

DELVE



CES 2021 Report

Joan Neeno



CES Overview



All virtual and kind of a let-down

CES is a trade show people look forward to and dread at the same time. Coming during flu season and packing around 200,000 people from around the world together in Las Vegas, it's pretty much a giant petri dish. You can count yourself lucky if you come home from CES without the sniffles or worse.

But if there's one thing that an all-digital CES showed this year is that this is one trade show that can't be replicated virtually. The biggest buzz from the show is wandering the expo areas, being surprised by the little startups and the unexpected products that you would never be exposed to otherwise. The number of digital exhibitors this year was less than half of who showed up in person in early 2020 –just eking in before the pandemic hit.

There were about 700 startups among those digital exhibitors, but this format made it really difficult to discover them. When you search exhibitors under a certain topic and hundreds pop up, alphabetically, with just their logos in anonymous-looking squares, how do you have any sense of what to look at unless you really know what you're looking for? You don't. It's telling that CTA, the organizer of the show, has yet to release the number of people who "attended" this year's show.

And the announcements from the big players felt more like extended infomercials. They often feel a bit cheesy live as well, but there's more excitement and the energy of the crowd. The painful opening keynote from Verizon, that must have cost a fortune to produce, is 40 minutes of my life that I'll never get back.

Many of the panel discussions were a lot more interesting and you'll see that reflected in our coverage this year. It doesn't feel very CES to me – it's always felt more like drinking through the firehose of hype and STUFF than a thoughtful examination of technology. But these sessions did provide some value.

Let's hope the pandemic is largely in our rearview mirror by January 2022 and CES can go back to being the Vegas-crazed eye candy binge it's been for years. And bring Eureka Park back, please. There are many wonders like AI, AR, 5G, VR, and a whole alphabet full of technologies, but when it comes down to it, we just aren't there yet to have that immersive CES experience that being there, exposed to germs, provides.

See you there, mask on, next year.

Digital health explodes



Here's a mind-blowing set of statistics for you: prior to 2020, only 24 percent of healthcare systems offered any form of virtual care. In 2020, telehealth visits exploded from less than 50 million annually to an estimated one billion in the United States.

"COVID-19 really is a perfect storm," said Vivian Lee, President of Platforms for Verily, Google's life sciences arm, during a recent CES panel discussion. "It's the point where it's advantageous to everyone to move to digital health. The payers are the ones who have the most to benefit if they really drive for evidence that it's improving health. It's a huge opportunity for employers, too. We don't have enough money in our economy to pay for healthcare as it is now, so we need to be more efficient."



The fever data collected by the Kinsa thermometer was an early warning sign

The power of digital health's ability to collect predictive data was on display when Kinsa's connected thermometer started showing a significant spike in people with high fevers across the country early in 2020 that wasn't explained by the flu.

"We caught indicators of COVID-19 everywhere about three weeks ahead of when it presented at hospitals," said Inder Singh, Kinsa's CEO and Founder. "It shows how important early warning is to managing outbreaks."



Verily's Onduo program gained in popularity as older patients wanted care at home

Lee said Verily saw an acceleration of acceptance of digital and telehealth services. In particular, their Onduo online platform for Type 2 diabetes management and glucose monitoring benefitted from older patients concerned about exposure to COVID. Digital health provided a powerful way to help patients manage diabetes at home. Lee saw similar benefits for mental health care.

Dr. Lee Schwamm, VP of Digital Health Virtual Care at Mass General Brigham said he's worried that once the pandemic ends the U.S. will return to the status quo rather than embracing digital health and telemedicine. The biggest obstacle will be payers, who are used to a fee-for-service model and could decide to pay doctors less for telehealth visits, putting them in an awkward position. Adopting a value-based payment model is an important part of the transition. "You can't turn off the fee-for-service engine and expect the system to keep rolling," he said.

Deconstructing the status quo

The continued growth of digital health will require a deconstruction of the current healthcare model, said Deneen Votja, Executive Vice President of UnitedHealth Group. She said more payers will be supportive as digital health demonstrates

its value. It's a natural progression. Much of our society is used to facilitated self-service, which is now common in everything from banking and grocery shopping to buying car insurance. Because of the pandemic, healthcare self-service is arriving about 20 years ahead of when it would have otherwise, she said.

