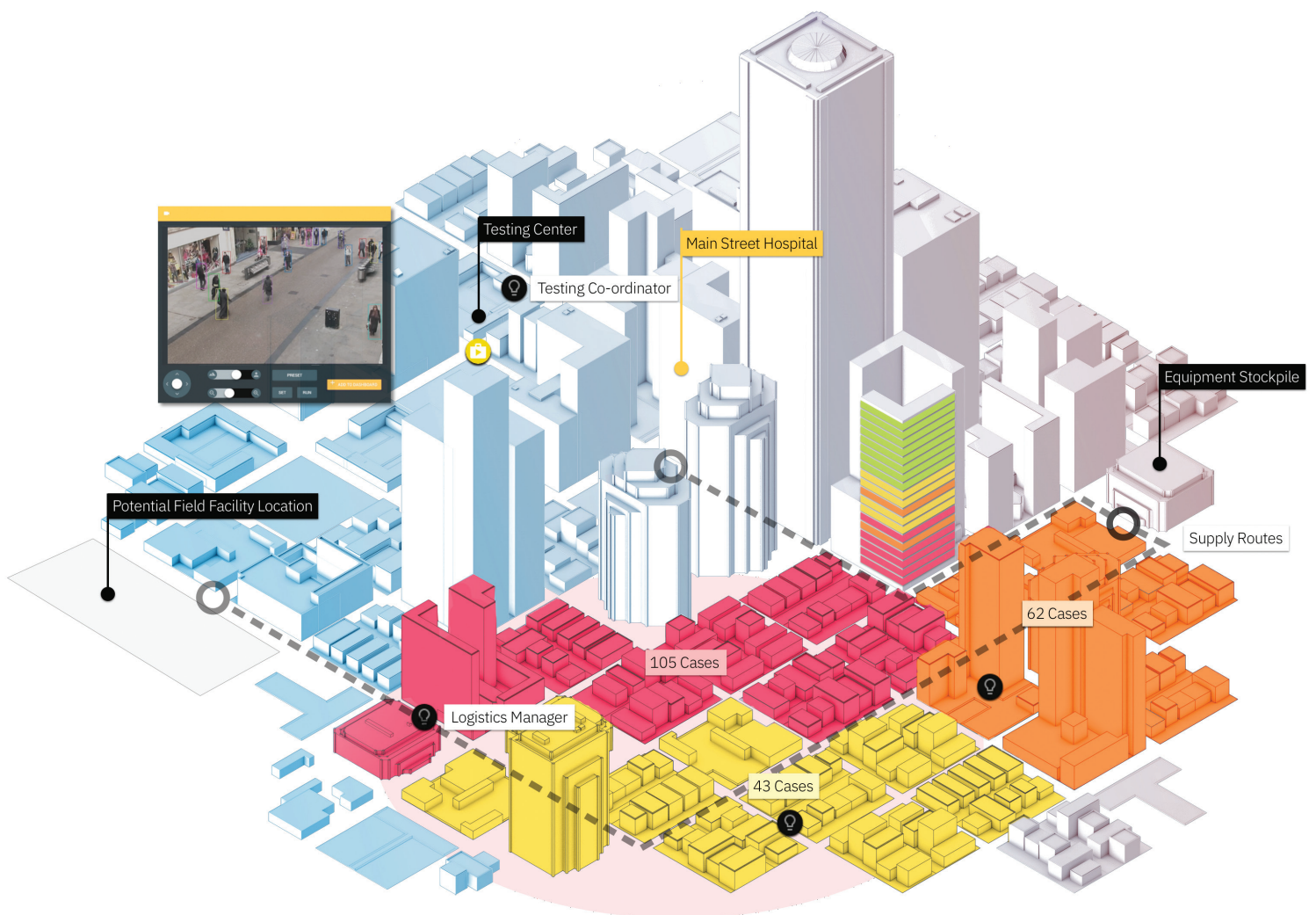# The Impact of COVID-19 on the Implementation of Digital Twins in the Global Building Industry:

Perspectives from Expert Practitioners

Contents

> **AMARAVATI WILL BE BORN AS A DIGITAL TWIN, THE FIRST ENTIRE CITY TO DO THAT IN THE WORLD. EVERYTHING THAT HAPPENS IN AMARAVATI WILL BE SCENARIOIZED IN ADVANCE TO OPTIMIZE OUTCOMES AND ADJUSTED ON THE FLY TO KEEP PACE WITH CHANGE.**

