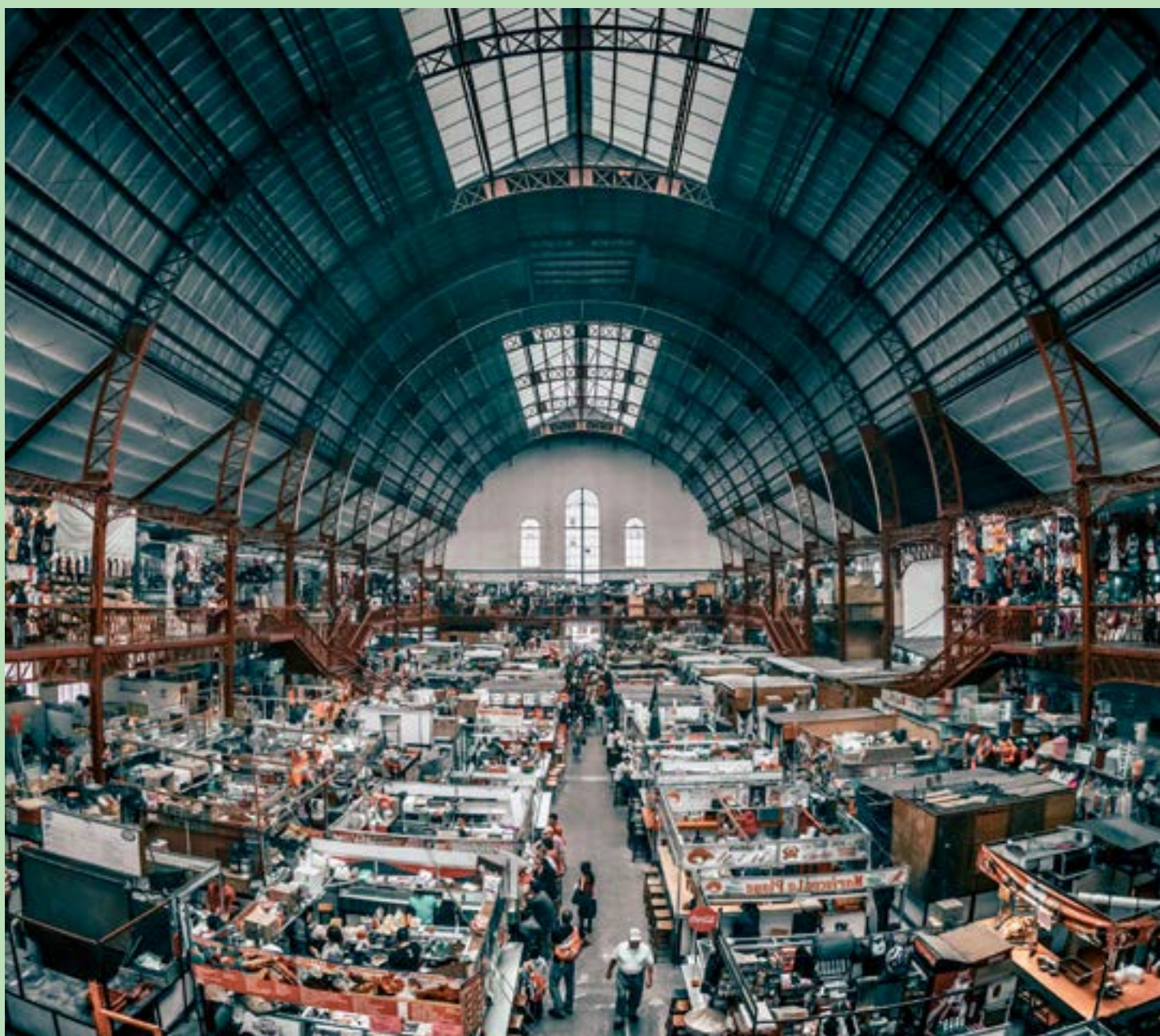


| Singapore Airlines | X-Force Cyber Range | Selectric Dancers | VW's Manual Cognitivo | STEM in India |



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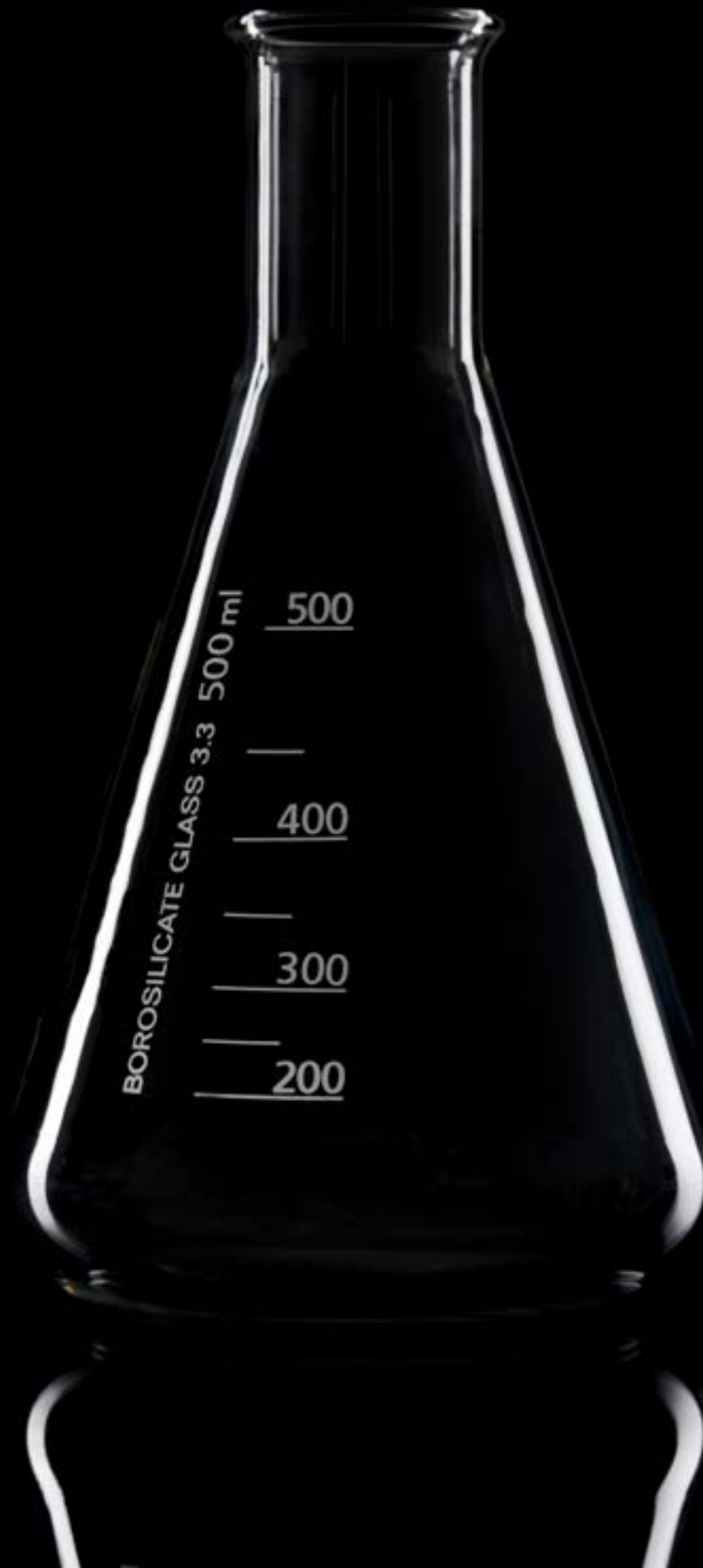
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In an age of exponential tech, we believe the industrious among us treat curiosity as a renewable resource. They are called to apply human determination and technological innovation to make a difference in the global community. Industrious magazine explores the stories that bring this credo to life.

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↑ Laboratory flask



Innovation. It's a word we say dozens of times a day, and in just as many contexts. But what's the practical application? What if we define innovation as openness? Openness to work together. Openness to try new approaches to business, and iterate on them. Openness, even, of trade borders and the transactions we can enable through new technology and the responsible flow of data. Recently, UniCredit partnered with IBM to shrink international commerce barriers by using blockchain and Hyper Ledger framework. The result? In their words: "A safe, pre-screened ecosystem for international trading." It's just one story of the many you will find in this issue that highlights forward-thinking in the international market. I hope you'll see yourself in these stories. With the right partners and the right tools, an open road with extraordinary possibility lies ahead.

– Martin Schroeter, Senior Vice President,
Global Markets, IBM



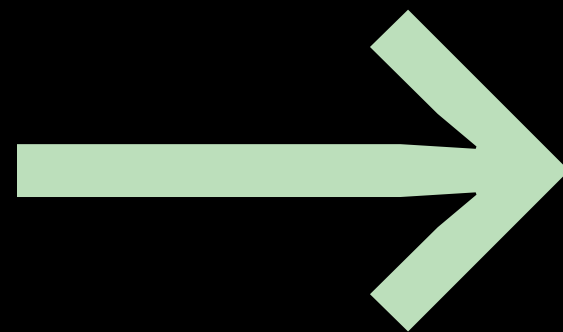
↑ Martin Schroeter

There is a phrase painted in bold letters on the wall at our headquarters: "Good design is good business." It's a quote from Thomas J. Watson, Jr. But it's far more than a platitude or corporate slogan. Good design—and especially the creativity it takes to envision it—is an ethos that we apply to nearly everything we do. Technology doesn't exist for its own sake. Creative thinking is the tandem element that brings it to life in extraordinary ways—even thousands of ways we've yet to think of. In a world riddled with uncertainty and volatile disruption, we have an opportunity, through creative thinking and technological excellence, to invent a path forward: from legacy plastics recycling to precision surgery to personalizing travel to bringing the world closer together. If good design is good business... perhaps creativity is just the element we need for great progress.