"The problem with telehealth now is pretending we liked the old healthcare system

"We have to do better."

— Deneen Votja, Executive Vice President of UnitedHealth Group

with all its social inequalities, racism, and fixed costs," she said. "We have to do better."

Dr. Schwamm noted that the deconstruction of the traditional model is taking place with remote patient monitoring and home testing that is a much less expensive way to deliver care. Personalized medicine enabled by technology offers the opportunity to move from an acute-care model to early detection and prevention.

But the barriers are significant. Digital health devices need to be just as available to underserved communities as they are to CES attendees. "An Apple Watch is not accessible to underserved communities," Singh said. "I pray we don't forget COVID 19. Once the vaccine is rolled out, we need a concerted effort to make sure we are prepared for the next one."

And availability of technology will play a huge role in preparedness. Smartphones aren't the issue, Singh said. He noted about 80 percent of Americans have them and they're distributed fairly equally around the country. Even so, digital health is at a turning point.

"Ultimately it's about patient voice," Dr. Schwamm said. "Patients need to demand it. We're going to move forward. The question is who we're going to leave behind. Increasingly, if you don't have broadband you're going to be in big trouble."

Healthcare, technology & COVID-19



In early 2020, Abbott Laboratories recognized the need for COVID-19 testing and used their massive resources to ramp up production quickly.

The company developed 11 tests within 10 months and manufactured 300 million COVID tests. That's 15 times the number of flu tests Abbott manufactured in 2019, said Andrea Wainer, Abbott's Executive Vice President of Rapid & Molecular Diagnostics, in a recent panel discussion at CES.

Abbott's BinaxNOW rapid antigen test received FDA approval in December. It's the first at-home, virtually guided test with results available in minutes. Wainer said it is best in detecting COVID within the first seven days of onset. Abbott partnered with telehealth provider eMED to service the tests.

“The home test required us to look at alternate solutions,” she said. “We looked to telehealth to guide a person to take the test, run it, interpret it, and act on it.”

Abbott projects producing 30 million home tests in the first quarter of 2021 and 90 million in the second quarter. “Heavy” rapid testing needs to be done in conjunction with the vaccine roll-out. Wainer expects the first half of the year to be focused on detection and a move to more antibody testing at the back end of the year, as flu season begins. Antibody testing will provide answers about the vaccine’s effectiveness.



BinaxNow is Abbott's home test for COVID-19

Testing is a critical first line of defense that needs to be used with masking, washing hands, and social distancing, she said. Frequency of testing is important to catch people while they are contagious. She suggested the possibility of on-the-spot “digital entry cards” that show a negative test as a way of entry to schools, concerts, and other public spaces.

Technology aids vaccine roll-out

Microsoft has been heavily involved in the logistics side of the vaccine roll-out, according to Dr. David Rhew, Microsoft’s Chief Medical Officer and VP of Global Healthcare.

Starting in May, the company partnered with FedEx to optimize workflows to get real-time info on all package deliveries. FedEx, along with DHL and UPS, have so far delivered 17 million vaccines without much incident. Refrigeration hasn’t been an issue so far, although Dr. Rhew expects challenges when additional vaccines with different requirements are released. But he sees those challenges are relatively minor. The real challenge is getting those vaccines in arms.

The current approach of using healthcare providers, hospitals, and retail clinics to vaccinate the population is insufficient, he said. He sees opportunities in expanding the base to mass-vaccination hubs in arenas and other large venues. Managing the process will be key to avoiding long lines, crowded waiting areas, and frustration among both the public and healthcare professionals.

“Managing the flow of patients coming in and out of the system is going to be *incredibly* important”