PICTURED: 3D rendering of Amaravati Smart City by Foster + Partners

The Digital Twin Phenomenon, A Surging Global Trend

$35.8 Bn

$3.8 Bn

2019   2025*

DIGITAL TWIN INDUSTRY REVENUE
(Source; Markets & Markets)
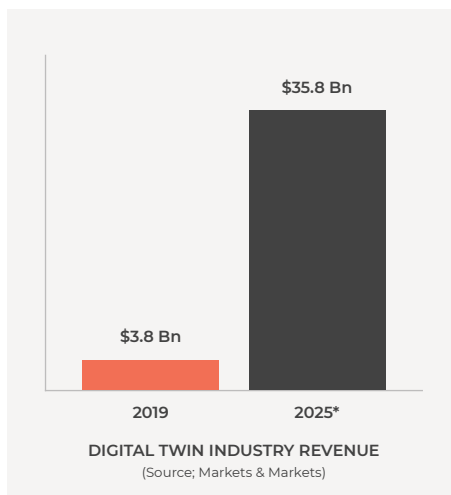
Recent market data depicting the impressive growth and maturation of the global Digital Twin industry over the last two years tells the whole story. In 2019, researchers at Markets & Markets reported that the Digital Twin industry generated USD $3.8 billion in revenue around the world, and is projected to grow to USD $35.8 billion by 2025, at a blistering CAGR* of 45.4%. For three years running, the adoption of Digital Twin technology has been ranked among the top 10 new technology trends in the world. By any measure, that's a significant market growing at a significant pace.

This whitepaper surveys and comments on the current state of the global Digital Twin industry from the perspective of long-time practitioners and early pioneers, and concludes that the current global COVID-19 pandemic, while certain to slow most business activity in varying degrees country by country worldwide for several months to come, will...

1. ...accelerate the adoption of Digital Twin technologies to help government officials, businesses and citizens...

    a. ...better prepare for COVID-19-type public health crises in the future, and

    b. ...better visualize and correlate analytics across multiple sectors in order to rapidly assess and implement economic recovery plans for affected cities and urban regions.

2. ...accelerate the general adoption of Digital Twin technologies at scale across multiple sectors as world economies emerge from recession.

The global Digital Twin industry, now in the early adopter upswing phase post-hype cycle (ref. Crossing the Chasm), is moving from concept to reality, from high-level discussions that ambitiously prophesy a Minority Report-style future filled with connected, interactive buildings and cyborgs, to ground floor, grassroots, granular implementations of specific ROI-driven use cases.

At [Cityzenith](#), we have been observing a shift in activity away from proof of concept-oriented projects towards full, enterprise-wide deployments. We are also seeing the expansion of the use of Digital Twin solutions in new sectors that weren't using them before. The earliest Digital Twin projects focused primarily on the manufacturing sector, assisting plant operators to better coordinate, manage, and optimize production activity. Our project list today spans multiple sectors, including but not limited to commercial real estate, retail, infrastructure, smart cities, smart campuses, smart districts, energy, and others.

Interest in "all things Digital Twin" is growing exponentially, even as the definition of what a Digital Twin **is** continues to take shape. Six countries around the world now have a national Digital Twin program, [most notably the United Kingdom](#); in the United States, the AIA is currently considering national Digital Twin practice guidelines. What's more, both private sector and public sector tenders the world over now routinely call for Digital Twin solutions, including a new mega Smart City in Saudi Arabia, which plans to test 19 different Digital Twin use cases over the next two years, and the planned capital city of [Amaravati in Andhra Pradesh, India, which claimed to be the first ever greenfield city born with a Digital Twin](#).

The real estate sector, one of the world's largest by dollar volume, has also taken notice. [A Realcomm webinar in March ('20) entitled "Demystifying Digital Twins"](#) at which I made a presentation was attended by over 400 real estate industry executives from around the world, the second Realcomm Digital Twin webinar in just four months. It seems like the boardrooms of almost every major company out there, particularly in the buildings, property management, and infrastructure sectors, are a flush with discussions about developing and rolling out a corporate Digital Twin offering or strategy. To boot, there are more companies out there touting Digital Twin solutions than ever before. And while that has served to confuse the market a bit, it has also served to generate awareness, debate, and adoption at all levels across multiple business sectors around the world.

What is a Digital Twin?

The standard definition of a Digital Twin as it pertains to the building industry is fairly widely accepted today: *Digital Twins are virtual replicas of physical building assets connected to the data in and around them, and deliver unique value at different phases across the entire lifecycle from design through demolition.* Architects, engineers, planners, developers, building owners, property managers, facilities managers, and so many more employ additional twin technology to support a wide range of use cases, from optimizing view corridors to analyzing climate change impact, predicting traffic patterns, and studying financial ROI models.

Up to 25%

in efficiency savings for enterprise-wide Digital Twin deployments.
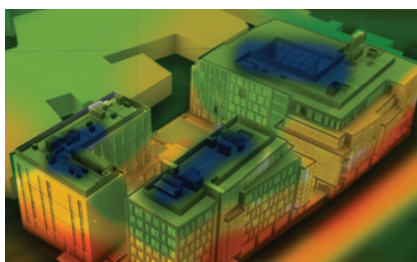
A single-prism-of-glass approach, Digital Twins provide users a comprehensive dashboard of the right data at the right time for the right purpose, presented in a compelling and intuitive 3D visual environment that is fun and easy for anyone to use. Traditional CAD, BIM, CRE, and GIS tools were made by experts for experts; Digital Twin solutions are made by experts for **everyone**. Virtually any user profile can be trained in just a few hours to use Digital Twin applications, intuitively. Building owners, for example, distribute licenses among building managers, facilities managers, engineering departments, and tenants, et al all of whom share rights-based access to the Digital Twin. Full, enterprise-wide Digital Twin deployments report efficiency savings that range from 10% to 25% on variable operating costs annually, with most of them first deploying one use case, then scaling up to multiple use cases.

