DESIGN QUAR-TERLY

ISSUE 14

Stantec

TOOLS AND DATA

Organize, inform, design

DESIGN QUAR-TERLY

ISSUE 14

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:
TOOLS AND DATA

The Fourth Industrial Revolution (4IR) will transform how we live, work and play, and upend the design industry. To maintain relevance, designers must begin harnessing data for design, construction, and operation. Design teams will need tools to gather data, organize it, and design from it. Stantec designers, engineers, and technology specialists are embracing this change—not only because it is inevitable, but because we believe it can be channeled into better design solutions, more efficient buildings, and healthier and happier communities. Design automation for residences, crunching numbers for master planning, modeling whole life carbon, communicating acoustics in VR—it's all in the service to making a better built environment for people.

HOW GAMING TECHNOLOGY IS CHANGING
THE WAY WE DESIGN FOR ACOUSTICS

BY DANIEL CASTRO

Game on for sound.

In current popular video games, three-dimensional sound simulation accompanies three-dimensional action to allow the player to move through the virtual environment. In gaming, virtual reality is sonically sophisticated to recreate a rich audiovisual experience. In games like Fortnite, Call of Duty and others however, all the 3D sounds are fake—they are as imaginary as the places the video game characters inhabit. What if we could report the scientifically accurate acoustic response in real 3D virtual environments? Would that be useful in design?

Acoustics requirements

There's a problem with the way we look at acoustics in design today—acoustics are often divorced from experience as they're difficult for clients to understand. Most countries have their own mandatory legislation for acoustics and in order to comply with these requirements and regulations, we (Acoustic Engineers) are called in to make sure all projects meet these minimum standards, and sometimes make them better.

Our industry and regulators have abstracted acoustics to a numerical rating to make these regulations possible. But the flip side of numerical ratings is that for clients and design teams, these numbers are hard to relate to. It is hard for non-experts to conceive how the predicted acoustic properties of spaces will translate to the sound experience in built form. For example, very few non-acousticians can guess a decibel level of something they hear. Ratings aren't the same as experiencing sound firsthand.

How can clients, designers or stakeholders understand acoustic comfort in a space when they're shown design changes that will decrease the reverberation time from 1.2 s to 0.7 s or an absorption coefficient from 0.9 to 0.2? How can they understand the value in investing beyond the minimum requirements?

Complexity of acoustics

Acoustics is a complex science because it has a significant subjective component. Just because a project meets minimum requirements, I tell my clients, doesn't mean it will be acoustically comfortable for everyone. With this in mind, I've looked for a way to communicate the way spaces sound during the design phase. Previously, I used a SketchUp plug-in so clients could hear the sound properties of designs in SketchUp, but the 3D visual lacked detail, and the tool is no longer available. >

"With video games in mind, I looked for a gaming engine that could provide the platform to allow for an accurate acoustic simulation in a VR environment."

VIRTUAL SPACES, REAL SOUND

We can simulate actual sound conditions of spaces in virtual reality and show users how materials and acoustic treatments will sound quality.

Inspired by gaming

With the goal of giving everyone the chance to experience the meaning of acoustic concepts, I looked at developing an internal tool for communicating acoustic conditions. With videogames in mind, I looked for a gaming engine that could provide the platform to allow for an accurate acoustic simulation in a virtual reality environment. To do this, I asked one of the world's premiere middleware companies (which can tap into the power of the gaming engine to develop apps) if it would be possible to create the tool I desired. They said yes. They provided us with the path to develop a new tool using a video game engine at its core, creating a new way to present acoustic conditions—in virtual reality.

Now, our clients and design team members can put on a headset and listen to the spaces as they walk through them in virtual reality. It's a game changer. We still produce the necessary report with its numerical ratings to demonstrate regulatory compliance, but our clients get a much better understanding of the sound of their space and options by listening to it. And that means happier clients. >

The tool we have developed has some powerful features which give us the ability to immerse the user in the acoustic experience.

1.
We can look at multiple acoustic scenarios in one space.

We can present multiple options for acoustic treatments, say one with bare surfaces, one with wall treatments, and one with an acoustic ceiling. We are able to precalculate and preload over a dozen scenarios into the tool.

2.
We can switch between acoustic scenarios with the click of a button.

The ability to compare and contrast these scenarios (to "A/B" them in audiophile lingo) is a crucial feature as it gives the user a chance to hear, in real time, differences in the acoustical properties of designs.

3.
We present the acoustics in a detailed VR environment.

With the VR goggles on, or using a laptop as if you were playing a video game, the user can walk anywhere in the space and experience how acoustic response changes. We've already calculated every position in the room and its acoustic impulse response. That gives the user a degree of freedom that simulates reality more closely.

4.
We can simulate multiple sources.

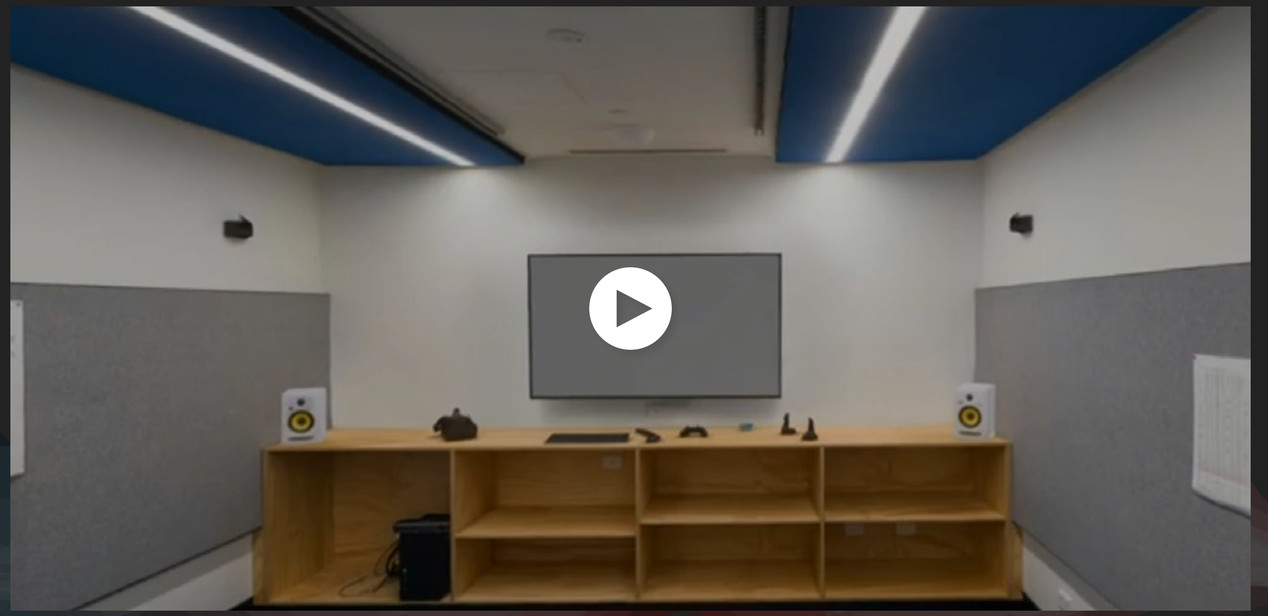
The software is designed to feature one person's voice for audio reference, but in its new iteration we are able to feature multiple sound sources simultaneously. We can listen to stereo sources simultaneously!

CASE STUDY

We are already using the tool to refine designs for better acoustic comfort. For example, we recently walked a client through the design for a 39th floor executive conference room with glazing on three sides, timber surfaces, and conference table. We modeled the acoustics and demonstrated that all the hard reflective surfaces would create significant echo—it would be like an echo chamber and uncomfortable to use for meetings. We also modeled it with an acoustic intervention (curtains on various acoustic surfaces) to show that it could, with some modification, be used as a multi-purpose meeting space. So rather than convince them with technical descriptions of the room, we had them walk through the space and listen to all the different options.

Status of the tool

We've taken acoustic VR from an idea to an experiment to a powerful tool we can use on real projects. But it is all a work in progress. Right now, our acoustic VR modeling service is more of a boutique offering we are using to find solutions on particular thorny acoustic projects. We need to streamline the tool, make it seamless, intuitive, and easier to deploy. Our goal is to apply acoustic VR on every project. >



AN IMMERSIVE EXPERIENCE

Using ambisonics (360 degree surround sound) and photogrammetry we can replicate the look and sound of a real room in virtual reality.

GO TO VIDEO ↗

Credit: Anechoic recordings by David Thery, Brian Katz. Anechoic audio and 3D-video content database of small ensemble performances for virtual concerts. Intl Cong on Acoustics (ICA), Sep 2019, Aachen, Germany.

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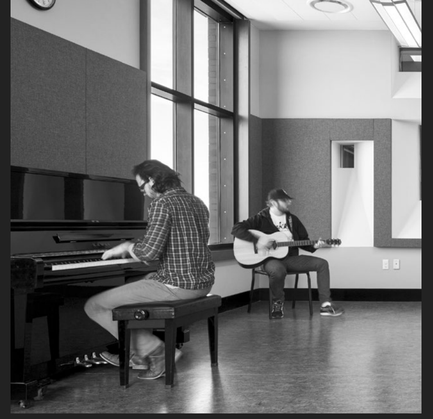
MORE ACOUSTICS & VIBRATION

Daniel Castro manages a team of acoustic specialists in Stantec's Melbourne office.

WHERE WILL ACOUSTIC VR GO NEXT?

Future applications:

We can envision numerous uses for the Acoustic Virtual Reality tools we're developing, some even outside the traditional role of the design industry.

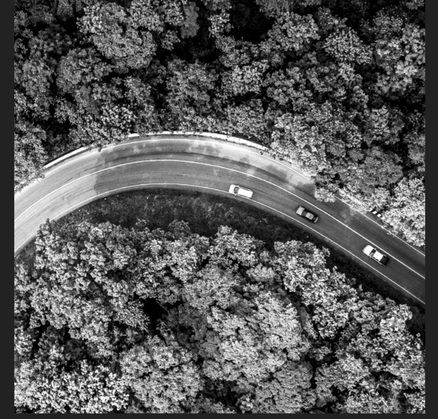


THE SCHOOL MUSIC ROOM

Perhaps the first place where we'd like to apply an affordable version of acoustic VR is on interior design for music rooms at new schools. We can use the tool to evaluate some of the standard music room designs and improve them, or develop a new set of optimized flexible music rooms.

STANDARD ON EVERY PROJECT

There's a big reason we don't rigorously analyze every project for acoustics: budget. If we can make this acoustic VR service truly affordable however we can offer it on every project we do. In fact, we will be able to show side-by-side comparisons for cost/acoustic strategy while presenting possible scenarios in acoustic VR. That way, the client and design team can hear the difference, decide what sounds good to them and evaluate the investment.



MODELLING ENVIRONMENTAL SOUNDS

We're looking at porting the currently working indoors algorithm to the outside world, i.e. integrating environmental sounds and moving sources from highway traffic to railroads in our model. If we can do this, we can predict how a new road will sound in a residential development and show the results in a VR model.

HERITAGE SONICS AND AUDIO-VISUAL REPLICAS

We are now able to model rooms extremely accurately. Using photogrammetry, which in simple terms, is taking thousands of pictures of a room, we can make a virtual visual record of a space while we simultaneously capture the sound of the room. This means we can record and create virtual versions of places featuring highly accurate interior details and acoustic properties. We can, therefore, create heritage acoustic models of real places, even historic places, like Abbey Road Studios or the Whispering Gallery at St. Paul's Cathedral. We can store historic acoustic records on the cloud forever making sure that both aural and visual characteristics are kept intact forever. Theoretically, we could model spaces such as a musician's recording studio so that users can experience sound just as the artist did during its creation providing a new way of experiencing music.

A LIFE CYCLE A DAY FOR BETTER BUILDINGS

Timely assessment of whole life cycle carbon impact is a game changer.

BY JAMES JACKSON

Whole life cycle carbon assessments are a bore–and an expensive one at that. Previously, these assessments have been tacked on to projects nearing completion to provide an indication of the carbon emitted by a building over its lifetime. These provide little opportunity for engineers and architects to optimize design for carbon and often rely on many hours of modeling. **But we are looking to change that with our new digital carbon workflow.**

Whole life cycle carbon is the carbon emitted through the construction, use, maintenance, and demolition of a structure. Typically, we look at this carbon burden in stages such as production and consumption, use, operations, and end of life. When it comes to assessing the total carbon burden of a project, each of these stages requires us to use a different set of parameters and a separate method of calculation. This process can get quite complicated quickly.

Traditionally, we look at reducing carbon appetite of buildings during the operational stage–through more efficient lighting, air conditioning and heating, and vertical transport for example. But the other stages–the production of building materials, the construction of a building and its demolition—all make up a significant portion of a building's carbon cost. We call this embodied carbon and it makes up about 28% of the carbon emitted by typical new construction.