— Dr. David Rhew, Microsoft’s Chief Medical Officer and VP of Global Healthcare

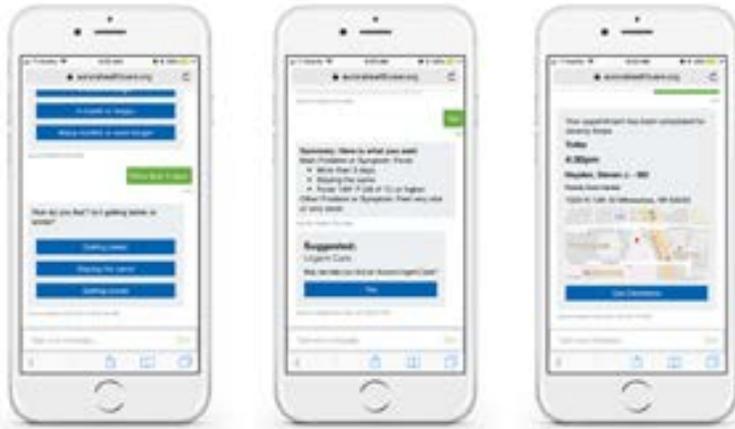
“Managing the flow of patients coming in and out of the system is going to be incredibly important,” he said. Some of the strategies they’re looking at employing are trying to get in front of the crush of demand. Pre-registration programs, scheduling, and appointment reminders for the first and second dose can all be done through digital technology.

Dr. Rhew sees technology, in particular AI, as a way to augment a health care system that is set up for on-demand use, not scale and volume. Research on internet searches about COVID-19 show that many people are looking for information specific to their situation. Chatbots are a way to ease the burden on the healthcare system by providing evidence-based, individualized guidance, including where to get tested and/or vaccinated. These AI systems can be used as modules on websites or integrated into information systems.

As much as technology like pre-registration and chatbots can help, there is going to be a need for feet on the ground as well, he said. “There are still many people who

don't use electronic tools. We will need to supplement technology with campaigns, going out into the communities to talk with individuals who have concerns." Chatbots could help these workers have quick access to answers to the questions people have.

Healthcare Bot



Microsoft's Healthcare Bot, used by the CDC, answered around a million COVID questions a day in 2020

Not surprisingly, a lot of the products at CES speak directly to the pandemic lifestyle and new expectations that come along with it. Lots of masks, air purifiers, and cleaning tech. The difficult part is, with CES being all-digital, it's impossible to tell how real these concepts are and how well they work. Time will tell.

Project Hazel By Razer

Razer's concept design for the "world's smartest" re-usable N95-class mask features active ventilation and UV sterilization/charging through its storage case. It's transparent for lip reading and can amplify the speaker's voice. Filters will be replaceable. There is no price or release date for the mask. According to The Verge, there are still some significant issues to be worked out in the implementation, so we'll see if this ever actually hits the market.



Razer's Project Hazel "world's smartest mask" concept

Airpop Active+ Smart Mask

This sensor-embedded mask monitors air quality and tells you what pollutants it has filtered out as well as when to change the filter. Designed for people who exercise outdoors, it also tracks your breaths per minute. All that for just \$150 and available soon.



AirPop's smart mask is designed for people who exercise outside, apparently in smog



It's a mask! It's a phone! It's MaskFone!

Maskfone

This machine-washable fabric mask has an N-95 filter, built-in microphone, and attached earbuds for clear calls without that annoying mask muffle. If synched with a mobile app, you can connect with Alexa or Google assistant through your mask. Can't you already if you just talk loud enough? Hmm. Anyway, it costs \$50 and comes with three filters. It will be available at retailers like Target and Amazon starting in February.

Biobutton By Biointellisense

This silver-dollar sized sensing device adheres to the upper chest and continuously tracks temperature, respiration, heart rate, activity level and sleep. BiointelliSense says that after a few days of data collection, the BioButton can help identify a possible coronavirus infection before you notice you're sick. The rub is that it can't distinguish between coronavirus and the flu, so you would still need to be tested. It has been cleared to collect vital signs at home by the FDA and is already being used by healthcare providers. Continuous vital sign monitoring could be more useful for COVID 19 screening than spot temperature checks, which only reflect a snapshot in time, but comes with the expected privacy concerns.



BioButton provides continuous vital sign monitoring

LG CLOI

UV-C technology has become the new “it” technology for sterilization. It's safer than the traditional UV sterilization that's been used in hospitals for years, but it still has its risks to skin and eyes. There are a number of companies coming out with sterilizing technology for home and autonomous robots, like this one from LG, that is designed to clean high-traffic, high-touch areas in retail spaces, restaurants, grocery stores, etc.

