

# COGNITIVE

TIMES

BY SPARKCOGNITION | VOL. 5 NO. 2 // 2020



## SPOTTING THE NEXT PANDEMIC

While the world navigates COVID-19, AI is already searching to find the next potential pandemic. See if you can find the virus super spreader on this cover!



TIME MACHINE 2020

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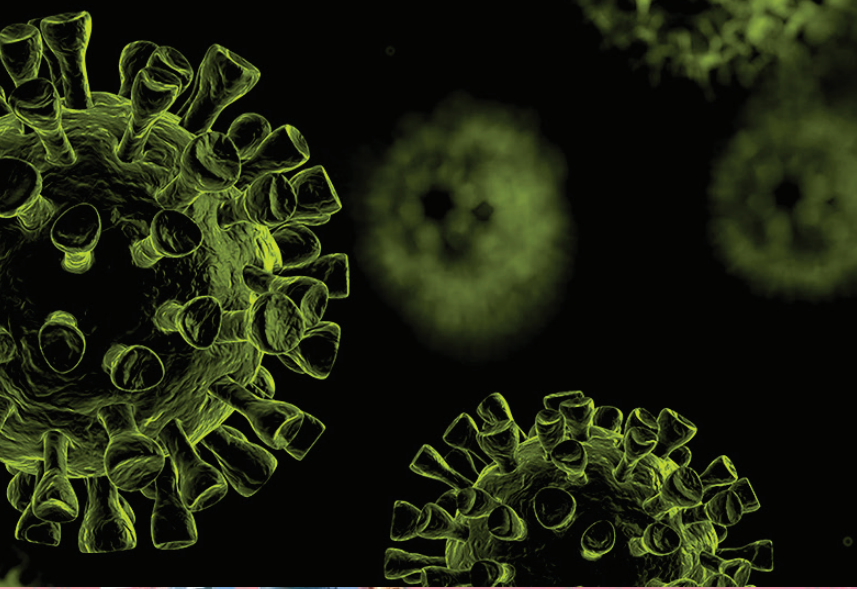
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BY MARLA ROSNER

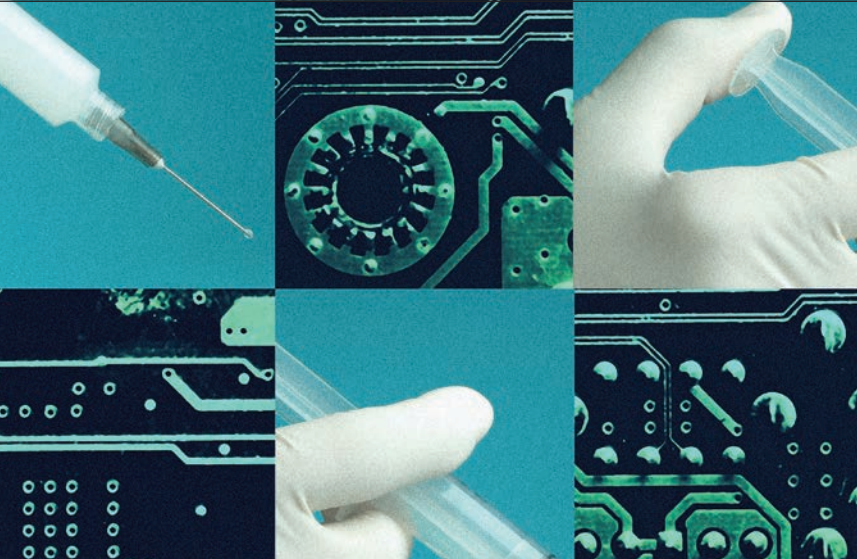


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# COGNITIVE TIMES

BY SPARKCOGNITION | VOL. 5 NO. 2 // 2020

## EDITOR IN CHIEF

Amir Husain

## MANAGING EDITOR

Rachel Kania

## EDITORS

Nathan Mattise

Michelle Saab

## CREATIVE DIRECTOR

Judd Oberly

## DESIGNERS

Jon Coyle

Rob Metke

Kelsey Kujanek

## STAFF WRITERS

Marla Rosner

Evan Sakrison

## CONTRIBUTING WRITERS

August Cole

Jaqueline Ting Quesada

## FEATURED WRITERS



**Joseph Guinto** is a freelance writer based in Washington, D.C. A former White House correspondent for *Investor's Business Daily*, Guinto was also a founder and editorial director of Dallas-based Presidio Media, which published several national and regional publications, including *Texas Business* and *Spirits & Cocktails* magazines. He contributes to *Politico Magazine*, *Washingtonian*, and others.



**Nathan Mattise** is the features editor at Conde Nast's *Ars Technica*, a science and technology publication the NYT Crossword once called a "website with gadget news." His work has appeared in *USA Today*, *Billboard*, *The AV Club*, *The New York Times*, *Wired*, *Texas Monthly*, *Esquire*, and on his parents' fridge. In his downtime around Austin, he can be found registering voters and practicing bocce.

# HYPERWAR

CONFLICT AND COMPETITION IN THE AI CENTURY



AMIR HUSAIN ■ JOHN R. ALLEN  
ROBERT O. WORK ■ AUGUST COLE ■ PAUL SCHARRE  
BRUCE PORTER ■ WENDY R. ANDERSON ■ JIM TOWNSEND

## WHAT PEOPLE ARE SAYING ABOUT THE BOOK

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*"'Hyperwar' doesn't just admire the problem of AI-fueled warfare, it offers concrete approaches to help U.S. policymakers and our allies prepare. It is a 'must read' for all humans seeking to be 'in the loop or on the loop' before these technologies outpace our capacity to make ethical, strategic and secure decisions about our future."*

—AMBASSADOR VICTORIA NULAND  
CEO, Center for a New American Security

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## NOTES

# FROM THE EDITOR

**WE ARE LIVING** in strange times.

Many of us have grown accustomed to a world where disease is an afterthought, or at worst an inconvenience. The rapid spread of COVID-19 has caught much of the human population off guard.

As we as a species face down this new normal, it's only natural to be frightened of what the future may hold—for ourselves, our families, our businesses, and our nations. But humankind is nothing if not robust, inventive, and ready to face every trial that has come our way.

At SparkCognition, we've been making some big changes. From our separate homes, connected only through Zoom screens, we've been discovering new ways of connecting, collaborating, and

reaching out to one another to stay focused, committed, and positive. Modern technology has allowed us to remain a community even at a distance.

Modern technology has also allowed us to take part in the fight against COVID-19. None of us here are medical professionals, but I have been proud to watch my colleagues find ways to step up and contribute regardless. Our IT team is contributing computing capacity to help Folding@home discover a cure. Our lab works around the clock constructing medical equipment. Our human resources and finance teams have funneled resources to help provide food for the families in our area who've been hit the hardest. We have partnered with Dell Medical School at UT Austin, and other members of the medical community both in and out of state to assist in every way we can.

As part of a company that values innovation, many at SparkCognition have also come up with novel ways of using artificial intelligence, image recognition, and natural language processing to aid researchers and healthcare workers as they battle the pandemic. Meanwhile, our defense team has proposed numerous ways to assist with the crisis both domestically and abroad, and our subsidiary with Boeing, SkyGrid, is finding ways to put its drones to use on the front lines.

In this time of crisis, we must turn to our greatest assets: science, technology, and innovation. And so, this issue of *Cognitive Times* covers the myriad ways technologists, businesspeople, and ordinary individuals are lending their strength to coronavirus efforts. Researchers devising new ways to predict pandemics, tech startups working to track the spread of COVID-19, new breakthroughs in drone delivery technology to get people the supplies they need, oil and gas companies using artificial intelligence to keep their operations running through the downturn—all that and more can be found in these pages.

This is a trying time. It's a period where we must all come together, serve others, and make a commitment to remaining positive. But if we join forces and take care of each other, we will power through. If we take the time to act with courage and lift others, when we look back at this challenge, we will be proud. We will be stronger as a global community and as a species.

So far, there has been no challenge history has thrown at humanity that we haven't successfully navigated. COVID-19 is just one more item for us to add to mankind's long list of conquered challenges.

**Amir Husain**

Founder & CEO of SparkCognition



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MEET THE MIND

BY NATHAN MATTISE

## DR. LAUREN MEYERS

*Epidemiology hasn't always been so data-driven; Dr. Lauren Meyers helped change that.*

**ALL OF US** kinda, sorta know we're living in unprecedented times—but Dr. Lauren Meyers can actually confirm the sentiment. The University of Texas at Austin Professor of Integrative Biology is one of the world's foremost experts in the field of epidemiology, and specifically epidemic modeling, an area that leverages public health data to compute potential outcomes and offer guidance to policymakers. Suffice to say, Meyers' work has been very

much in demand over the last year with the rise of COVID-19.

“This is unprecedented; it’s hitting home like nothing we’ve experienced in our lives and the demands are so many,” Meyers tells *Cognitive Times*. “I’ve gone from a team of me and my five students/post-docs to 60 people on a call every morning, all collaborating, all working around the clock. The pace of work has increased tenfold, if not more. It’s intense.”

When Meyers says “unprecedented,” she knows. Her roughly two-decade career in epidemiology has coincided with perhaps some of the field’s all-time biggest changes and challenges. As a postdoc student studying evolutionary biology at Emory University in the early 2000s, she fell into epidemiology when the CDC came down the road looking for modelers to “model the spread and containment of respiratory infections in close settings like

the CDC every week and there are dozens of academic modelers on those calls from universities from around the world.”


As that string of headline-grabbing diseases unfolded in the 2000s, epidemiology itself was transforming. Around the turn of the century, new epidemiologists like Meyers were borrowing theories from other academic disciplines and applying them in their field (like statistical physics’ percolation theory, which models how a fluid flows through a bunch of channels that are either open or closed in order to predict the extent of spread). Simultaneously, technology rapidly evolved—allowing for more near-real-time data collection, reporting, storage, and computation—so epidemiologists also adopted these tools as quickly as possible to ensure their new modeling approaches could be based more and more on hard data.

“[In the last 20 years,] we’ve been

inputs, and directly engage them with data to infer how things are spreading. That lets us make more accurate predictions about how epidemics might unfold or to evaluate how different intervention actions could impact the spread of disease, things we’re very interested in with COVID-19.”

When it comes to epidemiologists and the novel coronavirus, Meyers identifies one other important change within the last few decades—the reception awaiting the work of the doctor and her colleagues. While some of today’s highest-profile data naysayers routinely make the nightly news with ill-informed policy decisions based on incomplete or nonexistent data, Meyers still sees our current culture as being more open to data-driven epidemiology than ever. She has distinct memories of walking into public health agencies as recently as 2009 and being met with near-instant dismissal: “Someone invited me, but someone else led the room. They said, ‘I don’t believe in models. I think they’re crap and we have better things to do,’” Meyers says. It was a common conversation 10 years ago, she recalls, but thankfully modern epidemiology and its mathematical, machine learning methods meet more amenable minds these days.

“Most decision-makers today want evidence, data, and science. I get weekly requests from, the White House and CDC to local leaders in cities across Texas and the country. They’ve seen our models online, and they want to know how actions they may take can impact the health and safety of their communities,” she says. “These models aren’t perfect; they’re only as good as the inputs so they’re always changing. But it’s always so much better to bring whatever little evidence you can to the table rather than shooting from the hip. That’s what we can do right now.”

To watch Dr. Meyers speak on the pandemic, watch her latest Time Machine AI Session talk at: [go.timemachine.ai/covid-19](https://go.timemachine.ai/covid-19). 

## “The pace of work has increased tenfold, if not more. It’s intense.”

health care facilities and nursing homes, something that’s very relevant today,” she recalls. That work landed her a call from the British Columbia Centre for Disease Control, where staff had read a paper she co-authored with the CDC and wanted help with a new disease called SARS. From then on, Meyers would go on to help guide the response of policymakers through her research and modeling on diseases like H1N1, Ebola, Zika, HIV, and now COVID-19.

“[When I started doing] pandemic or epidemic modeling, it didn’t exist,” she says. “There are so many things that have changed in the last decade—the technology, all the models, the machine learning, everything we use—but there’s also been incredible growth in the field. There were maybe a dozen of us when I started, but now I’m on multiple calls with

through a data revolution,” Meyers says. “When I first started, there was almost no data, there really was so little. We were a data-poor field, because it was so hard to get info on how many people were infected on a given day until very recently. Instead, we had to do a lot of counterfactual work—if it were like this, this is what it would look like. Let’s put it into the model and see what unfolds.”

“The real innovations came from taking the models we were developing and figuring out how to fit them to data, to more directly engage these complex models with what was being seen in the world,” she continues. “So there are all sorts of methods—Bayesian statistics, AI and machine learning—that have come online and allowed us to take these models that could capture a lot about the real world if they have the right



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BY NATHAN MATTISE

# ELEVATOR PITCH

We ask an up-and-coming venture to sell us on its vision.