CARBON BURDEN STAGES

- PRODUCTION
- CONSUMPTION
- USE
- OPERATIONS
- END OF LIFE

EMBODIED CARBON IN A TYPICAL STRUCTURE'S LIFETIME

CURRENTLY 28%

RISING TO 40% BY 2050

And as grid decarbonization continues across the globe, we expect that operational carbon emissions will decrease while embodied carbon emissions will come to make up about 40% of a typical structure's lifetime emissions. Consequently, embodied carbon is an area where designers and engineers can make big sustainability wins.

Why are we looking at whole life carbon now? There's an emerging global consciousness around whole life cycle carbon, particularly in the regions where we work. Currently, 11 separate nations—including the United States, Canada, the UK, and several in the EU—have standards dictating the assessment of whole life cycle or embodied carbon, and the state of Colorado just passed legislation more stringent than what is required by federal policy.

This is particularly relevant in the UK at present as the Greater London Authority has mandated Whole Life Cycle Assessments (WLCAs) be submitted with planning applications at the outline planning stage and the detailed planning stage. But WLCAs will undoubtedly have future relevance in the North American markets as embodied carbon gets more attention and more jurisdictions pass Buy Clean legislation.

It's also the right thing to do. It gives our designers and engineers opportunity to design with the future health of our communities in mind, and it gives our clients a clear picture of their carbon impact very early in the design process.

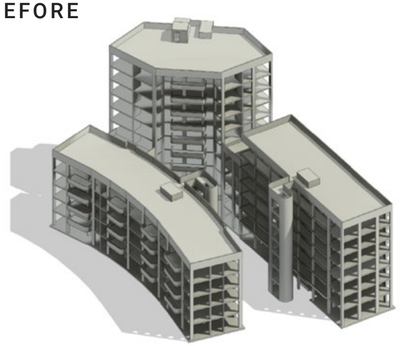
Roadblock to implementation

But current industry practice makes it difficult to design with whole life cycle carbon in mind. The standard approach in the industry is to take a project, push it through to detailed design and run that model through industry-standard analysis programs which spit out some data on carbon life cycle that is inaccessible to anyone but the experts.

Consider for a moment a project we're working on for Belmont Street in London. It's a 3-building residential block with a combined 22 stories and 12,200 square metres (130,000 square feet). To get the project design to the point where we can accurately assess the embodied energy of the building, we had to expend 110 hours of modeling and a similar number of hours in engineering. Once complete, we run it through the software that creates a document in the format required by the Greater London Planning Authority—a utilitarian data table.

A new approach to whole life cycle carbon assessment and modeling

BEFORE



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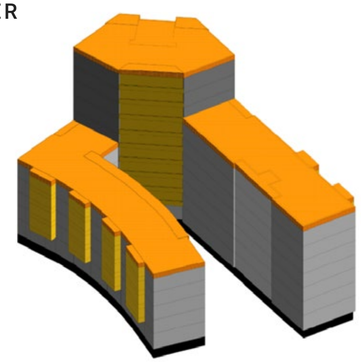
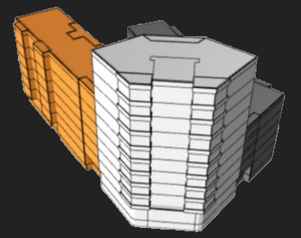


Belmont Street *London, UK*

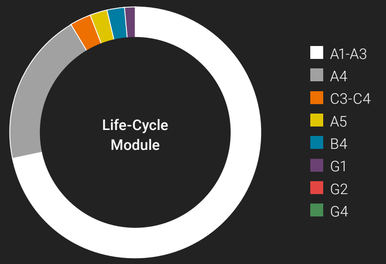
Belmont Street Whole Life Cycle Assessment

A life cycle module is a stage in the life of a building or building element. We use theses stages to categorize the processes that occur to a specific element over its lifetime. From these life cycle stages, we can quantify the emissions produced throughout an element's lifetime. The sum of these elements then provides us with a whole building life cycle carbon assessment.

Belmont Street | Isometric



Baseline Carbon Assessment by Life Cycle Module



Block

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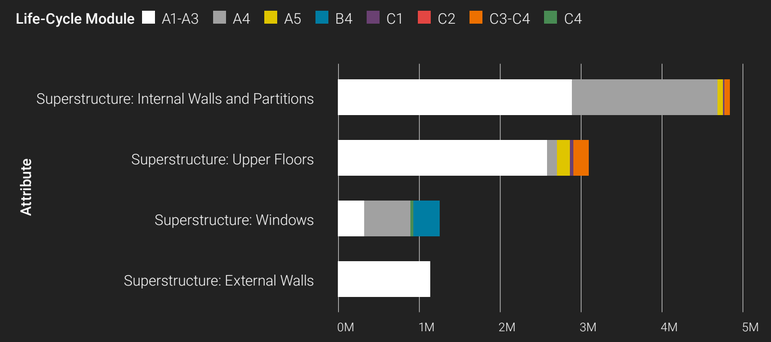
Assessment

- ☐ Baseline
- ☐ Improvement

Value by Attribute and Life Cycle Module

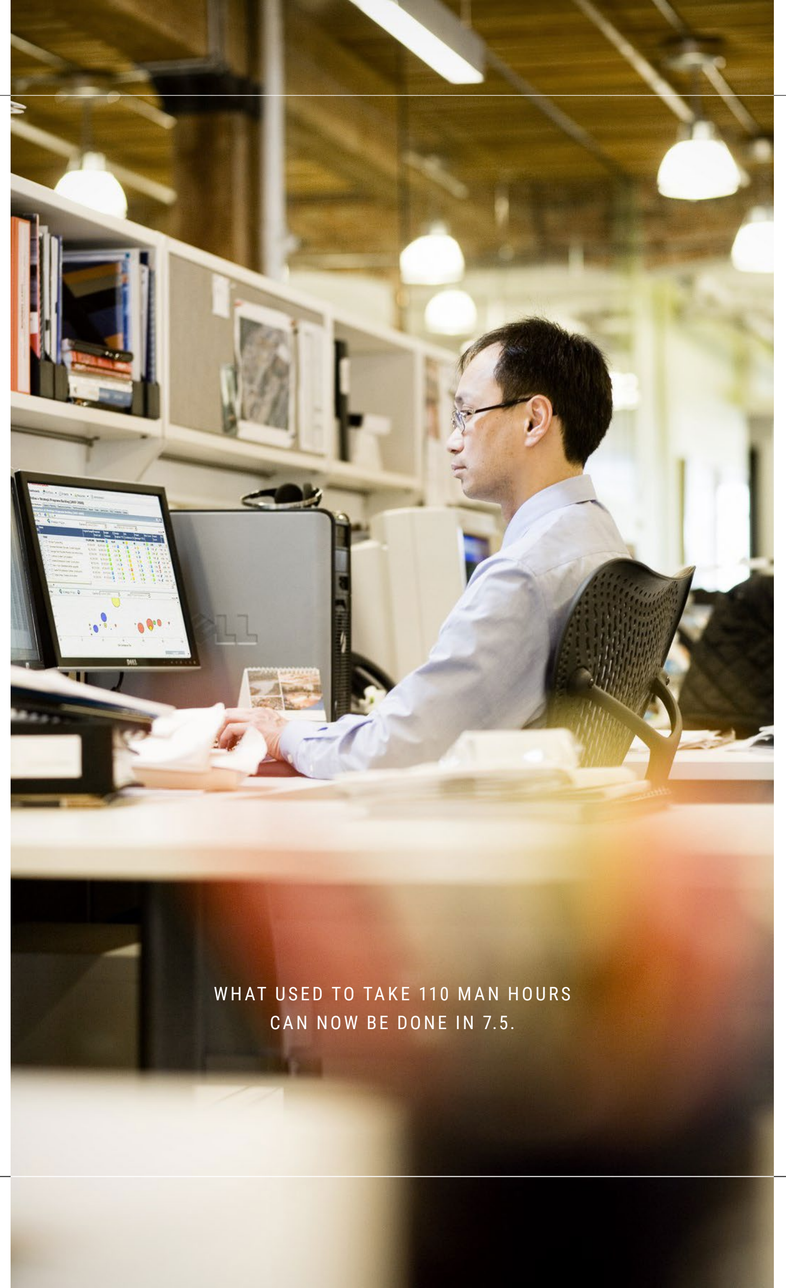


There are two major issues with this current practice.
1. It's costly, requiring our studio to spend spent roughly £4000 ($5500) in modeling time alone before we make the assessment using the most popular piece of software on the market.

2. It's retroactive. By the time we assess whole life carbon, the design team has made most of the significant architectural and engineering decisions on the project. We are past the point where we can change course. We are often looking at the carbon impact of designs that we are no longer able to change.

Assessing WLC in early design stages
From this desperation came inspiration. We saw the opportunity and the need for a workflow that enables us to assess whole life cycle carbon from the very beginning of a project–while designers and clients still have options and decisions to make.

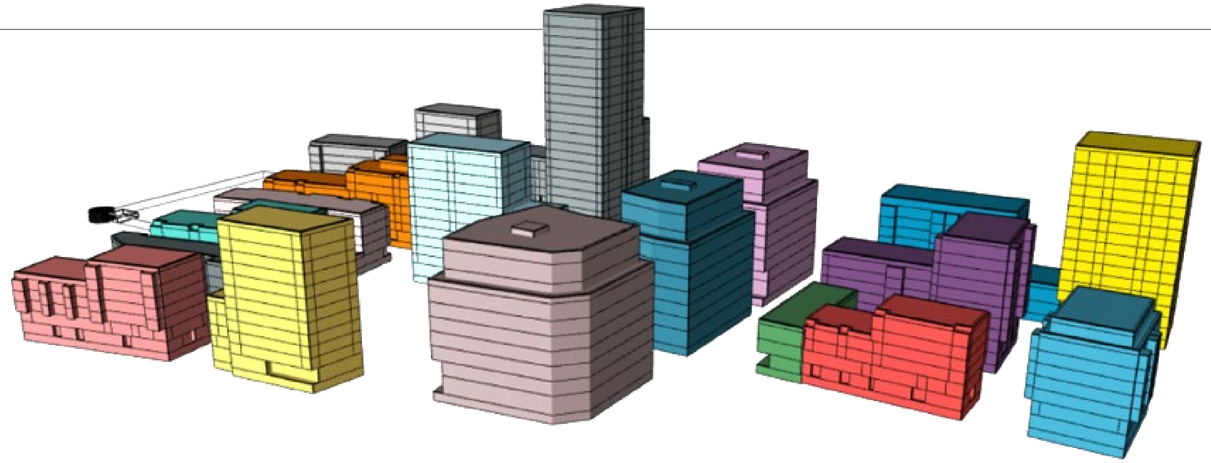
In this new digital methodology, we can spend just a few hours modeling a project from its most basic, two-dimensional massing plans and create something from which we can carry out a digital whole life cycle carbon assessment. From this model, we take just a few arguments—building use type, the area and the height of the building, and using our custom tool, our team can quickly compare the impact of design decisions on the construction's carbon emissions. At Belmont Street, for example—with just four-and-a-half hours of modeling and some time in our whole life-cycle carbon calculator, we can compare framing material, floor sizes, and even architectural build-ups. We can assess, change and optimize all of these factors before a column has been sized.



WHAT USED TO TAKE 110 MAN HOURS
CAN NOW BE DONE IN 7.5.

As engineers, we now have a direct link between design decisions and sustainability outcomes. And not only can we produce the report required by the GLA, but we can also create a sleek, dynamic, mobile-friendly and interactive document that shows clients how they can reduce their carbon footprint and how their design decisions influence sustainability.

Importantly, we can do this all in a day—from massing model through to report—in 7.5 hours. Previously, this process took three days of modeling time and another half day using the premiere whole life cycle assessment software. This new workflow allows us to design with community in mind, achieve lower carbon buildings for our clients all with 50% less effort. That's a clear win-win.



Pudding Mill Lane *London, UK*

Master planning with whole life cycle carbon

We've used this workflow on several projects. Now, we're even applying whole life cycle analysis for master planning projects such as Pudding Mill Lane. There, we're completing a life cycle carbon assessment at the master planning stage for 17 buildings to be developed by the River Thames.

This is a huge site, and the client is targeting 15% reduction in embodied energy from conventional. Previously, it would have required an immense mobilization of resources to put a project of this scale through structural design work, and many hours of design and modeling before we could process it through traditional life cycle analysis software.