Since coronavirus is largely spread through the air, rather than surfaces, some health experts call UV-C surface cleaning “hygiene theater.” While the air purifiers shown at CES offer some potential benefits, none are the silver bullet to safely and reliably purge the air of coronavirus particles that we all wish existed. But hygiene theater may be the price of business for years to come after the pandemic.



LG autonomous robot cleans surfaces with UV-C light



Sustainability gets its moment



In some ways, CES seems like a strange place to talk about sustainability.

A lot of the technology highlighted is pretty frivolous and highly disposable. But a growing number of companies are at least nodding toward sustainability and transitioning to a circular economy.

In a panel discussion at CES, Virginie Helias, Chief Sustainability Officer at Procter & Gamble discussed their global priorities of reducing waste (particularly plastic) and water consumption. Their goal is that by 2030, no P&G packaging finds its way into the ocean and plastic use is reduced by 50 percent.

She mentioned their involvement in [Loop](#), an online shopping platform that features durable packaging for many products that are picked up in a special tote bag, cleaned and refilled – making it a zero-waste solution.

Phillips is also doubling down on sustainability, looking at the materials they use, re-using more components, and, even more radically, changing their business and service models, said Robert Metzke, their Head of Sustainability. The company's operations are slated to be carbon neutral by the end of this year.

He talked about the transition to a service-oriented rather than transaction-oriented mindset at Phillips. For them, that means selling monitoring and diagnostics as a service in hospitals and clinics rather than selling a costly MRI machine.

"...sustainable business is not just a better way of doing business, it's the *only way* of doing business."

— Robert Metzke,
Head of Sustainability for Phillips

"I think COVID is an enforced break on business as usual," he said. "It's really a pause and reflect button for businesses and I think it shows what we can do together when we put our shoulders behind something. I think it's an exciting opportunity to rethink how we organize our societies and our businesses."

In the next three to five years, there will be significant changes, he predicted. Consumers and investors are looking at sustainability practices when deciding where to spend and invest.

"You will see an increasing number of businesses that realize that sustainable business is not just a better way of doing business, it's the only way of doing business. We only have one planet, and it places hard boundary conditions on how we conduct business. There's no outsourcing beyond our planetary boundaries. "

Here are some interesting, sustainability-minded products highlighted at CES:

Lasso recycling robot

Do you ever wonder about how much of the stuff you put into your recycling container actually gets recycled? Not as much as you think. Around half of recycling ends up in a landfill and over 90 percent of plastics are not recycled. Lasso is a startup with a robot that recycles glass, metal, and plastic into "pure" reusable material. The robot has a sensor to ensure an item is recyclable. It then washes the item to prevent contamination, grinds it down, and stores it until Lasso picks it up once a month. An app shows you how you're reducing your carbon footprint and helps you track credits to your account for the value of your recyclables. The robot is scheduled to ship in September 2022 and the company is launching pickup service in the San Francisco Bay Area and then will expand throughout the United States. Projected cost is around \$3,500.



Lasso recycling robot

Samsung solar remote

With the Eco Remote, Samsung is taking a small, but very practical approach to sustainability. The remote, which will come with its 2021 lineup of 4K and 8K QLED TVs, has a panel of solar cells on its back that charge the internal battery. It's made with less plastic, and over of quarter of it comes from recycled polyethylene terephthalate. The remote should last for two years before it needs a full recharge, which can be done through a USB-C port. Samsung estimates these remotes will reduce the number of AAA batteries recycled by 99 million over the next seven years (the estimated life cycle of the remote).



Samsung Eco solar charging remote



Chipolo ONE Ocean Edition



Chipolo ONE Tracker

This [Bluetooth tracker](#) tag is made from fishing nets, trawls, and ropes collected from shallow areas of the ocean near shorelines. According to Chipolo, at the pace we're currently dumping plastics into the ocean there will be more plastic than fish in the sea in 30 years. The company has committed to pledge \$1 from the profits of each ONE tracker (retails for around \$29) to the non-profit Oceanic Global to support ocean clean-up.