– Sharon T. Driscoll, CMO Industry Marketing
& VP Sales Enablement, IBM



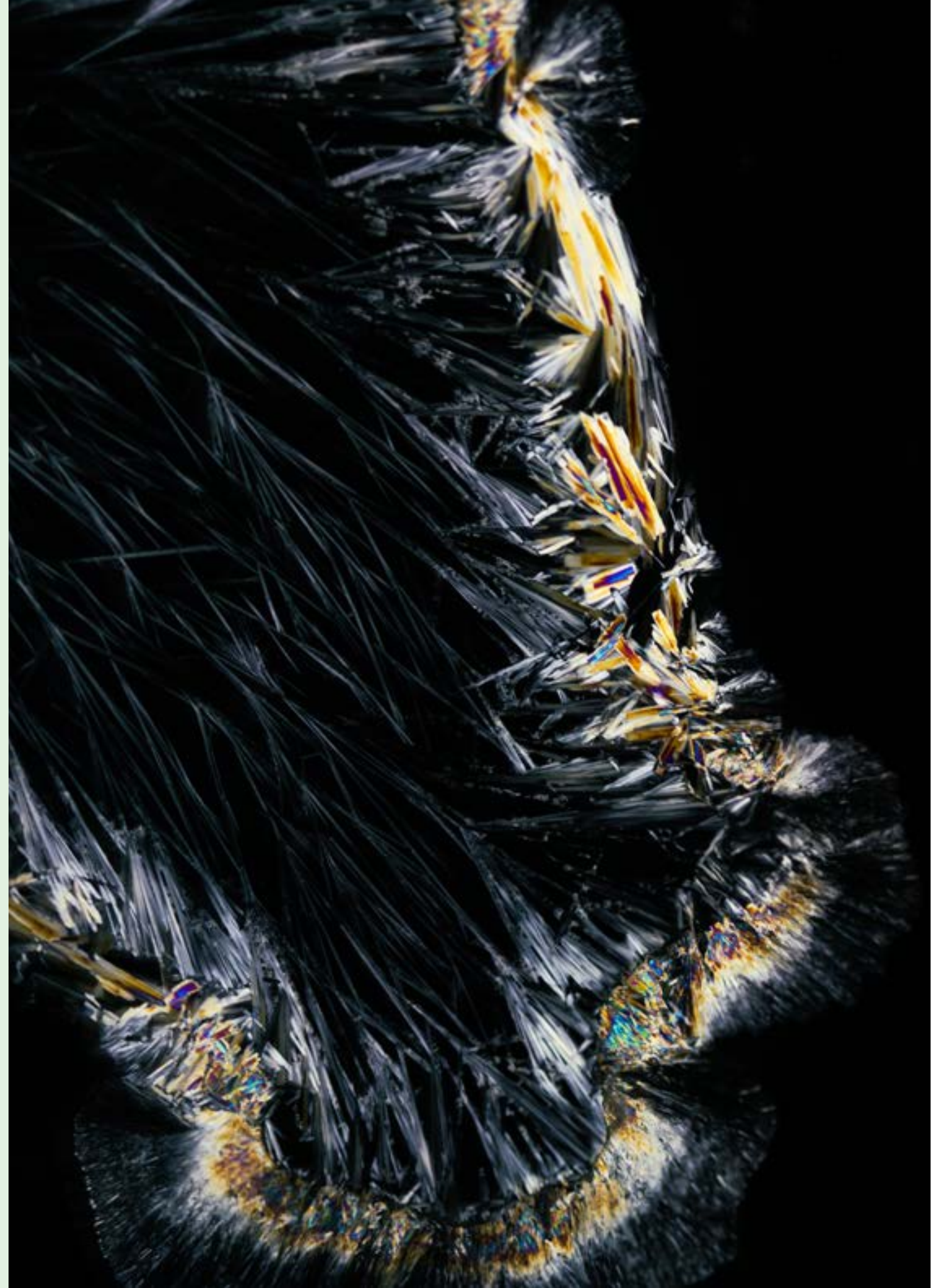
↑ Sharon T. Driscoll



IBM'S

Jeannette Garcia
is making the world
a better place
through chemistry

words: Justine Jablonska





“One of my interns left a stack of burned CDs in the lab,” Jeannette Garcia told *Industrious*. “I grabbed one of them and cut it into pieces and added a catalyst to break it down.”

She’d already performed a similar experiment with plastic water bottles. Garcia has been developing ways to break down commodity plastics since completing her PhD. Her goal: a new technology for recycling plastic waste.

Four years before Garcia joined IBM as a postdoc, the company initiated a water bottle recycling project around 2008. In 2013, she became a research staff member, and along with an IBM research team, she has since expanded and scaled her initial experiments into a new recycling process to transform old plastic.

Today, Garcia serves as the Global Lead for Quantum Applications in Quantum Chemistry and Science for IBM Research.

“Environmental issues have always been a passion for me,” she said. “The current ways we

“The exciting part now is that we’ve started to think about how to model molecules using quantum computers.”

— Jeannette Garcia

recycle are inefficient. The rates are less than ten percent in the US, and even worse in certain countries. Overall, it’s a massive problem.”

Garcia grew up in Seattle. Her mother was a passionate environmentalist and recycler.

“We did things a certain way,” she said, “and I thought this was what all people did.” Her mother collected rainwater to water plants with, and she taught the family the principles of conserving energy.

“We always recycled,” Garcia said. “I remember her sorting things out—she still does that. We had five different bins. Everything was rinsed before disposal.”

Garcia not only grew up with a set of beliefs about leaving the earth in a better condition than she found it—she saw it as something so valuable that she’s oriented her career around it. The first time she took chemistry was in college.



“I really liked it, I did really well. It still wasn’t The Thing,” she said.

But when she progressed onto organic chemistry, “that’s when all the lights went on.”

She loved it—and also found its visual nature and abstractions highly appealing.

Garcia’s professor would share chemical reactions with the class with one part erased. The students would have to fill in what was missing. For Garcia, this work felt highly relevant.

“You have this beautiful 3D structure of a molecule,” she said. “How do you make it? How do you take it apart?”

She started working in a lab and, once she got into research, didn’t want to stop. She went on to graduate school and then for her PhD. It’s there she began developing catalysts for chemical reactions.

At the time, IBM was working on a similar project, applying the same catalysts to breaking down water bottles. The potential to apply catalysts she was familiar with to recycling plastic is what initially drew her to IBM.

A new catalyst for the technology was announced in February 2019.

VolCat is a catalytic chemical process that can turn PET—a type of plastic used not just in water bottles but also food packaging and polyester clothing—into a renewable resource.

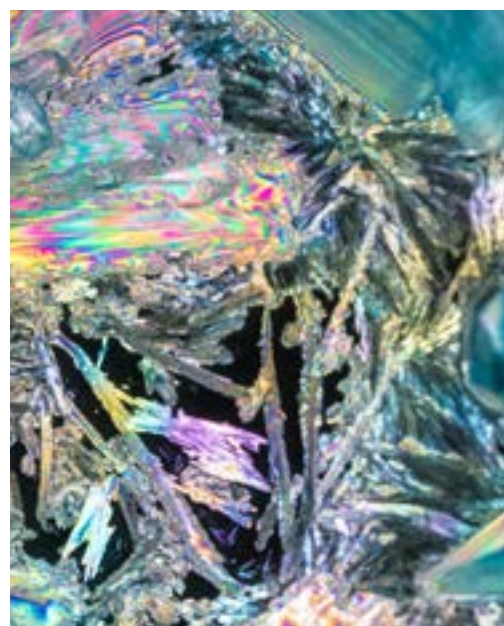
“The process involves putting one into a reactor that’s like an industrial scale pressure cooker. Before closing it, you put in a catalyst—the special sauce, we call it,” she said.

The cooker is sealed, and its contents heated, which selectively breaks down its components. Other plastics in the mix—like the bottle’s plastic cap, which is made out of different components—can be filtered out and recycled down the line.

“It could have implications for changing the way we deal with plastic waste,” Garcia said.

More than 300 million metric tons of plastic are produced annually around the globe, and about 10 percent is composed of PET. VolCat’s aim is to use chemicals, heat and pressure to reduce that amount.

The ultimate goal, Garcia said, is a fully closed loop: 100 percent efficient recycling,



↑ Chemical compound crystal under polarized light

➤ IBM Researcher Jeanette Garcia, PhD

which would in turn transform the way plastic is manufactured and discarded.

Today, Garcia’s job at IBM is unifying IBM Research’s work with quantum applications.

The experimental team at IBM Research works closely with computational scientists to develop catalysts and figure out how a reaction is occurring so that it can be harnessed.

“The exciting part now is that we’ve started to think about how to model molecules using quantum computers,” she said. And that’s very appealing on numerous levels.

“Quantum computers fundamentally act and behave differently,” she said. “Getting in at an early stage in research allows us to study new ways to model molecules.”

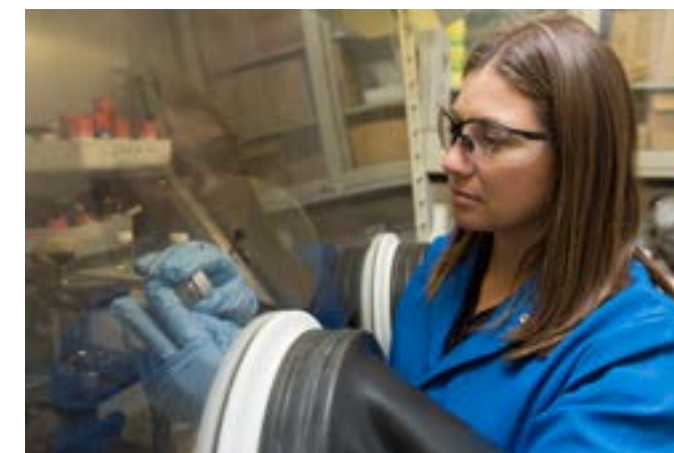
That ability could have enormous, long-term impacts.

“It would change the field of chemistry,” she said.

She’s also excited about how quantum computing is bringing different fields together, including chemists, engineers and computer scientists.

“That’s what I’m excited about currently,” she said. “I’m hoping we can apply that work perhaps to the problems of chemical recycling, but also more—to problems in many industries.”

Right now, the work is still in the earliest of stages. But though early days, Garcia has an intuition, “from a scientific standpoint,” that it will work.



Scientists have been classically simulating models for decades. Now, with the addition of quantum computers, Garcia and her teammates are using those classical simulations as benchmarks, and asking what processes quantum computers could take on.

Garcia spoke to Industrious from her office at the IBM Research lab in Almaden Valley, California. She sat in front of a white board filled with notations.

“This is how we model molecules using quantum computers,” she explained. “The chemical right there is called thalidomide, which has a notorious past.”

The drug was prescribed as a sedative and anti-morning sickness drug in the late 1950s in Germany. It caused numerous birth defects before its eventual ban in 1962.

“One of the reasons I use that molecule as an example is that it took us 50 years to completely understand why that happened,” she said. “50 years of theory, of experiments.”

In this current, early research stage, the team maps out molecules according to their orbitals directly onto qubits to simulate their chemistry.

“It’s so different,” Garcia said. “Things will come out of that we don’t even know yet. That’s what we’re exploring here.”



The Cognitive car comes to Copacabana

words: Matt A.V. Chaban

← Coastal highway in
Rio de Janeiro, Brazil

11

“Imagine you could turn on the car and just talk to the manual.” – Andréa Crespo

Last year, seeking to reclaim its position as Brazil’s biggest automaker, Volkswagen do Brasil, launched an entirely new sedan, the Virtus, designed specifically for Latin America’s largest car market. One of the biggest changes was not to the engine, the trunk or the paint job, though. It came to the glove compartment. Or what might better be described in Brazil as the bookcase.

Brazilian law requires all passenger vehicles to come with no fewer than six manuals, including functionality, maintenance, security, even one just for the radio. As VW do Brasil, a subsidiary arm of Volkswagen Group, rethought every aspect of their car, the designers began to wonder if there might be a way to bring the humble owner’s manual into the 21st century.

It may lack the flamethrower of KITT from Knight Rider, but the Virtus’ Manual Cognitivo is just as capable of saving the day when its driver is in a bind. Built on a Watson-powered smartphone platform, the Manual Cognitivo responds to more than 8,000 spoken commands covering 150 different vehicular situations. Drivers can also snap a photo of 22 different dashboard alerts, and the app can explain exactly what the issue is.

The days of mysterious “check-engine” warnings or reaching for the glove compartment for anything but gloves or napkins are coming to an end.

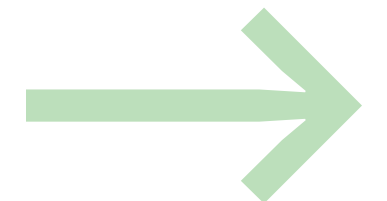
“Imagine you could turn on the car and just talk to the manual,” said Andréa Crespo, a data science and AI expert at IBM Brazil in São Paulo.