Instead, we have synthesized the architect's model with our digital whole life cycle carbon workflow and created something fantastic—an interactive report that encompasses all 17 of the structures on site. With this report we can guide our clients through the project, structure by structure, and demonstrate where they can make sustainability wins. We can show them just how much carbon they can save; we can show them how it can be done, and we can even show them where in the life cycle of the structure their savings will be realized. In short, we have taken the boring and made it brilliant.

New workflow to new service

With this workflow, analysis, and reporting power, we can augment our current services or provide a new standalone service. This digital workflow adds an arrow to the quiver of Stantec engineers by allowing us to conduct whole life cycle assessments.

This innovation and the immediate feedback it provides will begin to create an intuition in our engineers around embodied carbon, and what efficient design for embodied carbon looks like. By conducting these assessments when design changes are still possible, Stantec engineers can give clients more options and help deliver projects to clients that are more carbon-friendly over their lifecycle. This methodology makes it possible for us to better communicate ideas to our clients, and deliver more responsible buildings for future generations.

The clearer the picture we have of a building's carbon over its whole life cycle, the better we can design for the low carbon futures of our communities. D

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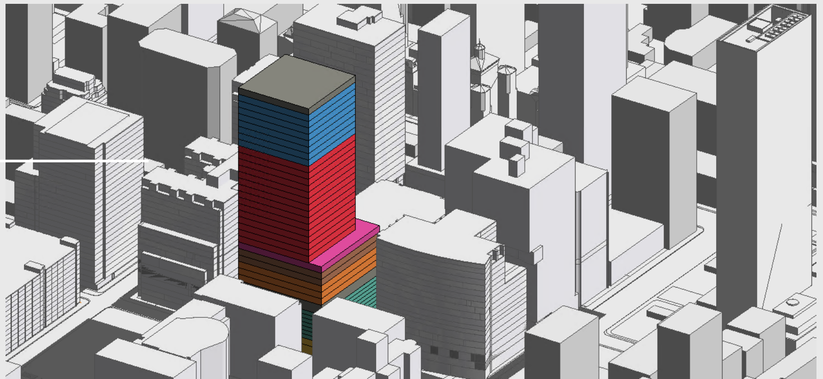
MORE SUSTAINABILITY

A structural engineer based in our London office, James' interest in sustainable design led him to innovations in Stantec's approach to design for embodied carbon.

END

Getting a clear view of the big picture



DATA VISUALIZATION CAN REVOLUTIONIZE MANAGEMENT OF COMPLEX REAL ESTATE PORTFOLIOS

BY ROBERT MANNA

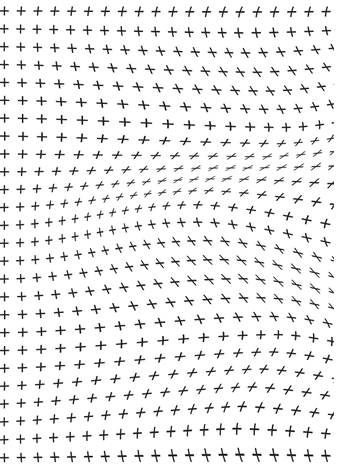
Coming out of the pandemic, many large institutions are taking a new look at their assets. New technology and safety measures as well as trends in remote work, distance education and telehealth are likely changing the volume and quality of space they require. They're thinking, "We have all this space. What are we doing with it now? What's our plan going forward?" They're reassessing their master plans.

They need to choose a path for the next ten or twenty years, a new master plan. They will need to make decisions about projects such as rehabbing the floor of an existing building, relocating a department, building a new facility, acquiring more land, and so on.

Need for a complete picture

First, however, these institutions need an accurate picture of what they have and how they're using it. Few if any, however, have such a complete picture. They may have data, but it's not organized in a way they can easily understand. Worse still, it's often siloed in different departments which don't speak the same language or share similar metrics.

The real estate group can share what they were leasing, the billing department has revenue information, the facilities managers may have plans for buildings under construction and so on. The information varies in detail. For example, an institution may have more detailed info about the space it leases (which must be justified in annual budgets) than the property it owns. Decision makers don't have a full picture.



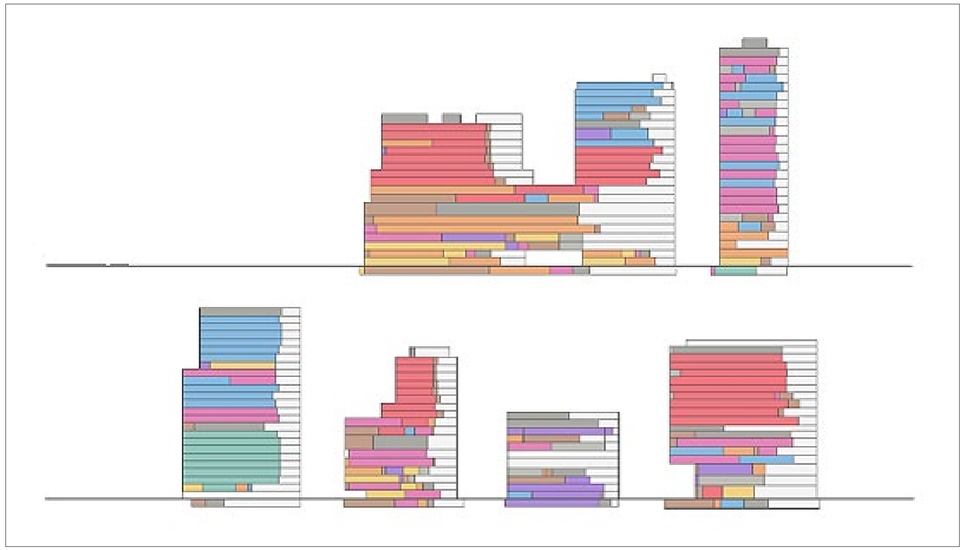
Clients at large institutions need the ability to see relevant data at a glance to allow for effective decision making on their long term (ten to twenty years) capital plans. Their planning departments, generally speaking, are not equipped to effectively gather and synthesize this data for their leadership. As designers and master planners, we encounter this dilemma when we are hired to devise a master plan.

The information we need often hasn't been gathered or organized to be useful. Therefore, we're developing our own digital services around data visualization for institutional planning, for use in master plans and capital forecasting and much more.

Better tools, better data, better visuals

As designers, we evaluate data to understand it, then synthesize it so we can come up with solutions and illustrate or diagram those solutions. The tools for processing and illustrating the data, however, are rapidly advancing in sophistication and power. Where once we might have drawn architectural diagrams by hand from an Excel document, we are now using applications like Power BI and dynamic programs that can read our data and auto-generate shapes from scripts we control. Today, it's possible to organize the data in such a way that makes the tasks of evaluating, synthesizing and illustrating the data more powerful, accurate and useful than what we've done in the past.

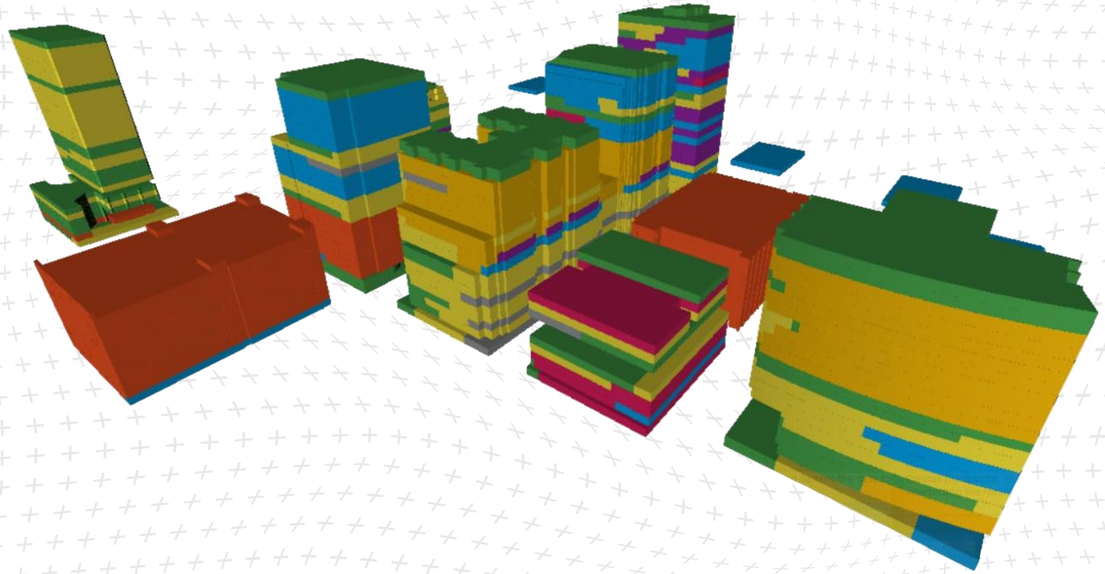
There's an increasing appreciation of the value of data among our clients, but data needs to be shaped, analyzed and represented to tell a story that's meaningful. >



Color-coded stacking diagrams help clients visualize how much space is dedicated to certain use types and how that space is dispersed throughout the building.

It's an approach not an app.
The tools are changing but data visualization for planning is a process, an approach, not an app. We use a series of data and visualization tools. Our approach is to organize, evaluate and illustrate the data. While we've automated aspects of the visualization, designers are still at the center of it. We start with the data available to us, take it as far as we can, perhaps asking for more along the way or showing the client where the gaps are. In this way, we find better data to tell a richer story.

We also must tune the visual storytelling to the audience whether it be healthcare decision makers, higher education campus planners, owners, developers, or an architecture and landscape design team. We often want to show the data using the hierarchy and organizational language of the client itself so that the design team can communicate with the client. In addition we can imbue categories of data, say for areas of inpatient, outpatient, diagnosis, treatment and support in a healthcare campus as another dimension in our data model. As designers/planners we further enrich the data with our own dimensions, which is valuable to us in our design process but ultimately to the client, too. It's all about making the conversation with the client that much easier.

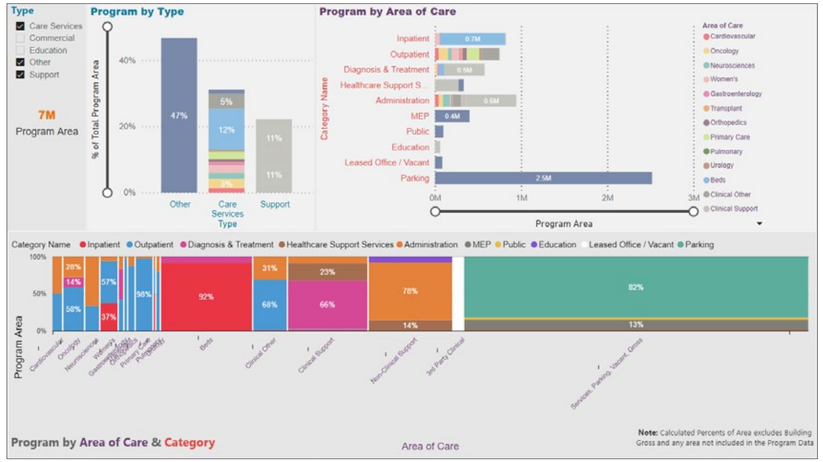


3D Visualization of Planning Data
Through blocks of color, we can represent a complex data set to correspond to the type of space programmed in each building in the masterplan.

A case study in planning data

A recent case study revealed that this approach has value. We can take a complex data set and represent it visually to facilitate the conversation about planning. In this case, we started with spreadsheets and PDFs and plans and began to develop a data model, which we then shared with our client (an institution with numerous owned and leased real estate assets and current building projects). Our client helped us identify the gaps. Finding and choosing which data to use is a key aspect of this work. As we iterated new versions of the data model, we acquired better data (finishing with three times the volume from where we began with) and built a clear picture.

Then we told the story in different ways, most notably as buildings with colored three-dimensional portions representing usage. We used Dynamo, a scripting product to generate the architectural diagrams from the data model. But the diagrams aren't meant to be literal, they are useful because they represent large, diverse portfolios of buildings and space. We added a level of abstraction and aggregation of the data to make the visual easy to understand and to move forward the planning conversation. >



Data visualization of program by type and area of care

Wider application is next

Today, Stantec's data visualization teams are using this method to help clients organize, evaluate, and illustrate data and create long-term plans for their healthcare and higher ed facilities. Planners for large and complex portfolios of space in education, healthcare, government, industrial and other markets need to understand their spaces. Data has value, we know this based on the market capitalizations of companies that amass vast quantities of data. Soon, the design industry's offerings will not be counted from the hours we put into executing a project, but in the data we generate and make useful for our clients.