Low-cobalt batteries

While electric vehicles (EV) offer many advantages for a cleaner environment, their batteries have been an ongoing problem. In recent years, companies like Panasonic and LG have been working to make them safer for the environment and more just for society. In particular, by reducing the amount of cobalt used in the batteries. Cobalt is primarily mined in the Democratic Republic of Congo under dangerous conditions (and possibly by children in some cases). Panasonic, which partners with Tesla, unveiled batteries that are under five percent cobalt. They are aggressively recycling the metals used in the production process to reduce waste and expect to completely eliminate cobalt within a few years. They will replace cobalt with cheaper materials like nickel that could eventually bring the cost of EVs down further. LG's batteries for General Motor's EVs use 70 percent less cobalt, replacing it with aluminum

GM Ultium Battery



Home is where everything is



If your home is your castle, during the pandemic it's also your office, classroom, coffee shop/restaurant/bar, gym, entertainment venue, spa, and, yeah, that place where you sleep.

Several panel discussions at CES 2021 touched on how technology played a huge role in making the abrupt transition to remote work. So, what can we expect moving forward? A different approach to working, but probably an old-school approach to education.

"I don't think remote learning for K-12 is going to stick long term," said Jennifer Kent, Senior Director of Parks Associates. "I think this has shown that kids generally benefit from socialization."

For adults, however, remote working offers benefits like greater flexibility and the end of lengthy commutes. But the lack of spontaneous conversations that spark creative ideas and the inability to pick up on body language in a videoconference call will limit the appeal of purely remote work, said Paul Lee, Head of Technology, Media and Telecommunications Research for Deloitte.

“Zoom and others are great at replicating meetings, but business is not just the boardroom,” he said. “What’s really hard is communicating using a 2D screen. It’s difficult not having the physical feedback. You see visual rectangles of faces, but you can’t see whole body language. I expect most people who can do so will go back to the office as much as they can.”

Most of the experts at CES expect work to take a “hybrid” approach – a mix of remote and in-office work.

But despite spending a ton of time in our homes, they are not changing all that much. According to Kent, less than 30 percent of consumers have at least one smart device in their home. The biggest growth area in smart home tech has been in

“Smart home devices are amazing but don’t really contribute to helping address *real-life problems*,”

— Megan Wollerton, Senior Writer for CNET

security, where costs have come down dramatically, as well as the fast adoption of smart TVs.

“Smart home devices are amazing but don’t really contribute to helping address real-life problems,” said Megan Wollerton, Senior Writer for CNET. “They don’t help with the chores like cooking and cleaning.”

So, what will stick? Adoption of online shopping exploded during the pandemic. Older consumers who were wary are now largely used to ordering online. Call-ahead or online ordering and curbside pickup provides real time savings that Kent thinks people will expect from now on. In the future, she expects pickup lines to be built into the infrastructure rather than the cobbled-together approach most grocers, restaurants, and retailers used to address the sudden demand.

Here are some of the cooler technologies at CES for your castle/office/everything:

Linksys Wi-Fi 6E Router

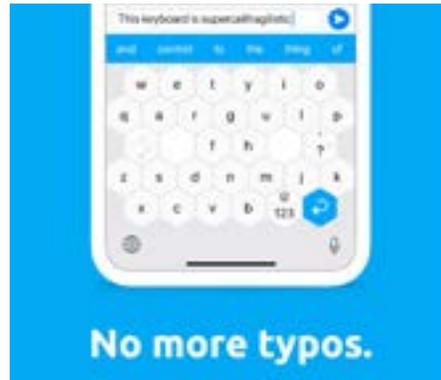


Linksys wifi 6E

One of the biggest frustrations of working from home is slow, spotty Wi-Fi. A new Wi-Fi band is available to help ease mobile congestion. The 6GHz band (6E) promises more capacity, stronger signal, and faster data transfer. Linksys says 6E provides a “crystal clear signal” and “ultra-fast” speeds for all devices, including the latest AR and VR and 8K streaming devices with “nearly limitless” bandwidth. Its [\\$450 mesh router](#) employs all three Wi-Fi bands for better speeds with any device, but if you want to take full advantage of 6E you’re going to need new hardware.

Typewise

Are you all thumbs when it comes to typing on a mobile device? The [Typewise app](#) may be just what you need. It's a next-generation smartphone keyboard with larger keys which the company claims leads to 80 percent fewer typos. Best of all, it's free.



