterfront
Sacramento, California

ramshackle gangways descending as many as 25 feet from the embarcadero at low water make getting to the water difficult. With big change and redevelopment in re-energizing the urban core, the City of Sacramento has decided it is high time for a modernization of Old Sacramento and its riverfront.

The big ideas driving the design for Old Sacramento are applicable elsewhere, in cities with historic neighborhoods and waterfronts that need attention and strategic investment to create vital urban places.

01

Provide amenities for residents

Very few (only about 90) people live in Old Sacramento. Residents leave the district for their basic needs, and those who work nearby leave when the workday is done. There's little pedestrian traffic or commercial activity before 11am or after 6pm. Residential density is needed to sustain a diverse array of markets, cafes,

clothiers, and workspaces—and shops are needed to attract residential density.

But what if current residents could move into new mixed-use apartment buildings near the water? What if there were coffee shops and restaurants that drew local as well as tourist traffic? What if visitors could stay in hotels in the oldest part of the city? What if Old Sacramento was an all-day, year-round destination?

Our vision for Old Sacramento is to create a place that will support a broad range of events and activities, where people choose to spend their spend time and, in doing so, support retail, dining, public transportation, recreation, and tourism.

That vision begins with creation of a large open space right on the water. Public open space attracts private investment, increases real estate value, and draws visitors. By removing underutilized and non-historic buildings that obstruct access to the water, we create flexible open spaces sizable enough to host large scale events and activities that will expand the ways visitors and residents can experience the waterfront. ➤



02

Provide for diverse programming.

The city would like Old Sacramento to become a site for large events and festivals. Our competition team consulted with Unseen Heroes—a local non-profit that specializes in transforming places through events and activities. Our direction? Make Old Sacramento a food destination—with restaurants, markets, and shops for provisions, and a place for regular food-oriented events and festivals.

While our team doesn't control future programming, we're designing open spaces that are broad enough to allow for large audience-oriented events that will draw hundreds of people at once. The park will be able to shift scales—movable furniture will help make this shift from large event to daily use. Our competition design proposed a modern rocking chair as the "Old Sacramento seat", a unique piece of furniture that is easily moved throughout the district and unmistakably identified with it.

03

Connect to history, with room for modern interpretations.

Rather than attempt to recreate history, our open space concept allows visitors to imagine the Old West while also inviting new meanings, new experiences, and entirely modern interpretations of the open space. A competition concept invited visitors to hop on a pump car to ride down Front Street on narrow gauge track—a quirky interactive opportunity that plays up the railway history of this area. The playful take on rail history extends to rail food cars, a mobile rail-mounted version of the urban food truck. And park visitors will stroll on a surface of decomposed granite—which evokes significant parks of Europe or the dusty streets of the Western frontier, depending on who you ask. >

For an interactive guide to the Sacramento Waterfront project, visit [Stantec.com](https://www.stantec.com)



04

Connect people to the water.

Despite Old Sacramento's waterfront location, the local community can't get to the water. Water level fluctuates by 25 feet annually, and in summer there is a 25-foot drop to the water from the embarcadero. To get to the water a visitor must navigate numerous unfriendly gangways, and once on the water the visitor is disconnected from everything happening above on Front Street. The experience feels illicit and uncomfortable, unshaded, and brutally hot in the summer. In winter, the water rises up to the elevation of the embarcadero. Our competition design was driven by this problem: we analyzed what kind of mechanism might make an amenity from the change in elevation and its seasonal fluctuations.

Our competition design provides diversified programmatic uses along

the river in a dynamic and innovative design we call "the accordion." The accordion floats up or down with the seasonal water height, providing a continually changing experience. In summer, the accordion becomes a series of stepped terraces that cascade down to the waterside, offering games, people-watching, and sunset seating along the way. At the bottom, a floating café provides waterside dining. In the winter when the water level is higher, it flattens to become an extended waterside plaza.

A floating wetland masks the underside of the embarcadero, benefiting local marine habitat, and offers a research opportunity for nearby university students from University of California Davis. Our riverfront design includes transient berths for boats and allows visitors a variety of vantage and access points to the river itself.

05

Use data to better understand the market.

To understand where and when people were visiting the area, we turned to data on pedestrian movement and parking garage use near Old Sacramento. Through a relationship with the Downtown Sacramento Partnership, we looked at pedestrian numbers on the four major streets of Sacramento to analyze the flows. Combining this data, we could see where people were going and at what time of day and week they visited. >



Sacramento Waterfront

Sacramento, California

Food-focused programming will make the district an everyday destination.

06

Make it multi-modal.

The design for Old Sacramento doesn't ignore the automobile—it attempts to right-size vehicular infrastructure and prioritizes pedestrian and cyclist experience, an approach that is beneficial not only for quality of life in the city, but also for store owners and real estate value. Research shows that cyclists spend more money than drivers, and places that have safe cycling accommodations maintain higher retail sales. Our local data demonstrated that parking rarely reaches capacity in the district, and it takes away from valuable public space along Front Street. Optimizing multi-modal circulation in Sacramento means reducing parking to one side of the street, making diagonal parking parallel, reducing driving lanes, and adding safe cycling infrastructure. In addition, we'll plan for occasional

closure of Front Street for festivals and events and allow for the parking lane to be utilized for pop-up activities throughout the year.

Underutilized city waterfronts have the potential to shine. With careful consideration for context and application of the fundamentals of placemaking and landscape design, we can transform waterfronts into destinations for recreation, culture, food, sport, history and more. These interventions are not reserved for large cities like New York, Chicago, and San Francisco alone. Cities (and capital districts!) like Sacramento are poised to recapture their waterfronts and yield immediate returns on their investments. **D**



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MORE URBAN PLACES

Longtime resident **Brian Crilly** works from Stantec's Sacramento office with broad project experience ranging from breweries to community development projects. Landscape Architecture design director in Stantec's New York City office, **Amy Seek** develops the landscape vision for multi-disciplinary projects from waterfronts to urban parks across the United States.



The smart, flexible workplace

Technology, generational preference, and an embrace of change will define the office today and tomorrow.

BY HELEN REED AND ANGIE LEE



HMS Host
Headquarters
Chicago, Illinois
Stantec/HMS Host



Xero
Denver, CO

The one constant in the workplace is change.