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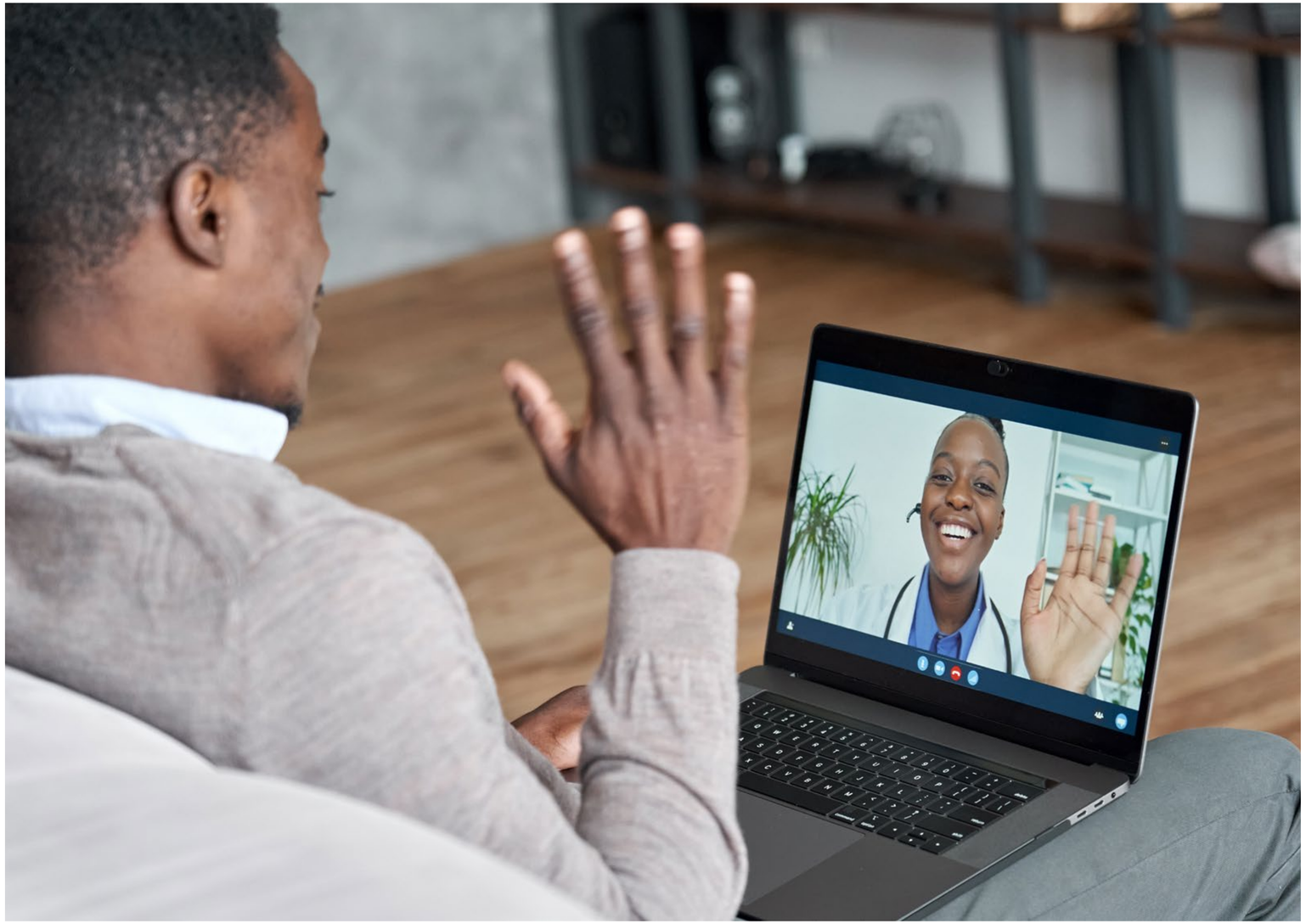
MORE URBAN PLANNING & DESIGN

As a project manager for Stantec's Digital Practice, Boston-based Robert helps our teams by providing the tools that make projects more successful.

Program and Context
We can show architectural diagrams of a client's assets color-coded to program, function or other data in relation to their immediate context.



The (remote) doctor is in.

Telepresence will change health delivery—if the networks can support it.

BY TOD MOORE

We're at the beginning of a virtual healthcare revolution, and we can already see the advantages of telemedicine/telehealth.

Take this recent case for instance. A family doctor examined a sick child in a remote rural area. The diagnosis was such that the physician would typically suggest a transfer of this patient to an acute care children's hospital environment far away. However, because of the telemedicine capabilities between the facilities, they were able to keep the patient at the clinic close to home, diagnose and treat the child remotely. The $18,000 cost of the transfer was eliminated as was the stress and expense for the family travel it would have required—all thanks to telemedicine technology.

Telehealth, virtual healthcare, telepresence, whatever terminology we use, has expanded. It's taking hold and achieving greater acceptance over the past two years. There are three reasons for this:

1. Remote tool evolution
Tremendous advances in remote diagnostic tools have improved the clinician's ability to accurately view and interact in "real-time" with a patient in the last several years. High-definition video, new camera technology, improved remote diagnostic tools such as blood pressure monitors, heart rate monitors, temperature monitoring, remote ECG sensors, respiratory rate monitors, and more form a wide array of "telepresence" technology. This broad range of technology enables healthcare professionals to provide remote consultative diagnosis and prescription.

2. Cultural acceptance
Before COVID-19, there was often reluctance by patients and providers regarding the use of telemedicine and telehealth, especially among older patients. The pandemic which necessitated remote work and virtual family gatherings, also laid the groundwork for telehealth visits. Thus, seniors and other groups that may have been technology averse, were thrust into using digital tools every day. This accelerated cultural change, familiarity with remote communications, and adoption. The result is that we've taken a relatively small portion of the industry, and rapidly expanded it. A study by non-profit group FAIR Health suggests a greater than 4,000% increase in telehealth claims across the U.S. from 2019 to 2020.

3. Financial viability
A decade ago, an enterprising physician may have been able to interact with or advise a patient by electronic means, even email, but there was no mechanism to charge for the service. Today, reimbursement for remote healthcare services is becoming more widely accepted by government agencies and insurers. In 2020 a Medicare waiver (1135) expanded telehealth coverage in the United States to include office, hospital, and other visits (including in patient's places of residence) furnished via telehealth across the country. A range of providers such as doctors, nurse practitioners, clinical psychologists, and licensed clinical social workers will now be able to offer telehealth to their patients. Forty-two U.S. states and Washington, D.C. have policies that cover telehealth claims.

The future of virtual health
One needn't be a futurist to see that virtual healthcare will continue to expand. A 2020 McKinsey report analyzing claims data highlights that US$250 billion in US healthcare spending could shift to virtual care models. The data identified virtual care use cases could comprise approximately 20% of all Medicare, Medicaid and commercial spend across outpatient, office and home health.

The principal technologies required, like the ability to make audio video calls, are now commonplace and can still be refined. We will see virtual reality and augmented reality enter the mix with visuals that use diagnostic info and other patient data. >

As designers, we must be aware of how virtual healthcare will influence healthcare delivery and facility needs. We can already forecast a few areas of change.

1.

Hospital size
Hospitals are amongst the most expensive building types to design and construct, so with telehealth expanding, healthcare providers can reduce their brick-and-mortar presence to bring costs down, while maintaining quality care.

2.

Rethinking clinical spaces
Clinical spaces are designed for inpatient treatment, they're not always conducive for telemedicine/telehealth visits, remote diagnostics and treatment. A rethink for clinical spaces will be required from health planners and designers. We'll have to accommodate remote flexibility, consider new space types suited for virtual work, or a mix of both approaches to meet rising demand for remote healthcare.

3.

Co-location of telehealth with command centers
Critical care, emergency rooms, operating rooms; these spaces aren't going away. But we will be challenged to design clinical spaces with telehealth in mind. One thing we're likely to see is a colocation of telehealth areas where clinicians can remotely interact with patients via central command centers in healthcare environments as part of a data-driven approach to health.

4.

More tech in more places
As we've noted, remote monitoring and diagnostic equipment available to healthcare professionals has improved and will continue to do so. Consumer home health technology is already available online and will get better and cheaper. At some point, every home will have a technology kit for remote diagnosis and monitoring, just like most homes have a first aid kit today.

5.

Robust networks required.
The greatest single point of failure in telehealth is not with the doctor or patient's systems, but with the network or latency in communicating over long distances. To enable this revolution to take hold and maintain a quality of care and interaction, networks are critical. Care quality will increasingly be a consequence of throughput.

Networks are a critical, yet often overlooked, aspect of healthcare master planning efforts. Healthcare organizations, with multiple sites, large campuses, have complex network needs. Future-ready network infrastructure for telehealth will be essential.

We are a long way from a consistent optimal telehealth experience, but uptake of virtual health is increasing rapidly even faster than we predicted in the Design Quarterly in 2019. The core building blocks—improved technology, patient demand, a desire for preventative healthcare—are already in place. The public and practitioners have overcome its biggest obstacle, cultural acceptance, by necessity of COVID-19. It won't be long before digital house calls are the norm.

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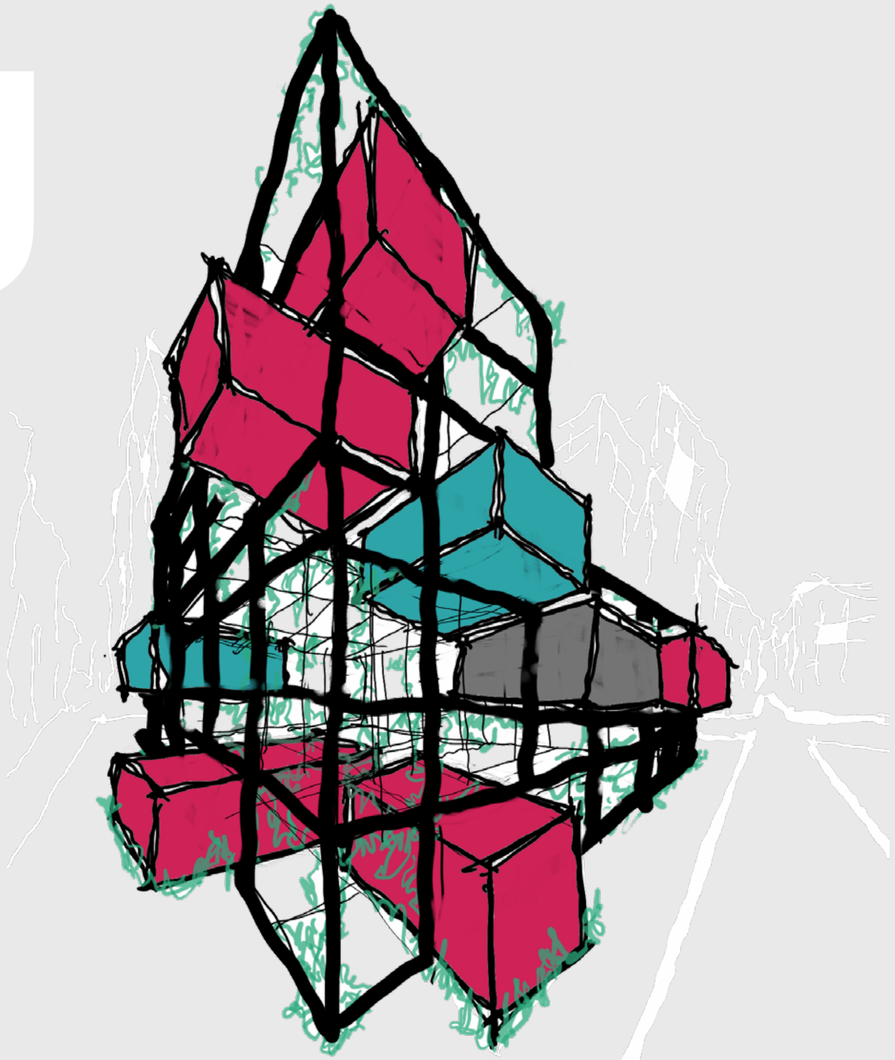
MORE HEALTH

From our Seattle office, Information & Communication Technology (ICT) discipline lead Tod Moore specializes in uncovering the healthcare industry's pain-points and devising solutions for them.