Typewise app

X Chair X-HMT



Gear Future Seating X Chair Mood 01

Along with crappy wireless, one thing most of us have experienced over the last few months is a sore bottom and tired lower back after sitting on a dining room chair for eight hours of computer and Zoom joy. [The X-HMT Heat & Massage Therapy Chair](#) is sort of like ergonomic furniture porn – it promises better circulation, improved productivity, and stress/anxiety reduction for just \$900 or more. It features several settings for massage along with continuous heat in 15-minute intervals. It also whispers affirmations in your ear ... Actually, it doesn't but that would be cool, wouldn't it?

Dell Ultrasharp 40 Curved Monitor

Is your home office (or dining room table) cluttered with multiple monitors? Well, you could trade those in for this



Dell Ultrasharp ginormous monitor

ginormous monitor with 5120 x 2160 resolution. You can fit the equivalent of three to four screens on this baby at full size. You might also be able to actually see facial expressions among the Brady Bunch-like lineup of faces during large Zoom meetings.

Cuzen Matcha Machine

Working from home means no more office coffee or stopping by your favorite spot before or after work for a little pick-me-up. The media covering CES has been going absolutely nuts over this [matcha machine](#) from Cuzen. It grinds the tea and prepares a perfect cup. We will admit to being ignorant about the joys of matcha and how much a prepared cup costs, but at \$369 you probably need to like it a lot to justify the expense.



Cuzen Matcha Machine

Home Personal Trainers

After the huge success of Peloton in the last few years, it's not surprising that NordicTrak, Bowflex, and even Apple are getting in on the act with streaming

fitness services featuring guided workouts paired with smart home fitness equipment. With so many people concerned about the safety of going to the gym, the combination of hardware and content is a popular one.



Bowflex T22 Lifestyle Treadmill

LG InstaView Door-In-Door With Craft Ice

InstaView door, meh. Giant balls of craft ice that melt slowly in my bourbon at the end of the day? Now we're talking! The spherical ice and large cubes that are preferred for many cocktails typically require a mold or old-fashioned ice cube tray (or carving blocks of clear ice if you're really hard-core [This LG refrigerator](#) automatically creates crushed, cubed, and round ice. It's not crystal clear, but you're not going to get that at home (or most bars anyway. It's \$4,000, so make sure you drink a lot to get your money's worth.

JBL Bar 5.0 Multibeam Dolby Atmos Soundbar



JBL Bar 5.0 Multibeam Dolby Atmos Soundbar

You're limber from being massaged all day while you work, you've got your glass of bourbon with bougie craft ice – now it's time to relax in front of your smart TV (and as always there were a ton of them at CES) and stream a movie. JBL claims its new compact soundbar, which will be available in the spring for around \$400, provides surround-sound immersion without the need for a separate subwoofer.

Stillness Bath

After enjoying the movie and perfectly chilled bourbon, relax in a bathtub inspired by Japanese forest bathing (whatever that is, but it sounds cool). If you're up for paying \$6,000-\$16,000 for a bathtub, you can luxuriate in Kohler's Stillness Bath. It comes with mood lighting, an app that controls the amount and temperature of the water before you dip your big toe in, and a moat around it for that infinity-pool feeling. If you don't sleep like a baby after all that, maybe you need to get out of the house more.



LG InstaView Refrigerators with Craft Ice (above) Kohler Stillness Bath (below)



5G starts revealing its potential



At CES in 2019, Verizon Chairman and CEO Hans Vestberg gave the opening keynote address about the upcoming advantages of 5G. Speed. Latency. Capacity. It was on the horizon, but still largely an unknown that consumers could only imagine – unfortunately for some in rather dark and strange ways.

Two years later, Vestberg was the opening keynote speaker at the all-digital CES. He was there to talk about the adoption and possibilities of 5G, with 2020 being the year that networks were starting to provide 5G connectivity in appreciable ways and more devices were becoming available to take advantage of it.

In many ways, 2020 was a strange year for the wider deployment of 5G because people weren't particularly mobile. We were largely home, using Wi-Fi that is readily available if often frustrating in its performance. A lot of smartphones have come out with 5G capability, but available speeds on the national platforms are uneven. Your smartphone that can handle the faster speeds of 5G might not be delivering on that promise yet.