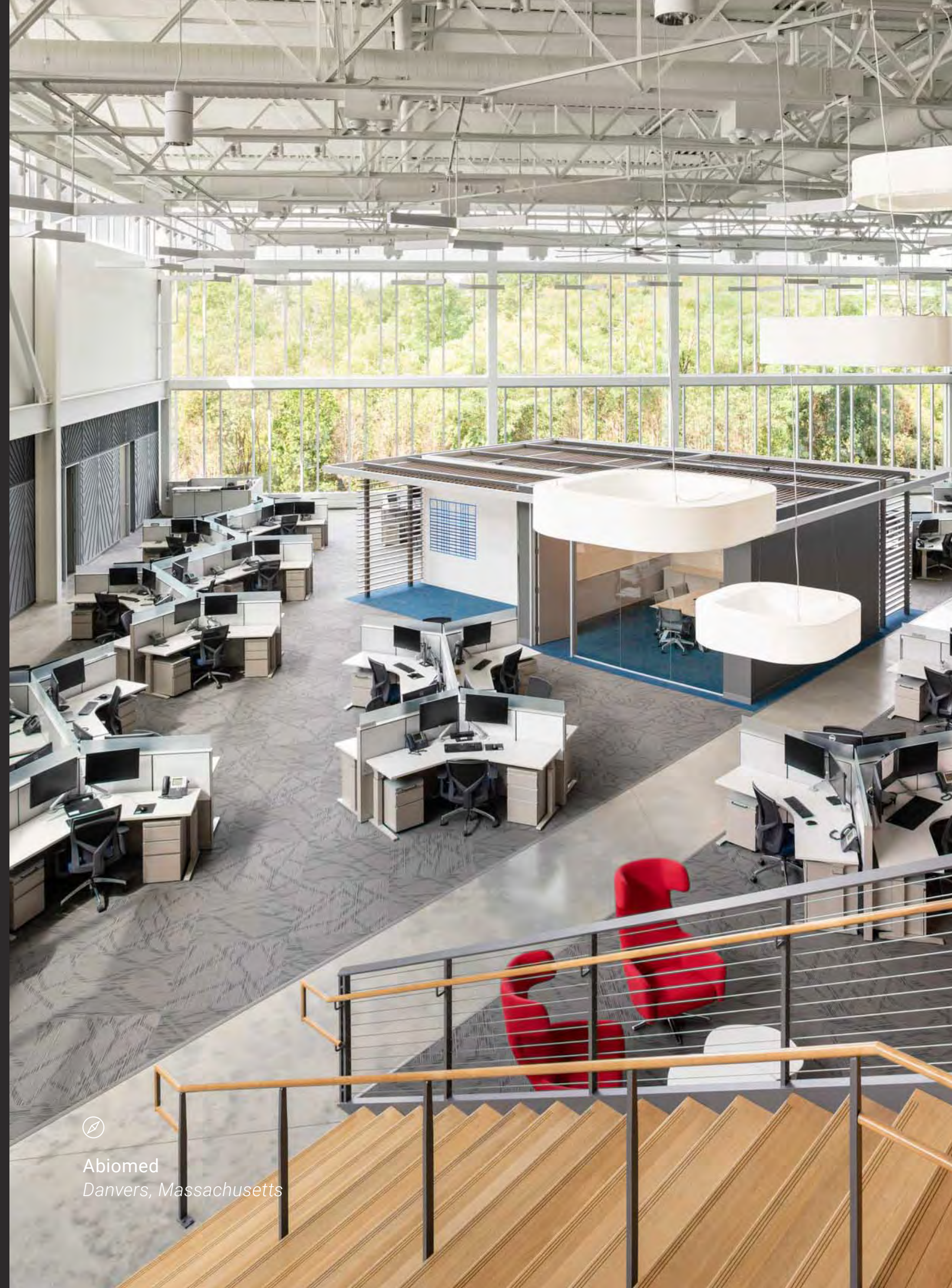
Almost a hundred years ago, the world of work was shifting radically as Americans became city dwellers, automobile owners, and office workers. Today, we're amid another dramatic upheaval in work. A new generation of workers who have grown up with digital technology—using computers online for their entire adult lives—are stepping into the working world, and a new set of expectations and preferences is emerging and reshaping the office. Technology is pushing innovation in the workplace. But its consequences are still emerging—making it worthwhile to periodically evaluate the trends shaping the new office. >

Flexibility for a workplace that's always evolving

Designing a future-ready and flexible facility is more important than ever in this time of change. The office must be designed to be flexible so that it can change for daily and weekly needs with built-in adaptability over the long-term. Increasingly, we need to be aware that things change in unpredictable ways and the influence of technology, for example, doesn't resolve as it first presents. For example, not long ago it seemed that desktops and monitors were going away, but now massive monitors are emerging as the preference. Despite the availability of small portable technology, big screens are in.

Culture and data-driven design

There have been many articles published over the past couple of years on the pros and cons of open workspace. The only point of clarity from that raging debate is that open office isn't for everyone. It's important to understand what organizations do, how their employees like to work, and what makes them happy doing it. More than ever, observation and research of the workplace on site must inform our design innovations so that the workplace ultimately reflects the client's culture and supports its business strategy. Design must strike a delicate balance between incorporating existing culture while embracing new ways of working. Furthermore, how we educate our clients to best use their spaces (otherwise known as change management) is critical in matching culture and new workplace.



Abiomed
Danvers, Massachusetts

Branding

Branding throughout the office, not just the entryway and lobby, is emerging as a key aspect of office design. That's because the audience for branding can be both internal or external today. Every client has a past, present, and future, as well as heritage, culture and values. As design professionals they look to us to help create a space and brand that reflects their narrative best. In our tech-enabled era, experiencing the brand itself takes an increasingly important role in reflecting culture, mission and morale, giving people reasons to want to come into the office every day and to connect their individual work to a greater purpose.

Lobbies as multipurpose and showcase spaces

Where can a firm host a Thursday happy hour or a massive annual holiday party with its clients? The lobby! Once a little used, transitory void, the lobby has re-emerged as a showcase space for many companies. We're designing the lobby as 'gathering space' that can be flexible workspace for visitors, guests and staff, then switch to event, all-hands meeting or party space as needed.

Homelike and hospitality-inspired options

The tech industry and its open, collaborative offices changed the way we look at offices. But it's the emergence of the homelike and hospitality-inspired elements of workplace that are >



defining design today. A big part of this shift relates to offering a variety of options in seating and work style ranging from formal and informal collaborative to focused and heads-down and private meeting space.

Wellness and fitness

Healthy food options, natural light and air quality, spaces that allow for movement, even standing desks are all part of a new standard in office design that, when employed wisely in design, creates places that enhance our well-being. As we design with the welfare of end users in mind, we help reiterate that the company is looking out for their office users' best interests. If the users are set up to live their best and healthiest lives, then that will be reflected in their productivity which allows the company to flourish.

War for talent

New generations entering the workplace want to work for innovative companies. They want flexibility. They want to tap into digital culture for inspiration. They want the opportunity to keep learning. They want a company that reflects their values and provides a space that reflects the way they live. Thus, designed spaces must have the mix of amenities, aesthetics, flexible spaces, light, and air that help employers compete for the best, brightest and most selective talent. In many cases, the quality of the office environment and its ability to attract talent can be directly connected to corporate success and innovation. It's all about the people!



Smart buildings, smart office

What's next? The smart office and building. Smart spaces will connect to users through seamless tech and apps—everything from room reservations to audio-video conferencing, desk and room reservations, climate control and lighting, elevator access and security will be intelligent and personalized for the user. But smart building benefits go beyond the individual employee. On

the owner and employer side, detailed data on building and room use allows for better decision making about investment and office design going forward. And that means continuous evolution and improvement in design and operation. And when design automation connects into smart building infrastructure, the possibilities for the future of workplace are unlimited. Now that makes for an interesting future. **D**

BPX Energy
Denver, Colorado


What's next?