Volkswagen and IBM have a longstanding partnership, whether building e-commerce platforms or developing mobility solutions. When VW do Brasil needed to achieve reliable voice recognition for the Manual Cognitivo—something capable of responding whether the Virtus was parked in the garage, speeding down the highway or stuck on a mountain road—the Watson team at IBM iX was ready.



To improve owner experience and appeal to younger, tech-savvy buyers, VW do Brasil developed the app-based Manual Cognitivo.

↑ Photo: Volkswagen Group





➤ Octavio Frias de Oliveira
Bridge, São Paulo, Brazil

“We look at AI as perhaps the most critical element of our innovation leadership strategy in Brazil,” said Fabio Rabelo, the head of digital and new business models at Volkswagen do Brasil.

His team chose a phone-based app, so owners can address issues and get answers even when not in their vehicle. The system can integrate with the car through Apple’s Carplay, Android Auto or MirrorLink.

Creating a seamless system goes beyond being able to understand commands like “How do I check the tire pressure?” or “How do I fade the stereo to the front since the twins are napping in back?”

The app also has to be personalized, recognizing the owner’s name and voice, the model of the car, even details like the paint job and wheel package. And the Manual Cognitivo also had to understand Brazil’s various dialects and regionalisms, as well as being adapted to Spanish, to serve VW vehicles across Latin America.

Yet the biggest challenge was pace. Because the car was so new, its features, and any discussion of them, had to be kept secret until the last possible moment. This left the Watson team four months to develop its program, including only a month for testing.

Not being able to talk to an AI built for voice recognition is quite the challenge.

“It’s important to have the feedback,” Crespo said. “We needed people talking and people’s behavior, this is what makes the artificial intelligence smarter.”

Even so, the Watson system achieved 89 percent audio accuracy within this accelerated testing phase, and 90 percent on visual prompts.



↑ Photo: Volkswagen Group

“We needed people talking and people’s behavior, this is what makes the artificial intelligence smarter.” – Andréa Crespo

Ben Stanley, the global research lead for automotive, aerospace and defense at IBM’s Institute for Business Value, said the Manual Cognitivo represents the latent phases of the massive shift automakers will make from manufacturers of products to providers of services.

“They have to move to an experience-based platform,” Stanley said. “If the car is driving itself in 10 years, you don’t care about the performance, you care about the experience inside and outside the car.”

The Manual Cognitivo has certainly demonstrated the value of these technological investments. The VW-IBM platform helped make the Virtus one of the most popular cars in South America, where Volkswagen Group’s vehicle deliveries were up almost 12 percent in 2018, including a whopping 28 percent in Brazil (the best performance of any country for the company).

The success of the Virtus was a big part of why the Manual Cognitivo has since been rolled out into a trio of existing models on the continent: the Tiguan and T-Cross SUVs and Jetta sedan.

These AI features also helped VW do Brasil reassert its position as a cutting-edge automaker, with the Virtus winning more than 20 consumer and industry awards, the most of any model in 2018. And they also sparked interest among the millennial and Gen Z buyers VW covets as long-term customers.

While consumer interest was the driving factor for developing the Manual Cognitivo, it has provided ample additional benefits. Notably, VW’s internal call centers have seen a decrease in help calls, leading to manpower savings.

Nor is the innovating over. VW do Brasil and IBM are studying the real-world queries customers have been making for a year and a half now, which are inspiring new features both for the Manual Cognitivo as well as VW vehicles overall.

“The more cars they’re in, the better the program, and they can develop more features, connect to more security, get restaurant reservations, et cetera,” Crespo said.

And so this is but the first chapter in the Virtus’ story. 🚗

Yave

Coffee's latest roast:
blockchain

words: Arzi Rachman

CONSUMER

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➤ Coffee plantation
in Kerala, India



industrious

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“We want to create a world where coffee can be de-commodified.”

↑ Yave CEO Scott Tupper with Ivonne Herrera, a coffee producer from Guatemala at her cooperative COINACAGRO. Photo: Yave



↑ Coffee plantation in Kerala, India

Time spent living in Central America didn't leave Pacific Northwest-native Scott Tupper without a few self-discovered truths. One was that he loved coffee, a cortado being his choice coffee drink. Another? A discernible lack of transparency into the global coffee supply chain.

With those two things in mind, Scott and his brother Paul saw an opportunity to improve a system for an industry worth more than \$100 billion annually. What's more, they see a potential to create a new model of operations for commodities-based industries of all kinds that would allow all involved parties to be rewarded for their work.

With Yave, a blockchain-based trading and tracing platform, he plans to do just that.

To begin, Scott mapped out many of the disconnects experienced by producers once harvested beans make their ways into the hands of distributors, roasters, and ultimately, the consumer. In Guatemala, for example, coffee beans are sold at nearly thirty to forty cents below the cost of what it takes to produce them. Most farmers can't cover these costs with the current model in place.

“We want to create a world where coffee can be de-commodified,” Scott said, while also “creating a transparent supply chain, bridging market access from producer to roaster.”

Piloted in Guatemala, the first proof of concept for Yave was built in Seattle in 2017 and currently runs on Hyperledger. Explaining the concept and benefits of blockchain to groups unfamiliar with the technology was one of the first hurdles that needed to be addressed for buy-in and support.

“I don't even use the word blockchain when describing it,” Scott told *Industrious*. “It's otherwise difficult for us to speak about what we're doing.”

Scott often compares the coffee supply chain to a game of telephone, where a message starts and is passed on from person to person. The final message is often a far departure from what was initially said.

Scott uses that analogy when he explains the technology to farmers and producers. Blockchain, he tells them, is a cheat for the

game of telephone to ensure that the message stays the same when moving from user to user.

By incorporating a smart ledger into a coffee supply chain, Yave offers Guatemalan farmers and coffee consumers transparency and traceability into the origin of their beans. It also allows them to earn their fair share of revenue generated from sales.

Paul Tupper, Scott's brother, is leading efforts to reward farmers even beyond the initial bean purchase. He does that by selling traced coffee through Onda Origins, their coffee company.

Using Yave's blockchain platform to trace where goods have traveled, the pair have been able to connect growers to drinkers, while giving the growers a bonus for sales of their roast.

"We're giving more money back to farmers— a 40 percent average increase," Scott proudly said.

The pair often brings coffee farmers from Guatemala to Seattle to give them greater insight into the overall supply chain process. This gives them the chance to demonstrate how blockchain works, and even meet some of their coffee fans.

For the Tupper brothers, a driving force for building Yave was connectivity between the parties who grow and consume one of the world's most popular drinks. They want coffee drinkers to know the source of their beans, the farmers and how purchases can impact them.

"This is who your dollar is going to," Scott said.

The brothers' work hasn't gone unnoticed. Efforts to fairly compensate have earned Yave the trust of Guatemalan farmers and even ANACAFÉ, the national association of coffee growers for Guatemala.

The partnership reached a new stage in May, when the annual Producer & Roaster Forum in Guatemala hosted the world's first coffee blockchain auction.

"As Paris Fashion Week is to designers, so are coffee auctions for high-end coffee roasters visiting Central America," Scott said.

Moving forward, Yave plans on tracking the transactional value of 25 of Guatemala's best

coffee lots, farm to cup. They'll do so using a new platform built with IBM Blockchain.

It's an ambitious undertaking. And for Scott, it's a reminder of the different motives for a farmer to use blockchain, compared to roasters or distributors.

With all he and his brother have achieved, Scott believes that more can be done.

"Coffee is in a crisis," he said on his way into his office. "People love to talk about traceability, but we need to actively engage actors in trade."

For the Tupper brothers, the development of new ideas for the value chain are sorely needed to transform the future of commodity-based industries, which often times have colonial underpinnings and are now faced with receding business practices. 🌱

↓ Ivonne Herrera, a coffee producer from Guatemala, with Yave CEO Scott Tupper, at her cooperative COINACAGRO. Photo: Yave



➤ Colombian men working at a coffee farm

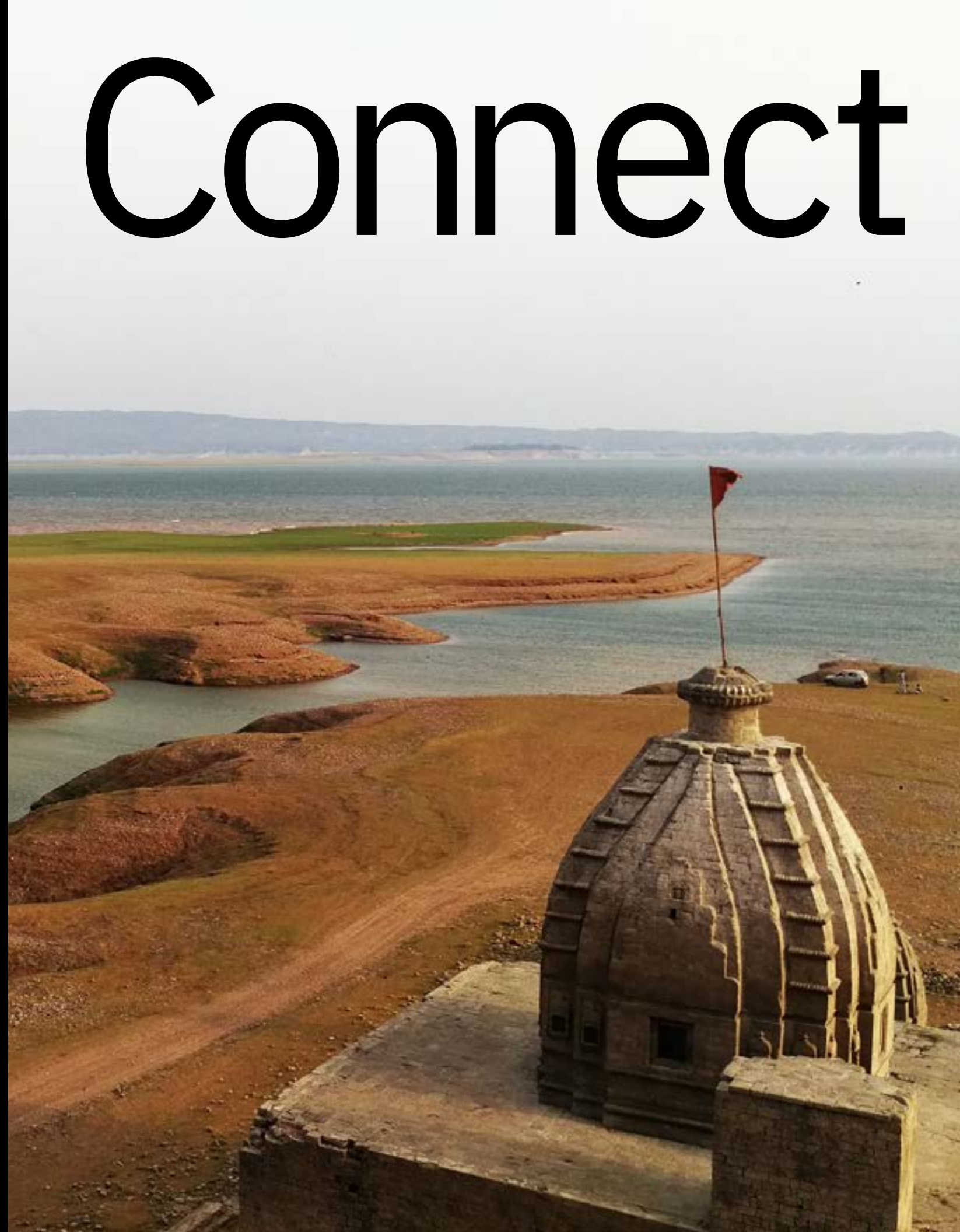


Farm

India student's project
will empower farmers
with technology

words: Kapil Sarin

Connect





When 17-year-old Jyoti's high school principal called her one afternoon in December 2017, her life was forever changed.