PICTURED: 3D rendering of Orlando Sports + Entertainment District by Baker Barrios Architects

Digital Twins vs BIM, GIS, and other traditional software tools

Digital Twins are not just 3D visualization tools, they do not duplicate the work of a systems integrator, and they are not BIM software tools. 3D visualization tools cannot be annotated with and connected to external databases, or used for any parametric or sophisticated simulation purposes. Systems integrators connect edge points to a hub and comprise an important data layer in the overall Digital Twin stack, but their service lacks a platform approach and requires indefinite manual intervention. BIM tools are a modeling-heavy approach specifically catered to the detailed design and later construction phases only, but not the operational phase. BIM tools cannot be repurposed into Digital Twins directly as the underlying software architecture does not accommodate the mass scaling of 3D object models or data, but they can be converted into Digital Twins.

With SmartWorldPro, Cityzenith's Digital Twin platform, we created a unique direct import feature that allows users to transform traditional good-for-construction BIM models (Revit, Bentley, Rhino,

SketchUp, et al) into good-for-asset management 3D models in our open system. We call these simplified 3D asset management models (exterior skin, floors, rooms, major equipment) inside Digital Twin applications BAMs or Baseline Asset Models. We predict that the number of BAMs worldwide will outnumber BIMs 10,000 to 1 over the next decade. BAMs are geometrically far simpler than BIMs, and can be rapidly generated and connected to data sources in minutes and hours, not weeks and months, and are therefore more readily deployable for emergency situations.

BAMs vs. BIMs

"BAMs worldwide will outnumber BIMs 10,000 to 1 over the next decade."

Digital Twins: A 3D/4D/5D Platform Approach to Aggregating, Managing, and Disseminating Information During the COVID-19 Pandemic

The release of SmartWorldPro V 2.0 comes at an important time. Fallout from the COVID-19 pandemic that is wreaking havoc around the world at this writing will most certainly have a substantial impact on the way that businesses and governments function in the future, and the Digital Twin industry is not immune to its trajectory. As we contemplate what those changes will be, certain trends seem almost inevitable.

A recent Forbes article predicted that a post-coronavirus future will include more contactless interfaces and interactions, strengthened digital infrastructure, better monitoring and use of IoT and Big Data, AI-enabled development, and an increased reliance on robots. Put simply, the trend will be towards *virtualization* and *digitalization* in all industries, and Digital Twin-making will pave the road to virtualization and digitalization in the building industry. More online meetings, less travel; more shared, flexible workspaces, fewer assigned physical spaces; more operational data collection via IOT sensors, less manual reporting; more AI-enabled analysis, less guesswork; more maintenance tasks performed by robots, less manual intervention.

DIGITAL TWINS PROVIDE A UNIQUE SOLUTION FOR COVID-19

> **VIRTUALIZATION AND DIGITIZATION WILL BECOME CENTRAL TO ALL HEALTHCARE MONITORING IN BUILDINGS**

People Won't Use Buildings the Same Way Ever Again

The impact on the way buildings are used will indeed be significant and long-term. One can look at how COVID-19 has changed how people use buildings in South Korea, China, and Singapore for clues as to how things might evolve in the United States and Europe in the months to follow.

Technology is being superadded into commercial buildings and also fitted into the hands of citizens in Asia as new regulations require a medical screening upon entry for every new visitor, the results of which are digitally transferred to a central hub which monitors the visitor's temperature over a period of time. Office building entry routines are changing dramatically as countries slowly re-open. Bloomberg reports that in Shanghai, China:

> *"Upon arrival, each worker scans a QR code and fills out a health status report to get a daily pass to enter. Then comes the temperature check and the hand sanitizer... Things like ventilation, UV light, density screening, video monitoring, and temperature monitoring, cleaning protocols — those are all going to have to change."*

Mobile apps tell building operators if infected individuals are within 50 m of their property; IoT sensors inform officials when crowds of more than 10 people have gathered and send automated messages to mobile phones asking people to disperse.

An open source geospatial tool allows merchants and residents to upload information about material supplies stocks that rapidly connects local hospitals to supplies in the immediate neighborhood. In a show of solidarity and support, around the world hundreds of engineers have taken part in hackathons sponsored by groups like Global Hack to mass innovate solutions like these that can help address issues related to the COVID-19 crisis.

# A Rapid Digital Twin "Hack" in Asia Shows Promising Results

Authorities in Asia were able to contain the spread of the virus by rapidly hacking together a massive, comprehensive, crowdsourced Digital Twin that could track the progress of the virus in real time, consolidating a wide array of available data points into just a few tools that enabled a coordinated response at scale, quickly.

Despite the innovative and sweeping call to action, national responses around the world, even in Asia, revealed the world's severe lack of a shared knowledge of basic emergency response resources, medical data points, and software tools necessary to both respond to and protect against such an unprecedented calamity.

In some cases, the lack of common access to software tools precipitated a harsh police intervention, and subsequent enforced quarantine. Most of the simple mobile applications deployed in Asia and elsewhere in response to the crisis, while useful, were thrown together in a matter of hours or days, and as a result, efforts between different software makers have yet to be coordinated. Citizens reported even being unaware that such mobile applications existed.