Smart buildings technology is here to stay. One of the most tangible benefits of smart technology is reduced energy use (or production) with sensor data informing operators and users about building efficiency and use. But smart buildings can do more. They can also foster connections with people in the workplace to provide a better user-experience.

Picture this:

You enter the building after parking your bike or car in a space reserved prior to arrival. The building senses your presence via an app on your smart device. At the elevator lobby, an elevator is waiting to take you to the location of your morning meeting. In the meeting room, the blinds are drawn, the room temperature is set to your preference, and the audio-visual and video conferencing set up is enabled and your clients in New York, London or Beijing are ready to greet you and start the meeting. After your meeting you return to an office or a workstation, whether it's assigned or unassigned, and your personalized desk height, lighting and thermal comfort settings are pre-set. This technology-enabled experience can also be programmed for clients and guests on their next visit. The office of the future. Seamless. Personalized. Smart. **D**



 Bulfinch
Needham, Massachusetts

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MORE WORKPLACE DESIGN

Interior Designer **Helen Reed**, based in San Francisco, is passionate about applying influences from the digital realm to designing spaces that meet today's corporate workplace needs. Chicago-based **Angie Lee** applies three decades of experience in leading teams on workplace strategy and headquarters design solutions to her role with the Stantec's Commercial Workplace Sector.



House calls of the future

Soon, our living rooms will host
virtual doctor's exams.

BY JEFF HANKIN



TROY
Boston, Massachusetts

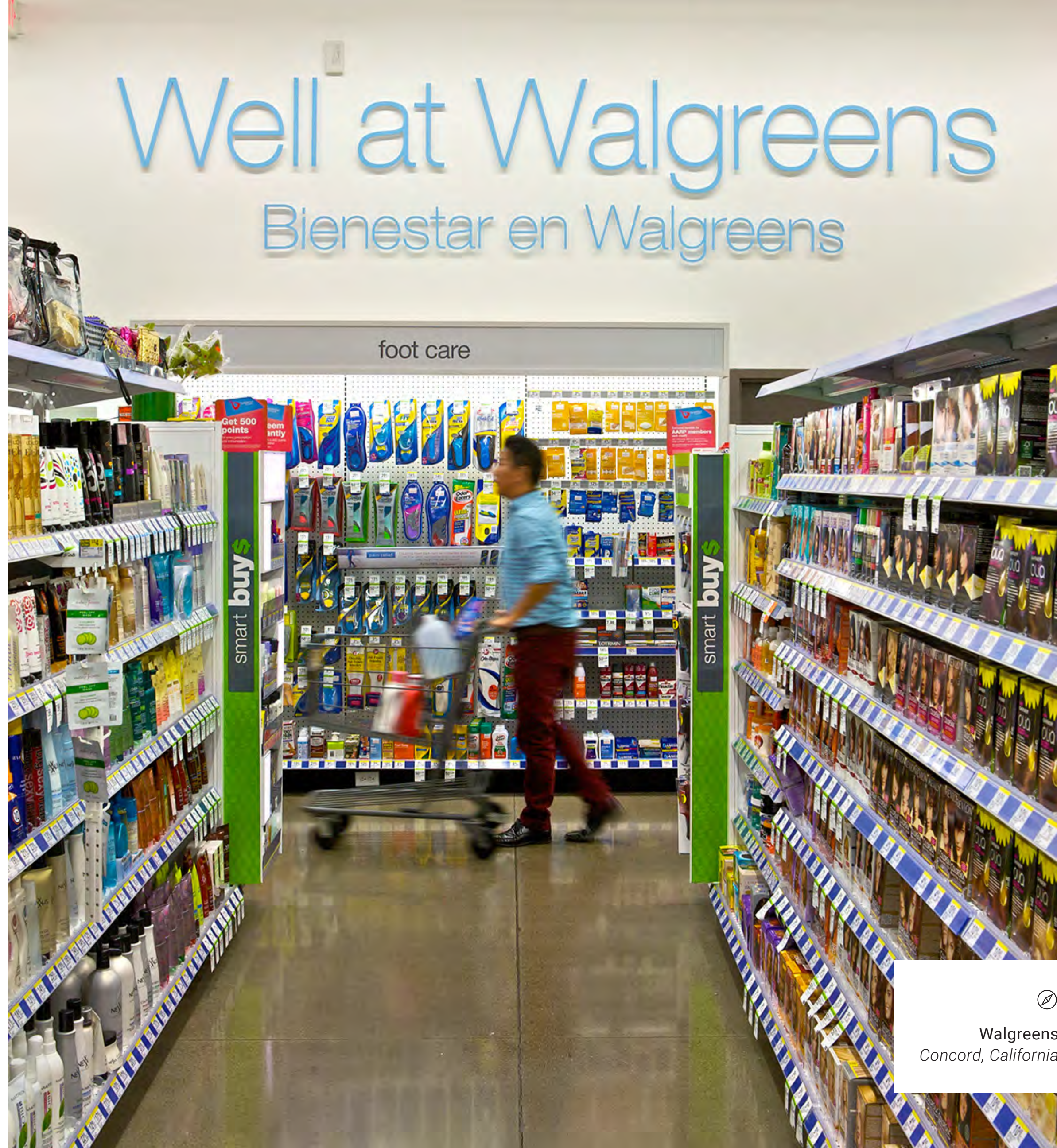
Well at Walgreens

Bienestar en Walgreens

The majority of the healthcare we receive, roughly 80-85%, is delivered in the confines of an exam room—not in a hospital or specialty center. If we could take the elements of the exam room and bring them closer to the patient, we can broaden access to healthcare in the community. Bring the exam room closer, and we'll make vast improvements in the overall culture of care.

Technology is making this possible, the cost of healthcare and lack of universal access are making it an imperative. Today, healthcare in the United States is characterized by a struggle with the increasing costs to providers and consumers, new challenges with reimbursement, and facilities that are struggling to make their numbers add up. Meanwhile, the population in rural and remote areas faces long travel distances for routine care.

The business outlook for healthcare is itself poised for change. In 2019, the industry's priorities include refining revenue capture while demonstrating value to a smarter, more tech-savvy patient base. Healthcare organizations are looking for ways to meet their standards of excellence, but also meet the bottom line. It's critical that they foster



innovation due to the competitive nature of healthcare, but also to answer the need to offer services more broadly and faster. All healthcare provider organizations have one thing in common—they need to optimize efficiency—that's how they are going to be successful. But to satisfy the client base and to get reimbursed, they've got to provide excellence and value. To become more efficient while maintaining quality, they've got to foster ideation—that is, bold visionary new ideas for delivery of care. These new ideas must include finding innovative ways that leverage the big data they accumulate to achieve their mission.