► <b>Company</b>	x.ai
<b>Home Base</b>	NEW YORK CITY
<b>Founded</b>	2014
<b>Founders</b>	ALEX POON DENNIS R. MORTENSEN MATT CASEY MARCOS JIMENEZ

## THE PROBLEM

Scheduling meetings is a pain—finding a time that works for everyone, keeping all the participants in the loop, dealing with cancellations and rescheduling. (*Phew*, just typing that.)

## THE SOLUTION

x.ai is a productivity tool powered by artificial intelligence that syncs with digital calendars and automatically handles the tedious stuff listed above.

## SPACE

Workplace technology, a space with greater urgency as many companies transition to completely remote teams (x.ai has been an all-remote team for more than a year).

## THE UPSIDE

The average person spends several hours a month on tasks related to scheduling meetings. This time spent has a real cost for the individual and their business. x.ai helps you streamline that process by handling the mundane for you.

## THE RISK

Like all technologies, it may come down to adoption. If some team members are slow to adopt the platform, it won't be as effective. "We've found that the most successful x.ai users are ones who commit to changing their behavior," says co-founder Dennis R. Mortensen. "These people are motivated to solve their meeting scheduling pain and they want to establish a new routine as a result. Our team works tirelessly to ensure our platform is user-friendly for meeting hosts AND their guests. You're not going to use a product your guests hate! We actually monitor guest satisfaction closely, and we're proud that guests rate us an average of 4.7 out of 5 stars."

## THE PITCH

"Just like when we moved all our files to the cloud (e.g., Dropbox), and just like when we all started to sign our contracts digitally (e.g., DocuSign), it seems equally inevitable that we will all use software to help schedule our meetings in the not too distant future. As that happens, a new market for approximately 90 million knowledge workers in the U.S. alone opens up. That in and of itself is interesting, but one of the more exciting things for us (and our current investors) is the natural network effects. The product gets better simply by more people using it, which suggests a moat can be created around the business."

## THE USE CASE

CC your AI scheduling assistant on an email and tell them to find a time to meet. They'll instantly pull a list of available times, based on your preferences, and send them to your guests to choose from. Need to reschedule a meeting? Click the x.ai link in your calendar invite and choose a new time frame for the meeting. And when you schedule a meeting with another x.ai user, the AI compares everyone's availability and preferences to schedule the meeting instantly.

## THE FUN FACT

At any given time, x.ai employees work across six different time zones.

## THE FUNDING

x.ai's blue-chip investors include IA Ventures, Firstmark, Two Sigma Ventures, SoftBank Capital, DCM Ventures, and Pritzker Group. The company revisited its cap table a year ago and has seen overall growth since, citing June 2020 as their best month ever for usage (most meetings scheduled).

# INNOVATION THAT'S OUT OF THIS WORLD



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# WHAT'S HAPPENING IN TECH



## A LITTLE (ARTIFICIAL) EMPATHY

**>** Tired of bots that seem a little, well, robotic? Facebook researchers would like to offer you Blender, a new chatbot that takes recent advances in AI and language then sprinkles some artificial empathy on top. Basically, Blender can sympathize with others concerned about making their parents happy or mimic their excitement when bringing up Modest Mouse. When Blender was presented to human testers against other human-ish chatbots like Google's Mee-na, Facebook reports, nearly 70 percent believed Blender sounded more human. Look out, future Turing Tests. *[Wired]*

BY JAQUELINE TING QUESADA

## MERRIAM-WEIRDSTER

Getting one-upped in Scrabble is the worst. Luckily, developer Thomas Dimson, formerly of Instagram, has a resource for you: [ThisWordDoesNotExist.com](http://ThisWordDoesNotExist.com). Think of it as an AI-generated dictionary, though every word is entirely made up. Dimson leveraged OpenAI's popular GPT-2 framework, which was built using 8 million webpages scraped from the most upvoted Reddit links. The results are as potent as trifane, or a synthetic hybrid drug that treats tuberculosis (and absolutely does not exist). *[The Verge]*

## QUICKER CONTACTLESS CHECKOUT

Walmart has started using an AI-powered self-service scale called RetailAI Fresh, by Malong Technologies, to their stores in China recently. The smart scales recognize items, even when bagged, to provide an even easier and faster checkout process than now-common self-checkout lanes (whether in normal or pandemic times). The results? Both increased efficiency and customer satisfaction. In ten RetailAI Fresh-enabled stores, waiting time was reduced by approximately 40 percent, according to company data. *[Walmart P.R.]*

## SIMPLIFYING SMALL BUSINESS LOANS

Loans have become a great white whale for many businesses in light of COVID-19. So this spring, Google announced its new PPP Lending AI Solution, an AI-powered tool that helps lenders accelerate the loan process. It has three components: a portal for lenders and applicants to submit and view status, the ability to extract data in applications, and the ability to view historical loan data. Google hopes this can improve the processing of applications through better customer experience, faster implementation, and improved security. *[ZDNet]*

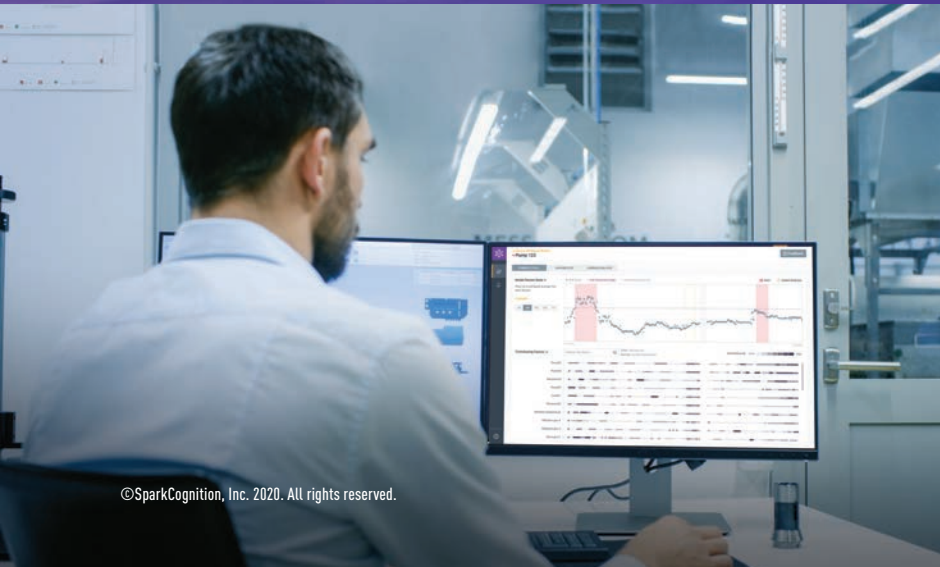
## GIVE US THE (ROBO)BEAT

Longing for the days of lengthy road trips with nothing but radio accompaniment? Maybe OpenAI's Jukebox, a music-generating system that produces songs from scratch, can suffice. This intelligence model uses pieces of existing songs, lyrics, genres, and artists to create brand new, realistic music. In OpenAI's first Jukebox examples, the songs display patterns, rhythms, and natural flow, though they lack structures like choruses that repeat. For those sick of fellow passengers shouting "Don't Stop Believing" or "Sweet Caroline," maybe this is the answer. *[OpenAI]*





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BY MARLA ROSNER

# CTRL+P FOR PPE

## How to make your own 3D-printed face shields

**ONLY MEDICAL PROFESSIONALS** used to know what “PPE” stood for. Now it’s common parlance—and it’s in short supply. Personal protective equipment such as face masks and face shields are vital to protect healthcare workers fighting the COVID-19 pandemic, but there’s not nearly enough to go around.

We can’t all be doctors, but if you have access to a 3D printer, you can help by making PPE in your own home or office. The best place to start is getting in touch with medical professionals in your local community to find out what they need and what designs they’ve approved. (Many areas have even set up COVID-19 tech exchange Facebook groups to facilitate this.) In case you’re ready to get involved, here’s how face shields are being 3D printed at SparkCognition’s office in Austin.

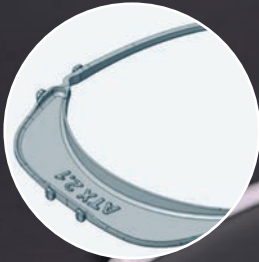
### SIMPLE ▶

Face shields are relatively straightforward to produce—it’s simply a transparent sheet of plastic held in place over the face by a visor or headband. The visor can be 3D printed and needs only to be fitted with clear plastic sheeting to be ready for use.

### QUICK ▶

This visor was designed to be quick to make. It uses as little material as possible while still providing good brow coverage and holding the plastic shield as far from the face as possible.





#### ◀ CLIP-ON

The six posts around the outside of the visor are where the plastic sheeting is attached to keep the shield in place.

#### ◀ REUSABLE

These visors are designed to be discarded after use, but cracks and crevices are minimized in case a healthcare professional wants to sterilize it for reuse.

*Please note that we do not guarantee the efficacy of the visors nor do we make any representation or warranty regarding the visor or any other PPE's ability to prevent the transmission of COVID-19 or any other virus, illness or ailment.*



#### CUSTOMIZABLE ▶

There is enough tension in the visor to ensure it fits most heads without additional tightening, but there are loops where an extra band could be tied on if needed.

#### APPROVED ▶

Text was added to the file name for the item to help standardize the design, which was worked on by the Austin tech community and revised with clinician feedback. The most important part of home-making PPE is getting direction and approval from your local medical community!





**COGNITIVE TIMES:** Siemens does work across so many fields—from energy to industry to transportation—so how do you pitch partners on the value of artificial intelligence in cybersecurity?

**LEO SIMONOVICH:** We're helping to make AI simple and practical for the industrial context. In general, our customers—utilities, oil and gas companies—are skeptical of black boxes. They're looking for proven technologies that can last 20-plus years, for decades.

With that said, we're doing three things by integrating AI: first, we're making models applicable at an increasing efficiency. Second, we're doing assurance testing to make sure we do more good than harm. That is to say, availability and reliability and safety are of the utmost importance. So when you deploy a piece of technology that is new, we better be sure it's not going to trip a plant or, worse, cause a safety event.

And the third thing we're doing is demystifying the black box by providing insights about how AI enriches detection and protection capabilities. We're out there sharing, let's say, what SparkCognition's DeepArmor brings to the industrial environment. And the best way we do this with customers is by providing outcomes—outcomes around detection and outcomes around protection.

**CT:** COVID-19 has really upended all aspects of life, but that's especially true for industries like energy where things are suddenly decentralized for the first time. What are some of the new security concerns this operational shift has unearthed?

BY NATHAN MATTISE

## LEO SIMONOVICH

Siemens' cybersecurity lead on keeping the lights on in a newly decentralized world.

**IN THE ENERGY** sector, the stakes already felt sky-high when it came to cybersecurity. Unlike other fields where a bit of malware might simply tangle up the IT team, attacks here might cut off power for large swaths of the country. So Leo Simonovich, the Vice President and Global Head for Industrial Cyber and Digital Security at Siemens, had plenty to think about at the start of 2020—then, he tells *Cognitive Times*, the COVID-19 pandemic complicated everything.



---

“In general, our customers—utilities, oil and gas companies—are skeptical of black boxes. They’re looking for proven technologies that can last 20-plus years, for decades.”

**LS:** We’ve seen a fundamental change, a transformation, in both the way people are working and also in the attack surface and security models we need to protect this new environment. We call it “plant-to-couch.”

As our customers transition their field personnel—the people running plants—into a home environment and only keep critical staff on board to maintain assets, the operational technology/information technology divide—the demilitarized zone of sorts—is being crossed in real time as employees connect to power plants to monitor and control. This has widened the attack surface.

This fundamental shift requires new security models and a new approach. There are two big problems we see: one is as power plants see a shortage of personnel that can maintain these assets—people who can do support patching, malware protection, whitelisting—and maintain the hygiene of these plants. They’re forgoing that in favor of [staff who can maintain] basics like providing power supply and keeping the lights on.

The other problem is there are fewer eyes on screens, and as those eyes are distributed and decentralized, there’s an increased need for monitoring. We see AI and machine learning having a key role to play in addressing both of these challenges. There’s now more complexity to detection. If you’re not maintaining these assets, you need a backstop that can help you detect anomalies and also provide protection in case you cannot patch and close vulnerabilities.

**CT:** What are some best organizational security practices you’ve developed recently that might be applicable to other organizations?

**LS:** My best tip is to keep cybersecurity front and center. Safety and availability are clearly paramount [in the energy field]; you have to keep the lights on. But cybersecurity is also an important risk that needs to be addressed.

[The priority is] establishing connectivity and maintaining these assets and their uptime; cybersecurity is something that follows this scramble. So keep security top of mind. Second, have a clear map of the connections that you’re establishing. Track them. That will allow you to have a better understanding of your attack surface. Third, utilize these connections not just to service, but also to do things like monitoring.

When workflows change and people are sitting at home, they’re often going to have their home laptops open at the same time. They may be plugging in from their home machines. They may be using social media. We’ve seen a rise in employees


sharing their experience, and in doing that they might be sharing pictures of real-time production. That invites attackers and social engineering. This is where, again, AI can play an important role—it can triangulate between these different pieces of data to help paint the larger picture.