"DIGITAL TWINS MAKE MEDICAL DATA AVAILABLE TO GOVERNMENTS, BUSINESSES, AND CITIZENS IN REAL-TIME."
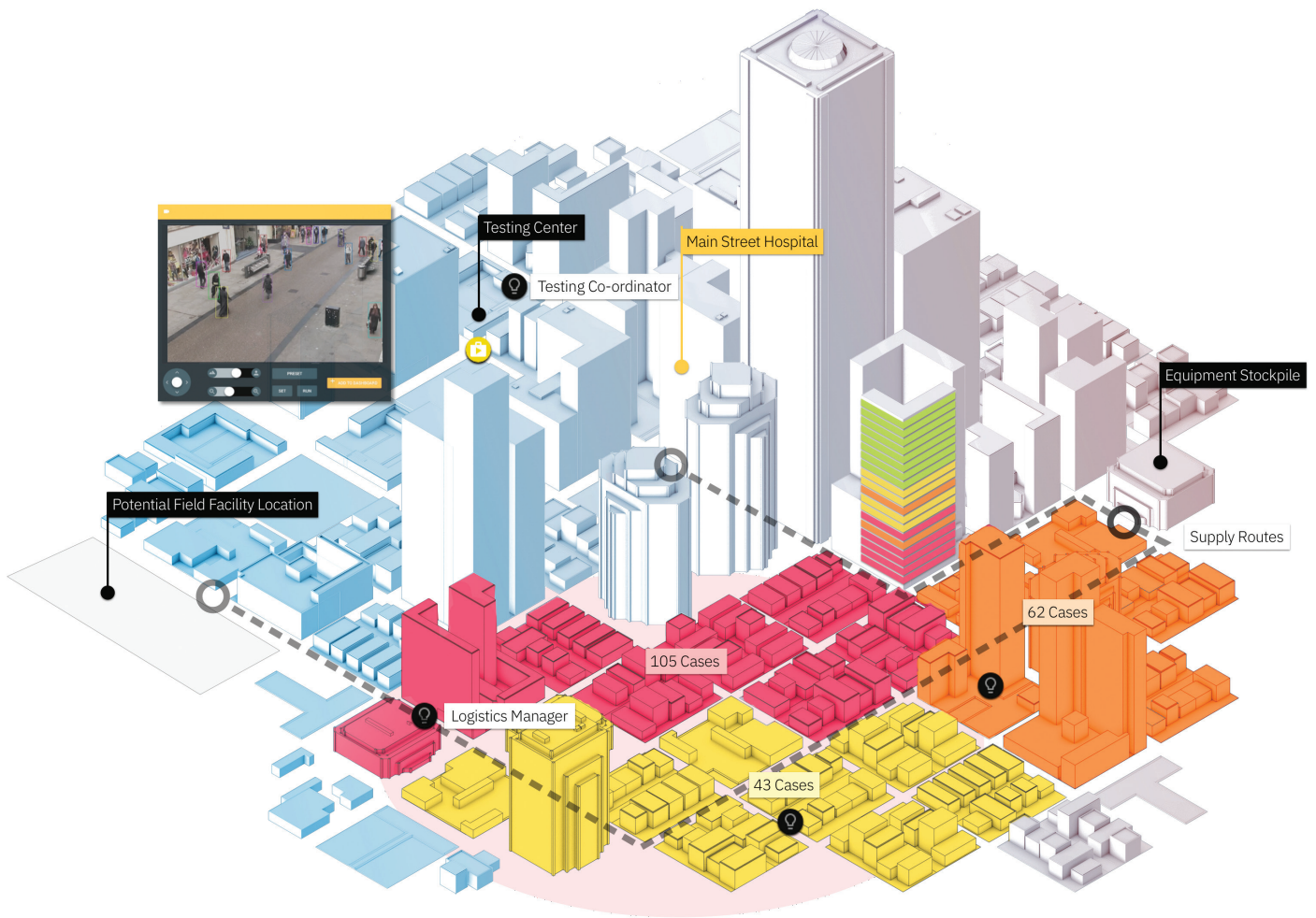
# 3 Reasons Why 3D Digital Twins Provide a Unique Solution for the COVID-19

Digital Twins provide a uniquely powerful solution for mapping, managing and mitigating the impact of the COVID-19 pandemic. A 3D visual model-based Digital Twin of an infected city is the perfect platform for aggregating and distributing information at scale in a time of a crisis such as the virus that is sweeping across the world today.

A 3D, Real-time, Interoperable, Shareable Data Environment is Key

First, a 3D model-based platform is inherently attuned to managing and communicating real-time spatial information, and the virus itself is fundamentally a spatial phenomenon, as it moves from point to point in space in real time – up, down, and sideways – just like a car, a package, or manufacturing component on a production line.

People become infected when they get too close to other infected people, or touch surfaces or breathe in air that exhaled by infected people, anywhere in space. This type of data is therefore most effectively represented in 3D. 2D GIS map applications such as those deployed by the John Hopkins Coronavirus Research Center to help visualize the extent and spread of the virus are useful for that purpose only, and offer no value otherwise. Scalable, low-polygon-count, data-enabled 3D parametric models are the key, as they allow governments to assemble a 3D Digital Twin model at a scale rapidly, up to an entire city, county, or even country.