DISRUPTION

Enter the disruptors. Once upon a time, the major healthcare innovations in the U.S. came from the Big 3 (Cerner, Epic, McKesson), then everyone else. Enter the internet. The digital age meant that data was everywhere, but there was little consensus initially for what to do with all that data, until big insurers and key healthcare organizations began to leverage the information. Today, in a digital, data-driven world, radical ideas are coming from non-traditional tech-savvy firms in retail, tech, and elsewhere. These ideas are catalyzing change and innovation in our culture of care. >



Walgreens
Concord, California



Cleveland Clinic Taussig Cancer Center
Cleveland, Ohio
Stantec/William Rawn
The future of healthcare may be a decentralized hub and spoke model in which patients visit specialized facilities (like the Cleveland Clinic, shown here).

Virtualization of health is critical for meeting these business goals of value, efficiency, access, and experience. Today, geography limits the distribution of healthcare services, there's a shortage of locations, especially of specialty services and specialists.

PREDICTING THE NEW MODEL

What can we reliably predict about the future of healthcare? New models will emerge. We're going to see hospitals of the future focus mainly on acute care services such as surgery, intensive care, critical care, imaging, etc. In this larger hub and spoke model, ambulatory and other outpatient services will be decentralized, and smaller centers of excellence will handle specialized services.

Virtualization, seamless patient observation, and data flow will characterize the new standard. Hospitals will follow the patient home.

THE TECH IS HERE, ALMOST

Many of the elements necessary for health virtualization, such as the smartphone and app that allow us to access our health data and care plan instantly, are already available. 5G data highways are coming to our cities, then suburbs, soon—which will make mobile solutions even more agile and accessible. And we already have the technology to apply sensors to the body and collect our vital health data at the point of care. We can get many vitals from our wearable tracking devices. One can already hail a ride from an app to visit the healthcare provider. >

Soon we may see the reverse, where the physician comes to us, a doctor on wheels, then soon after, healthcare technology that comes to us, say in the form of an examination pod that can perform a virtual exam.

Digital reading room technology isn't new—we've been able to deliver sensor data, imagery, health history, and diagnosis to one place and one healthcare professional for some time. However, 5G networks and advancing technologies mean that we will soon have access to all our health information anytime, anywhere.

HOW WOULD IT WORK?

How does the home exam room work? Think of the home as a docking station where we bring care, the examination functions, through mobile technology right to the patient. It begins when the patient hails a healthcare examination pod for delivery by car, autonomous vehicle, or even drone. Or perhaps they will have an exam pod installed in the home. Either way, it will be outfitted with virtual technology (sensors, diagnostic treatment, imaging) so that it can take vitals and much more. Someday, it may even offer surgical capabilities complete with pre- and post-operative functions. Once the patient is examined the data can be shared



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MORE HEALTHCARE

Based in San Diego, California, **Jeff Hankin** is a senior principal and member of Stantec's global healthcare leadership team. His portfolio of work spans complex projects for healthcare, commercial, retail, and public sector clients.

with a healthcare expert working remotely, who can conference and determine the next course of action. Check-ups and post-op check-ins can take place in this home exam room, too, reducing the burden of travel and appointment keeping on the client while boosting comfort and healing.

Sure, this may seem far out, but as I've shown above, it's only a matter of time and putting the technology components together. Will home exams via virtual technology become the norm in the industry? It's not so much a matter of if, as when. Digital virtualization for basic and emergency healthcare is already in use in the field by the military for certain applications, and is beginning in various forms within the private and public sectors.

WHAT DOES THIS MEAN?

Needless to say, the arrival of the virtual home exam will change the way we approach and experience healthcare in North America, and likely, everywhere else. For those of us who design and plan for healthcare professionally, we must anticipate these changes in our design and be flexible and adaptable in this new frontier of health. What does that look like? Perhaps a hub and spoke model or specialty center models, or maybe hospitals as the digital health information centers of the future. We know change is coming, perhaps even faster than we think—it's time to get ready. **D**

LOOSE FIT, **LONG LIFE**

With research and science education rapidly evolving, how can academic institutions get the best value in building design?

BY CYNTHIA LABELLE





Central Michigan University - Bio Sciences
Mount Pleasant, Michigan



Research culture and teaching pedagogy are rapidly evolving. Building new space to support these endeavors requires a large investment, so educational institutions want to build a facility that meets today's needs while being flexible enough to see it into the future.

At the same time, these institutions have more types of spaces on the menu for science education and research than ever. Those spaces may include traditional wet labs, dry labs, practical labs, and high bay labs as well as support space, computational areas, and simulation labs. The question becomes—how do you set the stage to maximize utility and flexibility, leverage resources, and provide solutions to the institution's unique goals and aspirations.

Below, I share some major considerations and pathways to finding a solution that suits your institution and some useful tools we've developed to achieve the best design outcome within this rapidly changing field. ➤

A variety of approaches to collaboration

In both research and teaching environments collaboration, cross-disciplinary and translational modalities are becoming the norm. How collaboration occurs varies from institution and can also be greatly influenced by the culture of the institution or a single department. For example, At Yale's new **Science Building**, one large department is the predominant occupant. The building is designed to encourage collaboration and leverage resources amongst a single discipline. While at the **University of Lethbridge's Science and Academic Building** spaces are purpose-built for cross-disciplinary research and teaching to encourage synergy between chemistry, physics, neuroscience and other departments. Collaboration can be approached in different ways. For its new Engineering Building, Tarleton State University took a typical CAD classroom and put it in the public corridor spread out over three floors making the resource accessible to all and promoting team building. At Texas Woman's University's new graduate research building, researchers are assigned to labs by the type of science or process being conducted in a space (rather than by department) as a way to leverage space and promote collaboration between disciplines.

Tarleton State University

has a number of high bay labs that are used for both teaching and research. By sharing specialized equipment they are able to maximize their investment and increase the diversity of equipment.



Tarleton State University
Stephenville, Texas

The type of lab spaces and the proportion of those program spaces to each other is also changing. As science moves toward more instrumentation, computation, and simulation in and outside the classroom, the proportion of wet to dry and damp labs is changing—especially in life sciences. Strategies that allow institutions to convert spaces from one use to the other in the future in a cost-effective manner is a critical design consideration. We must also embed enough technology and infrastructure to support more group centered activities.

Built to last

Science buildings are some of the most expensive spaces on campus. They are utility intensive and often require higher floor-to-floor heights to accommodate the required utilities. They also can require specialized spaces with criteria for vibration, exhaust, weight capacity or all three as with high bay labs for engineering activities. Achieving the right combination and proportion of new spaces with today's resources while designing a space with the flexibility to have a long life might sound daunting. There are, however, three strategies—**modularity, sharing resources, and infrastructure strategies**—we are finding useful in achieving these goals for our education clients. >

THREE STRATEGIES

MODULARITY

Short term flexibility

It's not a new idea, but modularity is helpful when institutions anticipate expansion/contraction within a lab type over time. For example, at Yale's Science Building, there are several open labs made up of island bench modules and each researcher is assigned a bay or module, with associated bench space within the open lab. If that researcher receives additional funding, a modular lab can easily accommodate the required expansion to another bay, if required, and conversely contract if space needs change. So, there's flexibility within the lab type itself.