Jyoti, who lives in the town of Nagrota in the northern state of Himachal Pradesh, was one of 30 students selected across India as an IBM student intern. The internship, part of the Atal Innovation Mission, was sponsored by the National Institution for Transforming India and IBM.

To qualify, students submitted entries focused on innovation in six areas: water resources, waste management, clean energy, smart mobility, health and agri-tech.

Jyoti's idea—featuring innovation and technology in farming—was shortlisted among thousands of entries.

The 15-day internship took place in October 2018 at IBM's Bengaluru facility, and was designed to mentor students for the new-collar economy.

The industry-tailored learning experience for selected students under 18 was designed to progress across 3 stages: induction, mentoring and recognition. The students were exposed to the corporate environment, and learned about technologies like IoT, cloud computing and blockchain, as well as the concept of design thinking.

The students worked on real-life innovation projects. Their work included coding and website redesign, testing new applications, software and products, social media and communications strategy, marketing campaigns and designing and administering client surveys.

Jyoti worked under the aegis of IBM mentors to further expand her idea of helping farmers learn about new techniques and technology. During the internship, she created a plan for an interconnected website and a smart robot.

The robot's sensors will identify soil fertility and humidity after mapping an entire field, and update the website with that information—helping farmers with insights like weather conditions, soil fertility and irrigation requirements.

Her website is called FarmConnect. The design is ready, and she's now working with IBM mentors and her school teachers to integrate it



“The robot's sensors will identify soil fertility and humidity after mapping an entire field.”

with The Weather Company, an IBM Business.

Jyoti experiment with various technologies to find just the right ones for her project, as well as gaining valuable technical experience across the field.

“I worked hands-on with TJ BOT, Watson, IoT and various other IBM technologies,” Jyoti explained.

Beyond her project, Jyoti said that one of the most valuable parts of the internship was the chance to interact with students from different states and learn about their culture.

India has one of the highest graduation rates in the world, but its shortage of skilled STEM talent has been increasing: up from 6 percent in 2014 to 12 percent in 2018, per Indeed.com.

India's government launched the Atal Innovation Mission February 2016 in direct response to that shortage. Named after India's former prime minister, the flagship initiative was set up by NITI Aayog with the purpose of promoting innovation and entrepreneurship across the country.

“There is an impending need for collaboration between government, industry and

academia to bridge the skills gap in the workforce,” said Amitabh Kant, NITI Aayog CEO.

In September 2016, IBM joined NITI Aayog to co-create a first-of-its-kind internship program for student-innovators under the age of 18.

In March 2019, IBM organized an India Skills Forum in New Delhi to showcase the progress being made, deliberate on the next steps, and celebrate student innovators—including Jyoti, teachers and partners.

After Jyoti confidently shared her skills development journey with top Indian government officials, senior IBM executives including CEO Ginni Rometty, and other students at the India Skills Forum, the room erupted with applause.

“I am very grateful to IBM for giving me the opportunity to enhance my skills through internship,” Jyoti concluded.

Jyoti is now back at school. She's determined to help alleviate the issues and struggles she sees many of her friends and family deal with in their home village. Her goal is to become an administrative officer with the Indian government, where she hopes to drive the adoption of technology at the grassroots level. 🚀

5G

IBM's Steve Canepa
is innovating for a 5G
world

words: Arzi Rachman

“At the end of the day, it’s
about people. The opportunity
to build lasting relationships
with our customers and partners
is what’s most important.”





What do the Space Shuttle, ATMs, the Emmys and 5G have in common?

Each is a testament to Steve Canepa's innovative spark.

Throughout his life and career—which spans a number of diverse industries—Canepa has tackled complex human problems through technology.

“The centerpiece of my career is working with clients to build powerful new capabilities that often play an essential role in our daily lives,” said Canepa, a global industry managing director for Telecommunications, Media & Entertainment at IBM.

Canepa began his IBM career in aerospace. There, he applied advanced mainframe solutions to help Rockwell International build complex engineering products, working most notably on development of the iconic white-and-black Space Shuttle.

Next, Canepa launched IBM's first industry consulting practice, focused on finance and banking, in the early 1990s. The objective was to accelerate the digital transformation of retail banking. It was a pivotal time.

“Consumers were first connecting with banks through electronic means—ATMs, network banking, and self-service devices,” Canepa said. “We were helping banks to create advanced analytics solutions to gain new insights like the lifetime value of a customer, or the value of family plans and upselling.”

Canepa then landed on the central passion of his career, helping launch IBM's Global Media & Entertainment practice in 1995. To him, the move was a no-brainer. He was already deeply engaged in the industry, as his wife, Marianne, was a successful producer of popular television shows such as 21 Jump Street, The A-Team, The Pretender, and Wiseguy.

And once again, he was focused on an industry right as it was undergoing major changes.

“It was clear that the transformation to digital products and services—and the innovations that standards-based technology could deliver—were going to fundamentally change the media industry and the world,” he said.

Video has been fundamentally reshaping the

information and business architecture of every industry, Canepa believes, and soon 5G wireless technology will further push boundaries and possibilities for businesses and consumers. Distance medicine, for example, will change how patients and caregivers interact with each other. First responders will increasingly fly drones over California to assess how they can most effectively fight fires—with 5G even paving the way for autonomous flight.

Video is changing our lives, said Canepa, “in real-time, all around us, every day, and 5G will only accelerate the pace of innovation.”

And the emergence of edge computing and hybrid network clouds will only further this acceleration, Canepa believes. By bringing the cloud closer to users and seamlessly integrating cloud operation, the next-generation networks will enable companies to enhance their brands and reinvent their services for hyper-connected customers.

“We all expect our next digital experience to be as good as our best last experience,” Canepa said. “There's this constantly rising expectation regarding the way you interact with products and services.”

To that end, the ever-changing, global nature of innovation inspires him.

“We can do something innovative in Singapore in the morning and talk to clients about it in Europe in the afternoon,” said Canepa. “The opportunity to learn cultures all over the world and to help different marketplaces adopt innovations at different rates and in different forms has been a great experience.”

Education is another area that's becoming increasingly interactive, multimedia-driven and digital. For Canepa, a more personalized learning environment is helping teachers in a number of ways.

“Access to education that can be tailored to improve learning for everyone is so important,” said Canepa. “Education is transforming to personalized services using technology such as AI so that each student can learn at the rate and pace that works best for them.”

To the next generation, Canepa's advice is to constantly challenge yourself to learn new skills because they always go with you on your life journey, especially when change is the new constant.

“If you're careful about the way you cultivate skills, it can position you for success,” Canepa said. “I've always mentored folks to think carefully about not just the job they want or the role that they'll play, but also what skills they will build or enhance that align with their long-term aspirations.”

It's those skills—and teamwork—that helped him to accept three Emmy Awards.

The first was for helping to build the Warner Brothers Network (better known as The WB, and now the CW), the first end-to-end all-digital broadcast network launched in the world. He received the second with the Fox Networks Group for transforming their sports broadcast platform to HD while dramatically improving the efficiency of video and audio transfers. He accepted the third Emmy in 2017 for the early work done by the IBM Media and Entertainment practice to enable the shift of production and broadcast workflows from analog to digital.

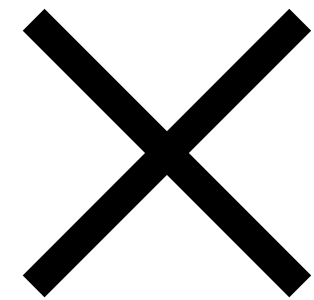
And while awards are career-affirming, he believes it's the human connection and our impact on the world that ultimately define us. 🌐





Game on:

IBM's Cyber
Range lets
organizations
prepare for
their worst day



words: Karin Breedis

It may come as little surprise that the finance and insurance industry is the most under threat from cyber attacks across the business landscape. Not only are vast sums at stake, but so is the personal data often required to open a bank account or take out an insurance policy.

Of all the cyberattacks and incidents last year, 19 percent, or almost one in five, targeted the finance and insurance industry, according to IBM's 2019 X-Force Threat Intelligence Index Report.

As the number and complexity of cyber attacks continues to increase, many corporate executives are regularly hearing the warning that it's not a matter of if they'll face a cyber attack, but when.

Gary Meshell, the Chief Strategy & Technology Officer for the Financial Services Industry in North America at IBM Security, works to ensure financial services organizations are prepared for their worst day.

That's been the primary mission for Meshell and the IBM Security team as they've ushered scores of companies through IBM's X-Force Command Cyber Range facilities.

At the Cyber Range, individuals experience a true-to-life simulation of a cyber attack and can assess and improve their cyber security readiness, all without risk.

With the stakes so high, it is imperative for cyber professionals to practice and stress test their cyber attack response plans in a realistic environment without real-world consequences. And what better way to do that than by making it a game, according to John Clarke, an IBM Ethical Hacking Test Engineer.

"Our gamified breach simulations immerse participants in a scenario that brings them as close to the endgame as possible," Clarke said. "In this high-pressure scenario, clients can test their processes, identify gaps in their security plan and train the muscle memory that is required for when the worst happens."

As with any game, preparation, practice, and teamwork are crucial because even the best plan for responding to a cyber attack is useless if members of the team are unfamiliar with it. Cyber security must be every employee's



"Our gamified breach simulations immerse participants in a scenario that brings them as close to the endgame as possible."



“This cyber war game provided an opportunity for companies to creatively come together and practice coordinated response and resilience in a controlled environment.”

responsibility, not just those in the IT or security departments. According to one customer testimonial, “cyber security is as much a business problem as a technology one.”

And while the gaming environment of the IBM Cyber Range is helping individual companies to assess and improve their own defenses, the Cyber Range is also home to multi-company events that break down barriers between competitors. During many multi-company events, participants jointly prepare to battle common enemies that threaten the entire industry. As companies become increasingly interconnected and interdependent, no one can operate alone. A security weakness at one company can jeopardize the industry’s collective armor. Individual firms must come together for their own sake and that of the industry.

“If one bank, for example, endures a breach, that incident can quickly spread to ATM networks, payment providers, clearing and settlement entities, and third-party services,” Meshell said. “Many across the financial services sector recognize this common threat. Innovative companies are preparing for a systemic cyberattack by working together to jointly develop plans that outline a coordinated response across all entities.”

To take up this gauntlet, the P20, a global initiative representing the interests of more

than 100 payment industry businesses in the US, UK and beyond, worked with FIS and IBM Security on a cyber war game exercise at the IBM X-Force Command Cyber Range in Cambridge, Massachusetts.

Emphasizing the importance of this October 2018 endeavor, members of law enforcement and the US Department of Treasury joined the global electronic payments industry.

The focus for the joint exercise was a simulation to battle an industry-wide attack that would strike on the busiest and most important day for online payments. This war game not only highlighted the potential impact of a worst-case scenario attack but also illustrated the critical need for effective plans that can bolster under-staffed security teams and enable them to take the best actions in the face of an attack.