The Wisdom of Experience: Lessons from Factory Floor and Construction Site Management Applied to Crisis Management
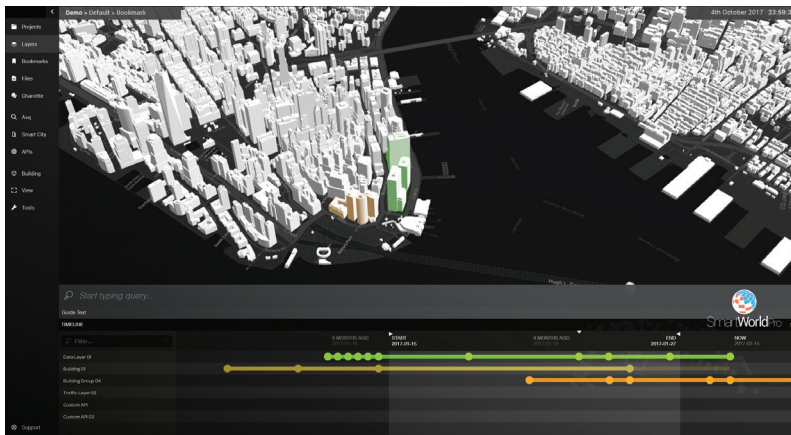
Second, just like Digital Twins help factories better understand inventory, employee movement, and help to optimize the spatial and temporal movement of people and goods inside a manufacturing facility, Digital Twins are user friendly and easy to learn, which means that they can be leveraged to help local, state, and federal leaders, health officials, healthcare workers, businesses, and citizens, to better optimize and coordinate a city's operational response to a pandemic, too.

The key is to successfully map all of its resources and assets – equipment, building assets, logistics vehicles, hospitals, temporary field units, emergency generators, ventilator and master stockpiles, goods in transit, etc., including the movement of individual citizens – to the Digital Twin so officials can quickly and clearly see what's where in real time, and optimize the delivery of emergency services as the city continues to largely function while in a state of quarantine. In other words, achieving all this becomes possible without having to shut down completely and destroy entire sections of the economy unnecessarily.

Atkins' Neil Thompson, Delivery Lead for the UK National Digital Twin Programme, offers his perspective: *"I think the digital twin is about being able to place information into the right hands of the right people at the right time, including information about the movement of human beings, so the Digital Twin mission control center isn't like the one at NASA in Houston. The computing power and connectivity of mobile technology (including laptops) enables us to carry around a mission control center at worst in a backpack, and at best in our pockets."*

Just like knowing where critical assets are in such times is key to specific solutions, knowing where people are and being able to tell people where to go in a pandemic, especially infected individuals, is essential, too. Every citizen in an infected city with a Digital Twin "Command & Control Center" (a laptop? a mobile phone?) would have an online profile page with their own personal Digital Citizen Unique ID that would stream real-time information such as his or her location, body temperature, photos and videos relating to the virus, etc. to the Digital Twin "Command & Control Center". Health officials, then, become empowered with a real-time 3D spatial map of the virus as it progresses and recedes, visualizing and geolocating every case whether confined in a studio apartment on the 30th floor of an apartment building, or a single-family home out in the suburbs.

In China, a mobile tracking system helped officials watch the movement of the virus spatially, helping to both better isolate and quarantine the most affected areas while also being able to warn citizens if they came within 50m of an infected person. The New York Times article from April 6th entitled "How Will We Know When It's Time to Reopen the Nation?" confirms the need for a "robust system" to battle the spread of the virus:

> *"A robust system of contact tracing and isolation is the only thing that can prevent an outbreak and a resulting lockdown from recurring. Every time an individual tests positive, the public health infrastructure needs to be able to determine whom that person has been in close contact with, find those people, and have them go into isolation or quarantine until it's established they aren't infected, too."*

Limitless Data Correlation and Simulation Capabilities

Third, Digital Twins are adept at aggregating multiple data points to power accurate, real-time scenarios and model simulations. Artificial intelligence plugins powered by machine learning reduce mass simulation event run times from weeks and months to hours and days. Nothing is more critical as officials race to get ahead of the spread of the virus i.e. knowing where it's likely to go next, and planning for containment measures.

Perspectives from Expert Digital Twin Practitioners Around the World

We asked leading Digital Twin experts from different sectors and world geographies to volunteer their thoughts as to how they think Digital Twins would drive the greatest value to stakeholders in specifically addressing a pandemic like the current COVID-19 emergency.

Neil Thompson, Director, Digital Construction at Atkins, Vice Chair of the TechUK's Digital Twin Working Group and Delivery Lead for the National Digital Twin Programme; London, UK

> **THE DIGITAL TWIN IS ABOUT BEING ABLE TO PLACE INFORMATION INTO THE RIGHT HANDS OF THE RIGHT PEOPLE AT THE RIGHT TIME.**

"Building a digital replica of the world has been at the forefront of what we do at Atkins, and it's something I have dedicated my career to. Constructing and connecting data models is not a trivial task, they need careful consideration and as digital twins gain the maturity to support rapid decision making, we have to take a stand on their ethical groundings. The public good has to be the first step.