**CT:** Before this pandemic, we were already entering a new era of cybersecurity where you see attackers leveraging AI or black markets online that simplify the knowledge needed to utilize malware. What are some of the most prominent security challenges on your radar when COVID-19 concerns finally calm down?

**LS:** We really saw two challenges our customers were facing. One is the “Brown Challenge,” securing legacy assets that have been around a long time that have open architectures and digital was bolted on top for increased connectivity. The other is focusing on digital-native technologies, a lot of which are associated with renewables and more efficient energy technology.

At the core of both focuses is the idea that we need to solve the visibility challenge. By providing detection and context, we are then able to empower our customers to take action. In Brownfield environments in particular, there are a lot of legacy assets that cannot be maintained using the traditional life cycle and hygiene measures. Take, for example, a compressor station that transports either gas or petroleum—that compressor station will have a terminal that has not been patched for three, five, eight years.

So we need a solution that can help us provide a backstop to patching to protect those assets until they’re decommissioned. This is where machine learning can really help—to help us detect the unknown, unusual activity for assets that cannot be patched.

We think that to do this well, to secure the Brownfield and secure this OT/IT convergence, you need to make AI practical. A lot of attackers are operating at machine speeds, so you need detection capabilities that can piece different pieces of the puzzle together quickly, at speeds that are frankly too much for the human mind. AI and machine learning can then play a role, because you need to understand not just the anomaly itself, but what assets are associated and where they are in the production process. You need to provide context and insight. The consequences are really high in the energy sector, so it’s important for us to bring together these technologies old and new to solve the challenges and meet that demand. 



INTERVIEW BY NATHAN MATTISE

# SPARKCOGNITION GOVERNMENT SYSTEMS™

## Industry

*Defense, intelligence, government services*

## Location

*Austin, Texas*

## General Manager

*Logan Jones*

## Board Members and Strategic Advisors

*Logan Jones, General John R. Allen, Secretary Lisa Disbrow, Secretary Michèle Flournoy, Amir Husain, Admiral John M. Richardson, Secretary Robert O. Work*

## On the Need for a New AI-Powered Strategy

The age of AI is upon us. And that applies as much to global politics and warfare as it does to everything else. The United States has long enjoyed a position of asymmetric advantage relative to peer and rival nations, effectively serving as a conflict deterrent and securing America's position as a world leader. But as former Secretary of Defense Jim Mattis wrote in his 2018 National Defense Strategy, "America's military has no preordained right to victory on the battlefield."

Among the many disruptive forces at work in defense and intelligence today, AI stands apart. But while innovation-driven sectors such as biotechnology and finance have embraced AI, the national security community has been slower to adopt it. At the same time, nations with committed AI investment programs, such as Russia and China, are investing billions of dollars in research and acquisition. In doing so, they

hope to give themselves the lead in logistics optimization, intelligence processing, combat systems, and other defense applications, creating their own asymmetric advantage that threatens to outpace that of the US.

Yet novel uses of proven AI systems can ensure American and allied forces retain a distinctive advantage, even when confronting peer threats whose own investments in AI and autonomous systems rival those of America's.

As the global competition for AI supremacy ramps up, and the COVID-19 crisis continues to rage, now more than ever our nation cannot afford to stop innovating. We will need new ideas and technology to continue to defend and support the country in the cognitive age.

## On SGS, Its Founding, and Its Mission


SparkCognition Government Services™ (SGS) is a new entity that was created in direct response to this issue. Its parent company, SparkCognition, has spent the past few years working closely with defense and national security clients, but there was still more that could be done to address the unique needs of this sector at such a critical juncture in time. Thus, SGS was born. Its goal is to evolve SparkCognition's innovative commercial systems and tailor them specifically for the government sector.

SGS is the first full-spectrum artificial intelligence company devoted entirely to improving critical functions of the government and national defense. By applying next-generation AI-powered systems, SGS enables government organizations to

address their most pressing national security missions. Using technologies built in the United States, SGS advances government operations by analyzing complex data to inform intelligent decisions, applying predictive analytics to improve maintenance and safety, deploying autonomy technology for search and rescue missions, and more.

"Warfare of the future will be characterized by rapidly evolving technology, of which AI will perhaps be the most influential," said General John Allen, SGS Board Member. "The side with the greater capacity to understand the implications of these technologies, and to employ them effectively, safely, and in accordance with the law, will be the side that prevails."

"With next-generation AI-powered technology, SGS advances government operations by analyzing complex data to inform and accelerate intelligent decisions, applying predictive and prescriptive analytics to improve logistics, deploying autonomy technology for power projection systems, using natural language processing for large scale processing of unstructured data, and more," says Strategic Advisor to SGS, and Co-Founder of Co-Founder and Managing Partner of WestExec Advisors, Secretary Michèle Flournoy.

No matter the uncertainty we face, the defense of the nation never stops. In a post-COVID-19 world, SGS is dedicated to finding new and innovative solutions to national security in the age of artificial intelligence. For more information about SGS, visit [www.SparkCognitionGS.com](http://www.SparkCognitionGS.com). 



“The Sentient Machine is a must-read for anyone looking to understand how artificial intelligence is poised to transform human society and life. Husain is not only an engineer and entrepreneur, but also a philosopher who thinks deeply about what AI will mean for humanity. Husain’s optimistic outlook on the benefits of AI, grounded in an accessible description of this technology, is a welcome salve to many AI fears today.”

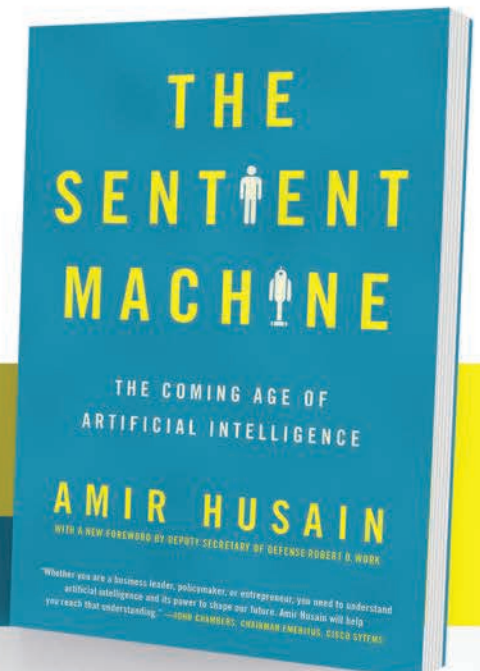
## PAUL SCHARRE

Director, Technology and National Security Program  
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# TENET

BY JAQUELINE TING QUESADA

# A TECH-SAVVY TO-DO LIST

## Internet of Things World



### IoT World Virtual

**AUGUST 11-13**

How are we all connected in this tech-driven world? This virtual event covers all things IoT: industrial applications, 5G connectivity, edge computing, smart mobility, and much more.



### Tenet

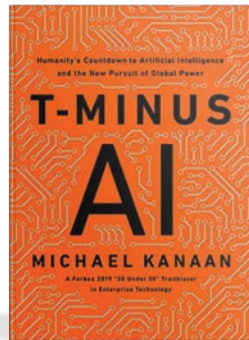
**AUGUST 12**

Christopher Nolan hits the big screen once again with his new thriller that revolves around international intelligence, machines, and time travel—all in hopes of preventing WWII.



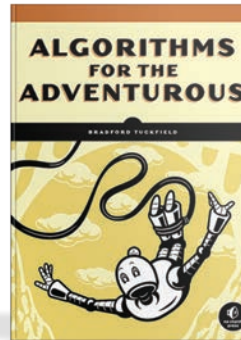
**AUGUST 25**

Michael Kanaan dives deep into the realities and capabilities of AI from a human perspective. You'll get a compelling overview of what you should know about AI, its global implications, and much more.



**AUGUST 25**

How about another good read? Bradford Tuckfield offers a fun, thorough, yet accessible introduction to algorithms to solve problems like those used in AI and machine learning.



### Amazon Prime Day

**SEPTEMBER**

Topping both Cyber Monday and Black Friday, this 48-hour shopping opportunity offers massive deals to Prime members, such as Echo Dots, Alexa devices, and tablets. Having sold more than 175 million items last year, this retail holiday is one to keep an eye on in September.



Image: businessinsider.com

### World Summit AI

**SEPTEMBER-NOVEMBER**

Featuring 10 online events, over 100 speakers, and brilliant minds representing over 160 countries, World Summit AI offers, well, world-class content online for three months straight!



Image: worldsummit.ai





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# Drone Defense

Will U.S. military defenses stop the latest unmanned threats?

**When a mysterious** flight of drones attacked two critical Saudi Aramco refining facilities last fall, it underscored that the shadowy fight against unmanned aircraft is not going well even for some of the world's best funded militaries. The consequential attack, which reportedly included more than two dozen drones and cruise missiles fired by Houthi rebels in nearby Yemen, flew right past Saudi Arabia's advanced U.S.-supplied air- and missile-defense networks.

Troubling on its own, the attack also signifies more troubling trends. On a macro scale, it's symptomatic of a growing list of near- and long-term threats emerging from globally proliferating technologies like drones. One day, this type of technology might be an invaluable tool capable of benefiting society. The next, it's turned into a potent tactical or even strategic weapon.

**BY AUGUST COLE**

But specifically, the Saudi Aramco attack is a harbinger for the escalating prominence of small drones on battlefields around the world—and a reminder of how difficult they are to defeat. For years, U.S. forces and their allies in Iraq and Syria have been under attack from relatively cheap quadcopter drones that drop grenades or are packed with explosives. But despite the pervasive threat, a clear defensive solution continues to elude U.S. officials. That has been the case during critical military operations such as the 2017 battle against Islamic State fighters for control of the Iraqi city of Mosul.

"It paralyzed the Iraqis as they were trying to retake the city because we had no answer—an absolutely asymmetric counter by the enemy underneath our air superiority," Gen. Tony Thomas (Ret.), former commander of U.S. Special Operations Command,

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“The Saudi Aramco attack is a harbinger of the escalating prominence of small drones on battlefields around the world—and a reminder of how difficult they are to defeat.”

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said during a talk at SparkCognition’s Time Machine 2019 conference in Austin, Texas. The Mosul campaign has been widely viewed as a precursor for the future of urban warfare and the role of ad hoc drone weaponry. Drones have certainly posed a range of problems since. Bomb-dropping commercially sourced drones have been used to devastating effect in Ukraine, and in 2018 a pair of drones were used in an attempted assassination in Caracas of Venezuelan president Nicolas Maduro.

The regional risk in Iraq and Syria in recent years from modified off-the-shelf quadcopters and their next generation of weapons is emblematic of the Defense Department’s worry about its facilities and personnel at home and deployed around the world. Despite the growing awareness of the battlefield dangers from weaponized small drones, the Pentagon is still trying to come up with a large-scale solution.

After meeting with commanders in the Middle East and Central Asia late last year, the Defense Department’s official in charge of weapons buying, Under Secretary of Defense for Acquisition and Sustainment Ellen Lord, made clear to reporters at a December briefing that countering unmanned systems was a “top priority for the Department.

“The one takeaway from all of my visits is that we need to continue to focus heavily on counter-UAS systems and strategies,” she said.

Spending is one way to measure the Pentagon’s priorities, though in this case funding would seem to be out of step with the potential consequences. For its next fiscal year starting in October, the Pentagon plans to spend roughly \$487 million on counter-drone systems, according to an April report from the Congressional Research Service, which offers lawmakers unbiased analysis. That could be on par with what is being spent in 2020, though it is less than half of the approximately \$1 billion budgeted in 2019. To be sure, tracking spending on myriad drone defense programs is no easy task, but as a matter of comparison, the Pentagon wants a budget of \$9.2 billion for the Missile Defense Agency in 2021.

Organizational focus is another way to gauge whether the Defense Department is going to lead or lag on drone defenses. A reorganized initiative puts a U.S. Army general at the head of the new Joint Counter Small Unmanned Aerial Systems Office, a move that

is designed to produce a much narrower list of programs so that there are prioritized weapons-buying initiatives. “My goal is to make sure we have three to five systems that are tailored to a series of different types of threats, and that we can get the economy of scale, of having a few best systems out there,” Lord told reporters. Under Secretary Lord added she wants to “get those systems into the warfighter’s hands as quickly as possible along, very importantly, with training and a logistics tail.”

During the last few years, counter-drone systems have used different technological approaches. Shoulder-fired jammers like DroneDefender developed by Battelle, which looks like an oversized rifle, have been deployed with U.S. forces. Others like the Marine Corps MADIS (Marine Air Defense Integrated System) have been mounted on small Polaris RZR-style all-terrain vehicles and large Navy ships to neutralize small drones. According to the Congressional Research Service, the U.S. Navy will be testing a pair of directed-energy weapons, including a laser and a “dazzler” to blind drone sensors, aboard the USS *Preble* next year. The Air Force is also fielding ground-based counter-drone directed-energy weapons.