Modularity through expansion/conversion

We're seeing more and more need to convert spaces from one use to another within academic research facilities. If we approach lab space design from a modular perspective, using a typical space module for all types, the ability to convert lab space types from wet lab and lab support space becomes easier and the infrastructure delivery can be simplified.

Another modular strategy entails creating a module of a space type and making it work for

two types of users. At UTPB Permian Basin's new Engineering building a single module was created for both the research and teaching labs. This allows the university the flexibility of prioritizing research or teaching in this building in the future without having to do extensive renovations—a design solution that helps them stay nimble.

SHARED RESOURCES

Sharing resources is also growing in popularity, particularly with large institutions, but it can also work at a smaller scale. Sharing resources can mean creating core lab components that multiple researchers, or in some cases multiple department, can use. At Texas Woman's University new graduate research building, we designed a microscopy suite and vivarium that will be utilized by TWU's Biology, Psychology and Food and Nutrition Science Departments. TWU is a smaller institution and recognized that by pooling resources it could efficiently invest in new equipment, make it shared among departments and thereby increase access for all. By designing core labs as shared spaces, institutions can leverage infrastructure, resources, and apply research grant money to the maximum benefit of the whole institution. >



University of Lethbridge -
Science Commons
Lethbridge, Alberta
(Stantec/KPMB)



Cleveland State University brings aspiring nurses, doctors and other health professionals together in core classes and labs.

Cleveland State University -
Center for Innovation in Medical Professions
Cleveland, Ohio

Institutions are also looking to increase the utilization of their investments in teaching labs. They are freeing up specialized teaching labs for use by multiple departments. At the new Center for Innovation in Medical Professions, **Cleveland State University** wanted to bring medical and health science education together under one roof—educating doctors, nurses and other allied health professionals together. By doing so, CSU was able leverage many of the classrooms and specialty practical labs that can serve all these students—maximizing their interaction and the institution’s investment.

Teaching and research can also come together in one space. At **Tarleton State University’s Engineering Building**, due to the investment in specialized equipment, high bay space, and utility requirements, our design organized the high bay spaces by process/equipment so that both teaching and research will take place in the same spaces.

INFRASTRUCTURE

As we have seen on recent projects such as the Yale Science Building, the more we can standardize the utilities within facilities, the better. Taken to the extreme, this approach means that we design so that all utilities are everywhere—the ultimate flexibility, however, can be economically challenging. Or an institution can take a baseline approach—bringing the basics to all spaces while planning for future pathways or by using a nimble point-of-use approach for specialized services. For example, all spaces could receive power, data, and compressed air, but vacuum or specialized gases could be smaller room-based systems rather than building centralized systems. Technological advances in utility equipment now make it easier for researchers/institutions to bring specialty >



To learn more about Yale’s approach to modular design, check out **DQ05: Destination Zero**

services to exactly where they are needed, which is good news for researchers and institutions who want to be nimble and resourceful with capital resources.

In some engineering spaces, particularly high bay spaces, an overhead utility grid can be a powerful and flexible solution. At Tarleton's Engineering Building, utilities are provided from an overhanging grid, meaning equipment can be moved and changed easily as the focus of the class or research changes.

As you can see, the sky is the limit when it comes to long-term flexibility and adaptability in the research and teaching laboratory environment. Ultimately what's important is that designers work with their clients to illuminate the unique goals and aspirations for the programs and building. Only then can we design labs with right fit to educate students and support research in a future that's constantly changing. **D**



Carthage College - The David A. Straz, Jr.
Center for the Natural and Social Sciences
Kenosha, Wisconsin

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MORE SCIENCE & TECHNOLOGY

Cynthia Labelle designs architecture for science, research, and higher education facilities from Stantec's Houston office.



Sunroom at Northbrook Court
Northbrook, Illinois

Meet me at the new mall

Once just a means for getting around
for shoppers, the concourse emerges
as the cool place to be.

BY STEPHANIE TYRPAK



It's where we took our family portraits, got our ears pierced, went on our first movie date and bought our outfit for the prom.
It's the mall.

For decades, malls were a kind of main street for suburbanites in North America. They were places where everyone from teens to grandparents could walk through the same doors and find something—buy anything from a Mrs. Fields cookie to a kayak. Today, however the mall as we know it is in decline. Analysts estimate that one in four shopping malls will close its doors by 2022.

To some extent, our digital life is to blame. Digital technology makes many of those mall thrills as easy to access as a swipe of our smart phone. An app fulfills our need to socialize and be seen, our urge to go to the movies, our desire to window shop, and buy the latest trend. We can do these things at home or on the train or even on the beach. How can malls compete?

To succeed again, malls need to change their focus. They need to become places that buzz, where people want to be—social destinations. The challenge for designers is to create spaces that capture and nurture the energy, the rush, the creativity, and variety that the digital world dips into so effortlessly. Malls have at least one big advantage, however, they have physical



Amphitheater and kids play area at Northbrook Court
Northbrook, Illinois

space that can provide a social experience in real time that connects with our emotions. They have the ability to engulf us in an environment. And while e-commerce continues to grow, physical store sales still comprised more than 90% of retail sales in the U.S. and Canada in 2018. Malls still have much to offer.

For existing malls, surviving can mean broadening the offerings on main street by incorporating more residential-gear development like grocery stores, fitness centers and healthcare—when an anchor tenant pulls out—as well as increasing transit options for visitors. But we must reimagine the interior of the mall itself with ways to attract and engage people so that it becomes a hangout space of its own.

Create A Place To Hang Out

One significant way we can achieve this revitalization is by re-envisioning the mall concourse. In our recent work in mall repositioning and new mall design, we approached the concourse as a destination of its own, a place for hanging out, rather than just a route for reaching retail. Our client implored us to run wild and ignore many of the preconceived notions and guidelines about retail to simply imagine the kind of space we'd seek out and want to dwell in.

Connecting To Emotions

In the conventional mall, the concourse is simply a circulation space. But what if it was a place to be? What kind of path would one want to take to get around? And what emotions should it evoke to be attractive >



Marketplace at the SoNo Collection
Norwalk, Connecticut



Physical store sales still comprised **more than 90%** of retail sales in the U.S. and Canada in 2018.

to people? We map different areas where people might feel serene, healthy, playful, social, collaborative and focused. Then we look at big nodes near the anchor tenants where we could create excitement and create a vibe that would engage people and give them a reason to stay.

Break Up The Monotony

An overarching design goal for us on these types of projects is to break up the vast monotony and uniformity that is the typical mall concourse. In our work on the concourse for SoNo, one of the only new malls being constructed in America, that shift began with the creation of a footpath that meanders through the concourse casually rather than linearly to bring some playfulness and randomness to the experience. From there, it becomes about enriching the human experience.

Places For People

We drew on our experience with the workplace and coworking spaces where a key strategy is to simply create a variety of pockets and places in which people can dwell for an extended period. We brought our experience in creating engaging and dynamic corporate interiors applied it on big, public-friendly scale to infuse some charm to the physical environment of the mall.