By mimicking a widespread attack on the financial and payments ecosystem, this exercise forced participants to navigate uncertainty together.

“This cyber war game provided an opportunity for companies to creatively come together and practice coordinated response and resilience in a controlled environment,” Meshell said. ↵

IBM's

Shawna Hoffman-Childress
Client Partner, Global
Cognitive Legal Co-Leader
& Blockchain Subject
Matter Expert

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What's your relationship with technology around your creative process?

Technology is my best friend. I use technology such as AI to enhance my creativity process daily.

Share a recent experience where technology influenced your creativity, or your creativity led to a technological advancement.

I am a mom of three teenagers and often spend my nights helping them with their homework. A few years ago, my youngest son was first learning Common Core Math. It was a very different way to view math problems.

All of a sudden, a lightbulb went off for both of us. I had been working on an invention and using Common Core Math was a great basis to solve a problem I was having with my invention.

I started making correlations between the new math and different algorithms for AI. In the end, my invention was enhanced by using advanced technology and is now the patent "Detecting Clusters and Relationships in Large Data Sets" (Publication Number 20180096047). 📄



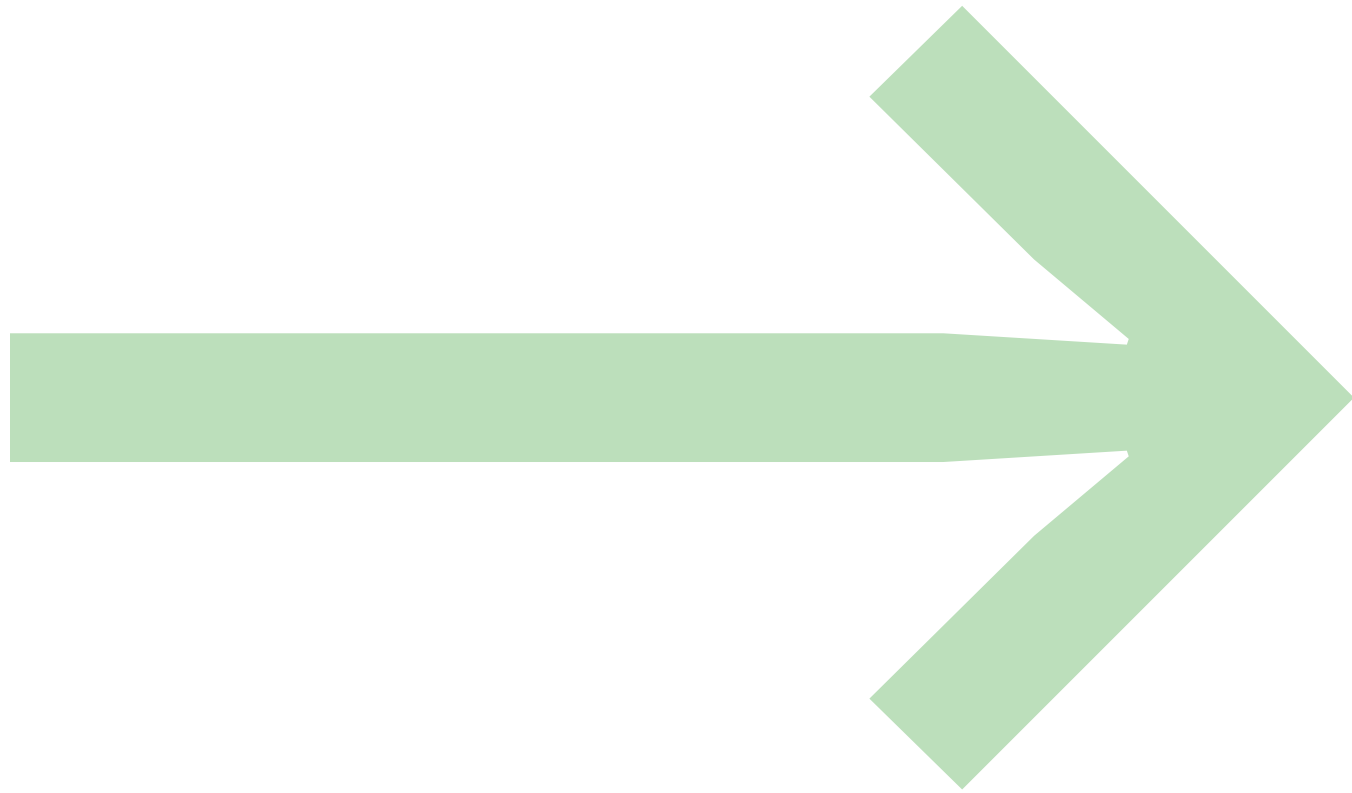
↑ Shawna Hoffman-Childress

➤ Abstract blocks

Singapore Airlines lifts pilots' preflight burdens

From Auckland to Zurich, airlines crisscross the globe on a daily basis. Their pilots, like bus drivers or subway conductors, typically fly the same routes. Yet even if they've navigated these courses hundreds or thousands of times, no two trips are ever the same.

words: Matt A.V. Chaban



Cabin and cargo occupancies vary. Weather changes, often unpredictably. Even bird migration patterns can present challenges. Nor is every Boeing 777 or Airbus A380 the same, having flown different trips, experienced different environments and undergone separate maintenance. That leaves each plane with its own characteristics and quirks about which the pilot must be intimately aware.

Typically, pilots review all these particulars at their airline's flight control center—an important yet tedious journey that begins well before take-off. Simply getting to these facilities within the airport, as well as reviewing the materials, can take up to 90 minutes before the crew heads for their gate. This all while toting luggage burdened with so many manuals, pilots' bags felt more like heave-ons than carry-ons.

This preflight ritual could at times be a drain on the valuable time and energy of pilots and carriers, especially those on long-haul flights like the ones regularly operated by Singapore Airlines. (The company now boasts the longest non-stop route in the world: a nearly 19-hour, 8,285-mile flight from Newark to Singapore.)

Singapore Airlines was eager to digitize the preflight briefing to save their pilots the time and frustration of dealing with the existing system. Putting the materials onto tablet-based apps would enable pilots to prepare for their upcoming trips from the comfort of their home or hotel room, or even in the shuttle bus on the way to the airport. With the help of IBM and Apple's MobileFirst for iOS platform, Singapore Airlines deployed a pair of apps in September 2017. These allow pilots to spend less time thumbing through manuals and calendars and focus on flying.

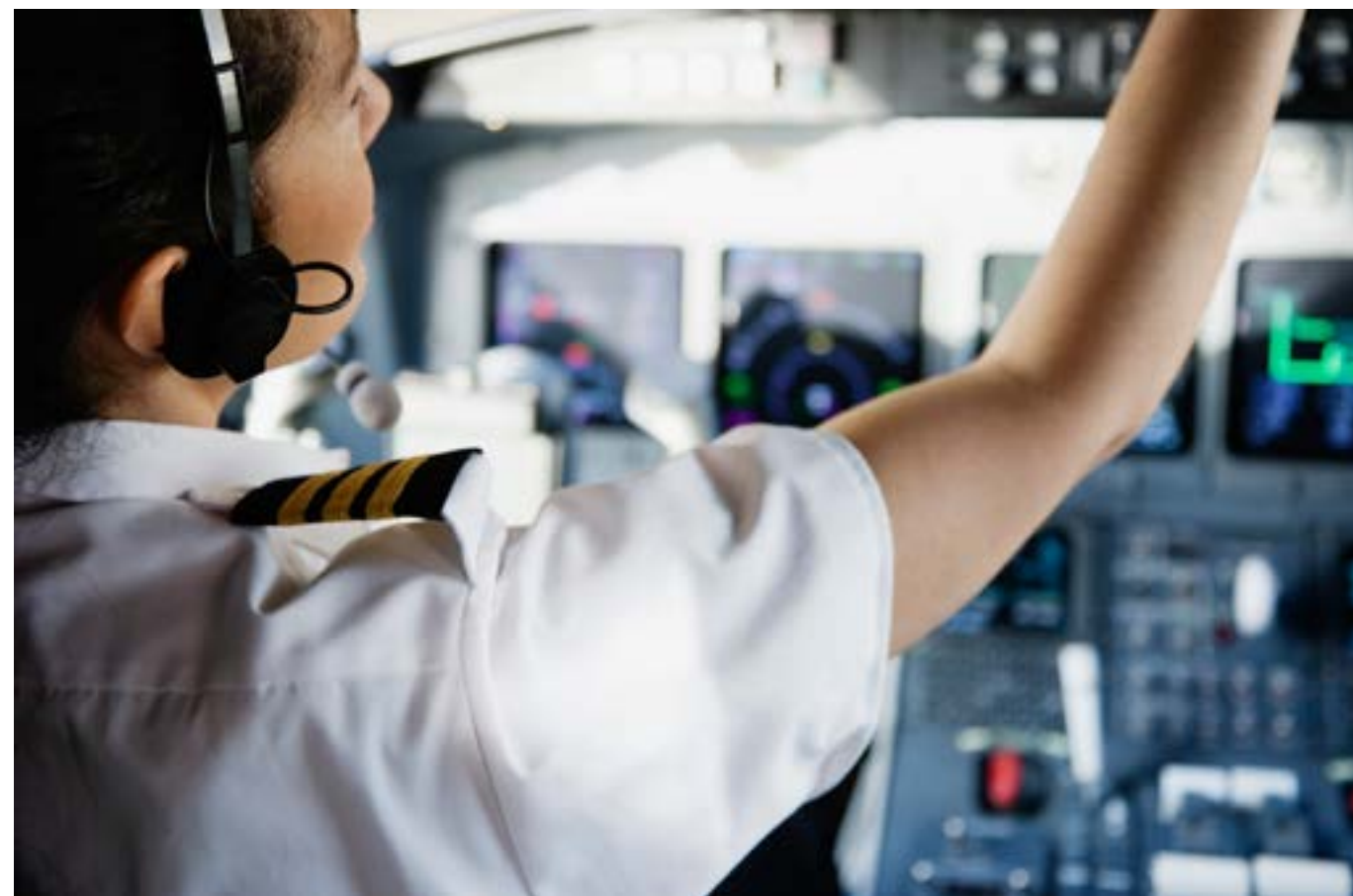
"If I had a solution where a pilot could obtain information for anything they had to do at any time, anywhere, at any place in the world, that would be the vision of these products," Lorimer Yong, a management pilot with special duties for training at Singapore Airlines, said. "It's really about having information at your fingertips."

For the past 20-odd months, Yong has helped lead the effort to get iPads with IBM's



↑ Passenger airplane taking off at sunset

"Pilots can now adjust their lifestyle around their duties... they don't have to log into web portals, as was the way before, which could be cumbersome."



↑ Pilot preparing for takeoff



↑ Airplane landing as seen through the cockpit

“If I had a solution where a pilot could obtain information for anything they had to do at any time, anywhere, at any place in the world, that would be the vision of these products.”

Fly Now and Roster apps into the hands of Singapore’s 2,600 pilots.

Fly Now has eased the burden for these pilots, often quite literally, since they previously had to lug as much as 50 pounds’ worth of manuals on a given flight to guide their decisions. Now, all that information is contained within a pilot’s iPad. And given how far and frequently Singapore and other carriers travel, many have predicted as much as seven-figure fuel savings annually from the reduced weight.