Looking Up

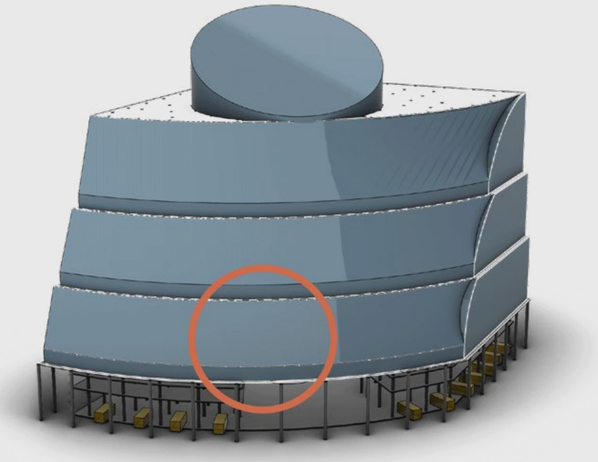
Researching vertical modular design and mixed-use resiliency in neighborhood stability

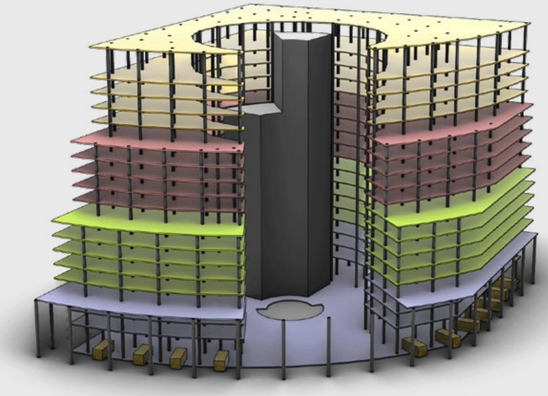
BY JILL DEXTER AND DANIEL MASSARO

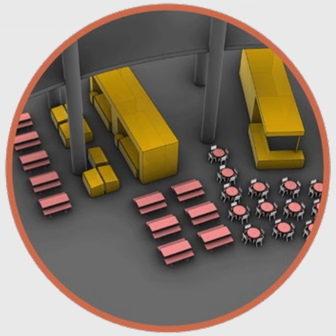


The pandemic gave us a new perspective on buildings which are primarily used for one purpose—be it residential, office, or hotels. In many cases, we saw large blocks of space with a single function basically deserted during the pandemic. When our daily behavior—work, shopping, dining, travel—was severely disrupted, these single program places suddenly had nothing to offer. They went unused. Downtown spaces in many cities, where office buildings predominate, turned into virtual ghost towns overnight.

That made us think, could we diversify building use to enhance social resiliency and connection to the community?







REVAMPING THE THOMPSON CENTER

Our conceptual design modifies the existing building to create more flexible space including an open all-season marketplace on the ground floor which will leverage modular vendor stalls in the existing structural grid.

IN OUR RESEARCH PROJECT WE FOCUSED on one inefficient building in particular, The James R. Thompson Center, also known as the State of Illinois Building in Chicago's Loop.

Designed by the late Helmut Jahn and completed in 1985, there's nothing else quite like it in Chicago. It's a post-modern marvel, aesthetically speaking, but today it's the subject of much heated debate. It's been called both "outrageous" and "wonderful" by design critics. Now, however, many consider it to be obsolete and unusable for its intended purpose as a building that houses government services and offices. Calls for a complete demolition abound but are counterbalanced by cries from preservationists to save the Thompson Center as a striking example of our recent architectural past when postmodernism reigned.

We found ourselves asking: Could it be reimagined? So, we undertook the conceptual design for a revamped Thompson Center.

By reinventing the Thompson Center as a mixed-use vertical community where people can live, work and play, our design creates a destination experience enticing visitors to experience the diverse building that has been interwoven into downtown life. The revamped Thompson Center doesn't lose its appeal at the end of the workday.

Through adaptive reuse and modification of the existing building to create flexible spaces on the interior and the addition of a modular tower, we explored how the Thompson Center could be diversified and made into a bustling community. How did we get there?

Remote collaboration technology

Our conceptual research project was informed by a new way of working. To communicate our ideas while often designing remotely and off the clock, we used new platforms and tools. This enabled us to work on this conceptual project from anywhere around the world; car, beach, our desks, on a boat.

We utilized Miro board for concept story boarding and brainstorming, Autodesk Sketchbook Pro to sketch our ideas, Rhino to build a 3D model of the Thompson Center and the tower, and Microsoft Teams to record our brainstorming sessions. We utilized Clipchamp, which is free, for editing video >

content, and created .gif animations with Photoshop to enliven the presentation. When it came time to assemble our presentation, we turned to the web app Canva so we could log in and collaborate from anywhere.

Remote technology enabled us to complete the project, a week's worth of work for each of the three members of our team, on a tight two-month deadline all done during our off hours.

Reinvent and add
The big idea was to reinvent the existing building and add on to it. We designed a tower to increase the building's footprint and prominence, increase its square footage, and integrate a residential component.

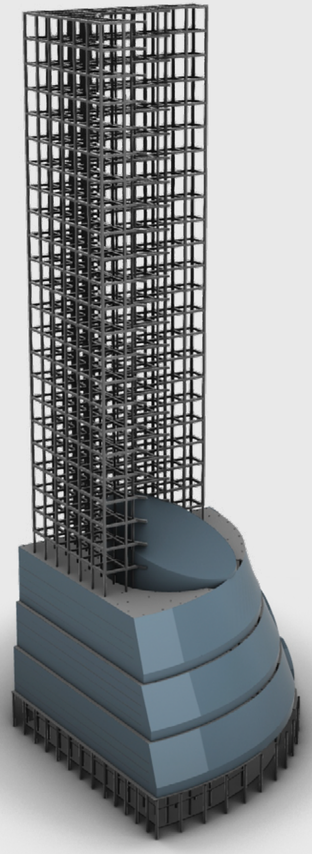
Edit interior use of the existing building
On the ground level, we've proposed opening up the space to create an all-season marketplace. We suggest modifying the remaining floorplates above to allow for mixed-use tenants to further diversify the use of the space and create a dynamic environment.

Add the tower
To increase the building's overall square footage and allow for diverse programming, our design proposes to erect a structural grid frame following the existing structural grid of the building. This will allow us take advantage of a modular construction approach which will be efficient from a cost and material standpoint and allow for the tower to populate organically.

Add pods
We created pods, a flexible, mixed-use-friendly, modular building block that snaps into the building's structural frame and new vertical structural grid. Pods come in a variety of flavors, each suited to a function—from retail and hospitality to space for education or health clinic. We can add more pods as needed which enables us to adapt the existing space to fit different functions resulting in a dynamic building that is economically diverse.

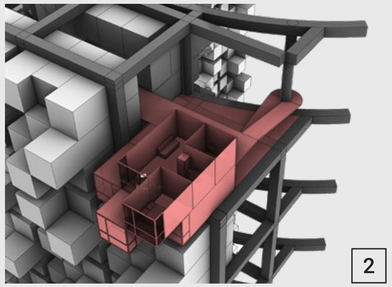
By mixing the pod typology and varying them in construction, we can create a vertical community with a visually interesting facade. Destination spaces integrated at points throughout the base building and tower will drive people to different areas and increase the foot traffic within this vertical community. >

1



ADD THE TOWER AND PODS

The structural grid would allow us to mix pod types as needed.



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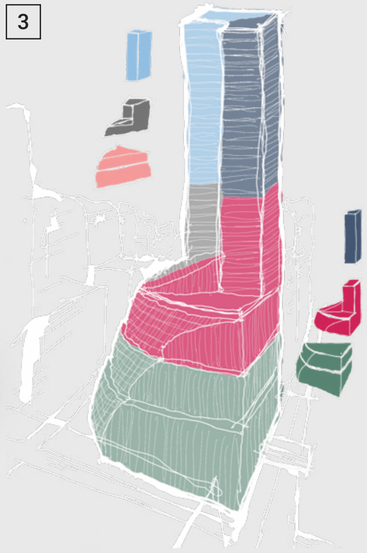


BREAK IT

In order to leverage this mixed use vertical community concept in the most places possible, we thought we could apply the idea and implement it at scale across neighborhoods in Chicago.

Break it, flip it, integrate it
Inspired by the components we developed for The Thompson Center, we see an opportunity to apply modular construction on these vacant areas and develop them into mixed-use spaces to support businesses that communities need to thrive.

So, we took our vertical community concept, broke it up into modules for mixed uses to serve the impacted neighborhoods, and scaled those models so they could be built on vacant lots throughout the city. We rotated our vertically oriented building grid to suit the shorter residential neighborhood scale.

We broke the mixed-use community of the tower into blocks of smaller ecosystems, created smaller sections of pods, and adjusted the mix of pod types for the neighborhood as needed.

Pods in the neighborhood
Chicago has space—empty lots concentrated on its south and west sides, many of which are owned by the City of Chicago.

In our research on the modular mixed use community concept, we realized many city neighborhoods have suffered economically during the pandemic with businesses shuttering, resulting in empty lots and further resource drain. COVID closures have an economic and social impact on Chicago's neighborhoods, further deepening the disparity between neighborhoods have historically lacked resources and those with plentiful access to everyday comforts. We thought our mixed-use, modular approach might help promote economic resiliency in city neighborhoods. Taking a modular approach while diversifying zoning and building typology we can create communities infused with vibrant mixed-used places that allow for more local entrepreneurship and resiliency. >

Modular development in the neighborhood

Our conceptual research project theorizes that modular development via our pods has many potential benefits.

CREATE MICRO ECONOMIES

Build small businesses in the neighborhood.

PROVIDE ACCESS TO NECESSARY RESOURCES TO ALL

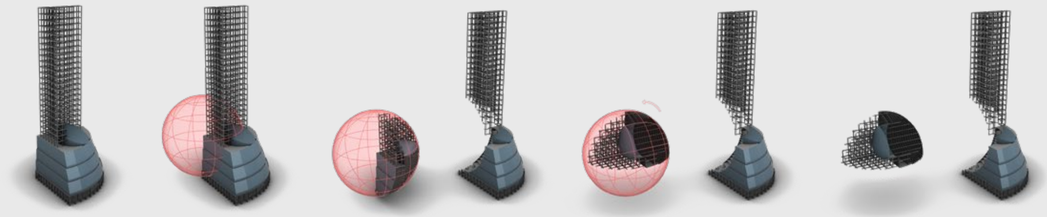
Get rid of food deserts, expand healthcare reach, and increase access to educational programs.

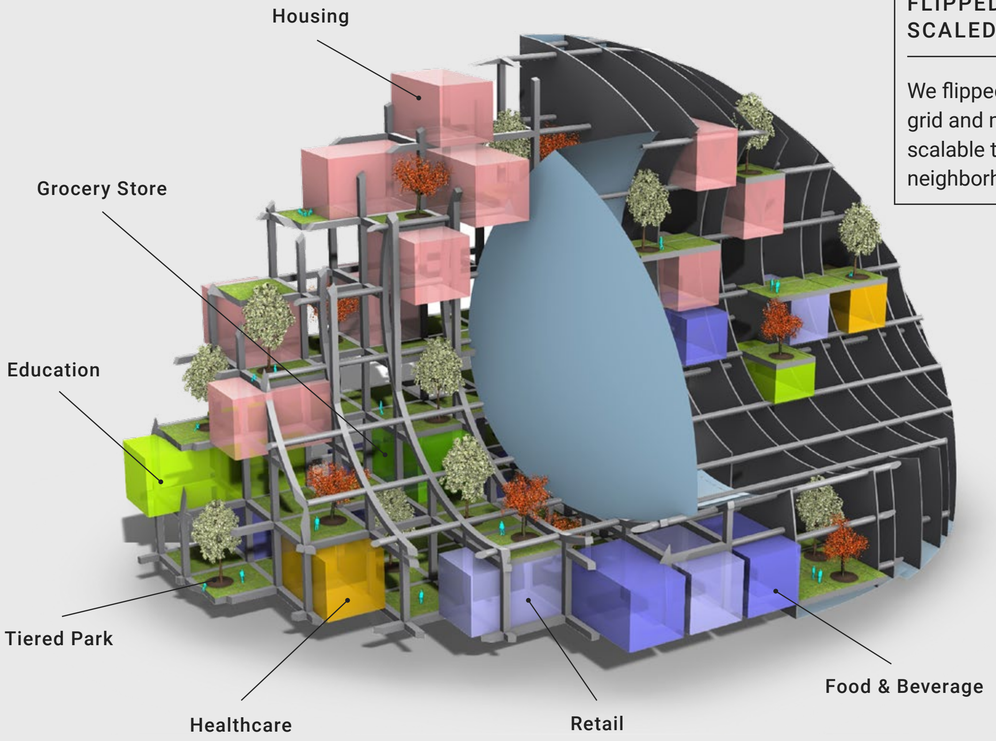
CONSTRUCTION EFFICIENCY

Pod or modular construction allows for more efficiency in construction and reduction of material waste. Cost can be optimized for developers as well.

OPPORTUNITY

Allow entrepreneurs, developers, existing businesses, and the community to come together.





FLIPPED AND SCALED

We flipped our structural grid and made it scalable to residential neighborhoods.

These pod sections could be deployed by developers or public agencies in the communities that need services or space for start-ups and small businesses, or to bolster communities that have been hit by hard times. These pod communities can be built "as you go" which lowers the barrier to entry and risk for smaller developers and public/private partnership.