Public Spaces, Anchor Nodes

Off the envisioned path, visitors encounter a variety of activity nodes that correspond to those emotions above and appeal across generations. The closer

we come to big name anchor tenants, the louder and livelier the adjacent space can be. It's here that we can invoke excitement and a public vibe through design. In these louder, more social areas, we can program anything in the space from a "park" that can host movie viewings or broadcast fashion shows to a young kid's play area or a food hall featuring food trucks and a farmer's market vibe. Elsewhere, further from the anchors, we can create serene places for contemplation.

Work And Play

In some locations, we might propose a maker space (with 3D printer) or cafes with pay-to-print abilities available to the public to draw remote workers, start-ups, entrepreneurs and educators. A high-energy gaming area where older kids can plug in and play on a network can also make for an attractive destination.

Wellness And Community

Malls are already used as wellness destinations. Why not play that up? Places like Northbrook Court in Illinois (where Stantec is re-designing the concourse) are popular with mall walkers and for regular daytime stroller outings. It's important to create incentives and destinations that encourage the walkers to take a break and stretch, even distance markers where they can track their progress. We've suggested educational elements around fitness and wellbeing and engaged retail tenants to contribute to prizes for visitors who reach certain fitness milestones in the mall, like 10,000 steps. >

Pop-Ups

Pop-up cafes and kiosks allow for dynamic and hyperlocal programming. A local artist can take over a space temporarily and imprint it with their own aesthetic. Or a tech retailer can offer us a chance to try the latest Virtual Reality headset.

Indoor-Outdoor Vibe

At The SoNo Collection in Connecticut, we cultivated an indoor-outdoor vibe, creating spaces with the aesthetic and openness that mimic an outdoor gathering area. The third-floor marketplace is treated like an open-air market in its look with food truck-like dining options. “The magnificent room” at SoNo mirrors the concept of an outdoor urban plaza, with an outdoor terrace, reconfigurable stage, private library and multipurpose room. “The park” features an amphitheater with seating facing a multimedia display which wraps around the main vertical circulation core.

Make It Cool

In today's technology driven society, many of us still crave a community experience and physical, social interaction. Creating places within the concourse where people want to be, that's the goal. Make it a destination, make it a place where people want to hang out, a place where life happens. **D**

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MORE RETAIL, HOSPITALITY AND MIXED-USE

Stephanie Tyrpak designs retail and workplace projects from Stantec's Washington, D.C. studio.



The SoNo Collection
Norwalk, Connecticut



Optus Stadium
Perth, Australia
Architects: Hassell,
Cox, HKS



ASK AN EXPERT:

How do you future proof a stadium in the digital age?

Senior Project Engineer, Principal and Australian Discipline Lead **Liliana Mironov** on electrical design for Optus Stadium

INTERVIEW BY JOHN DUGAN



Q & A



That seamless sporting experience, uninterrupted, no disturbances, is important. Today, events go smoothly if your infrastructure—especially electrical—is designed with resilience in mind.”

Q You’ve been with the firm for 25 years, right?

LILIANA: I migrated from Europe and joined the firm in August 1994 as a graduate engineer with a passion for electrical systems, and since then I’ve worked on many inspirational projects. Now a Senior Project Engineer and Principal, my responsibilities have increased but the project experience is no less enjoyable to me. My latest project is one of the most interesting of my career; the Optus Stadium in Perth.

Q So, why did Perth need a new stadium?

LM: The Australian Football League is followed by everyone in Western Australia, but the old stadium in the heart of the city had capacity for just 40,000 people. Western Australia has boomed recently with a huge migration from eastern Australia and overseas. The government recognised that a bigger venue was a necessity, not just for sports, but to increase tourism and recreation in the area and to spur growth.

The new development is not just a 60,000 seat stadium, it’s part of a precinct with public spaces, restaurants and playgrounds. It’s conveniently located close to a casino complex and tennis facilities, a golf course and more amenities along the banks of the beautiful Swan River. What’s more, a new train station and footbridge link directly to the business district.

The whole stadium was designed with one goal in mind; to bring community together to have a great time. It’s all about the ‘fan first’ experience.

Q What was your role on the project? How long did it take?

LM: As a project engineer and internal services coordinator for Optus Stadium, I was responsible for the electrical services, mechanical engineering, fire, sustainability, vertical transport, security and CCTV. The project coordinator role offers the client and design team one point of contact, simplifying the communications through a single channel. We were thankful

to be part of a fabulous team of people, working collaboratively with Brookfield Multiplex (construction) and Hassell, Cox and HKS (architecture), Arup (structural), Philips (lighting), and others. From the initial proposal submission, this was a five-year project, but three years of that was particularly intense.

Q Today’s expectations of a stadium experience are high, how did the team create an elevated experience for fans?

LM: The site was once an Aboriginal campground, so reflecting the history and culture of the Aboriginal people within the stadium design was critical. The project intent was to enhance Perth’s culture and environment, creating an attractive place with easy transport links, while featuring the latest technology. The challenge was to design a rich ‘fan first’ experience for everyone. The resulting design is a comfortable space that doesn’t look like a conventional stadium. >



Optus Stadium
Perth, Australia
Architects: Hassell,
Cox, HKS



A 'fan-first philosophy combined with sophisticated design and cutting-edge technology resulted in Optus Stadium receiving the Prix Versailles 2019 Sports Award and named the most beautiful stadium in the world.

The aim is to get people off their couches and out in the community, meeting friends and family, being entertained—creating shared experiences. The stadium is a multi-functional space that supports cricket, rugby union, soccer, football and has the flexibility to host concerts and other events. Inside, there are function rooms for entertainment. Flexibility was a key element throughout.



How does the design enrich fan experience?

LM: The technology itself is convergent virtual network, which means easier operation. From a central control room, one can control the lighting, the power, the mechanicals, emergency, security and CCTV. The stadium has one hundred percent coverage for WiFi and a distributed antennae system, providing mobile Internet and communications for thousands of patrons.

One 'fan first' element is the wide availability of screens so that visitors can visit food and beverage outlets and never miss a play. There are two large screens inside, another

outside and over a thousand small screens distributed throughout the building. Multi-functional, these screens display safety messages, provide information on food and beverage, deliver access and way-finding messages, player statistics and event advertising.



What about energy usage?

LM: With the scale of the building, it would be irresponsible to design without environmental impact in mind. Sustainability measures are a must. We designed the stadium with climate change, energy conservation and recycling in mind. So, it has great energy saving initiatives, with automated controls (the lighting control system has occupant sensors that switch lights on and off) with modular wiring, lots of areas of natural ventilation, some sun control, automated light controls, reusable materials like low smoke zero halogen cabling, an energy monitoring system and converged network. This is the first Australian stadium with sports/event lighting that's 100% LED-lit, so it's highly energy efficient. >

Q How do you future proof a stadium in the digital age?