“A smooth and safe flight is always a top priority for airlines,” Dee Waddell, IBM’s global managing director for Travel & Transportation, said. “Today, we are seeing forward-thinking airlines like Singapore Airlines investing in digital technologies like MobileFirst for iOS.”

Even in today’s highly automated planes, pilots must be ready for every situation possible. At Singapore Airlines, pilots can now focus on that crucial work after reviewing the information in Fly Now, considering different flight paths, fuel levels and dozens of other factors from wherever is most convenient. Gone are the days of hurriedly hunting for the right page in one of their

booklets or winding past slow-moving crowds at the airport after leaving the flight control center.

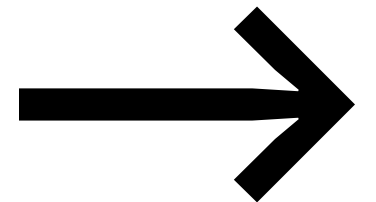
“A lot of the time pilots spent preparing has been trimmed off,” Yong said.

And in an industry where every second matters, these apps not only mean happier pilots but also better gate times and arrival scores—metrics that drive rankings and attract customers.

With time and convenience in mind, Singapore also deployed IBM’s Roster app to help pilots manage their schedules and communicate with one another for up to six weeks in advance. Yong said it was far easier to have this valuable information in the same place as the flight materials, and it made swapping shifts and other communications between crew more seamless.

“Pilots can now adjust their lifestyle around their duties,” Yong said. “They don’t have to log into web portals, as was the way before, which could be cumbersome.”

With more than 100 planes flying to more than 60 destinations around the world each day, cumbersome is never good. At Singapore Airlines, the paper is now down, wheels up. 🛫



globe-trotting

For IBM's Greg Land, globetrotting is the best education

words: John Kultgen

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→ Greg Land on the Inca Trail to Machu Picchu, Peru





“Getting off the beaten path is the most educational for me. For both learning about other cultures, and learning about myself.”

↑ Llama overlooking Machu Picchu, Peru

Those who knew Greg Land as a child probably wouldn't have predicted that the bookish, brainy Texan would one day become an international businessman and world traveler. Land grew up one of eight siblings. His strict and religious family spent vacations driving across the American South.

“We couldn't afford to do big vacations,” Land told *Industrious*. “For us, a vacation was renting an RV and visiting our relatives. I didn't go to Disneyland as a child.”

Though he never experienced Disney's *It's a Small World* ride, his career has led him to a life of global exposure. Today, as IBM's Global Industry Leader for Aviation, Hospitality and Travel Related Services, Land loves making deals across continents.

“At one point my siblings thought I was a CIA operative,” he said, “because I'd go to a place like Johannesburg or Dubai on 24-hour notice.”

Land's life changed the day he quit being an accountant in 1989 (“I was bored out of my mind”) and went to work for an airline. Until then, he led what he calls as a “very sheltered life.”

He made friends with other airline employees, and together they would play a game called Gate Roulette. Every Friday night, they drove to the airport and picked a gate number at random. Then, they took a standby seat on wherever the plane was headed. He wound up in Des Moines one Saturday and in London another.

“I see my travel as being much more of an education than books ever were,” Greg said with a chuckle. “It's about learning through meeting new people and observing other cultures.”

Land, who speaks with genuine enthusiasm, wants everyone to cultivate the same wanderlust that drives him.

“In 2008, I took my family to Italy for two weeks,” he said. “We rented a villa on an olive farm. For two of my nephews and niece, it was their first time getting a passport. It totally changed their minds about what's outside of the United States.”

Could his family have done the trip without his experienced hand as a guide? “No way,” he said. It's clear that being a guide is both a calling and inspiration for Land.

Navigating itineraries can be difficult, especially for novice travelers like his family. To that end, Land feels professionally driven to improve the various stages of a customer's journey, to make it simpler.

For instance, Land and his colleagues worked with United Airlines to equip flight attendants with IBM MobileFirst iOS Passenger+. The app centers around empowering flight attendants to noticeably improve the travel experience for passengers.

“If you're on an airplane and your connecting flight gets cancelled,” Land said, “they can come to your seat and rebook you from the air. That really does ease your arrival into a new city.”

This type of customer-first optimization has regularly been appreciated off the tarmac, as well — IBM's Travel & Transportation team was recently named Best AI Travel Technology by the World Travel Awards.

“We've been so vocal about how AI can really drive personalization of the travel experience,” Land said. “The secret to personalizing it is in the cognitive capabilities and leveraging everything from the weather data to the unstructured data. It's all part of the analysis around why somebody is traveling and how a company can make somebody's trip better.”

For jetsetter Land, travel is part of his personal and professional lives. The fact that he's made a stellar career out of something he loves continues to fuel his desire to keep seeing more of the world. His next trip is in late December to South Africa, where he'll celebrate the New Year on safari. 🦒

Hear more from Greg Land
<https://ibm.co/GregLandVideo>



“It’s about using digitization to remove obstacles that have historically made it harder for small-and medium-sized enterprises to engage in cross-border transactions.”

↑ A souk in Marrakech, Morocco

How technology is helping boost global trade

words: Content Team



“I wake up every day and think, how can I improve the service I give to our clients?” Raphael Barisaac, UniCredit’s Global Co-Head of Trade Finance and Working Capital Management, said.

One way is to give them greater access to the tens of trillions of dollars in global trade transacted each year. With this goal, shared by a dozen European banks and IBM, we.trade was formed in 2017 to lower the barriers between businesses, especially smaller ones, and international trade.

A joint venture between CaixaBank, Deutsche Bank, Erste Group, HSBC, KBC, Natixis, Nordea, Rabobank, Santander, Société Générale, UBS and UniCredit, we.trade aims to make cross-border transactions more efficient and secure, and open up trade finance to a wider pool of companies by using technology.

Since we.trade’s inception, Barisaac has worked to grow and evolve the platform all the

while keeping the big picture of the global economy top of mind. In his work, everything revolves around trade, which, in turn, serves the larger economy.

A driving vision for we.trade was to develop new ways to simplify and streamline the process around international trade in order to grow it.

“To a large extent,” he said, “it’s about using digitization to remove obstacles that have historically made it harder for small- and medium-sized enterprises to engage in cross-border transactions.”

Those small-to-medium firms account for half the world’s output, with two-thirds of the world’s jobs. That’s one reason why UniCredit focused on this segment. Another was the qualitative difference that makes the small-to-medium segment an especially strong candidate for digital solutions. These

“A driving vision for we.trade was to develop new ways to simplify and stream-line the process around international trade in order to grow it.”

companies, according to Barisaac, have an inherent agility and culture of innovation.

For Barisaac, it was important that we.trade utilize blockchain technology. Companies avoid trading with foreign partners because of the inherent complexities and risks involved. Legal processes in international trade deals are usually lengthy, which can prohibit progress and run counter to the agility on which SMEs thrive. Furthermore, there’s a risk that the counterparty won’t pay.

The trading solution developed by we.trade is based on IBM Blockchain, which runs on the IBM Cloud, and uses the Linux Foundation’s Hyperledger Fabric framework.

In we.trade, banks like UniCredit provide an entry point for their customers on the platform. Each company admitted is thoroughly vetted for issues like money laundering.

“Think of we.trade as a kind of safe, pre-screened ecosystem for international trading,” Barisaac said.

The technology addresses the risk of contract non-compliance twofold.

First, blockchain uses distributed ledger technology to create an immutable, time-stamped record of each entry. If a company attempts to unilaterally change the terms of the trading agreement, the technology at the heart of the we.trade platform instantly alerts everyone party to that trade—including the bank’s intermediaries—about the change.

Second, the technology features a built-in smart contract. Smart contracts automate contract execution one step at a time, thus all but eliminating counterparty risk. Once one side performs an action that follows the agreement, blockchain prompts the other side regarding what needs to happen, like sending a payment.

Barisaac sees the potential as uncorking international trade opportunities for small-to-medium enterprises.

“We’re seeing lots of customer enthusiasm,” he said, and new banks are ongoingly joining the network.

“It reinforces our belief that we.trade—and the technology it runs on—is adding new stimulus to international trade,” he said.



IoT

IoT is helping eye surgeons see their workflow more clearly

words: Content Team



“I’m a paid daydreamer,” Ron Cummings-Kralik said. “I work to figure out what would be helpful, and how to make doctors’ lives better.”

As a Principal Network Engineer and IoT Architect in the Surgical business unit of Bausch + Lomb, Cummings-Kralik and his team set out to create a smarter and more connected experience for doctors who perform eye surgery, such as cataract operations.

Ophthalmologists conduct nearly four million cataract surgeries in the US annually; worldwide, that number is around 20 million.

Cataracts occur when the eye’s natural lens becomes clouded—often due to various factors, including age and medical conditions like myopia, diabetes and hypertension.

During the procedure, ophthalmologists remove the natural lens of an eye and replace it with an artificial lens. It is one of the most frequently performed surgeries in the world. It’s also fast and has success rates of approximately 98 percent.

Eye surgeons face a unique set of challenges and pressures. Since eyes are such delicate organs, the surgery requires extreme precision. That is the case for cataract surgery, as well as other eye surgeries, including emergency procedures, when a doctor is called upon to help prevent a patient’s permanent vision loss. And, like all doctors in the US today, ophthalmologists are under continuous pressure to improve their workflows, increase their efficiency and cut costs. The performance of the equipment they use is another critical factor.

“My team and I sat down to figure out what we could do to make the surgical flow smoother and simpler,” Cummings-Kralik said.

In order to achieve this goal, Bausch + Lomb partnered with IBM to develop the eyeTELLIGENCE platform, which the company launched in October 2018. This cloud-based solution is exclusively available on Bausch + Lomb’s surgical platform for cataract and retina surgery, the Stellaris Elite™ vision enhancement system.

The IBM partnership and development of eyeTELLIGENCE is part of the company’s overall vision to provide ophthalmologists a more connected surgical experience.

“We’re digitally transforming surgery to provide the best and most efficient experience for the doctor,” he said.

For eye surgeons and their staff, the eyeTELLIGENCE platform provides first-in-class efficiency solutions: expedited technical support and the ability to synchronize their preferred surgical settings across the system.

Both are game changers, according to Cummings-Kralik.

To access technical support in the past, surgeons or their staff had to contact sales or Bausch + Lomb representatives, who would then need to physically visit the office to address the issue.

Now with the eyeTELLIGENCE platform, medical staff have a direct connection with Bausch + Lomb, which allows them to make service requests or report technical issues with the click of a button. Once the appropriate selection is made in the system, the request is immediately sent via the IBM Cloud to the Bausch + Lomb team.

The eyeTELLIGENCE platform also allows surgeons to log into the system, make adjustments on the settings and save them. This allows the many doctors who operate on multiple Stellaris Elite machines in different operating rooms or facilities to have their exact settings saved instantly on all the machines they use.

“The machines are super complicated. There’s 100-odd settings you could adjust,” Cummings-Kralik said.

Previously, surgeons had to sit down with a technician to implement the adjustments on all of their machines. The new system could potentially save each doctor hours a day, according to Cummings-Kralik.

As of May 2019, nearly 200 Stellaris Elite machines are connected to the IBM Cloud through the eyeTELLIGENCE platform. These connected machines are allowing the Bausch + Lomb team to gather information that is helping them better understand the machine’s performance, and help surgeons improve their efficiency.