The COVID-19 pandemic is a clear demonstration of the broader value of connecting data. It is no longer about supporting just the owners and operators of critical national infrastructure and other built assets. It is now about supporting international governance to be agile and rise to these challenges.

I have been warmed by the those behind the creation of the nightingale hospital in london, the national standards bodies who opened up the standards for ventilators for free, the response of our manufacturing base to build those ventilators and lastly the effort of the research community to lend its labs, talent and computing power to solving solutions around the response. Imagine if they had the power of a nexus of connected digital twins to test their solutions at a large scale!

I think we are in a perfect storm. If we combine the benefits that digital twins could have given to those managing the COVID-19 response with the backdrop of Dame Judith Hackitt's recommendation of the golden thread from the Grenfell Tower disaster inquiry, we have the opportunity in the data age to use these lessons to align the behaviours and purpose of not just individual twins, but **a entire nation of connected digital twins**."

Terence Tan, Lead Consultant, Virtual Singapore (Digital Twin) Program, GovTech; Singapore

> **INHABITANTS OF THE PHYSICAL WORLD NOW TAKE CENTRE STAGE AS CLEAR AND PRESENT USE CASES FOR DIGITAL TWINS TO ADDRESS, NOT JUST INANIMATE ASSETS.**

"The current COVID-19 pandemic has set the stage for Digital Twins to live up to and over deliver on the promises, and take on other dimensions and behaviours. It is no longer relevant to mirror the physical world in virtual 3D for typical city-centric use cases. Inhabitants of the physical world now take centre stage as clear and present use cases for Digital Twins to address, not just inanimate assets.

In highly populated Singapore, the national coordinated response to the evolving COVID-19 situation has taken on many dimensions. After our ability to contain the initial outbreak which was admired by the world, the second wave of imported cases from returning students and workers demanded tough new measures. Instead of allowing them to return home, quarantine arrangements were made with hotels and vacation resorts to prevent local transmission. Identified clusters and contact tracing were pursued relentlessly to break the infection trajectory. With a sizable foreign workforce housed mostly in close proximity dormitories, safe distancing could not be implemented effectively without rehousing them in smaller numbers. Public hospitals also needed to free up capacities for more acute cases by transferring recovering patients to rehabilitation facilities converted from convention and exhibition halls.

These are just some of the many ways in which a nimble and resilient Digital Twin combining a dynamic view of human, urban, building, equipment assets and can shine to constantly help authorities recalibrate responses to keep people safely apart and flatten the curve. In city-centric parlance, this is a facility management use case repurposed at the national emergency level."

Tom Shirciff, Co-founder and Principal, Intelligent Buildings; Charlotte, North Carolina, USA

> ❝ IT WILL BE INCUMBENT ON THE PROPERTY MANAGEMENT INDUSTRY TO ESTABLISH NEW NORMS AND NEW LEVELS OF SERVICE BOTH SHORT AND LONG TERM. ❞

"Our Digital Twin practice focuses on (building) control systems, contractors, and staff and their role in risk management, building performance, and occupant experience. Use cases for those three areas including COVID-19 issues rely on "the data around them" including online contractor health-risk screens, control systems data points and analytics, environmental sensors for water (legionella and corrosion) and air quality (humidity, CO, CO2, VOC), and surface conditions. The digital twin approach is right in line with that, aggregating building-oriented data while also expanding well beyond the built environment.

As we all consider how and when we will fully re-occupy buildings, and how data, visualization, cybersecurity and vendor risk management will play a role, it will be incumbent on the property management industry to establish new norms and new levels of service both short and long term. We predict that they will establish additional, no-cost service practices relating to contractor management and environmental monitoring as well as optional services for landlords and occupants that will include more in-depth public health solutions, thermal scans, restricted space management, and touch-less entry."

Peter Scialla, President and COO, Delos; Co-Chair of the Well Living Lab, a Delos and Mayo Clinic collaboration; New York, New York, USA

> ❝ AS WE CONTEMPLATE REOPENING OUR OFFICES IN THE WAKE OF COVID-19, IT IS CRITICAL THAT WE TAKE AN EVIDENCE-BASED APPROACH TO MAKE OUR WORKSPACES SAFER WHEN WE RETURN. ❞

"At Delos we've spent the last 8 years examining the correlation between the indoor environment and human health. Through our subsidiary, the International WELL Building Institute, we have seen rapid global adoption of the WELL Building Standard, a performance based certification program that measures a building's effect on the health of its occupants. With increased focus on transmission of viruses through not only behavioral patterns, but also air quality and surface hygiene, the role that indoor spaces play in determining health outcomes for the people inside these spaces has now become more important than ever. In fact, certification programs bring increased importance to ensure the quality of industry best practices – and it seems that implementations of healthy interventions into real estate has moved from a "nice to have" to a "must have". Equally, an understanding of specific technologies and solutions that can reduce the viral burden of the indoor environment must come with a high regard for the scientific claims of these technologies and solutions, further supported by 3rd party testing to validate the potential benefits.