What we learned

This conceptual research project taught us about the limitations of specialized building types. It allowed us to investigate modular, mixed-use building types that build community resiliency. It reminded us that there is value in applying our passion and innovative ideas to society's big challenges.

We also learned that creativity can still flourish outside the traditional framework for collaboration. The pandemic forced us to adopt new tools for shaping and sharing our ideas which revealed technological horizons we hadn't explored previously. We were able to experiment with new applications for sketching, modeling, documenting and presenting our work. Our creative world got bigger, more connected, and more flexible.

We must be able to harness technology to quickly explore and test robust solutions to successfully reimagine our downtown cores. D

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MORE MIXED-USE

Based in Chicago, Daniel has spent recent years exploring the frontier of generative design software, applying the latest methods to the organic geometry of the Lucas Museum of Narrative Art and other projects.

Jill designs compelling interior spaces for workplace and cultural projects from Stantec's Chicago studio.

Daniel and Jill collaborated on this idea and submission with Piotr Jelonek.

To view the complete Revamp Thompson Center presentation, activate QR code.

A SINGLE SOURCE OF TRUTH

Why this design firm made a platform for digital twins.

BY SARAH DREGER

You may have heard the phrase “digital twin” used in connection with smart buildings and drawn a blank. Perhaps an analogy will help explain the concept. Let’s think of a smart building as an elite athlete who has been hooked up to every biometric sensor on the market. They can analyze their training, their competition, and their conditioning, but have yet to connect those sensors to apps on their mobile device. At worst, all that data sits there, unused. At best, their coach must click through ten different apps to get to the information, then export it to a spreadsheet to analyze it. What if this elite athlete had a “mission control” where all that data is available on one screen; health data, performance and injury data, training regime, diet, and equipment history, all in a graphic that maps precisely to the athlete’s body—heart, lungs, arms, legs. Wouldn’t that be an advantage? That’s the digital twin.

Everything that we produce, everything that we consume today has a data component to it. During the pandemic, we saw a race by organizations to leverage their Internet of Things (IoT) technology and data analytics to find efficiencies and prepare themselves for the arrival of machine learning and artificial intelligence (AI). The design industry, like any other industry, must prepare itself for transformation that new technologies such as machine learning and AI will unlock. Before the industry can harness these technologies, however, it must be able to organize its data.

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The data organization gap

Project data in our industry comes from multiple sources—architects, consultants, contractors, and increasingly flows in from smart devices and sensors in our buildings. This data can include design documents, three-dimensional models, PDF images, and live sensor data. But in the AEC space, there are a variety of standards, best practices, types of content, nomenclature, and even different types of sensors in devices we're using—so the data comes in 31 flavors. So, while building owners and operators have access to an overwhelming amount of data, it is siloed, fragmented, and disorganized making it all difficult to navigate, even useless.

Data is critical to the success of organizations today and increasingly, it is a critical component in design.

At present, however, there is no single solution that aggregates all of that information. We were inspired to create a solution to this pervasive industry problem. As an additional benefit, this created the opportunity for us to help our clients better organize, and therefore interact with and leverage, their information. We set out to build a platform for digital twins.

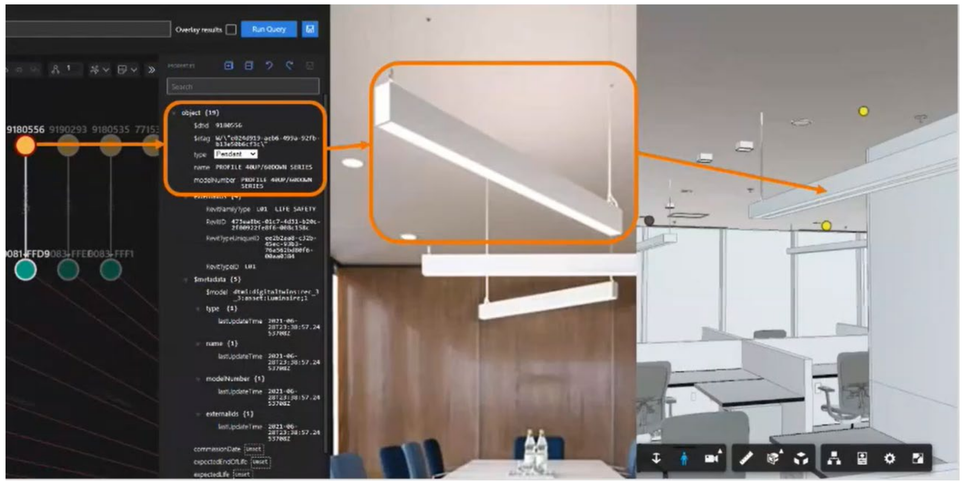
Digital twins are literally data. While the definition of digital twin continues to evolve, fundamentally a digital twin is a virtual replica of a thing. A digital twin is a combination of live and static data that pairs with the real object that you can recall, append or interact with through a mechanism like an app.

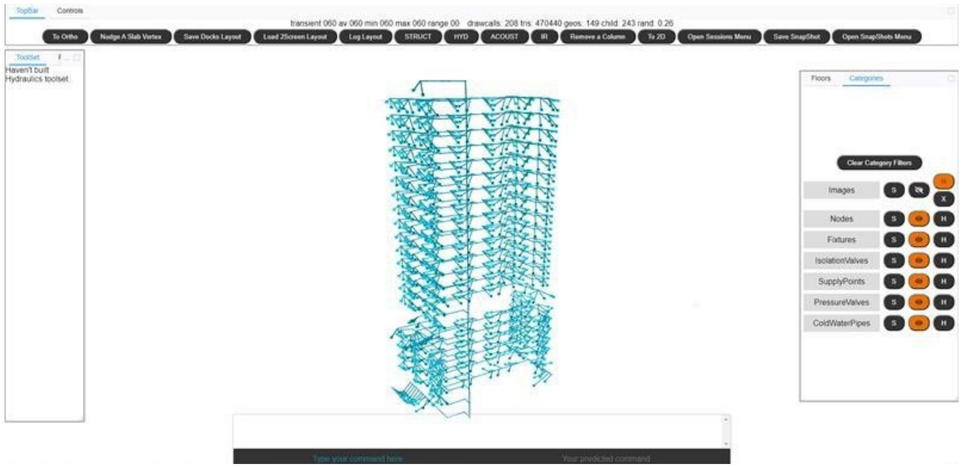
One can have a digital twin of a floor of a building, an entire building, a city block, or a city, for example. A digital twin platform allows the user to curate, centralize, and then interact with that data. It's mission control.

Digital twin platforms make it possible for users to analyze and gain insights to inform future decision making. The digital twin provides users with a graphic interface to interact with data that would otherwise be nearly impossible to understand for the average person.

We wanted to create a platform, a digital twin interface, that could be a single source of truth for our clients. We call our prototype platform Project Gemini. (Project Gemini is an internal designation. We will give it a new name when we take it to market.) >

> ***"Digital twin platforms make it possible for users to analyze and gain insights to inform future decision making."***





How does Project Gemini work?

It aggregates all types of data. Project Gemini acts as a single source of truth for our clients, it aggregates info from multiple sources, bringing it all together. Project Gemini can handle standard 2D documentation, drawings, images, laser scans, systems data, and 3D models, it doesn't matter where the data originates.

It centralizes data in one place. Project Gemini aggregates that data in a central location, so the user can interact with a single source of truth. This centralized aggregated data allows us to perform building system reports and analysis automatically. It enables us to execute predictive modeling, even look at behaviors like throughput and people flow, predicting building and space usage, and much more.

It offers a graphic, navigable experience for accessing data. The building model itself acts as the navigation environment. Project Gemini provides a graphic representation of the built environment as an analogy for the user to access its data. So, for example, one can inspect the lighting system in a conference room by navigating to that space using Gemini and clicking through to the information desired.

1. With Project Gemini, our design is better informed by data. In design, we continually strive to achieve the best form and function for the client and the community. Project Gemini allows us to deliver and improve upon the promise of design.

Today, we simply don't have all the data we would like to validate and evaluate our designs. We rarely have the data to show that buildings are performing as intended. And we often have to contend with changes made between design and construction and opening. As a design and engineering firm, our role often ends with building commissioning. It's very rare that we have access to either the building performance data for the months and years after opening, or the behavioral data on how humans are using the building. >

A single digital twin platform like Project Gemini enables digital knowledge transfer back to design. It captures all the historical information about a project (from design through construction to opening) and gives us anonymized, live, operational data so we can fully understand how our design choices play out in the world. It closes the loop in the design, construct, operate cycle by connecting it to the next design project. Digital twin technology changes the nature of the design industry and design consultancy by changing the conversation with our clients from “I think” to “I know.”

With this feedback on building and systems performance, we can better design for our clients to, for example, meet their sustainability goals or manage operational costs.

2. With Project Gemini we can provide a new suite of services to client.
Project Gemini potentially means we can extend additional services to our clients, to append the technology with additional functionality such as space optimization, wayfinding, safety, emergency simulations, and other applications.

A digital twin could leverage well organized building data in 100 different ways. We can use it for basic asset management or total facilities life cycle management. Two years into a global pandemic, our clients are trying to make strategic decisions about space. Organizations could use Project Gemini’s building data to understand their space usage in real time and optimize their spaces on the fly.

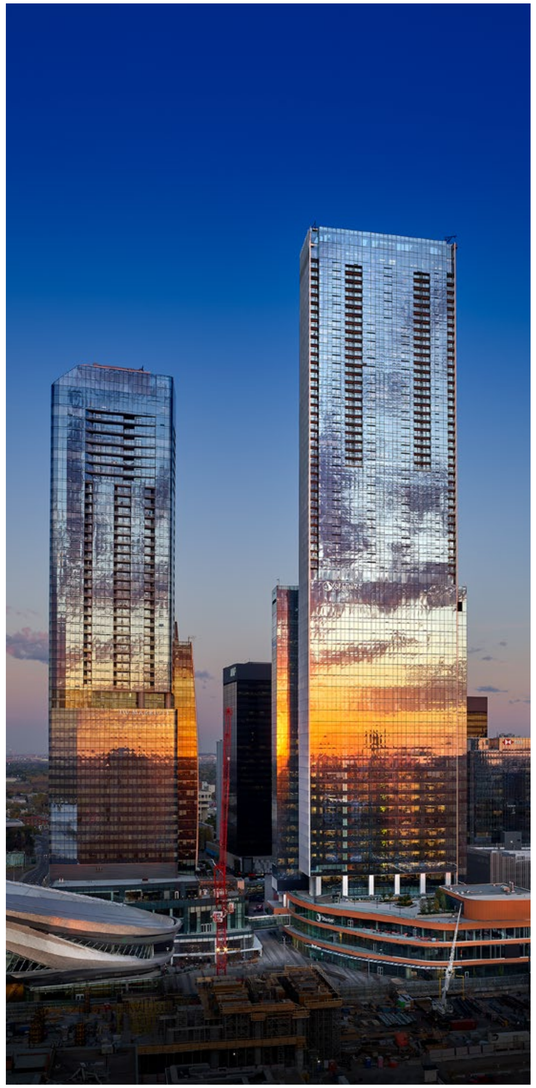
We see immediate value in leveraging Project Gemini for building safety and emergency. We can equip a digital twin facility with data including the building model, floor plan, badge information, seating information, emergency response sensors (smoke and fire), and connected lighting and messaging systems. In the event of an emergency (or drill) we can use building automation to deliver routes for emergency egress and exit and muster points directly to occupants’ mobile devices while activating building lighting for wayfinding.