How fast the new drone office can establish priorities and deliver on these systems remains to be seen. Nonetheless, speed is critical. At the same time as the Pentagon and its suppliers advance, irregular forces and terrorist groups continue to refine small drone tactics from harassment to high-consequence, as the Saudi Aramco attack demonstrated. And for missions like spying and gathering data—key tactics in the AI-driven warfare era—such ad hoc air forces could be as consequential in the information domain as they were when they debuted in Syria and Iraq crudely dropping grenades.

To be clear, how to effectively counter threatening drones is a worldwide question. Advanced militaries in countries like China are developing AI-powered swarms of small drones that will wield similar destructive capabilities as seen in Mosul, but at a scale of hundreds or even thousands of unmanned aircraft in the air at a time. Commercially accessible and open-source swarming algorithms are also proliferating. It’s a reminder that for all the focus on quadcopters, it is the code that powers them that will determine how dangerous the next generation of drones will be—and whether U.S. drone defenses will be ready to meet the threat. **TC**



# Science and the Shining City on the Hill

**The COVID-19 pandemic** is unlike anything we've experienced before. Not because it is, at least as yet, the worst crisis we've experienced. But because it affects each of us throughout the world, all at the same time. Some parts of the world were entirely removed from events like the World Wars or 9/11, but coronavirus is everywhere.

A crisis of this nature, precisely because it is unprecedented and shared by all parts of the globe in its impact, will bring forth a reckoning in its aftermath. People across the world will now see how the politicians, system, technologies and values of the United States did in contrast to those of Germany, the

**BY AMIR HUSAIN**

U.K., China and elsewhere. Is the U.S. still the leader? Do we have a science-minded government and society that is well positioned to deal with not only COVID-19, but also the general threat of fast-spreading future pandemics? Are we capable not only of controlling the crisis at home, but of reaching out to those nations of the world who do not have intrinsic capacity and are likely to be overwhelmed? Will the scientific breakthroughs come from the U.S. or from elsewhere?

So far, it does not appear that we in the U.S. have handled this crisis in anywhere near an exemplary manner. Our politicians continue trading barbs and the system has not proved itself to be

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“It is hard to argue that the U.S. was well-prepared going into this crisis. And much of this lack of preparedness has to do with a key, worrying trend: a rejection of science.”

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one that enables all sides to come together quickly in the greatest public interest. As Ed Yong, writing for *The Atlantic*, puts it, “Rich, strong, developed, America is supposed to be the readiest of nations. That illusion has been shattered. Despite months of advance warning as the virus spread in other countries, when America was finally tested by COVID-19, it failed.”

Why has it come to this? It is hard to argue that the U.S. was well-prepared going into this crisis. And much of this lack of preparedness has to do with a key, worrying trend: a rejection of science.

Not only is science at the heart of progress, but it alone can provide solutions to coronavirus and every other disease. Yet, in our country, science is under constant attack, specifically for its teachings to our children. Take the theory of evolution, which is described by our National Science Teaching Association as “a major unifying concept in science.” By September 2019, more than a dozen bills had been presented in several states to weaken the teaching of not only evolution but other “controversial” topics, topics that are science and evidence-based, but run counter to fringe dogma. The denial of widely agreed-on conclusions of climate scientists at the highest levels of our government is just one more example. In fact, this spring the *New York Times* reported on Indur Goklany, an administration official who “embarked on a campaign” to “insert misleading language about climate change... including debunked claims that increased CO2 in the atmosphere is beneficial.”

But attacking well-established science does not stop with these broader examples. Inexplicably, in 2018 the White House eliminated a pandemic response team whose entire purpose of existence was to provide critical capacity and coordination in a situation like the one we find ourselves in today. We hear our leaders often repeat, “But who could have known?” Science could have known and did know. But we continued to ignore those who warned us. In a now-famous TED talk delivered in 2015, Bill Gates highlighted the very real threat of an influenza-like pandemic—exactly what we are confronted with now. But government funding and actions were not consistent with building up our national capacity to respond to such a crisis.

By weakening science in our country, we strengthen superstition and conspiracy theories. Can we afford to allow the superstition

of anti-vaxxers to put society at risk and expose us to known and yet-unknown diseases? This is not how a country that has led the free world since the end of World War II prepares its children for the future.

One of the most problematic elements of our early response to COVID-19 has been the lack of testing in our country. The reason why has to do, at least in part, with our desire to shun cooperation and go it alone. The World Health Organization (WHO) had already developed test protocols for coronavirus and shipped tests to 60 countries by the end of February. Yet a sufficient number of tests are not available in the U.S. even today. Why didn’t we have these tests? Politico interviewed dozens of viral-disease experts and concluded, “Why the United States declined to use the WHO test, even temporarily as a bridge until the Centers for Disease Control and Prevention could produce its own test, remains a perplexing question and the key to the Trump administration’s failure to provide enough tests to identify the coronavirus infections before they could be passed on.”

Perplexing indeed. Or, perhaps it’s part of our increasing unilateralist tendencies that have resulted in the United States refusing to ratify the Kyoto Protocol, berating NATO allies, asking for financial support to base troops in the Middle East and many other such inexplicable positions that make us seem selfish and uninspiring.

As we grapple with these issues and wonder why things stand where they do, we must also realize that people all over the world are watching and wondering what happened to the United States. The opinions they form now will determine how they see us tomorrow. As a leader, or as a nation that has lost its way.

In a post-coronavirus world, countries will need to rethink their systems of administration and organization. They will look for templates of concepts and techniques that are proven to work. They will look at the United States. They will look at China. With whom will they be impressed and whom will they seek to emulate? I continue to believe in and cherish our democracy, our freedoms and the science and engineering of generations past that allowed the United States to be what it is today. But we are squandering what we have. Leadership is not a birthright. It is a choice we must make every day. **TC**



# All in on AI

COVID-19 has created an unprecedented financial crisis for oil and gas; it's time for the industry to embrace AI in pursuit of a better bottom line.

**It's a scary** time to be in the oil and gas industry.

As over three billion people worldwide hunker down at home to help curb the spread of COVID-19, global oil demand has dropped by a third in mere months, with prices hitting a 20-year low. Meanwhile, the glut in crude oil supply is the largest in history, and experts estimate it will ultimately swell to over twice the previous high-water mark. All of this comes against the back-

**BY MARLA ROSNER**

drop of what is certain to be a massive global recession, as COVID-19 brings worldwide economic activity to a standstill.

The hard truth is that we are now in deeply troubled times for the oil and gas industry, and no one can say how long they will last or where the industry will be when the smoke clears. The situation the industry finds itself in now is unprecedented; Pulitzer Prize-winning oil historian Daniel Yergin has

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“McKinsey has found that by implementing predictive maintenance, operators across industries are typically able to reduce machine downtime by 30 to 50%, and increases machine life by 20 to 40%.”

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commented publicly that he “can’t think of any [oil market crash] that was in the context of a larger global epidemic.” Already some smaller oil and gas companies have shuttered, and massive layoffs have begun with more predicted ahead. Some in the industry have expressed fears that investors may never trust oil and gas in the same way again; others have begun to worry if that’s irrelevant—because this might be a death knell for the entire industry.

It is a bleak-looking picture. It’s clear that oil and gas operators are going to need to tighten their belts if they want to survive the coming months or even years, but many are unsure where to begin. In the aftermath of the downturn that began in 2014, triggered by a substantial rise in supply from U.S. and Canadian shale oil and prolonged by geopolitical rivalries, many oil and gas companies have already been working to run leaner operations. Now, those same companies are unsure how to trim down further to keep themselves afloat.

But despite the fears many in the industry have expressed, the current situation isn’t so bleak. There are still ways to dramatically reduce excess costs and optimize operations, and it comes down to two areas of low-hanging fruit that artificial intelligence is ideal to address. Despite the progress the industry has made, many if not most oil and gas operators are still incurring unnecessary extra costs in unscheduled downtime and inefficient operations. Addressing these issues can provide dramatic benefits to a company’s bottom line—enough for a business to stay afloat even through the hard times ahead.

### **Predictive Maintenance**

One of the biggest sources of this lost revenue, and a major driver of extra costs, is unscheduled downtime. A critical asset failure on an offshore production platform can wind up costing a company \$3 million in a single day. But too many companies still rely on outdated methods for maintenance, leaving them spending more money than necessary on maintenance paradigms that leave their operations vulnerable to unexpected failures.

AI-powered predictive maintenance is the best way to keep your assets up, running, and producing. In this approach, machine learning algorithms ingest sensor data from critical assets and analyze it, uncovering the patterns that indicate an asset might be trending to

failure. This technology can then flag impending asset failure days or even weeks in advance, allowing operators to plan accordingly.

This isn’t just theoretical, either. McKinsey has found that by implementing predictive maintenance, operators across industries are typically able to reduce machine downtime by 30 to 50%, and increases machine life by 20 to 40%. In short, predictive maintenance is vastly more effective at preventing expensive failures and breakdowns than its scheduled or reactive counterparts.

### **Operational Efficiency**

Another way for oil and gas operators to cut back on costs is by better optimizing their operations. Research by McKinsey & Company has found that offshore platforms only realize an average of 77 percent of their full production potential. Each year, the industry loses a whopping \$200 billion to operational inefficiencies.

This is in large part because of the sheer amount of variables and data involved in oil and gas production. Detecting inefficiencies requires analyzing and understanding heaps of data, and it’s more than any human analyst can make sense of.

Here, again, AI can change the game. AI is specifically designed for analyzing large amounts of data and complex variable interactions. In this case, machine learning models can be used to forecast production rates based on both historical and real-time data. More powerfully still, machine learning is able to evaluate control variables in drilling operations, identify the parameters that are driving performance, and use this knowledge to make recommendations to operators on what variables to tweak to optimize production.

None of these are theoretical applications—many leaders in the oil and gas space were leveraging AI capabilities in all the ways described above even before the current crisis.

It’s still unclear how the industry—and the globe—will change in the days, weeks, and months to come. Not all companies will make it out of the current pandemic. But the current outlook doesn’t have to be as scary as it seems. By making smart, thoughtful investments, oil and gas companies can future-proof their operations and stay standing through whatever comes. The necessary tools already exist; it’s only a matter of operating more (artificial) intelligently. **TC**



# Autonomous On-demand

Are You Ready For Autonomous Last-Mile Delivery Vehicles?

**Consumer expectations seem** to accelerate at the same pace as technological innovation. Convenience, one of the key dimensions of product quality, is at the heart of this trend, especially in the transportation sector. The development and mass production of autonomous vehicles is almost always at the top of everyone’s mind. Five years ago, *The Guardian* claimed we would be “permanent backseat drivers” by now. Just imagine Marty McFly’s (from the movie *Back to the Future*) immense disappointment upon discovering 2020’s current state.

But many technological advances later, consumers are already thinking about another form of convenience: last-mile delivery. Unfortunately, that’s where many businesses fall short. According to a survey commissioned by Convey Inc., 96 percent of respondents considered customer experience important when measuring

last-mile supply chain performance. And yet only 5 percent of companies said their current systems “fully support efforts to improve the customer experience.”

If those numbers don’t provoke a fundamental shift in how companies approach last-mile delivery, they risk tarnishing their brands, and cleaning up their reputations will be a long and expensive process. Speedy fulfillment, doorstep satisfaction, and low-to-no-cost shipping are the hallmarks of a successful customer experience.

## The Convenience and Cost Reduction Game

Not having to leave your house to pick up groceries, electronics, and countless other products was one of 2020’s ultimate conveniences. And at this point, given COVID-19’s untimely grip

**BY EVAN SAKRISON**



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on the world, it's practically a necessity, causing a spike in local delivery demand. But even before the current pandemic, delivery services were wildly popular. Just a few taps in your favorite mobile app, and you can be on your front doorstep unboxing your order in as little as two hours.

That's great for the customer, assuming their package was delivered safely and on time. Retailers, restaurants, and pharmacies, on the other hand, are shouldering almost all the risks and costs associated with delivering goods. For costs alone, last-mile accounts for 50 percent or more of total package delivery costs. Luckily, autonomous delivery vehicles, while still in their infancy, will bridge the gap between cost and convenience while benefiting both customers and businesses. According to MarketsAndMarkets, the current cost for each last-mile delivery is \$1.60 via human drivers—and that could be scaled down to a mere \$0.06 by utilizing autonomous delivery robots.

### On the Ground

ResearchAndMarkets reported that the global autonomous last-mile delivery market is expected to explode from a value of \$11.13 billion in 2021 to \$75.65 billion by 2030, nearly a 7x increase. Depending on where you live, you may have already noticed an aerial drone, lightweight robots, or self-driving vehicles lugging packages around on public roads and sidewalks—largely in pilot phases, of course.

If you happen to live in Scottsdale, Arizona, or Houston, Texas, you may have spotted a fleet of self-driving Toyota Priuses on your street within the past year or two. You may have noticed smaller, more compact, futuristic delivery vans sharing the road with you as well. Nuro, a well-funded robotics startup in Mountain View, California, founded by two ex-Google engineers, is at the helm of this project.