As we contemplate reopening our offices in the wake of COVID-19, it is critical that we take an evidence-based approach to make our workspaces safer when we return. We have always felt that Digital Twins provide an extraordinary roadmap to advance the efficacy of health interventions into the built environment. As the building sciences and health sciences continue to converge, the benefits that can be provided by linking wellness principles with design, operational protocols and architecture, especially utilizing Digital Twins is more prominent than ever before."

Gregory G. Curtin, Ph.D., Founder & CEO, CivicConnect; Advisory Council, World Economic Forum (WEF) Future of Urban Development and Services; Global Advisory Council, The World Nano Foundation; Los Angeles, California, USA

" THE "NEW NORMAL" THAT WE NOW HEAR SO MUCH ABOUT WILL NO DOUBT REQUIRE THIS TYPE OF DATA DRIVEN APPROACH ACROSS ALL PHYSICAL, DIGITAL AND SOCIAL INFRASTRUCTURE. **"**

"Some real world experiences I have had over the past few months might provide some perspective on the opportunity, and indeed, the need, for building fully connected communities and places, not just buildings and facilities. I recently found myself on the road for the better part of a month from mid-February to mid-March...just as the Coronavirus situation was blowing up globally and in the U.S. The week of February 17th I travelled to London, U.K., to unveil at a global investment forum our just launched Living-as-a-Service™ platform, integrating physical, digital and social infrastructures in a new business model to deliver comprehensive smart and connected communities at scale. Emerging Internet of Things (IoT), digital twin, mobile, augmented reality (AR) and artificial intelligence (AI) technologies are critical components of this innovative platform. As might be expected, Coronavirus specifically and healthcare generally were top of mind for the investors, as Europe had just witnessed its first COVID-19 death just a few days earlier. As one prominent investor commented, "We're going to need these types of smart connected communities to ensure safe, secure, healthy living now and into the future."

The next week I was in Orlando, Florida, to participate in the Lake Nona Institute Impact Forum "Building an Ecosystem of Wellbeing." The Coronavirus situation provided a real world context for this dynamic forum of global CEOs, health and wellness technology innovators, leading academics and researchers, and prominent public health experts. One of the key themes that emerged was the urgent need to connect healthcare, health and wellness to the actual places and environments where people live, work and play – COVID-19 drove this home like nothing else could. New data driven digital technologies and strategies including community IoT and community-scale digital twinning would absolutely help in this regard.

Finally, on March 11, the day the World Health Organization (WHO) declared COVID-19 a pandemic, I was back again in Florida to speak at a municipal planning/new urbanism conference. I was presenting on "Connecting Communities... Digitally and Physically." It could not have been a more on point, timely subject, and in fact it prompted real discussion around how a truly "smart connected community" would be better positioned to respond to something like the Coronavirus.

I travelled back to my home in Los Angeles, California, on Friday the 13th (auspicious?). Since that time a consortium of companies including some of those contributing here have been modeling and prototyping how to deliver an initial COVID-19 community response platform as part of Living-as-a-Service™ and as a fundamental step toward delivering real time health and wellness at the connected community level. The "New Normal" that we now hear so much about will no doubt require this type of data driven approach across all physical, digital and social infrastructure."

Dr. Jonathan Reichental, CEO, Professor, Author of 'Smart Cities for Dummies'; former Chief Information Officer, the City of Palo Alto, California, USA

"Digital twins of cities offer urban planners, policymakers, and others more tools and information than static data models. Areas such as scenario-testing and strategic planning are greatly enhanced through accurate data-driven visual simulations. Stakeholders can monitor construction progress, traffic, environmental conditions, public safety, energy consumption, building occupancy, and now so critically, health and wellness conditions – all in real time."

Joseph Dignan, Founder, Kintechi (former Industry Managing Director, Worldwide Public Sector, Microsoft and Global Partner Lead, Future Cities Catapult); London, UK

"When Lenin wrote: There are decades where nothing happens; and there are weeks where decades happen" he wasn't thinking of Digital Twinning but the observation works in the current climate. The advanced urban digital transformation arena formerly known as smart cities has been maturing over the last few years. IoT platforms create data that is synthesised through Data Trust Models and the results made accessible with depth and context in space through Digital Twins. They are a tool with which we can observe, track, plan, develop scenarios, communicate and share information across agencies and they are here at the right time to help fight the COVID-19 pandemic."

Jagan Shah, Former Director, National Institute of Urban Affairs; New Delhi, India

"Cities and regions across the world are in urgent need of an integrated and holistic plan that matches their resource base and potential for supporting sustained and resilient growth with their socio-economic ambitions and trajectories. Digital Twins offer the necessary levels of technology-enabled agility and intelligence that are necessary to achieve the sustainable development of the complex systems and networks that determine the health and productivity of local communities, critical in a time of crisis. We live in an era when anticipating multidimensional risk and planning for continual adaptation will differentiate the organisations that flourish from those that suffer threats to survival – digital twins can make the clinching difference."

BY 2022, OVER TWO-THIRDS OF COMPANIES THAT HAVE IMPLEMENTED IOT WILL HAVE DEPLOYED AT LEAST ONE DIGITAL TWIN IN PRODUCTION.