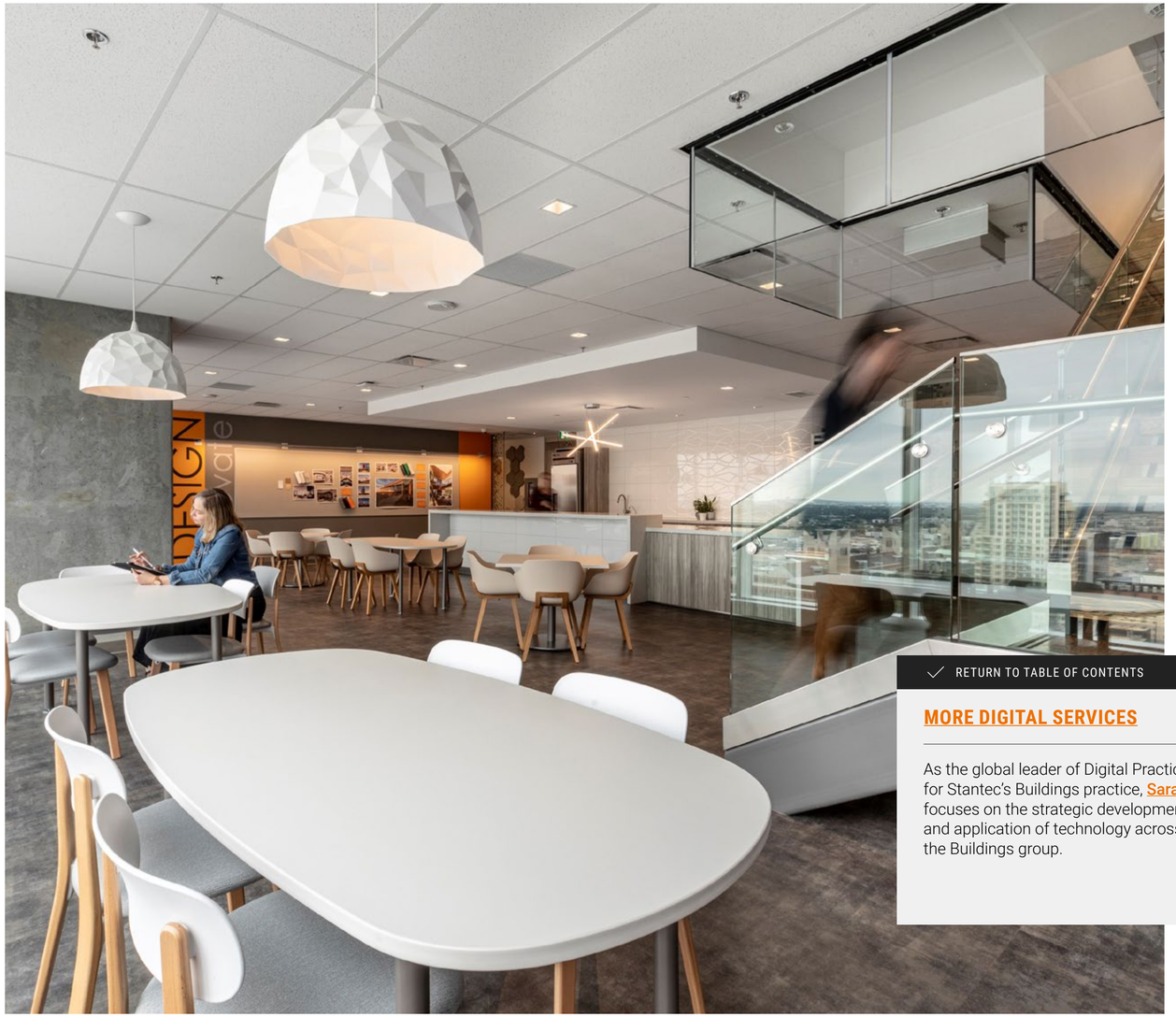
3. Project Gemini will inform our design tools.
Project Gemini can also inform the continued evolution of our design tools. Today, Stantec is already using Audet and other computational design tools to automate the more repetitive portions of the design process and build generative design into the early stages of our process. Once we create a feedback loop from Gemini with operational data from built projects, we can train our design assistance tools to be more predictive. If, for example, a building owner wants to understand how their operating costs would be affected by a 5% rise in ambient temperature, we could run a predictive model in our design applications that draws on live data. In this way, Project Gemini is a key piece in our quest to build intelligent, predictive, and truly automated designs. >

What's next?

Stantec is charting fresh territory by developing a digital twin solution for availability in the mass market. Like any good software developer, we beta tested our product ourselves with our new headquarters building as a test bed. Stantec Tower in Edmonton is a new building with "smart" systems and controls. As the anchor tenant, designer of our space with a good relationship with the property owner we were able to use the design models, documentation, and data from the building systems as a proving ground and develop the core concepts for our digital twin solution. With that work complete we are currently engaged in developing a customizable version of our digital twin platform to meet client needs. Our next goal is the full application of an operational version of Project Gemini on a state-of-the-art smart building.

We believe the potential for the digital twin is virtually limitless. D





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MORE DIGITAL SERVICES

As the global leader of Digital Practice for Stantec's Buildings practice, Sarah focuses on the strategic development and application of technology across the Buildings group.

DESIGN AUTOMATION IS HERE.

Four reasons we're excited about our new design tool.

BY
AERON
HODGES

Design automation is transforming the design industry. How designers evolve and adapt with technology will define how we continue to drive innovation and create value for our clients.

For years, I have led a research group searching for design solutions that drive housing affordability. As we began looking beyond the typology of housing (compact living, cohousing, etc.) as a solution to creating affordability in the housing market, we started focusing on the process of developing housing. We were interested in the ways we could expand or streamline our design and production process. We thought a digital tool that quickly takes any development site from initial feasibility through design, documentation, all the way to construction might be useful in multifamily residential development.

It was a tall order. The tool would need to distill a great deal of design knowledge and react instantly and intelligently to project data and limiting parameters (cost, code, etc.) for a project or site. Our team, comprised of architects, engineers, and our digital practice technology group, spent well over a year developing and testing this tool.

The result is AUDET, a new design automation tool. AUDET is currently programmed to quickly generate floor plans, 3D massing diagrams, and data visualization for residential projects, but the applications for AUDET extend to any building with repetitive space typologies (think hospitality, student housing, and even some types of healthcare).

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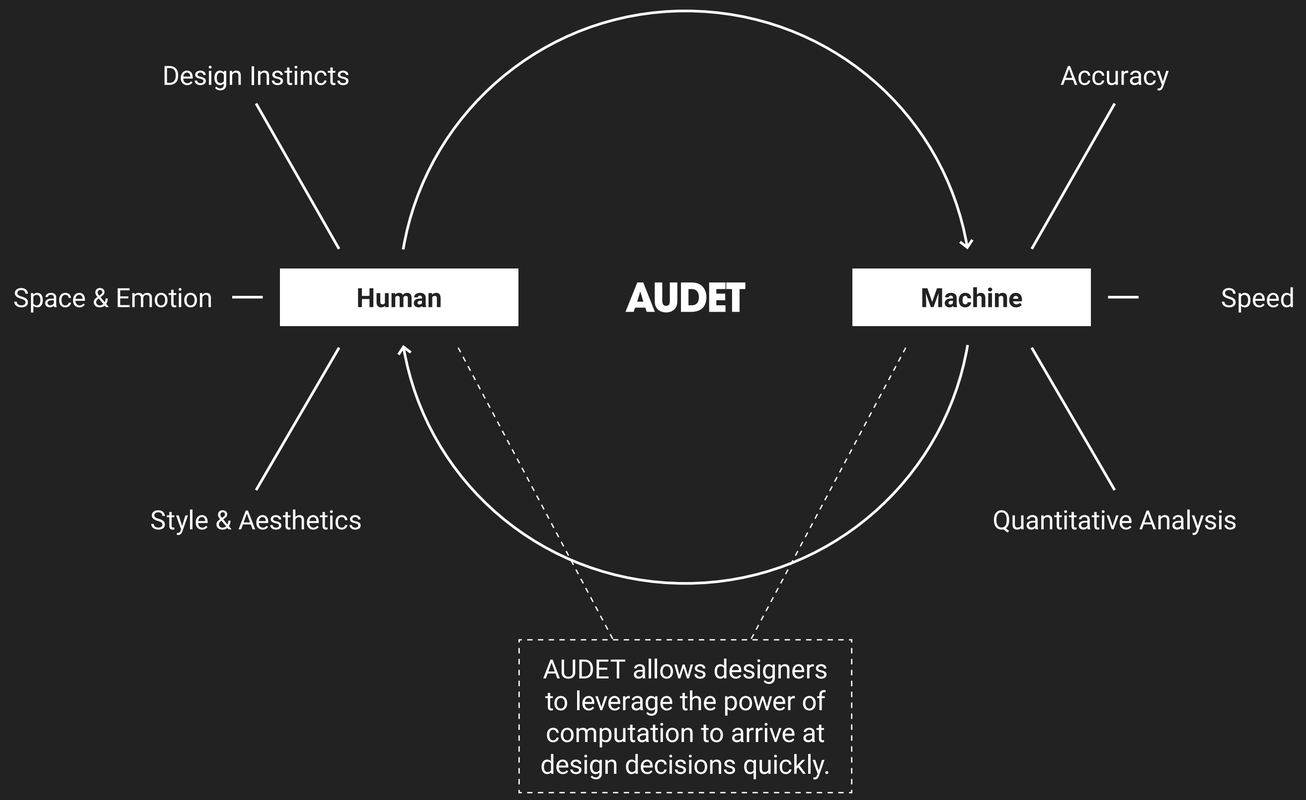
What does AUDET do?



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Here are four reasons we're excited about AUDET.

1 It facilitates real-time collaboration with clients.

Typically, designers generate then fine-tune three or more design options for presentation to the client. But what happens when they don't hit the mark? The whole timeline resets. Designers go back to the drawing board. Time is lost.

With this tool, however, we can close the timeline between design, presentation, and client feedback. The designer-client conversation becomes a dialogue. We can get immediate feedback.

With AUDET, we can start design with the most basic project information. We can collaborate with clients in real time. We can begin to draw the basic building shape together. Then, the tool populates it with unit details automatically, generating multiple design solutions within a much-reduced time frame.

As we pull together a visual representation of the emerging project from the data, we can say "is this what you're looking for?" If we need to try something else, we can adjust a few inputs in our algorithm. This dialogue can help clients make decisions on the fly.

Clients, such as developers, can see how many units can fit into a design scheme in progress. We've tested the tool at client workshops and have seen how clients appreciate the ability to compare an early-stage design with their project goals. >

WE CAN USE AUDET TO QUICKLY DESIGN FOR A DESIRED MIX OF UNIT TYPES AND TOTAL UNITS PER BUILDING WITHIN SPECIFIED SITE PARAMETERS.

2 It helps us avoid roadblocks and ripple effects.

The design process is iterative, adapting to changes or roadblocks that occur throughout the design development timeline is a reality. A variety of circumstances can necessitate a change in direction for a client's project plan, which requires us to revamp our design. Every time we make those changes, there is a ripple effect on the entire project.

Roadblocks in the design process slow it down. Typically, every time we make changes based on those roadblocks, we're making manual revisions to our design, backtracking, and redrawing.

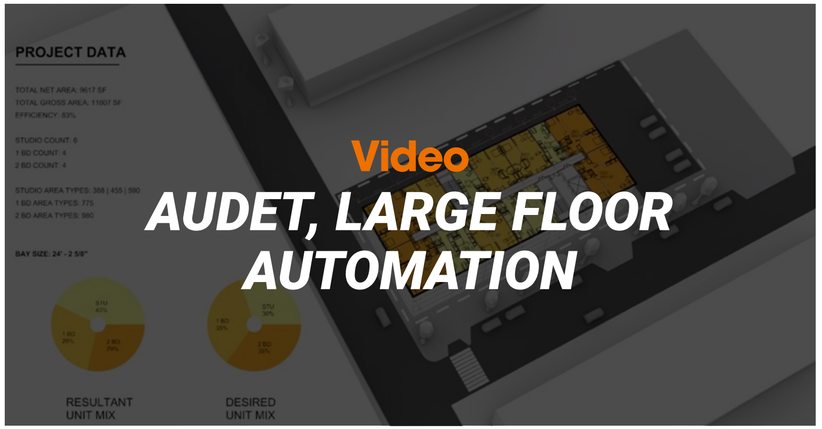
Instead of drawing the same units over and over every time small details change, what if an automated tool, programmed with all the site and budget parameters, could redraw the design quickly? With the right parameters, we can automate the conventional mundane aspects of the documentation process, and spend more time focused on design activities which suit our clients project objectives. That's the beauty of AUDET. >

AUDET CAN AUTOMATE SOLUTIONS TO A GIVEN SITE BOUNDARY AND TARGET MIX OF UNIT TYPES.

3 It's designed for multifamily residential design… but could go anywhere.

There is a simplicity in multifamily residential design that can be more easily codified than with other project types. Multifamily residential projects feature many repetitive elements—units of a similar size connected to a corridor which is connected to a core with elevators, lobby, amenity, and social spaces. There's a logic to it. We have designed AUDET's automation around these interrelated elements.

Likewise, hotels and student housing have similar repetitive rooms across a building, which makes them great candidates for the markets where we could apply AUDET next.



In recent months, the AUDET team joined forces with another Stantec research project: Mass Plan led by Steven Park Chaffer. Mass Plan is a design assist tool that automates some aspects of multi-block, multiprogram planning. We're working on combining these tools in a new application which can include additional programs such as office, parking, retail, and beyond. Our future plans for AUDET include implementing the ability to compile data on building façade, the window opening percentage, daylight, thermal performance, and other specifications that our sustainability specialists can use in their carbon analysis.