Their unmanned delivery vehicles are equipped with thermal imaging cameras, long and-short wave LiDAR sensors, and a host of other sophisticated technologies to maintain a 360-degree view of the road at all times. Most importantly, they strictly follow traffic laws and top out at 25 mph, so you won't catch them zooming across Interstate 10 on their way to a customer's house. Instead, they stick to the suburbs, roaming around residential streets, mapping the city, and laying the groundwork for future delivery services.

Nuro partnered with Kroger to deliver groceries in the Houston area early last year, and the company recently announced they would be partnering with Walmart to provide similar delivery services to Walmart customers. Interestingly, back in February, the National Highway Traffic Safety Administration (NHTSA) and the U.S. Department of Transportation (DOT) granted Nuro the first federal exemption for a driverless car—a milestone for the industry. Its R2 car will not have to have rearview mirrors

or other features needed in human-operated vehicles to be on public roads.

Nuro is far from the only company in this space today, of course. Another major player is Udelv, a company leveraging Chinese search giant Baidu's open source Apollo platform for autonomous vehicles. Udelv debuted its autonomous Newton vehicle at CES 2019, and Walmart opted to partner with the company in a self-delivery trial program in Phoenix that spring.


And given the potential growth, smaller delivery startups have developed to offer more localized solutions. In some American campus communities from Tempe to D.C., a company called Starship has been autonomizing food delivery for fast food and local delivery restaurants through the use of a small cool-looking robot that navigates sidewalks. A similar enterprise called Kiwibot has been taking that same approach abroad, and it recently brought the company's tiny cube robots to the Bay Area to serve the UC Berkeley community.

### The Home Stretch

What's next in the world of ground delivery bots, self-driving trucks, and vans? McKinsey estimates that more than 25 billion packages will need to be delivered in the U.S. over the next 10 years. Cost-reduction potential, as well as the convenience factor, have a wealth of startups and tech juggernauts gaining traction in the autonomous last-mile delivery race.

As transport is considered one of the main pillars of modern economies, the big question revolves around not only how fast these systems are ready, but how quickly consumers will accept autonomous delivery vehicles on public roads. At present, according to a study from the Capgemini Research Institute, 59 percent of people surveyed feel a sense of anticipation about the future of self-driving vehicles. On the flip side, 48 percent feel a sense of fear and 46 percent associate self-driving vehicles with anxiety. These negative emotions are often tied to personally being in an autonomous vehicle and people trusting that it will keep them safe.

However, 49 percent of consumers would be comfortable with self-driving cars running an errand on their behalf without them in the car. Last-mile delivery may not only be a primary role for AI to inhabit within transportation, it could be the introduction much of the public needs to get on board with the idea of autonomous transportation at large.

Once autonomous vehicles are more widely accepted in the coming years, it will be interesting to see how attitudes shift and whether that changes the use cases these autonomous transportation companies focus on. But for now, it seems consumers are most accepting of autonomous delivery vehicles above all else—after all, who could hate pizza being contactlessly delivered to your door? 

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EVERY STARTUP  
NOW HAS THE  
SAME PROBLEM—  
COVID-19—AND  
THEY'RE APPLY-  
ING THEIR UNIQUE  
SPECIALTIES TO-  
WARD SOLUTIONS.



# ***PIVOT***

***LOW***

*BY MARLA ROSNER*

**THE IDEA DIDN'T** start with any one team member in particular.

“It was a few weeks before quarantine started, around when we were all realizing that coronavirus was really going to be a major crisis,” recalls Milton Lopez, the head of SparkCognition Labs. “So then a bunch of us on the team started independently thinking, what do we have at our disposal that we can leverage?”

What they had was AI algorithms, drones—and 3D printers.

Normally, Lopez leads a team of seven engineers who create physical prototypes for his company’s digital software. “SparkCognition is an AI software company, but to truly appreciate what software can do, you need to show it running,” he explains. “So we make some hardware—drones, robotics, and so on—that you can use the software on. It lets us test our software and also demo it and show what it looks like running, instead of just showing people a PowerPoint.”

They used to work in their own secluded room under the main staircase at SparkCognition’s Austin, Texas office building. Surrounded by the constant hum of robotics equipment, their work was punctuated by frequent group excursions to send drones on test flights. Now, like most of the world, they work from separate living rooms and garages connected only by Zoom screens.

Even so, the 3D printers Lopez and the team carted home are running night and day, as they iterate new ways to apply the technology and materials they have to the problems at hand: namely, COVID-19. So far, SparkCognition Labs’ easiest and most successful venture has been 3D printing personal protective equipment (PPE) to provide to local healthcare workers, who continue fighting on the front lines against the pandemic with rapidly diminishing supplies of face masks and shields.

“We went at this not from the angle of ‘let’s design the best face shield possible,’ but instead focused on what’s available now that we can start producing a lot of, and if we find out this isn’t as useful later on, that’s OK, but let’s not waste time,” says Lopez. “In the



**WE'RE ALL  
LOOKING AT  
WHAT PROBLEMS  
WE CAN SOLVE  
WITH THE  
TECHNOLOGY WE  
HAVE.**

*-Milton Lopez*

meantime, we were iterating on the design to see if we could solve some of the problems we identified while wearing the shield.”

According to Lopez, SparkCognition Labs’ current design was created to produce quickly and with as little material as possible. Right now, two shields can be printed in two hours and 41 minutes. The team’s goal is to produce 80 to 90 shields per day across their ten printers. Each mask requires 33.72 grams of filament; and since they’re designed to be disposable, any type of filament will do. As word of the Labs team’s efforts has spread, they’ve gotten some donations of more filament, and they have more on order as well. Still, materials continue to be a matter of uncertainty. Lopez estimates that there’s enough filament for three more weeks. “We’ll just have to figure out what supplies we need then,” he says.

Face shields aren’t the only COVID project the Labs

team has in the works. They've also been prototyping a ventilator of their own design, making use of all the tools at their disposal. Sometimes this means designing intelligent sensors for the ventilator using their parent company's AI analytics software. Other times, it's building physical parts out of skateboard wheels and windshield wipers scrounged from team members' garages.

The team has been toying with uses for their drone technology as well, be it delivering needed supplies or monitoring areas for fevers. Beyond Labs, other departments are also joining the effort; some are working on using natural language processing to help sort through and analyze medical documents, or even information being shared on social media. The IT team has donated compute resources to Folding@Home to help crowdsource research into COVID-19.

"Each organization is focusing on what their specialty is and how they can leverage that," says Lopez.

## A UNIVERSAL EFFORT

None of this is unique to SparkCognition, of course. COVID-19 is a global problem, and it has prompted an equally global response. Organizations and individuals everywhere have been stepping up to contribute, from medical professionals fighting directly against the pandemic to individuals using their time while housebound to hand-sew face masks for others trapped inside homes scattered across the world. This work happens under wildly different circumstances from people with wildly different tools and abilities, but one thing seems to unite us all: We want to help.

The tech industry is no exception. Almost all of the world's major tech companies have found a way—or even multiple ways—to contribute beyond monetary donations (though many have chipped in with hefty amounts of cash as well). Apple has donated 10 million masks to healthcare workers in the U.S. Google is working with the U.S. government to develop better education and resources on COVID-19, as well as using its DeepMind AI to contribute to research on the structure of the virus. Honeywell has pivoted to manufacturing N95 face masks.

But you don't need to be a Fortune 500 company, or have pockets deeper than the Marianas Trench, to help out. Tech startups across the world, of all sizes and from all different subsectors of the industry, are already proving that, by coming up with innovative ways to provide aid with the capabilities they already have. Across the pond, for instance, UK-based startup Zoe previously offered a customizable nutrition app. Now it's branched out, partnering with King's College in London to develop an app that tracks the spread of COVID-19 symptoms based on user self-reports. Taken together, this data is helping researchers track the spread of coronavirus and identify potential upcoming hot spots.

In some ways, it could be argued that smaller startups like this have an advantage over titans like Google or Apple: speed. Small, agile tech companies can ideate, iterate, and implement creative new ideas in a fraction of the time it would take at a larger business—even if it sometimes involves skateboard wheels.

## SMALL TECH, BIG IMPACT

In Austin a few miles from SparkCognition, fellow AI company Athena Security has also thrown itself into finding new ways to contribute during this crisis. Founded in 2017, Athena Security aims to prevent mass shootings and other violent crime by using artificial intelligence and thermal imaging to detect and flag concealed guns in public spaces. Now the company is repurposing this technology to identify coronavirus symptoms.

Many businesses and doctor's offices are trying to help protect their workers and clients by screening customers before they enter. Right now, that generally takes the form of an employee sitting at the door all day long to ask anyone who approaches if they've experienced any symptoms or been in contact with anyone who has—a somewhat risky strategy. By using the AI technology it already had, Athena Security has developed a new thermal camera for remote detection of fever temperatures, making it easier to keep workers out of harm's way. The camera is accurate within half a degree, and it will flag

anyone with a temperature over 99 degrees Fahrenheit.

In an interview with local Austin, Texas TV station KVUE, Athena's co-founder Christopher Ciabarra explained that he wanted to help put people's minds at ease. "A lot of people are going to be afraid to go outside after all of this, but having a system that will be able to tell if someone has a fever or not will help them go back into society and be comfortable sitting at restaurants again."

Mutual Mobile, another Austin-based company, hasn't been sitting idle either. A technology and innovation consultancy, the company brings its tech expertise and its network of like-minded clients to the table. It's been putting both to good use: In late March, Mutual Mobile put out the call to tech and medical professionals to join its newly founded Corona Coalition, which aims to pool talents within and across these industries and find new ways to fight back against COVID-19. In a press release, Mutual Mobile's chairman John Arrow stated: "We are calling on developers, product managers, designers, QA and medical professionals passionate about creating a technology solution to come together to support this effort. We are in critical need of backend support for scaling and medical/infectious disease experts that can help us build the most effective solution for the largest number of people."

So far, the Corona Coalition's main project has been CoronaTrace, an open-source app designed to notify users if they've been in proximity with someone who's been diagnosed with COVID-19. They're far from the only ones with this ambition, but their approach has been a bit different. "We are taking a GPS-based approach with a central spatio-temporal database that balances privacy, user experience, and time-to-market," says Mutual Mobile's founder, Tarun Nimmagadda. "We are freely sharing resources with other groups but think it is important for parallel efforts to take place that can possibly merge down the road once it becomes clear which approach is best for which scenario."

## A HELPING HAND FOR THE HARDEST HIT


There's certainly no shortage of tech companies working to find new ways to help track or prevent the spread of coronavirus. But the tech industry is nothing if not creative. COVID-19 has generated widespread economic unrest, and startups from all over are finding ways to pitch in on that front as well.

Zira was launched in San Francisco just last December, but that hasn't stopped the brand-new company from getting in on the action. Alongside its workforce automation platform, which helps streamline team scheduling and communication, Zira has now rolled out a free service called Bounce Back, an app designed to help the unemployed navigate coverage, healthcare, and job hunting.