LM: The stadium is built for flexibility. It's designed to handle multiple sports and multiple users with flexible interior spaces. It's expandable to accommodate 70,000. Lighting controls can be accessed via iPad or touch screens and can set scenes for diverse uses. The sports lighting itself has more than 30 preset scenes, from training to major sport.

From an engineering perspective, adaptability means enabling modification of space use without requiring major infrastructure changes. We built in pathways and cabling to allow for additional advertising, lighting, and screens over time. The plant areas and the electrical infrastructure like switchboards can be accessed easily, so a space can easily be retrofit from one use to another. A function room can be repurposed as an office with only some minor work. In the electrical design, we used modular style systems and built in spare capacity. The modular wiring system allows for easy changes. The services are distributed within the stadium and divided in four cores, each with common risers and all the services locally.



Optus Stadium
Perth, Australia
Architects: Hassell,
Cox, HKS

Q Why is electrical infrastructure so important today?

LM: That seamless sporting experience, uninterrupted, no disturbances, is important. Today, events go smoothly if your infrastructure—especially electrical—is designed with resilience in mind. A total shut down is unthinkable, from commercial and safety perspectives, but it was a possibility in the past.

And when we say electrical infrastructure, we are talking about a lot of services and wiring associated with that. How these myriad systems talk to each other—seamlessly, flexibly and reliably—is complex.

Reliability is number one. We have dual power supplies which automatically switch on in case of failure. We have a substantial generator backup system, designed not only for continuing power during the game in the case of a major power failure, but also to help with peak load demand and additional energy savings. Systems also back up of all the stadium's IT and network. >

Q And for the media?

LM: Events from the stadium are televised on a weekly basis in Australia. Because of the number of sports to be accommodated, we consulted widely on a variety of events to ascertain broadcast modes, radio and television needs, for the Australian market and international standards. Services and connection points throughout the stadium are flexible and widely distributed so media can produce in any televised mode, partial or fully live.

Q What was a particularly challenging moment during the project?

LM: We had a short program to deliver the stadium in time for its opening date and a commitment to the Premier. To meet these targets, the team completed the design and construction stages concurrently. Elements requiring longer lead times for delivery, like structural steel for beams, had to be ordered early by the contractor to maintain timelines.

But to do so, they needed to know how our electrical services would run, or if any penetrations in the beams were required, all before the architects had finished the conceptual design. Now that is tricky!

We adopted a design methodology that was fully flexible and adaptable that could incorporate design changes throughout construction. Constant communication was crucial to our success.

Q What did you like most about the experience?

LM: The most enjoyable thing was to work in part of this large team of very talented architects, designers, and engineers. It was exciting to bounce ideas of each other and explore new technologies together. That was the pleasure of it because it wasn't just working in isolation, but rather constantly coming up with ideas together to deliver an iconic building, and a rich experience for fans and visitors for years to come. That's a special opportunity.

Q Have you been to a few big events now?

LM: I have been to a couple. If I have tickets, I usually give them to my children and I babysit the grandchildren. When they come back, they say, 'Oh, Lily, it's a fantastic place.' It makes you proud when your family gives you good feedback on how it feels to be at the venue. **D**

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MORE SUSTAINABILITY

John Dugan is the Editor of the Stantec Design Quarterly. **Liliana Mironov** is an Electrical Project Engineer and Australia Discipline Leader. She established the firm's Underground Power Design section for Australia and has worked on education and commercial sector projects of all sizes over the course of her 25-year career.





FINAL THOUGHT

Good for change, change for good

By exploring systems thinking, we can
design for a rapidly changing world.

BY ANDREW IRVINE



Changxing Island masterplan
Dalian, China



Change is everywhere.

And despite our access to tools that enable us to be more predictive, we don't always know where it's going. Who knows what new forms of energy, generational mobility or communication tools we're going to be using in the next 10 or 15 years. And yet the role of planning and design is focused on imagining or predicting this future. So, what does that mean for our design profession? I believe systems thinking offers some answers.



Marina
Ruwais, UAE
Stantec utilized a systems approach to planning and design on projects in the UAE.



Changxing Island masterplan
Dalian, China



Systems thinking

Systems thinking is not a new idea, it has been embedded in our work at Stantec for the past decade. And it's a great way to rethink the way that you approach urban systems, particularly in terms of new development and building communities from the ground up.

But when it comes to looking at our existing cities, it's much more difficult to break out of our existing approaches. Across North America city

infrastructure is crumbling and there's a lot of talk about the need for major re-investment. But that infrastructure is tied into large interdependent networks for data, transport, power, water, etc. It's incredibly difficult to tactically and incrementally repair and update. This makes executing change expensive. This also means, because of the expense and interconnectedness, once we commit, we're all in. And that makes it hard to experiment or adopt new technologies and more sustainable strategies.

Systems thinking seeks a more **resilient**, flexible, and ultimately more responsive solution to an uncertain future. >

But outside North America, we have applied systems thinking approaches to the built environment. In our master planning work in the Middle East or China, for example, we've been able to take a fresh look at how we might to approach the different layers of thinking necessary to work within the land and fast-growing urban systems.

When we apply systems thinking, we look at the ecology, the land systems, social systems, demographic trends, community fundamentals, and what changes are likely there. Considering these elements holistically allows us to be more adept at thinking about how we service that community, whether it's health and wellness or education or socialization or employment. That helps us understand how to accommodate today's needs and meet tomorrow's.

Then we look at infrastructure. We need to break it down from that broader network into something that is more district-oriented to find a better solution, something more resilient, more flexible, and ultimately more responsive to an uncertain future. >