This May during the annual meeting of the American Society of Cataract and Refractive Surgery in San Diego, researchers presented a paper, which demonstrated that they were able to find a trend in energy and fluid usage patterns through eyeTELLIGENCE. This allowed Bausch + Lomb to inform doctors of adjustments they could make to help improve their surgical efficiency.

Bausch + Lomb is continuing to work with IBM to develop additional features for the platform that will deliver valuable feedback to surgical facilities while also providing a platform for surgical procedure planning.

“Together we’re reinventing the way that surgery will work for people,” Cummings-Kralik said. 📱

“We’re digitally transforming surgery to provide the best and most efficient experience for the doctor.”

→ Extreme close-up of human eye



All ears

IBM's Nancy Greco is all ears, from college radio to the factory floor

words: John Kultgen

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Machine welding metal





If someone shuts the window, go to the door,” Nancy Greco told *Industrious* from her research lab in Yorktown Heights, New York. “And if the door doesn’t open, blow a hole through the wall. Don’t let anything be a barrier to you moving ahead.”

Greco is an IBM Distinguished Engineer, a role focused on building the boldest innovations in areas like programming, services, science, design and technology.

Her mantra: be curious and make time to understand how and why things work, even if that means circumventing the status quo. She’s had a long career with IBM—starting in 1981—but has never allowed company life to pin her to one role.

“You can’t meet me and figure out what I am,” she said. “It takes a little while, because I’m not just one thing. I am a compilation of many roles, and many lives.”

Greco’s life has never been narrow. She grew up on a farm in the Hudson Valley, where her family raised dairy cows. Relatives called her

“If people don’t understand what you’re saying, they don’t get it, they don’t buy it, and they don’t use it.”

– Nancy Greco

an “odd duck” for wanting to read rather than play outside. Since farm life was her primary world, it’s no surprise that Greco initially wanted to be a veterinarian and would often ask her family questions about why some animals got sick while others stayed healthy. She also observed how her family researched symptoms, treatments and preventative measures for their animals.

Similar challenges inspire Greco’s work with next-generation computer systems today. When an automotive part needs a massive recall due to a bad weld, for example, she considers that a form of sickness.

In the manufacturing world, inspections are typically performed visually or sometimes destructively—meaning that the piece is physically destroyed to inspect whether it was properly made. Every second counts in the fast-paced



manufacturing world. If it takes minutes to detect a bad weld, multiple products may have been manufactured with that defective weld.

Greco and her team have become resourceful when it comes to inspections. In one of their projects, they've included sound as an added inspection step for humans working with AI.

"With acoustics, AI can tell within seconds that a weld is bad and stop the robot," Greco said. "The human is needed to collect, teach and validate the AI model."

And now instead of inspecting for the defect, the human can spend time on troubleshooting and creating preventive measures.

Thanks to Greco and team's innovation, manufacturers from automotive to electronics are responding positively to this approach.

Greco attributes much of her success to her two contrasting degrees. As she self-funded her way through Cornell University, she first decided to study chemistry. That often placed her in an introspective setting where she didn't need to speak a lot—which as an introvert, she welcomed. But since she also faces fears head on, she took on an unexpected challenge, and pushed herself to become a college radio DJ.

"I said to myself, 'Get in front of a mic,'" Greco said. "'How hard could it be?'"

While scary at first, Greco soon began looking forward to seeing the red light come on, her cue to fill the silence with words people would want to listen to.

"You'll notice a lot of the DJs have a certain voice," she said.

She demonstrates by dropping her voice to a lower register: "'Welcome to WBNR.' I started to learn techniques like that. I started to get exposed to speaking style."

For Greco, learning how to talk to an audience led to her second degree in technical communication.

"If people don't understand what you're saying, they don't get it, they don't buy it, and they don't use it," she said.

The ability to both understand and explain the most complex inventions—she holds over 20 patents—makes Greco a captivating

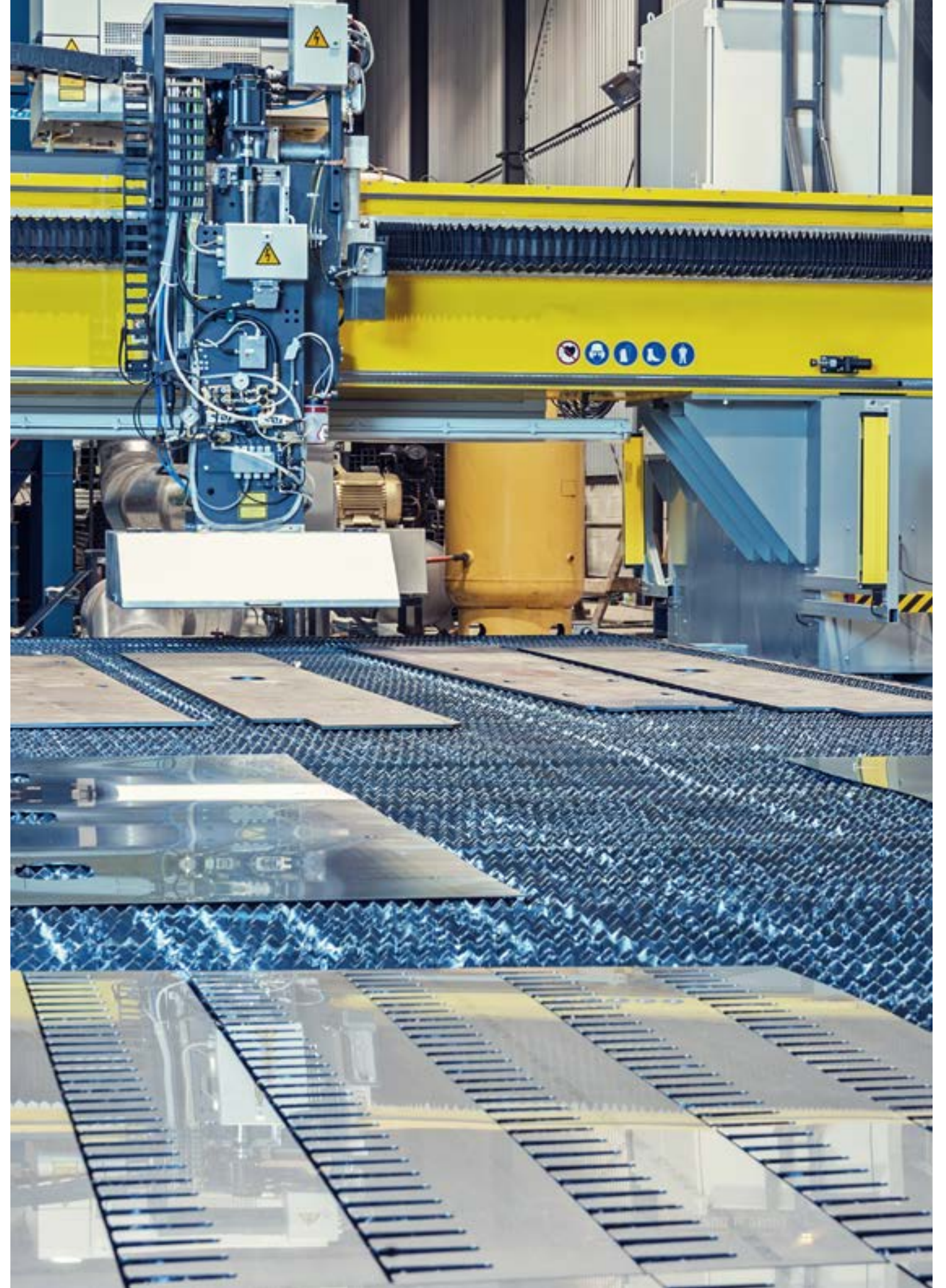
storyteller. When she talks about building semi-conductors, for instance, she explains it as "building a micro-city, layer by layer."

An example of Greco's approach is her work with data. Around 80 percent of the world's data is proprietary and not shared outside of its organization. Greco works with these entities to help them realize the potential their data holds, and how AI can release the insight from the data, and share the AI models, not the data, to enable faster learning.

With manufacturers' data, for example, consistency is key in identifying defects or problems. AI delivers that consistency, providing hour after hour of inspection.

And AI not only takes on burdensome tasks like inspection, it adds context to the data so the human can understand quickly what actions need to be taken. As an example: AI identifies a dent in a part, and also adds where the dent was likely to occur, what tool was used, and why.

"Let's release the human to do the creativity, to do the problem solving, to create new ways of doing things," she said. "There's so much more that humans could do with their brainpower." 🗨️





A different
type of dance
move

selectric

words: Justine Jablonska

How to record, quickly and accurately,
the body movements of dancers
without resorting to time-consuming
hand drawings.

← This photo accompanied a December
1973 IBM press release

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“Like

Notes On A Staff,” begins the December 1973 announcement for a new IBM Selectric typewriter element to record dance and movement. The element, we learn, was developed by IBM in conjunction with the Dance Notation Bureau of NYC to answer a problem “which has long confronted choreographers and teachers: how to record, quickly and accurately, the body movements of dancers without resorting to time-consuming hand drawings.” The “scientific approach” to recording movement notates body motion by means of abstract symbols.

IBM introduced the Selectric electric typewriter—featuring a typing element, or typeball—in 1961. The typeball, a compact unit containing all the letters and symbols of a keyboard, rotated and pivoted to the correct position before striking. It replaced individual typebars that would swing up and hit the ribbon and page. The Selectric and its descendants would go on to dominate the typewriter market for decades. Charles Ditchendorf joined IBM’s Office Products Division, which designed and manufactured the Selectric, in 1966.

“The typeball was a very interesting technical breakthrough,” Ditchendorf said in a phone interview. “They put a metallic coating onto a plastic element that gave it durability. I don’t recall anyone ever wearing one of those things out.” Beyond durability, the Selectric typeball allowed for a unique flexibility: it could easily be changed out, so customers had the ability to order typeballs with customized fonts and symbols. Ditchendorf remembers the dance typeball announcement because it was so unique. The typeball had special Labanotation symbols, developed in the 1920s by Hungarian dancer/choreographer Rudolf Laban to analyze and record movement and dance. The typeball was issued with a grid “so that you could figure out how to put the movements together,” he said.

A symbol’s location showed which part of the body—arm, leg, torso—was to be used. The symbol’s shape indicated direction. The symbol’s shading showed the level of an arm or leg. And its length controlled the time value of a movement.

“My sense is that somebody important at IBM probably had a relationship with a dance company,” Charles said. “Maybe as a volunteer or a board member.” He believes that IBM created this particular typing element as a public service. “Somebody did a favor to people who needed it.”

The Selectric and its descendants dominated the typewriter market for decades.



→ Red Selectric courtesy of IBM Archives



"The soaring, graceful movements of a dancer's grand jeté are quickly and accurately recorded through use of special symbols."

↑ IBM Advertisement, circa 1973

The typing element had 88 different symbols, which could be arranged to form a complete vocabulary for recording movement of any kind, from ballet and modern to ethnic, even folk. And the range of motions extends well beyond dance: Labanotation can also be used to record movements in areas like sports, behavioral sciences, physical therapy, and even industrial operations.

At the time of its announcement, the dance typeball sold for \$18 (today, that's a little over \$100). The new element "joins a growing collection of special-purpose typing fonts which IBM has designed for the technical disciplines," according to the press release.