Be patient, it's coming, was the message that Vestberg and other speakers at CES delivered. The city centers, large offices, stadiums, museums, and performance venues where all this connectivity could enable immersive experiences are sitting empty right now. But when we can get back together, 5G is poised to revolutionize how we live.



Verizon CEO Hans Vestberg at CES 2021

“The biggest misconception is it’s just another G,” said Anne Chow, CEO, AT&T Business. “More speed, more fancy devices, and so what? But what I think is so powerful is 5G is a really critical ingredient, and enabler, in terms of next-generation networking and connectivity coupled with device innovation, and demographic shifts in the workforce. What 5G represents is that next generation of innovation. It will infuse into every aspect of our lives. It will infuse gaming, change retail, manufacturing, healthcare – there’s no facet of society that does not have an opportunity to innovate with 5G.”

Alejandro Holcman, Senior Vice President, Engineering, Qualcomm Technologies, said the pace of this transition and the spotty availability is similar to the shift from 3G to 4G but this process is more complex. Still, more than 200 million 5G devices have been shipped to date, he said.

There are “*better*” on 5G experiences and “*only*” on 5G experiences

— Drew Blackard, Vice President of Product Development for Samsung Technologies

We really don't know the capabilities of 5G because we haven't fully experienced it, according to Drew Blackard, Vice President of Product Development for Samsung Technologies. There are “better” on 5G experiences and “only” on 5G experiences, he said. He mentioned Samsung's partnership with Google to create a fully HD video chat platform, and Cloud gaming on the Xbox. These are the “better with 5G” experiences but the “only” experiences are still being defined.

For example, both he and Vestberg mentioned augmented reality experiences at football games. Not only does 5G provide the foundation for real-time immersive experiences while you're sitting in the stadium, but it also has the capacity to handle 100,000 people doing the same thing in that stadium at the same time.

Vestberg talked about 5G projects Verizon is working on with the Smithsonian, NFL, and Live Nation venues that will change those experiences – once we can get out and experience them.

Several speakers mentioned that 5G will be the technology to truly enable autonomous driving because of its lack of latency. Edge and cloud computing

powered by 5G offers up lots of interesting opportunities for real-time data that informs smart homes, cars, factories, supply chains, education, and pretty much all other facets of both consumer and commercial business where AI and machine-to-machine communication will drive improvements.

5G could also play a big role in bridging the digital divide, Blackard said. Currently, nearly 20 percent of Americans don't have access to broadband and getting the wiring into these areas – many of them rural and geographically challenging – is a costly and difficult endeavor.

Mobile data usage spiked by 20 percent in the last year. "People are finding the fastest device they have is the one in their hands," he said. "As 5G gets built out there are going to be people in the country who effectively get the equivalent of broadband for the first time through 5G, both through the distances it can carry and the speeds that it can deliver."

Considering access to healthcare, remote working, operating a business, shopping, and so much more is increasingly related to high-speed connectivity, bridging the digital divide may be the most transformational change 5G brings many underserved Americans in coming years.

To Michael Miebach, CEO of Mastercard, 5G, Cloud computing, and bitcoin are going to be shapers of the future of commerce and how businesses operate. "Trust-enabling" technologies will help businesses rethink their world.

"We have a unique opportunity where we need to rebuild after this crisis," Miebach said. "Looking at getting back on our feet is going to take a different approach. We can hire more widely around the world and not have to be in a big city."