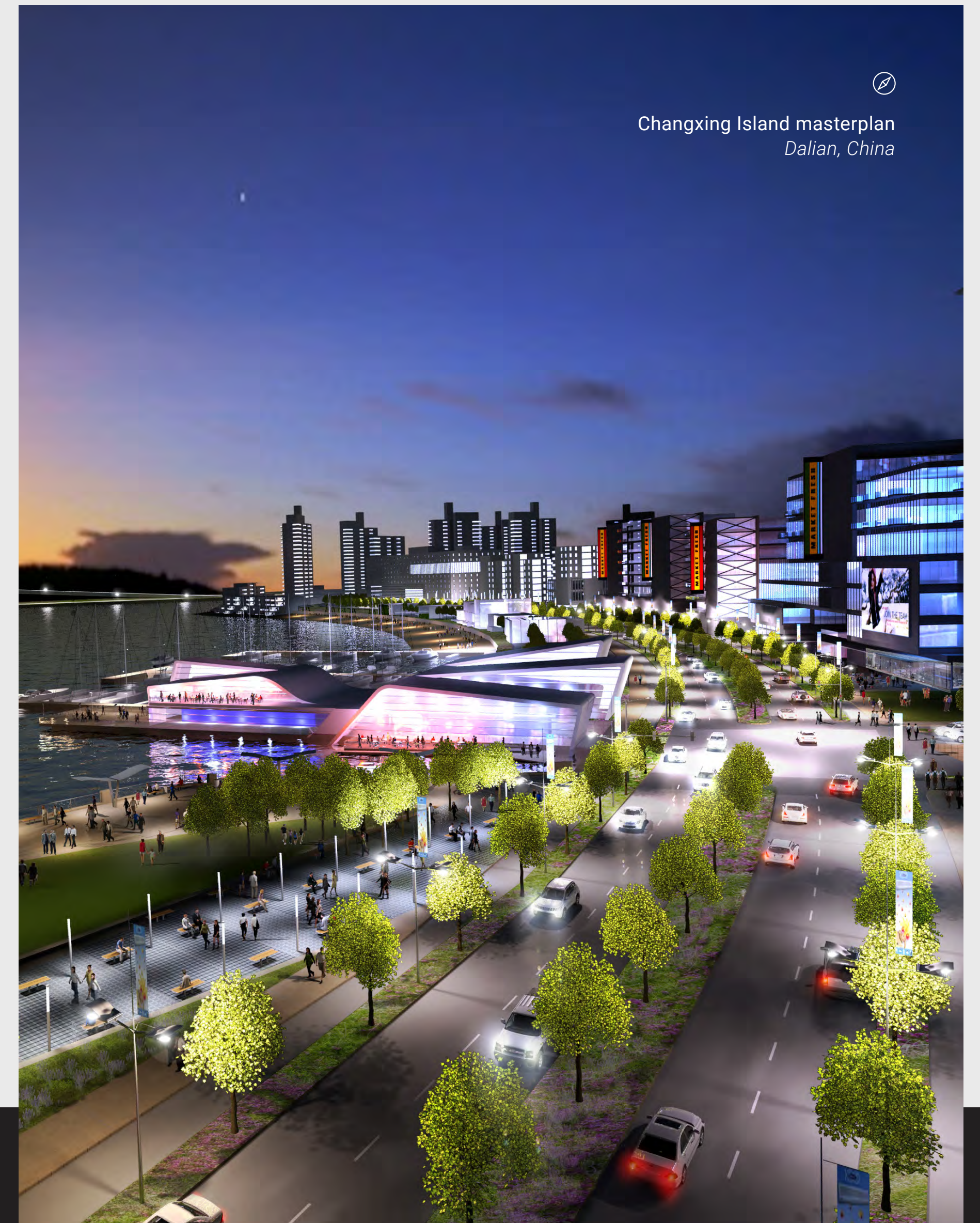
Incremental strategies to build resilience

Rwanda is called the land of a thousand hills. It lacks industrial-era infrastructure, but it's embracing the technical revolution of digital and cellular technologies. I participated in a project in Rwanda that concentrated density at the top of the hills and lower density and ecological and agricultural uses at the bottom of the hills, then used gravity to channel waste to environmental treatment zones and convert it to energy. Using waste-to-energy technologies in the system, rather than a big sewage treatment plant on an existing network, generates methane as a fuel with minimal environmental footprint. We applied the same strategy in India and used biogas digesters at a district level to harvest energy from the waste from local cooking stoves to use in a 5 million SF commercial office development. Approaching things at the district level allowed us think differently and incrementally roll out infrastructure systems to change the community and make it more independent, sustainable, and resilient.

In 2013 Stantec was part of a team developing a master plan to accommodate 1.2 million people for a growing industrial area on a chain of islands in

China near the Bohai Sea. There were water supply issues, so we looked at land area and rainfall and determined how much natural water we could harvest, store and use to support that population. We repurposed losses within the system for either industrial or agriculture use. We did the same with the mobility and energy systems. Since this was a new community, we were able to take a district-based approach and try closed-loop, local solutions rather than connecting to the larger networked energy supply, water supply or waste management.

Now, we're applying that kind of thinking to resilience. We explored some of these ideas in our recent Houston 2020 workshop, for instance. There, we looked at networked emergency systems, social systems, schools, health centers, fire stations, the community safe havens during an emergency, as well as the land system. By understanding the land system's vulnerability, we can begin to identify community level interventions that will best serve the local population in extreme situations. >



Embracing urban life

To solve today's challenges within existing communities, we're going to need to employ systems thinking. A groundswell of interest in urban living is densifying downtown areas across North America. This increasing urban population, combined with disruptive changes in mobility, puts greater pressure on the public realm and the open space network to satisfy the needs of a growing urban population. In growing cities like Denver, we can't create new land to provide recreation amenities, putting us at risk of losing connection to nature through parks and recreation and the associated benefits to health and wellness. This means we need to be more creative in rethinking recreation, open space, and food production. But there are opportunities. We're exploring innovative ideas such as vertical open space, adopting biophilia as a design generator, and repurposing parking structures and former industrial buildings to help meet those important community amenity needs.



Mobility

Urban centers are increasingly challenged by traffic congestion and mobility issues. But rather than simply building more roads to address congestion, we're seeing a shift toward new ways of moving people; from electric scooters to public-private mass transit. Systems thinking will help us find fresh approaches for solving mobility and addressing the changes in cities brought on by the shared economy, autonomous vehicles, and new forms of mobility. >



Automated Shuttle Feasibility
Study & Concept Plan
Chamblee, Georgia, USA

Interventions

When we can start from scratch, apply our big ideas, and understanding of different systems-based approaches, we can chart a smarter and more resilient direction for growth and development. To repurpose networks within the United States, we must overcome entrenched government, agency, disparate ownership, and economic models. In some cases, we are locked into the existing large urban infrastructure systems. But perhaps there are other, equally impactful interventions that can be applied where we are unable to change the existing broadscale network.

By drilling down to the building level or block scale, intervention in cities is suddenly more realistic. New interventions occur within our urban fabric at the building level, think about the possibilities brought about by PV roof or cladding tiles, coupled with new advances in battery and smart grid technologies. Consider the new communities we are designing around

a sustainable lifestyle and urban farming such as **Adams Crossing**.

We can design buildings that are more resilient with their own closed loop networks for energy, water, waste and food. We have the design and technological capabilities to make smart buildings happen right now.

By applying creative thinking at the district, block, and building scale, we can re-shape our cities to promote more resilient and sustainable approaches, and more responsible management of our limited resources. But to do this, we'll have to think more broadly and across the silos of disciplines. Only then will we make rapid change—a change for good.

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MORE CITIES ADAPTING TO CHANGE

Denver, CO-based **Andrew Irvine** is the Urban Design Discipline Leader for the Stantec Buildings group.



Lakehouse

Denver, Colorado

The Lakehouse in Denver is both a highly sustainable building and a pilot project for the WELL Building program. It will be the first WELL certified multi-family building—setting a new bar for urban redevelopments. The building layout promotes access to natural light with apartments oriented toward city, lake and or mountain views. Close attention was paid by designers to air quality through material selection. Social spaces are situated throughout the building. One of the exciting innovations was the incorporation of a community garden on the podium amenity deck alongside the pool and other recreation amenities. The garden, which has seen its first abundant harvest of vegetables and herbs this year, is connected to a community kitchen and dining area where the residents can come together to cook, learn how to cook and share their harvest together reinforcing a resilient social system.

DESIGN QUAR- TERLY



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