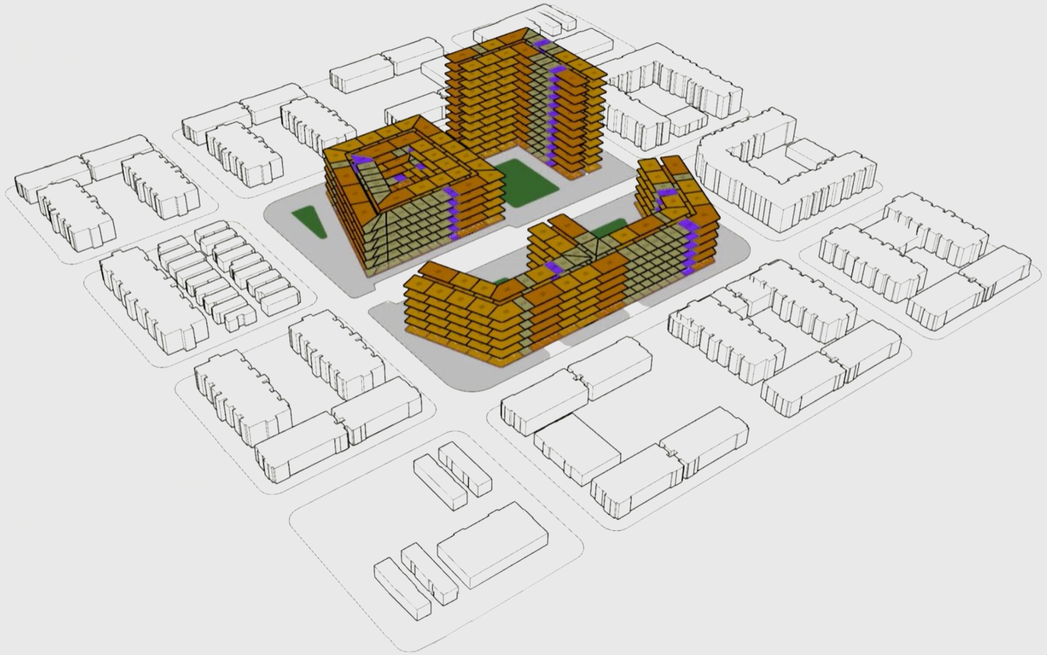
4 It has plug-and-play features but doesn't dictate design outcome.

You won't know an AUDET project simply from its look. That's because the automation doesn't dictate a design outcome, it just gives us more options to consider.

AUDET's plug-and-play features allow the user to quickly arrive at design solutions, which can then be customized further to suit client needs. It gives designers a default library collection of grids, unit sizes, and building systems.

The algorithm simply pulls from the library based on what's appropriate for the desired floor plan and plugs it into the space. While the tool provides a visual representation of certain design metrics (building size, number of units, etc.), it doesn't reflect all the details in a completed design. By giving designers an early and accurate picture of a project's parameters, AUDET can help rightsize systems.

AUDET's customizable features give the designer control over massing, expression, and building system, so each project is unique and contextual. We implement the tool within our typical design process and collaboration with the client, where the key drivers of the project are articulated. The tool aims to empower designers in this collaborative workflow, and helps us think holistically and see the project clearly. >



Technology like AUDET that automates the repetitive aspects of our work represents a bold step towards a fully data-driven design framework. It also frees up designers to concentrate on the human aspects of design and achieving responsive, efficient, and contextual solutions that help our clients do what they do better than before.

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MORE DIGITAL SOLUTIONS

Architect Aeron Hodges, a designer in the Boston studio, passionately researches design solutions to the challenge of the high cost of urban housing.

Stantec's Steven Chaffer and Alireza Memarian are key contributors to the AUDET development project.

FINAL THOUGHT

Data is design's new currency

In the information age, architects and engineers will become data collectors, organizers, and interpreters.

BY JOEL MARTINEAU

We're in the midst of a fourth industrial revolution and data is driving it.

Take a step back and look at where we are in the world today. Twenty or thirty years ago, to learn something new or verify information, we had to go to the library or look at an encyclopedia or textbook, something physical that was updated and reprinted periodically. Today, we can access knowledge via the Internet which can be updated instantaneously. We have powerful digital tools in our hands which are generating enormous amounts of data, for us and others. We're surrounded by technology in our everyday lives, much of it equipped with digital touch points. The data we generate continues to grow at an exponential rate. This is the reality of the information age.

Austin Oaks Redevelopment *Austin, TX*

Our ability to process and use data is rapidly developing.

The key to this revolution is the ability to process and consume the data. With smartphones and smart devices, we can do anything from take photos and book a hotel room to adjust the thermostat and lighting in our home from a vacation destination. Technology enabled individuals, we're consuming and producing data all the time.

What does this mean for design?
Just what does this mean for architects, engineers, and designers, who only 25 years ago, drew by hand and delivered work on paper? As people that impact the built environment, we're just beginning to adjust to the information age.

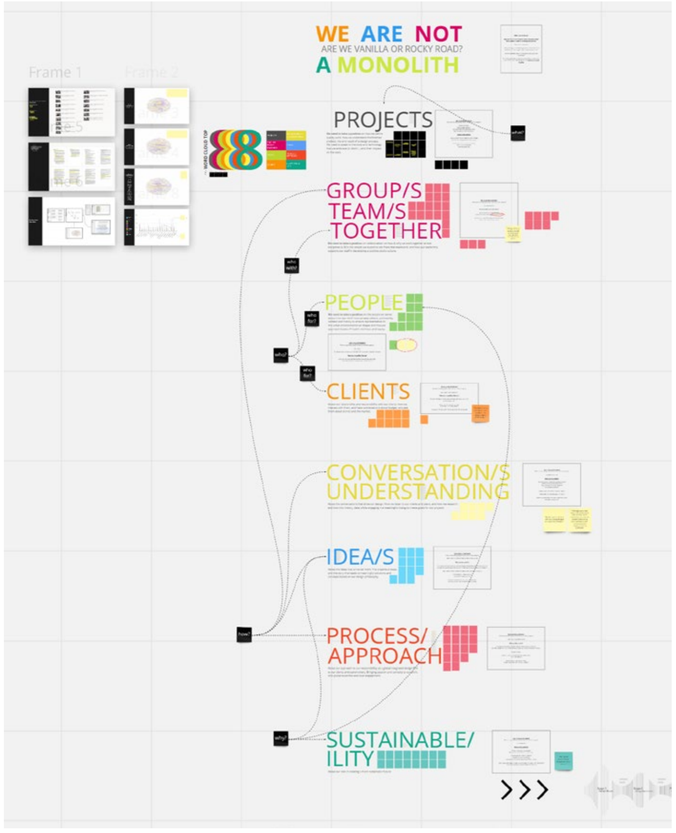
But one thing we know is that change is constant, especially as it relates to the intersection of design and technology. Today, we find ourselves asking what's the next step in this digital transformation?

Here are three ways I see this information revolution changing what we do. →

1 | RESEARCH AND INPUTS

Previously, when working on a project, we would look back at existing built work for similar examples to reference—usually a narrow swath of design examples published in print. Now, we can go online to look at precedents authored by designers around the globe, from any era.

We can gather other kinds of information in our search, too. We can get data from weather stations on climate to inform our site analysis. We can pull data on pricing to see how various building systems will influence construction costs, such as materials for steel-versus-concrete construction. We synthesize and incorporate this data in our design choices. >



2 | ENGAGEMENT

Typically, when we are engaging with the community, we go to a meeting and share various images with the people we are collaborating with (users, owners, clients, stakeholders)—these could be photos of activities or examples of similar projects, or just inspirational images that capture the feel of the project goal.

Sometimes we tell the participants to bring images they like to a meeting. Not so long ago, they might have needed to get prints made of their photographs, or simply cut images from a magazine. Today, most people have a phone with a built-in camera, they can walk along, see something they like, and snap, take a picture. This provides a new opportunity for our stakeholders to engage and inform the conversations we have.

We take it for granted, but digital imagery has fast-forwarded our design conversations and collaboration.

Digital innovation is also impacting our charettes. We can come to a meeting with virtual collaboration tools like Mentimeter and Mural and ask our clients and members of the community their opinions, gather that information and use it. For example, with Mentimeter you could have community members vote on what functions they would like to see in a new park—do we want a park that has a kid's area, dog area, and maybe a basketball court versus a tennis court versus a skateboard ramp or more green space? Now, we can collect data that advances the planning conversation. Additionally, this can be done after the initial engagement has taken place.

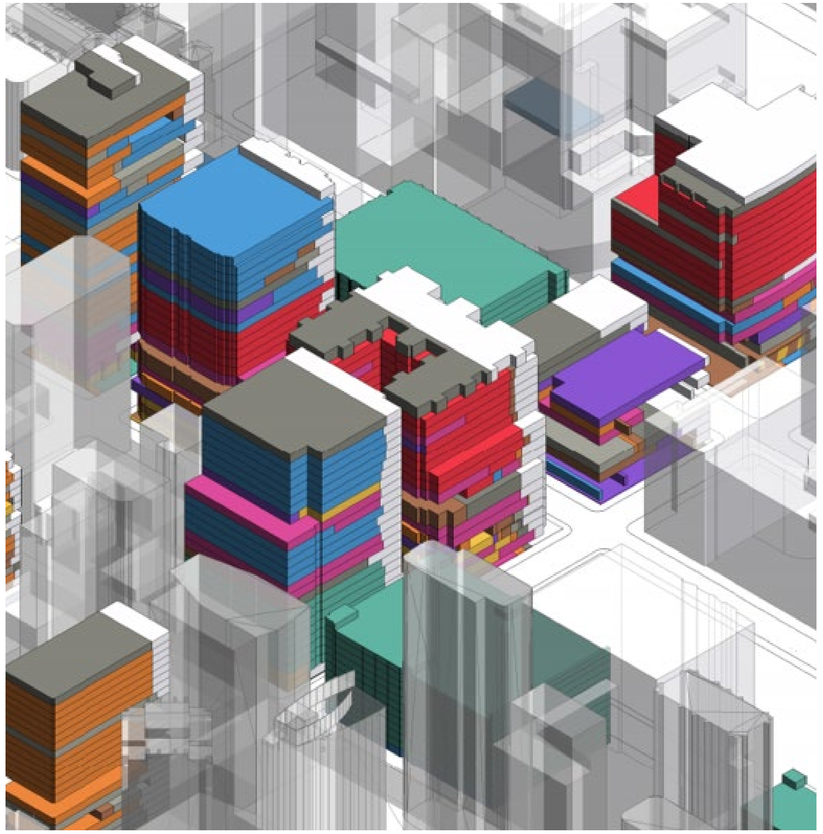
Once design is underway, we can hand VR goggles to our clients and stakeholders and take them on virtual walkthroughs of designs yet to built. Today, we can even let them hear a space before it exists. These are powerful tools for communicating our ideas. >

3 | OPERATIONAL PHASE

When we get to the operational phase of a building, the technology conversation shifts to smart devices, buildings equipped with sensors, and the digital twin.

A sensor-equipped light can understand when a room is unoccupied and turn off the light—lowering electricity demands and helping clients achieve sustainability goals. As we get more sophisticated with our data collection, we can track room utilization over time to understand usage patterns. If we know a room is typically unoccupied by 5:30 pm and the first person arrives at 8:30 am, we can automate that. Devices can learn from previous usage and data the sensor has accumulated. Overtime, the building can automatically adjust lighting based on patterns of use and can adapt for seasonality.

We can do the same with thermostats and transition to heating and cooling based on what human activity is taking place. Those are data points that we're collecting and amassing in buildings. Obviously, owners and operators can use that data. But designers can, too. We can interpret the data from operations to make smarter decisions in future projects to create higher performing buildings. At every stage in the life cycle of the building from pre-design to reuse, the availability of data will inform our practice. >



Data visualization for master planning for confidential client

Using data to inform design

There are three steps to harnessing data in design: collect, model, and analyze. Data collection comes first; it tends to be on-going, for the duration of the project or as we've outlined above, through the life of the building. Raw data is like a pile of unsorted toy bricks: some from a bag in the toy room and some from a bin in the basement. Once we've gathered the individual pieces, what can we build from them? It's time to model that data. We must take the time to organize and structure the information we've gathered. Next, we can analyze the data and create insights to tell a story to guide decisionmakers. As with any creative project, we often discover we're still missing something to support our model and tell the story. We go back to the basement to find the pieces we need. Data analysis for design is not a linear workflow, it's an iterative process.

With more data from an increasing number of collection points and more sophisticated tools for modeling and analysis, data is the new currency for designers.

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MORE IDEAS

Digital practice project manager Joel Martineau promotes the use of design technology across the firm to foster creativity and innovation, and improve project design and delivery from our Washington, D.C. offices.

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