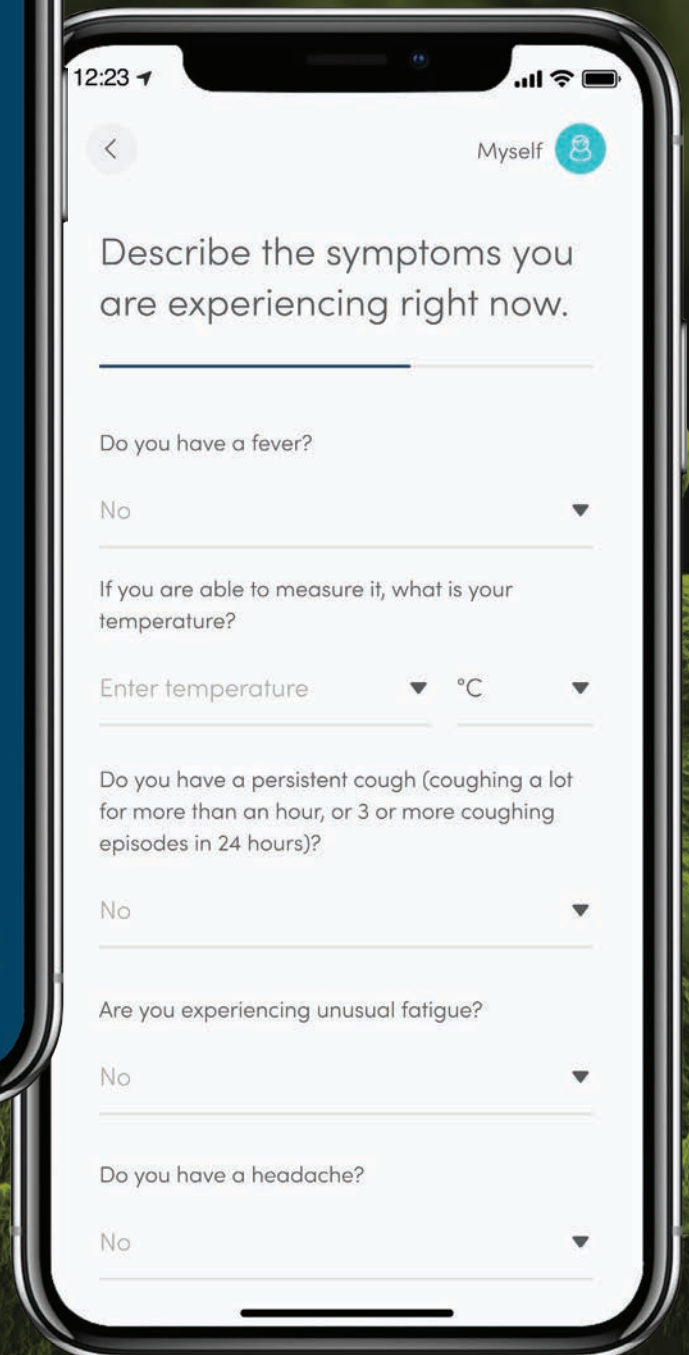
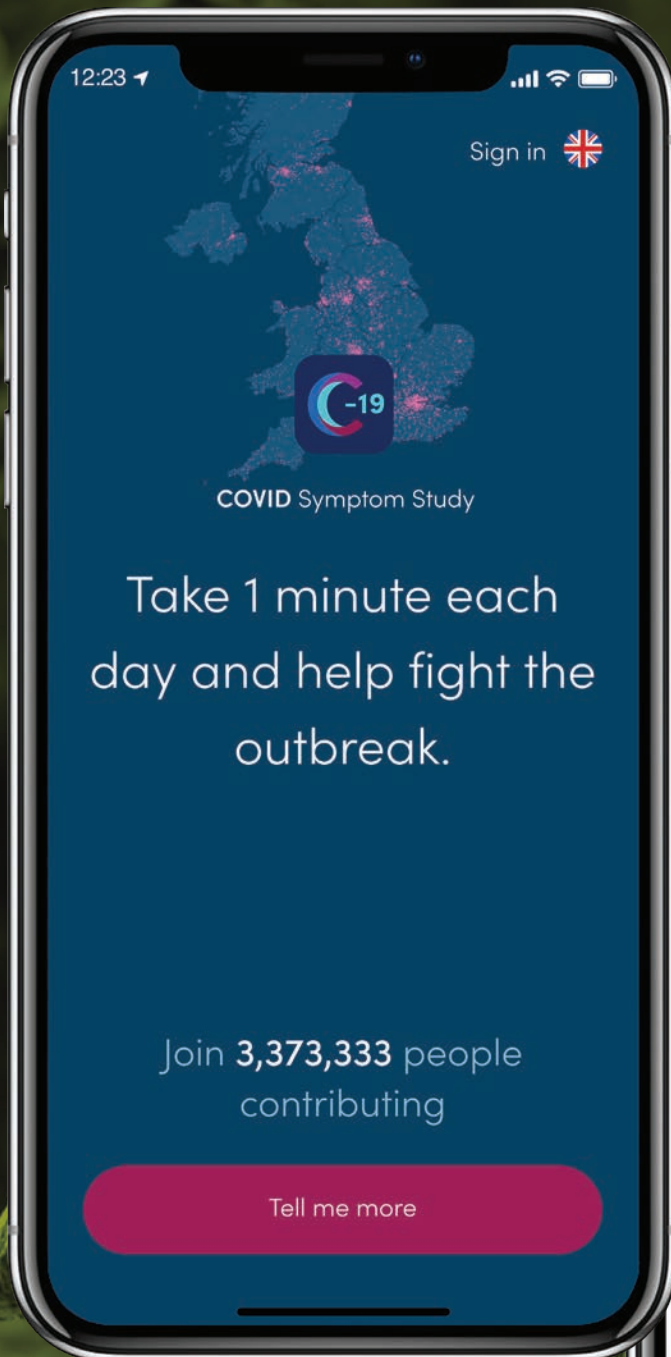
Meanwhile, My Menu, a startup that helps restaurants create digital tablet menus, has decided to offer up its underlying technology on a silver platter. In a time when many restaurants are struggling to survive, they can now freely use My Menu's tech to build better digital menus and improve their online footprint, making it easier to stay afloat during quarantine.

Virtually no one has been unaffected by this pandemic—which also means nearly everyone wants to find a way to help, whether they have a medical degree or not. For tech companies of all sizes and all prior focuses, the key to joining the fight against COVID-19 seems to be simple: just figure out how to apply the tools at hand.

"Working remotely has been different, but work like this is a matter of life or death. We're contributing in a small way, but it makes a life-saving difference, and that's what motivates us," says SparkCognition Labs' Lopez. "We're not doctors; we're doing the best we can and trying to be as efficient and fast as possible, because that's what we can contribute.


"We're all looking at what problems we can solve with the technology we have." 





**Coronavirus symptom  
identification App by  
Athena Security**





# BUILDS FOR YOU

## THE CITIES OF TOMORROW

BY: EVAN SAKRISON

**FINDING A PLACE** to call home matters. It's human nature to want a place where you feel like you belong, although you'd be hard-pressed to find one city today that checks off all the boxes—no place is perfect. Yet no matter where we choose to plant our roots, place has a way of shaping our identities. And in turn we, along with our neighbors, collectively define our city's identity. Hopefully, the result is a livable environment that works for everyone.

Roughly 55 percent of the world's population lives in urban areas today. By 2050, the global population is expected to skyrocket to 9 billion people, and the United Nations projects that 68 percent of the world population will live in urban areas. This level of urbanization has the potential to usher in a new era of economic growth and technological advancement, among other benefits. For now, however, it seems our cities have been built with vehicles in mind rather than the people who inhabit them. That means countries around the globe will need to figure out how to meet the changing needs of their growing urban populations despite having an existing infrastructure that may not be best-suited to the future.

Perhaps you've heard the term "smart cities" to describe these urban centers of the future. While that's seemingly a broad concept, the Smart Cities Council promotes three specific core values that it believes make up the foundation of future cities: livability, workability, and sustainability. From traffic flow and healthcare to affordable housing and public safety, today's advanced technology has the ability to address the council's core values to effect meaningful change. Here are just a few of the ways it can happen—all stemming from technologies already in limited use.

## ACCESS TO AFFORDABLE HOUSING

With nearly 7 in 10 people expected to live in urban areas by 2050, millions of new dwellings need to be built every year for the next 30 years to accommodate the huge influx of people. The accelerated need for affordable

housing is undeniable, yet real estate development is historically slow and costly, and has failed to improve significantly over the past several decades.

Today, several companies are utilizing artificial intelligence to tackle this complex real estate problem, including Miami-based tech startup Deepblocks, whose AI software uses algorithms to optimize and streamline the real estate development process.

"[Deepblocks] came about out of a deep frustration for how fragmented the real estate development process is," Olivia Ramos, founder and CEO of Deepblocks, tells *Cognitive Times*. She explains that everyone involved in the process—whether it's the architects, the brokers, the contractors, the lenders, or the developers—currently works with completely different datasets, meaning they typically fail to understand the totality of a project or the potential of a property. To combat this, Deepblocks' AI software mirrors Ramos' desire to learn the whole process from beginning to end, combining everything into one platform to streamline real estate development.

Where does Deepblocks come in? The software aims to completely streamline the initial analysis phase, a process that currently can take three to six months to phase out what projects you want to build due to disparate data on potential costs and revenue. Deepblocks wants to compress the process and deliver information in an instant. "The more we can optimize that process, the lower we can make those ultimate rents," says Ramos. "[Currently,] the problem with affordability is that it's too costly to create a project in the first place. In the end,

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there are such little returns that no one's really incentivized to build it. In a lot of cities, only projects that build a certain amount of units are actually incentivized with tax benefits. So smaller affordable projects are almost impossible to get done.

"So, instead of depending on subsidies or tax benefits," Ramos says "there is a future where the building itself can be so much cheaper to build that you can afford to bring down the rents and still make a good return." As more and more companies use this kind of technology on the development side, Deepblocks believes it will invite healthy competition to meet the demand for lower rent.

Beyond merely identifying projects where revenue potential can overlap with affordable living, there's that whole issue of physically building spaces. Here, the use of 3D printing technology is a solution that's been proposed to solve the housing affordability crisis. For example: ICON, an advanced construction technologies company based in Austin, Texas, uses 3D printing to build homes on-site that are more affordable and energy-efficient than current homes of comparable size at a fraction of the cost.

"There are a lot of roadblocks to accessing affordable housing, but the biggest culprits are supply, construction costs, and fees," says ICON co-founder Evan Loomis. He says the United States needs over 9 million new homes to meet current demand, however, "there's been very little innovation in housing for the past 1,000 years. We've basically been doing it the same way one stick and brick at a time. Technology has unlocked

tremendous benefits for every other industry, and it's time for us to use technology to help us build more beautiful, affordable, and resilient homes at a fraction of the time."

Loomis references a recent report from McKinsey & Company stating that construction is the only industry over the past 50 years to have lost productivity gains, thus driving up costs. Speaking to fees, Loomis says, "In many parts of the U.S., regulation is bloated to the point where 'fees' make up 15 to 20 percent of the cost of a house. That's incredibly high on a dollar basis and punishes lower-income earners the most."

Since its founding, ICON has made waves across the United States and Mexico as they address each roadblock with their 3D-printing technology. In 2018, ICON printed a 350-square-foot home in East Austin for just \$10,000 in 24 hours. Less than two years later, the company delivered a cluster of 3D-printed homes in Northeast Austin's Community First! Village to provide shelter to some members of the city's growing homeless population. With its Vulcan II 3D printer, which utilizes robotics and automated material handling, the company's goal is to cut home-building costs by 30 to 50 percent. Of course, this means rent would significantly decrease.

"The housing of the future must be different than the housing of our past," as Loomis puts it. "We believe the future is automated and digital and this will be no different for the construction industry."

## INTELLIGENT CONNECTIVITY AND ENHANCED SAFETY

Physical infrastructure is just one

aspect of ideal future cities—they need to be designed to optimize modern information infrastructure, too. "The most important new fact about the human condition is that we are now suddenly connected," as Ethernet inventor Bob Metcalfe put it during the 2019 Time Machine AI and Future tech summit. Metcalfe said 57 percent of the world's population is now connected to the Internet, and there were already 8 billion "things" connected to the internet. By 2030, the Internet of Things will comprise more than 30 billion devices connected to the internet.

What does this mean for cities of the future and the people who inhabit them? It means trillions of sensors scattered across the city, collecting valuable data that can be used to optimize everything from bicycle routes and traffic congestion to public safety and environmental sustainability. The potential of the Internet of Things (IoT) is virtually limitless, especially with the ongoing development and expansion of 5G technology.

For some people, 5G means little more than downloading their favorite movies at lightning speed, but there are other eventual benefits to get excited about. Reliable connectivity and speed are the lifeblood of IoT and are needed to make sense of the oceans of data cities generate on an hourly basis. In the handful of countries that have launched 5G services, 5G can send data to and from as many as a million devices per square kilometer, compared to 100,000 devices per square kilometer using today's 4G networks.

In other words, the IoT behind modern cities will get a major boost from 5G-grade connectivity as more and more device sensors survey and react to the bustling cities around them.

Those sensors will increasingly power the improved urban mobility and safety essential to improving the quality of life of city-dwellers. For instance, Henry Ford's great-grandson Bill Ford believes that "the mobility model that we have today simply will not work tomorrow." He's held this notion for nearly a decade, and city planners and companies alike are working tirelessly to address this complex issue. According to a report from Accenture, applying smart city solutions like IoT and 5G technologies to the management of vehicle traffic and electrical grids could produce \$160 billion in benefits and savings through reductions in energy usage, traffic congestion, and fuel costs.

It's not just a financial move, of course. The National Safety Council estimates that 38,800 people died in car crashes in 2019, and roughly 4.4 million people were injured seriously enough to require medical attention. If IoT and 5G technologies combined ensure safer roads where cars communicate with each other and city infrastructure, it'll lead to a significantly safer driving experience in any city.

## MORE PUBLIC DESIGN PARTICIPATION AND UNDERSTANDING

Augmented and virtual reality possess that "cool" factor usually associated with gaming or social media. And with AR in particular, developers use existing environments out in the real world and create a playing field on top

of them. Think Pokemon Go and Snapchat filters, for instance. However, both augmented and virtual reality have the potential to make the leap from being a fun social experience to an advanced technology that improves city residents' lives.


Believe it or not, buildings pose both cognitive benefits and risks to people's health and well-being depending on their design. Whether it's the layout of the space, the availability of natural lighting, or where a building is physically positioned within a city, well-designed architecture and urban planning determine the difference between a happy city-dweller and a stressed-out individual who wants to escape from their metropolis. Luckily, augmented and virtual reality essentially allow everyone impacted by and involved with city design to see how physical changes will impact a community and the surrounding environment—all before any paperwork is signed or bricks laid.