"To the best of my knowledge, I didn't sell one," Charles said. He's also not sure how many were ever sold.

He did, however, sell other custom elements and products—a Braille typewriter, for example. He remembers a big green binder with every special character ever designed for typewriters, each with a visual example sorted by type style.

"If someone said, I need something like this, you'd get that binder out and see if it was available," he said. If not, a special element would be designed.

He once worked with a typist who requested a square foot symbol: a square with a slash through it. He asked why she needed it. "Everything we do is about marketing square footage," she told him. "I'm constantly typing sq. ft.," which was eight characters instead of one.

"I went and looked in the binder and sure enough, we had one," he said. He had his custom engineer put it on her typewriter, and received rave thanks from the typist.

Charles eventually moved out of the Office Products Division and worked for various other IBM groups, including headquarters. There, he was "part of the group that took IBM out of the typewriter business and into computers," he said. "Nice closure there."

Throughout the many products and iterations of IBM, he notes that one of the company's greatest competitors has been human resistance to change: he saw that firsthand with the sunset of typewriters, copiers, printers. As a salesman and later manager, one of his responsibilities was educating about the changes happening, and others to come.

"Things always change, don't they," he said.

Recently, he said, one of his grandsons bought an original Selectric Typewriter. "He had to outbid the guy who bid 50 cents. He paid a dollar for it," Charles said. "And it still works." 🐼

Quick

17 leaders of industry
answer the question:



What does creativity
in technology mean?

Creativity in technology accentuates our greatest strengths and addresses society's greatest challenges. Communities benefit most when this creativity goes beyond consumer products and is used to innovate in spaces that are often overlooked, such as suicide prevention, mental health and human rights.

– John Callery, Director of Technology,
The Trevor Project

It's a moment that makes the hair on the back of your neck stand up. It's seeing a sensor the size of your fingernail that can help better manage Parkinson's disease, or a quantum computer whose core is the actual coldest place in the universe. It's a moment that alters all our preconceived notions of progress.

– Rachael Morin,
Executive Communications Lead to IBM CMO

The best technologies are those that get creative in how easy they are to use, how invisible yet impactful they are, how graceful they look, how human they are. They impact millions of lives. Think smart wearables that look good and are intuitive to use; blockchain that guarantees our food safety; AI assistants we can talk to.

– Lavanya Raghuraman, Executive Architect &
Industry Consultant, Global Government CoC,
IBM GBS

Takes:

The best creative insights always come from collaborating with the end user that you're designing a solution for. Instead of going on gut instincts and building fast, by involving your target audience in everything from ideation to prototyping, you will inspire creativity for impact, versus creativity for novelty or recognition.

– Anastasia Goodstein, SVP,
Digital Product Management, The Ad Council

Creativity in technology is seeing past what a current use case is and thinking about how this technology could be used to solve more and different problems at different scales than its original creator had in mind. One of my favorite movies is “Powers of Ten” by Charles and Ray Eames. The short film “depicts the relative scale of the universe according to an order of magnitude (or logarithmic scale) based on a factor of ten.” It’s a great creative mental exercise to think of how a new technology might be applied at all of the scales depicted in the movie.

– Jean Brownhill,
Founder and CEO of Sweeten

It means using technology to create unexpected and unique experiences for our customers: It’s bringing a virtual personal element to their online experience, whether on our site or in our marketing, which allows them to connect with the brand in ways they didn’t think would be possible online.

– Damien Alexeev, Head of Marketing
Personalization and Technology, Full Beauty
Brands

It’s when we use our imagination and current technology to solve a problem in a way never done before. Thousands of years ago, there were two important inventions, the wheel and the sack. It was not until 1970 that Bernard D.

← Jelly tail

Sadow attached those wheels to a suitcase to make lives of millions of travelers easier. That’s creativity.

– Vaibhav Jain, Solutions Executive, Strategy and
Solutions Development, IBM Telecommunications,
Media and Entertainment

It’s taking one step further and pushing the boundaries of the story. If Bueller hadn’t used his stereo technology for sick calls and snoring, he’d never have had his epic day off. He pushed. He created a story—a story that is remembered.

– Pam Sahota, Content Director, IBM Originals,
IBM Hybrid Cloud

Getting lifts from strangers is a disruptive thought. Creating a business to allow strangers to stay in a spare room in your flat is lateral thinking. We find creativity in an industry when it fundamentally changes the way it operates.

– Naval Singh, Business Development
Consultant, IBM GBS

As augmented and virtual reality become ubiquitous through the spread of 5G, designers will be forced to redefine the user experience. The era of flat 2D digital is over. How humans experience brands in three dimensions is the new creative frontier.

– Sara Oberst, Associate Partner,
Extended Reality Growth Lead, IBM iX

It’s not technology that makes companies like Apple, Nike, Tesla or Twitch successful. It’s that they’re led by design-conscious founders who place design at the heart of their decision-making. Take Airbnb, whose business took off when it hired professional photographers to shoot highly produced photos of its listed apartments and properties. That took the company from \$200 of weekly revenue to a multi-billion unicorn. Technology is just the enabler that allows the experience to happen.

–Eric Pilkington, Partner, Digital Strategy,
Growth and Innovation, IBM GBS

Creativity in technology can take two forms. The first is creating something new, the invention of new tech. Electricity didn't exist in the early 19th century. Interactive online searches didn't exist in the 1970s. MP3 players didn't exist in the 1980s.

The second is using existing technology in new ways. With ride share, for example, the car is an old technology. We're simply applying a new use to it by requesting rides and having multiple riders use one car.

– Baylee Greenberg, Special Operations Manager, Lyft

In the business of packaged tourism, the Holy Grail is not to find ways to replace the essentials that made offerings great—the seamless door-to-door travel, the carefully curated accommodations and excursions, the expert local guides and the camaraderie—but to complement these basics with more free time and opportunity for holidaymakers to enjoy their own personalized experiences. Native apps with audio and other media, fast-downloading city modules and intuitive route guidance have all enabled experiences that more closely synchronize with travelers' individual ambitions, dreams and specific needs.

– John Boulding, Group CMO, VOX S.p.A.

There's a natural co-dependency between creativity and technology that is hard to ignore. Without human curiosity and creative problem solving, technologies would cease to be invented. Conversely, without new forms of technologies to augment our thought processes and workflows, creativity wouldn't be able to evolve. As we move into the fourth industrial revolution and usher more advanced and AI-driven

technologies into the world, it's going to be increasingly important for human-centered design to drive responsible advances in technology and, in turn, safely augment our intelligence and creativity for generations to come.

– Billy Seabrook, Global Chief Creative Officer, IBM iX

Without creativity, technology gives us the same things we have today, maybe easier, faster or cheaper—as Henry Ford would say, we get faster horses instead of the automobile. It is when creativity intersects with technology that we design and discover new ways to do things, things we never thought we needed, and suddenly they become the only way we want to do things going forward. It will be a new class of modern-day Leonardo da Vincis who integrate art, science and technology that will drive the most impact in our work and society.

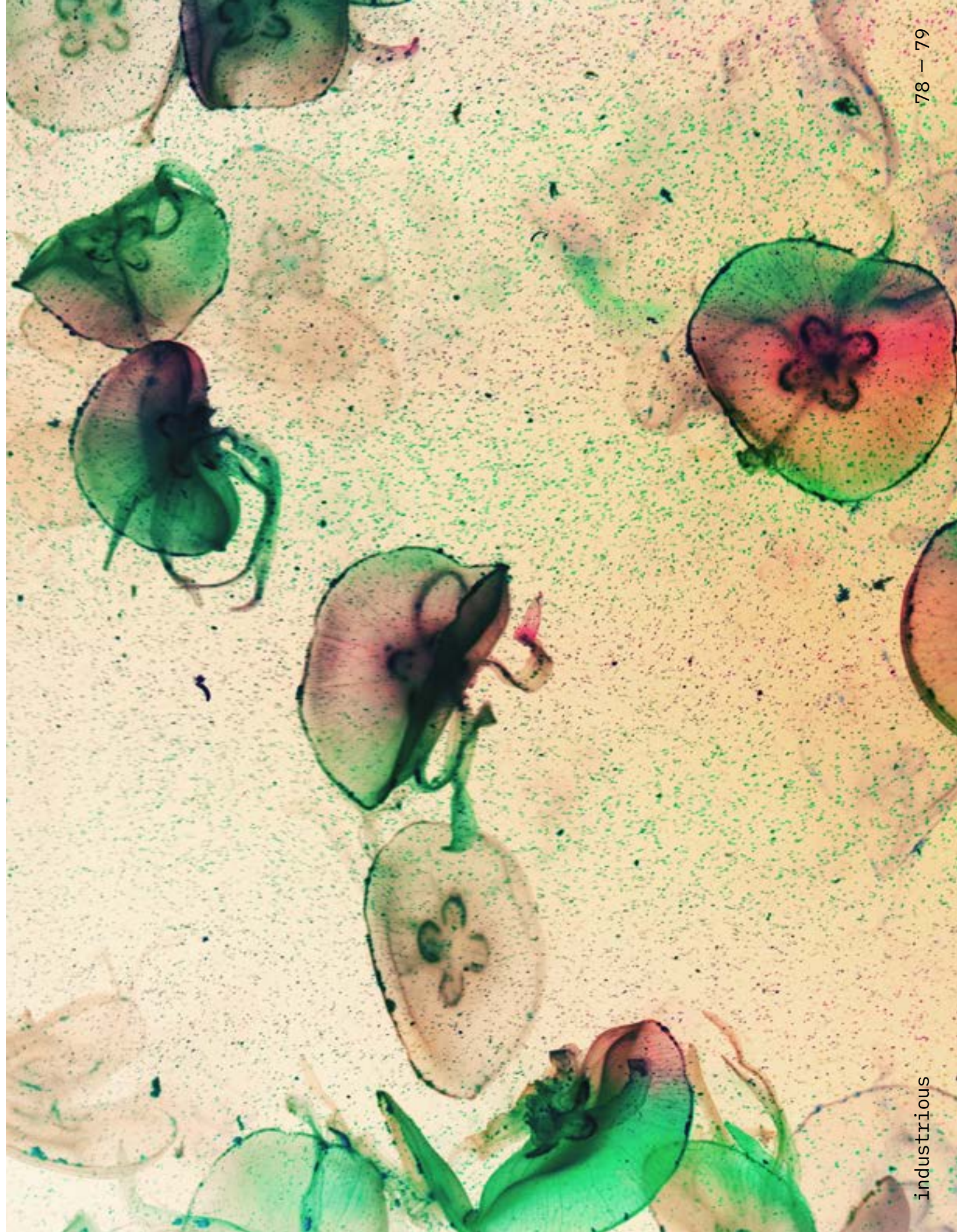
– Jesus Mantas, Managing Partner, Global Strategy, Offerings & Innovation Platforms IBM GBS

The technology is not itself the creative idea. It is the means with which to express that idea. It's not enough to express a bad idea through innovative technology. As creators, we need to use innovative technology as a tool to bring a brilliant idea to life.

– Stu Weiner, Video Producer, IBM Originals

When work feels like play.

– Alysa Lesemann, Content Director and Lead Writer, IBM Watson Health



“What if we define
innovation as openness?
Openness to work together.
Openness to try new
approaches to business.
Openness we can enable
through new technology
and the responsible
flow of data.” – Martin Schroeter