PICTURED: A world networked and connected through Digital Twins

Towards a Brave New Future: A World of Networked Digital Twins

We are moving towards a world which will be increasingly reliant on Digital Twins of all shapes and sizes. Benoit Lheureux, research vice president at Gartner, "predicted that by 2022, over two-thirds of companies that have implemented IoT will have deployed at least one digital twin in production." In times of crisis, Digital Twins can provide unprecedented transparency to multiple stakeholders, improving multilateral decision-making, increasing operational efficiencies, strengthening risk mitigation, and facilitating innovation and collaboration at the local, state, federal, and international levels, across government agencies and businesses alike. The coronavirus pandemic, while tragic at an epic scale, is also necessitating that people not only reconsider how they interact with each other, but also how they interact with the built environment in which they live, work, and play. We predict that as businesses, government agencies, and other institutions emerge from this pandemic, they will look to Digital Twin strategies to (1) provide their owners, tenants, employees, shareholders, insurers, and maintenance staff the reassurance that they operate a in virus-free environment, and (2) protect themselves against the fallout of another such incident in the future.

Cityzenith's SmartWorldPro Advanced Digital Twin Platform

Cityzenith has been helping to pioneer the Digital Twin trend since I founded the company in 2009. Before Cityzenith, in 2004 I started building one of the world's largest BIM services companies, backed by Sequoia Capital, an AEC, CAD, and BIM outsourcing firm that grew to over 500 employees in just four years and served 25 of the world's top 50 AEC firms (click here to see us on CNN in 2006). By 2008, with thousands of completed CAD and BIM projects under our belts, we discovered we were using far, far too many software tools to achieve far, far too little for our clients and their projects. Half-a-dozen BIM tools (now officially over 100+), several scheduling tools, clunky GIS platforms, myriads of analytics plug-ins... we could barely keep up... and none interoperated with each other. Indeed, the AEC and CRE tool ecosystem was heading towards a common language crisis which was beginning to spiral out of control.

We concluded that there was an urgent need in the market for a **single** platform to accommodate all the different types of data generated for and by today's large-scale complex projects and properties, and in 2009 created Cityzenith to solve the problem. That September, we engaged the creator of Google Earth (aka Keyhole, acquired by Google) as well as one of the founders of Revit Technologies (acquired by Autodesk) to help us build the first version of our platform. With an expert core team in place, we set course with one aim: to develop an amazing all-in-one software platform that would gamify all the complexity of the building world and help make bigger building projects better for everyone involved. A decade on, and after millions of dollars invested in research and development combining leading expertise from the fields of game engine design, BIM, GIS, UXUI, data science, architectural visualization, and proptech, today's SmartWorldPro is unparalleled in the market.

The last several years has seen us evolve through five independent versions of our platform, each gaining new wisdom from the wide variety of Digital Twin project experience that we have been amassing year after year. To date, we have executed more than two-dozen major Digital Twin projects in a dozen countries since inception, and our work has been recognized across the industry, winning multiple awards, including the Realcomm Digie Award, a World Smart Cities Award, and a Chicago Innovation Award. We were even profiled on the BBC, which called us one of the "clear leaders in the emerging Digital Twin industry".

Coming soon this May 2020, we will be releasing the next edition of our Digital Twin platform, SmartWorldPro V 2.0, a giant leap forward for our company, unveiling more features and integrations than ever before, a completely new backend, and a completely new user experience. We are very proud of it. We will also later be announcing the arrival of two new products, **Mapalyze** (our very own App Store) and **TwinUp** (LinkedIn meets Instagram for architects). Stay tuned as the date draws near.

About the Author:

Michael Jansen, CEO & Founder, Cityzenith; Chicago, Illinois, USA

> " DIGITAL TWINS ARE RESHAPING THE FUTURE OF BUILDINGS AND NOW HEALTHCARE THROUGH A COMMAND CONTROL OF UNLIMITED DATA MAKING THE POSSIBILITIES ENDLESS. "

An impassioned architect, urbanist, and entrepreneur, Michael Jansen has founded and led high-growth companies in the U.S. and Asia for more than two decades.

Having studied architecture at Yale and Cambridge, and earned a Fulbright Scholarship, he pursued a career in architecture in the United States, India, and China for several years, leading the Asia practices of two major U.S. international architecture firms before the age of 30.

In 2004, Michael founded a major BIM services company in India backed by Sequoia Capital, which grew to over 500 employees in just four years. In 2010, Michael took the helm at Cityzenith as CEO and embarked on a personal mission to revolutionize the way we use data to transform the built environment the world over.

Featured on CNN, CNBC, the BBC, and in several major business, government, AEC, and real estate publications worldwide, Michael has received several awards for his work, including the "40 Under 40" accolade from Building Design + Construction. In 2014, Michael was honored as a World Cities Summit Young Leader in Singapore for his life-long contribution to improving sustainability and the quality of life in cities; and recently In 2019, he received a Chicago Innovation Award for his company's groundbreaking work in the Digital Twin arena.

A husband and father of three, Michael speaks Chinese and Hindi, has travelled to over 90 countries, swims a lot, reads more political and science news than he should, and plays the guitar.