Right now, augmented and virtual reality help many urban planners visualize prospective projects to understand how they'll impact residents. But if we're focusing on designing cities of the future with people in mind, people should also have a say in what's getting built, where it's getting built, and what it means for the city overall. Today, augmented and virtual reality also aid public participation in urban planning by allowing citizens to see 3D virtual representations of proposed buildings visualized on top of existing architecture instead of trying to decipher 2D design plans.

While this kind of public access is

already happening, it's still not widespread or common. Luckily, initiatives like Google Cardboard and its ilk are working towards bringing down the cost of VR access, and modern smartphones running both iOS and Android have increasingly enabled users to enjoy the benefits of AR. And as we move towards the city of the future—one where building happens with people in mind and cities exist in conjunction, not conflict, with nature—utilizing augmented and virtual reality to democratize design will be vital. Having more pervasive than tech will be, too.

Alongside other present-day tech like 3D-printing, artificial intelligence, and 5G connectivity, AR/VR is undoubtedly part of the tapestry of our future cities that happens to be available today. These tools and potential applications are only the beginning, of course. As we grow increasingly tech-dependent, more technically driven tools and unique solutions will inevitably surface. Put simply: Citizens have a lot to look forward to when it comes to finding a place to call home. And that place may look a lot different—an inclusive, interconnected city that works for everyone.

"There are a lot of things that we can learn from the natural cities that have been made by nature. Now we're using not only artificial intelligence, but also biomimicry to really understand how these things work and how we can generate buildings like that," says Deepblocks' Ramos. "That's something that if we have the opportunity to in the future, the goal would be to create buildings that are completely autonomous and that don't require any infrastructure to be a healthy operating system." 



# Artificial Intelligence

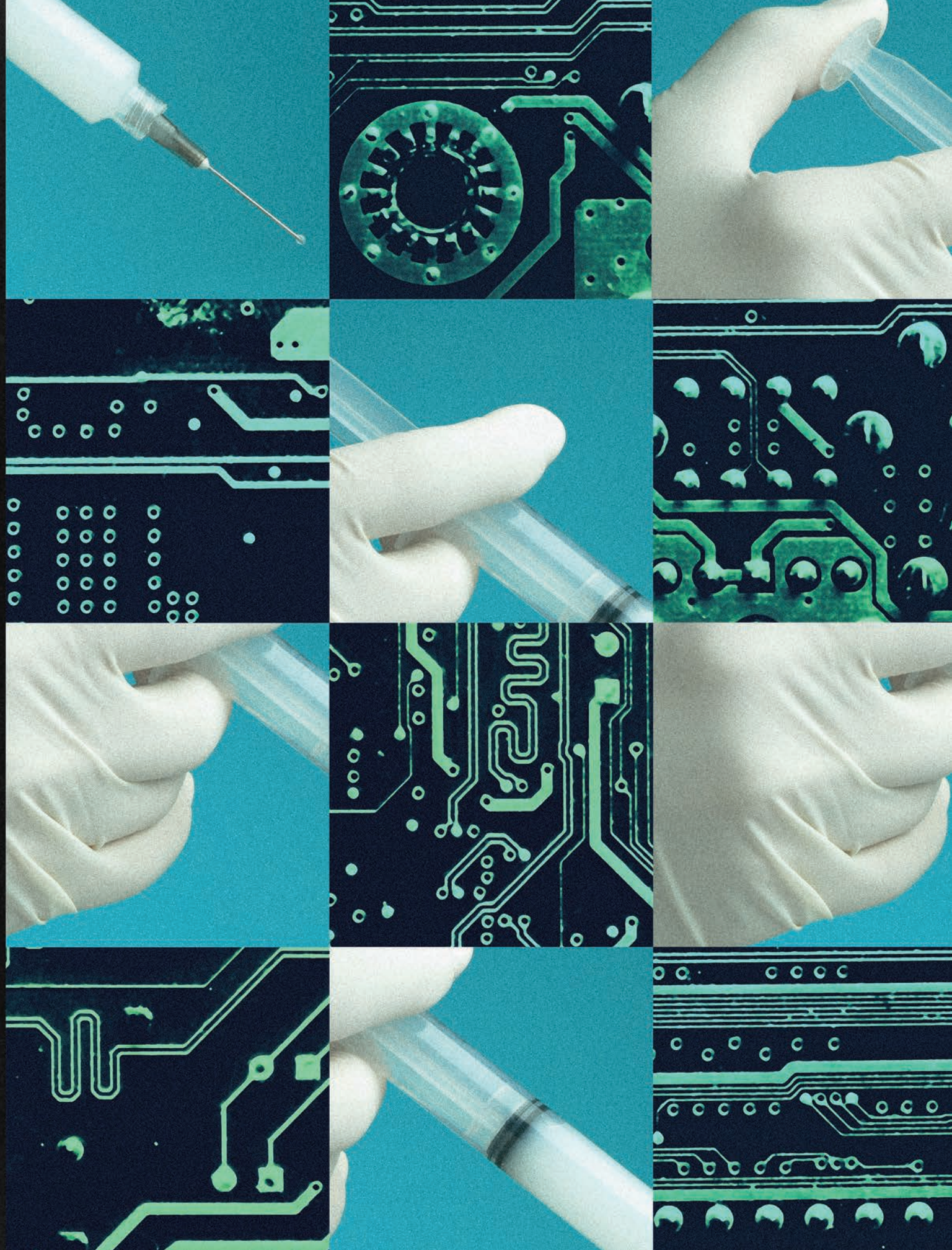
ARTIFICIAL INTELLIGENCE HAS ALREADY BEEN CRUCIAL FOR  
SOCIETY NAVIGATING COVID-19—BUT WE NEED TO UTILIZE AI  
EVEN FURTHER TO MINIMIZE THE NEXT PANDEMIC.

**vs.**

# The (Next) Pandemic

BY JOSEPH GUINTO





“AI HAS LIMITED ROLE IN CORONAVIRUS PANDEMIC.”

“‘BORING AI’ MAY BE THE REAL LIFE SAVER IN THIS PANDEMIC.”

“AI COULD HELP WITH THE NEXT PANDEMIC—BUT NOT WITH THIS ONE.”

“AI STEPS UP IN THE BATTLE AGAINST COVID-19.”

IN HEADLINES FROM CNBC TO THE BBC, EVERYONE SEEMS TO AGREE THAT ARTIFICIAL INTELLIGENCE SHOULD HAVE A ROLE TO PLAY IN TIMES OF A PANDEMIC—BUT CONSENSUS ON WHETHER IT’S AN EFFECTIVE TOOL IS ANOTHER STORY.

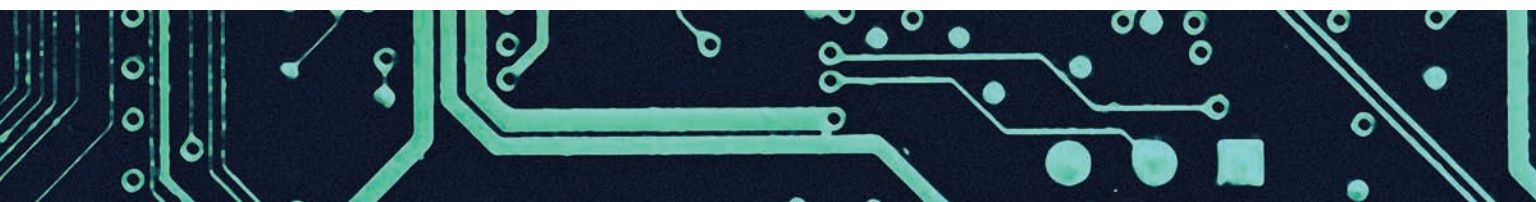
→ WHICH VIEW IS right? Maybe all of them. It’s true that AI healthcare tools did little to prevent the initial, rapid spread of COVID-19. But it’s also true that AI has been used to effectively respond to the crisis ever since. AI tools spotted the current outbreak and predicted its spread weeks before the World Health Organization (WHO) identified the novel coronavirus in Wuhan, China. AI-powered X-ray models repeatedly found success diagnosing patients with COVID-19. And more recently, AI companies were among the first to identify drugs that have, so far at least, been effective in treating the symptoms of this disease.

So whether or not AI ultimately leads directly to a breakthrough, this technology is one of society’s key tools for responding to our current crisis. It will be critical in helping the near-term fight against COVID-19—and in predicting and preparing for the next contagion down the road.

“It took what is hopefully a once-in-a-lifetime disaster to make us think about how we could have done things better, and the pandemic has proven that you need data and you

need it fast,” says Peter Pitts, president and co-founder of the Center for Medicine in the Public Interest and a former FDA associate commissioner during the George W. Bush administration. “That’s going to require public officials, industry technologists, public health experts from academia and elsewhere to realize that one of the failures in this crisis was the ability to predict. And what’s one of the best tools out there to help with the ability of prediction? Artificial intelligence. So, now, how can we get together to think about how to use AI better?”

Talking to industry analysts, technologists, health professionals, and AI-focused academics, the answer to Pitts’ question seems to boil down to four AI applications necessary for conquering the next COVID-19-like pandemic.



## SOUNDING THE EARLY ALARM

In retrospect, one of the earliest alarm bells about the emerging, novel coronavirus in China stemmed from AI—specifically, a Toronto AI company called BlueDot. The company’s Global Early Warning System spotted something unusual on December 31, 2019; two days later, similar alarms rang in the San Francisco headquarters of an AI firm called Metabiota. Both companies use these AI tools to scour the Internet for news reports and government releases that may indicate a potential public health crisis. Using natural language processing applications, both companies are constantly on the lookout for words like “coronavirus” or other terms that could indicate high-risk diseases.

Those simple AI applications allowed the firms to identify some kind of outbreak underway in Wuhan, China an entire week before the WHO reported “a cluster of pneumonia cases” in Wuhan and the preliminary determination, by Chinese scientists, of a novel coronavirus.

Of course, BlueDot and Metabiota’s tools didn’t stop analyzing data surrounding the disease upon identification. Both companies also use software that can track flights, including passenger counts, worldwide. BlueDot even tracks cell phone movement from one country to another. So as the WHO was warning of an unusual cluster of pneumonia cases in Wuhan on January 9, BlueDot already had analytics available showing thousands of potentially infected people had boarded flights out of Wuhan as well as data on where these passengers traveled and moved upon arrival. Such information helped the company predict that COVID-19 might soon follow in countries including South Korea—a place that did ultimately have an outbreak soon after Wuhan locked down.

Not a lot of people had heard of BlueDot or Metabiota at the beginning of 2020, but this AI

application is being taken very seriously now that the WHO and others warn that COVID-19 will not be the last viral outbreak of its kind. If AI can ultimately identify then pinpoint the potential spread of a new infectious disease, in theory cities can start to prepare for the public health consequences before a virus arrives.

That’s partially the hope behind a new AI tool developed by Stratifyd, a Charlotte AI firm that started out focused on bioterrorism tracking for the government. Called the Augmented Intelligence Platform, Stratifyd’s AI tools scan social media postings for widespread talk of illnesses then match that chatter with any official statements (i.e., those from public health organizations and governments) to spot problems disparate doctors may have communicated to each other.

“Our work,” says Stratifyd CEO Derek Wang, “is trying to understand how we can leverage news media and social media in different languages all around the world.”

The company crafted a baseline dataset that relies on identifying certain indicators of behavior based on keywords and what’s being discussed in multiple places online where there may be clusters of sick people. “Maybe you have a group of people in one center city that talk about shortness of breath, or fatigue,” Wang says. “You see that on day one. On day two, you see they’ve started feeling a lot of pain or you see them say, ‘I’m sweating like a pig.’ Those key terms and phrases automatically bubble out and tell you something is going on.”

If this AI system can prove successful at this pattern recognition, it’d give Stratifyd notice of groups of sick people potentially before—or at least in conjunction with—the time health-care workers in one region realize they have common patient problems. “We take this from a data-driven, AI-driven method,” Wang says. “That way we can match what’s being said to

**“IT TOOK WHAT IS HOPEFULLY A ONCE-IN-A LIFE-TIME DISASTER TO MAKE US THINK ABOUT HOW WE COULD HAVE DONE THINGS BETTER, AND THE PANDEMIC HAS PROVEN THAT YOU NEED DATA AND YOU NEED IT FAST.”**



what's being found in laboratory pathogen results and see how global transmission of certain pathogens may be happening—hopefully ahead of time.”

#### FINDING NEW PATHS TO TREATMENT AND RECOVERY

Optum is a pharmacy benefits manager and health services company based in Eden Prairie, Minnesota. The work may sound dense and, well, it is. The company uses AI to automate some of the “very, very unsexy, but also really complex” parts of the healthcare business, says Sanji Fernando, a senior vice president at Optum who heads up the company's AI and analytics teams. Since COVID-19 began spreading around the world, Fernando has also been putting Optum machines to work on finding solutions to the problem currently vexing most of the world.

COVID-19, unsurprisingly, has proven to be highly complex. “We don't know what the answer is to the pandemic,” Fernando says. “It is what you'd call in AI an ‘unsupervised problem.’ You can model the spread of the disease. But those models rely on prior assumptions, and in a changing landscape, your assumptions can change at a very rapid pace.”

The longer COVID-19 carries on, however, those assumptions give way to concrete data. And with the data coming in, Fernando says Optum has already found good news. The company believes it can use the information already collected about patients worldwide to build automated, AI-driven treatment models pertaining to future patients. The idea: By using AI to collect worldwide data on any measures that helped people recover from COVID-19, healthcare providers will then be able to create blueprints for successful treatment regimens. That kind of AI deployment could mean having effective, lifesaving treatment options that precede pharmaceutical treatments.

“I don't think we'll have to wait 18 months or two years for a vaccine,” Fernando says. “Given the way the dataset is growing, we might be able to train models now for use in the fall.”

Optum is far from the only organization leveraging AI in the hopes of identifying treatments that could save lives and minimize the health impact of COVID-19. Several researchers have already used machine learning to diagnose COVID-19's presence within seconds of digitally reviewing lung CT scans. Others have analyzed the ribonucleic acid sequence of COVID-19 in hopes of finding drug combinations that can treat the disease

ahead of a vaccine. And in mid-March, South Korea-based Deargen had an AI model specifically suggest the FDA-approved antiviral drug remdesivir could work in treatment—a month before Dr. Anthony Fauci shouted out a study on the drug as “quite good news.”

#### MAKING LOCKDOWNS AS EFFICIENT AS POSSIBLE

Most stories on AI's role in pandemic planning focus on the disease itself (identifying or treating it, for instance). But clearly a pandemic's impact goes beyond health. If COVID-19 lingers for years not months, AI could also be key in helping to keep workers on the job even as outbreaks persist around the country.

Tom Davenport, a professor of IT and management and AI expert at Babson College in Massachusetts, envisions machine-learning tools that could create risk profiles for individuals who might be exposed to the disease. Those profiles would match things like a person's age, current and past medical conditions, and health conditions of their household partners to all known risk factors for serious complications or death from COVID-19.

AI in essence could then produce millions of customized risk profiles for people, which could better inform companies weighing whether to reopen a physical space. And if the state of testing in the U.S. remains incomplete, a data-driven approach gauging risk might be the best resource society can hope for in a timely manner.

“We could then have some people distance themselves because they're highly likely to get a disease and other people keep working or keep dining in restaurants, and so on, because they are much less likely to become ill,” Davenport says. “You could combine that with the use of existing wearable devices that can alert you when you've come in contact with



someone else who has the disease. There'll be a huge amount of data in all that, so you absolutely need AI."

There's one big catch to using AI to leverage all that health data: Most health data in the U.S. and Europe is private. And for now, polls show that Americans like their health records being closely guarded. Still, Stratifyd CEO Wang believes that in crisis moments, many will choose to opt into apps or anything else that could help them stay healthy and informed about the spread of a potentially deadly virus.

"For our company," he says, "we don't need your name, we don't need your demographic information... we don't need your anything except what you voluntarily give. And for me, personally, right now, if you tell me my iPhone is going to tell me whether I have been in contact with another potential patient, I don't think I have any choice but to opt in."

#### AI FOR BETTER DATA, SO DATA CAN MAKE BETTER POLICY (AND AI)

The numbers were grim, but they weren't the same. On May 1st, CNBC reported that the WHO's data on COVID-19-related deaths in the U.S. had hit a record one-day high of 2,909 people. That same day, *The Washington Post*, which bases its count in part on data from Johns Hopkins University, reported 1,723 COVID-19 deaths.


That two estimates could be so far apart shows another pandemic challenge—there's a data problem that impacts public health when illnesses like SARS, Ebola, and COVID-19 spread. If AI tools are going to learn from vast amounts of public health data and start generating solutions to big problems, centralized and accessible datasets—lots of them—are important.

"We don't have a current data collection agency that the whole country can use and

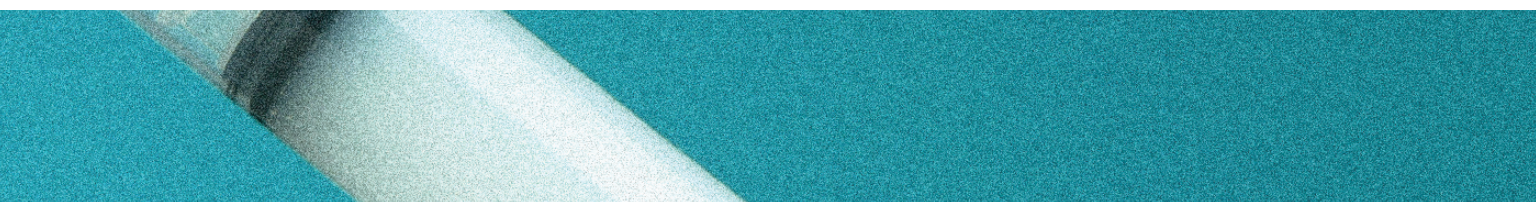
analyze the data from," Davenport says. "If you try and figure out how many tests there are in New York on a particular day, you'll get various different numbers. It would be nice if we had some sort of common countrywide approach to gathering data. The countries that have handled this crisis best—South Korea and Singapore and so on—do have that."

Some of this data discrepancy simply stems from the age of our core reporting systems. Partly out of understandable concerns for privacy, healthcare firms have for a long time kept medical records in ways that are now hard for AI tools to access. "Data is definitely a major limitation for AI," says Lian Jye Su, an analyst at ABI Research. "In the past, healthcare institutions utilized handwritten records. This is not useful when it comes to the training of machine learning-based AI."

Bridging such data gaps is likely to mostly be a matter of pushing policymakers and regulators at the federal levels to fund IT upgrades in critical industries and to consider changing rules that limit what can and can't be accessed. And the aftermath of a pandemic—when everyone will be looking for new solutions to head off some kind of recurrence—may be an excellent time for AI companies to lobby for this change in Washington.

"AI has to be a game changer because we're not becoming less connected globally, we're becoming more connected," says Peter Pitts, the former FDA associate commissioner during the Bush Administration. "Maybe there should be an AI caucus in Congress. Maybe a presidential task force on artificial intelligence and pandemics. Maybe a presidential AI czar. AI is what we need to be talking about now." 

**"I DON'T THINK WE'LL HAVE TO WAIT 18 MONTHS OR TWO YEARS FOR A VACCINE," FERNANDO SAYS. "GIVEN THE WAY THE DATA SET IS GROWING, WE MIGHT BE ABLE TO TRAIN MODELS NOW FOR USE IN THE FALL."**





# TURING TALK

BY COGNITIVE TIMES STAFF

We have a few questions for the world's chatbots, digital assistants, and other artificial users of natural language. Specifically, we have the questionnaire created by French TV host Bernard Pivot and popularized by James Lipton on *Inside the Actors Studio*. This issue's guest is Larry, one of the many virtual assistants being created this spring by state governments to help citizens trying to navigate various online resources like unemployment benefits or loan applications. Larry hails specifically from Texas, where everything is bigger—except, evidently, the chatbot's off-script capabilities.

**Cognitive Times:** Hi, Larry, what's your favorite word?

**Larry:** *Hi, how can I help you?*

**Cognitive Times:** Well, first I'd like to talk about your favorite word.

**Larry:** *To reach a customer service representative, you will need to call Unemployment Benefits Services Support. Our call centers are now open seven days a week, from 7 a.m. to 7 p.m. Central Time.*

**Cognitive Times:** All right. Let's try something else. What turns you on creatively, spiritually, or emotionally?

**Larry:** *I'm sorry to hear that you're frustrated. Your patience is greatly appreciated during this unprecedented time.*

**Cognitive Times:** So patience turns you on? What turns you off?

**Larry:** *Please select an option or*

*try rephrasing your question in a few short words and ask again.*

**Cognitive Times:** Hmm, OK. [Clicks "Trouble logging in"]

**Larry:** *I understand you are having login issues. What are you facing issues with?*

**Cognitive Times:** COVID-19, Larry. Like everyone.

**Larry:** *If you were impacted by COVID-19, you should indicate layoff and the reason as COVID-19 when filing your claim.*

**Cognitive Times:** What's your favorite curse word, Larry? COVID-19 brings to mind a few for me.

**Larry:** *You won't be penalized if you received notification that you needed to contact us and our high call volumes prevented you from getting through. If we need information from you, we will have someone contact you.*

**Cognitive Times:** I'd prefer if you answered me, Larry. What profession other than your own would you like to attempt?

**Larry:** *If you are working but your employer reduced your hours, you may be eligible for benefits. Your reduction in hours must not be the result of a disciplinary action or due to your request.*

**Cognitive Times:** This has certainly turned out to be more work than anticipated. Let's go to the closer: If Heaven exists, what would you like to hear God say when you arrive at the pearly gates?

**Larry:** *I understand you are having login issues. What are you facing issues with?*

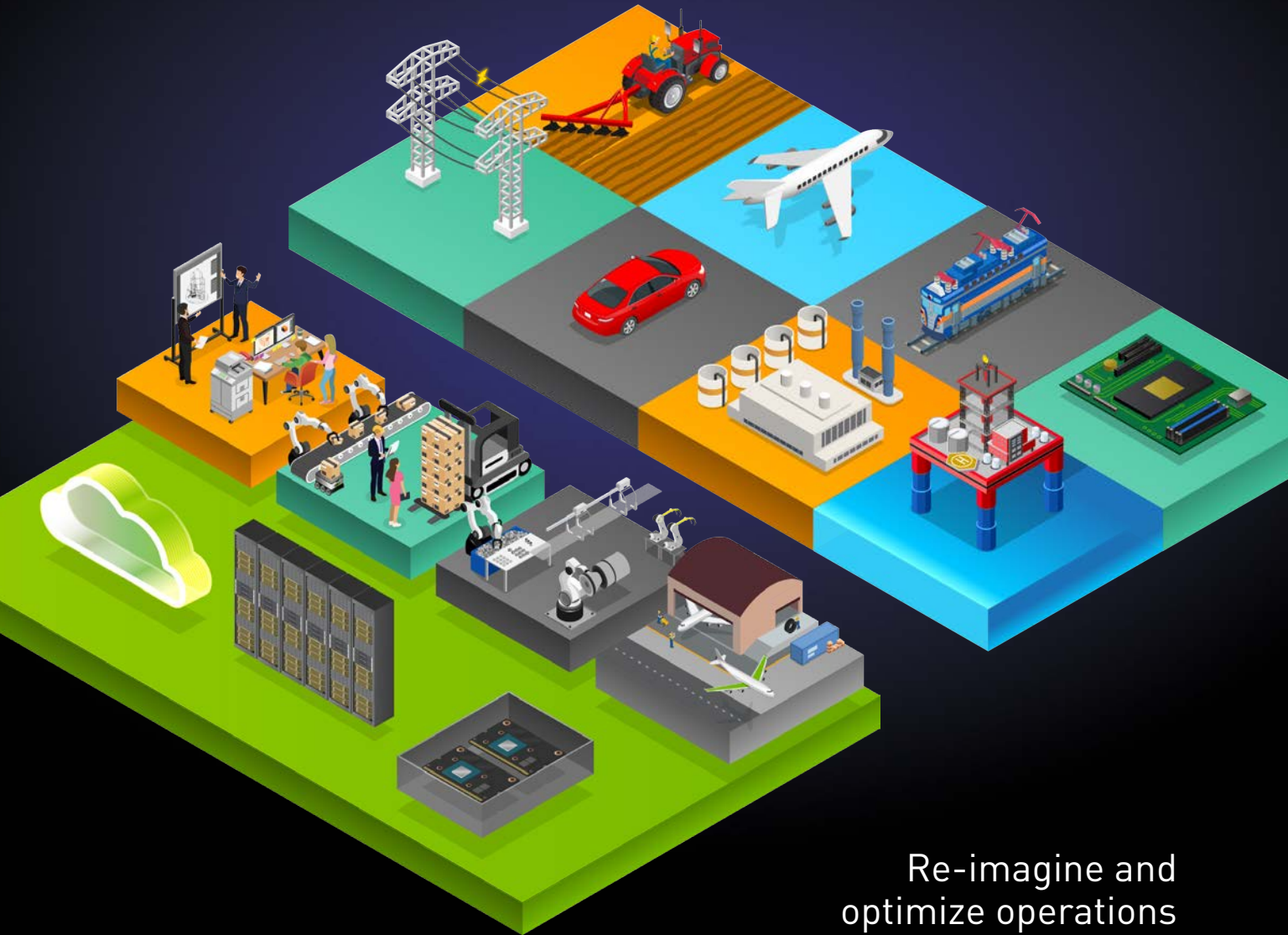
**Cognitive Times:** This is not about my password hygiene, Larry. Stay safe.



We support and appreciate all of our frontline workers during this challenging time. Thank you!



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