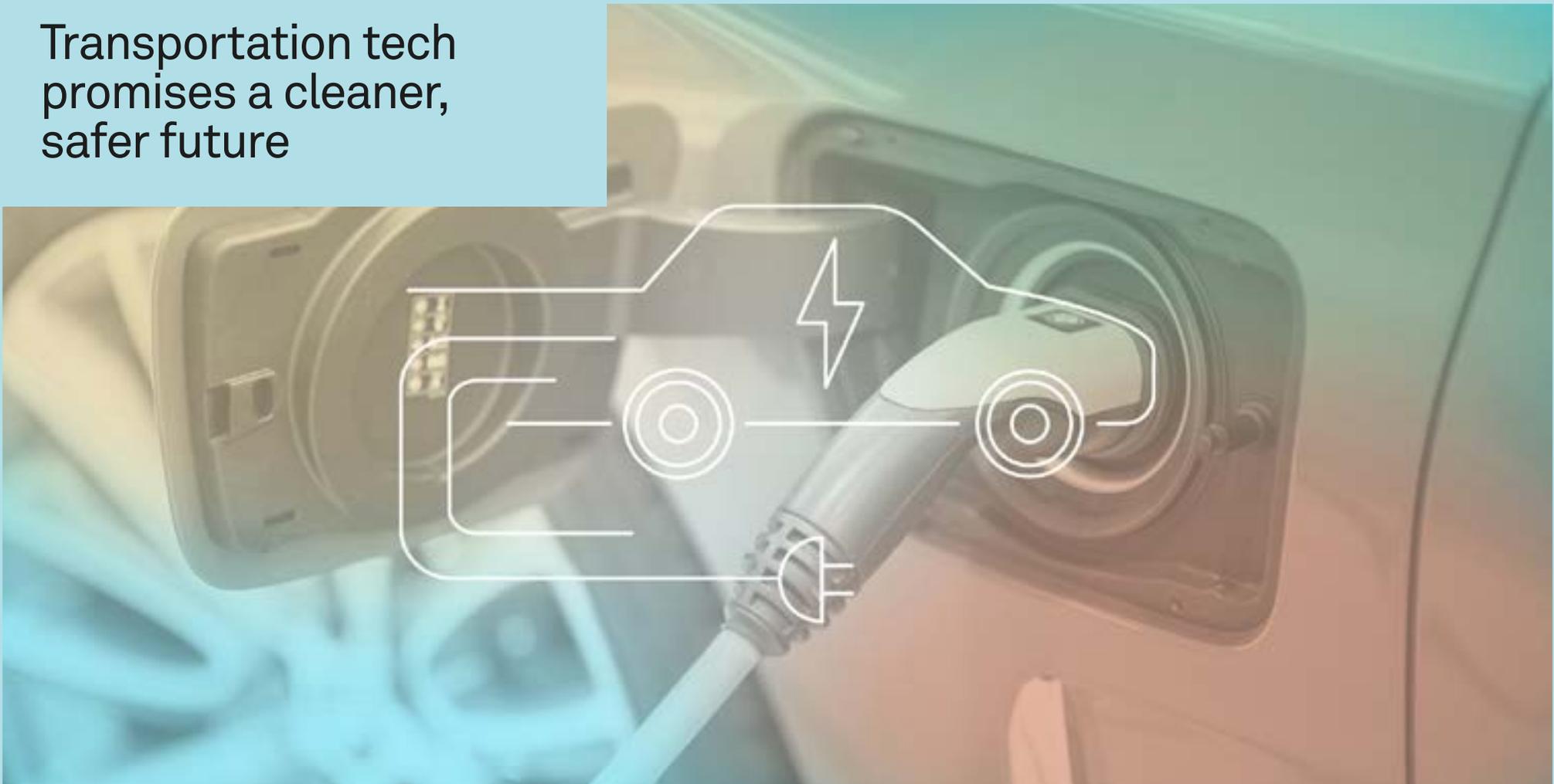
From shifting to a stakeholder capitalism focus to putting real muscle behind racial, geographic, and financial equity, Mastercard is taking a 10-year view of a quickly shifting future, he said. "There's no going back."

“There’s no going back.”

— Michael Miebach,
CEO of Mastercard



Transportation tech promises a cleaner, safer future



The vehicle expo area of CES has been one of the most exciting parts of the trade show in recent years. Given that attendees couldn't see and interact with the real thing (or super-cool prototypes) this year, it just wasn't the same.

But hopefully 2022 will bring the ability to gather in person again and experience new automotive technology close up. Because there are technological advances such as 5G and lidar that will make autonomous vehicles more than an aspirational concept within a few years. Many tech experts mentioned that the lack of latency, speed, and capacity of fully deployed 5G systems will make autonomous vehicles truly viable in the near future.

Mobileye, which was bought up by Intel in 2017, announced that it will use crowdsourced mapping, a camera-based computer vision system, and a lidar suite to safely put highly automated cars on the road by 2025. Pending regulatory approval, Mobileye plans to have test vehicles on New York City streets by the end of this year.

Just how complicated your car is going to get was highlighted by Bosch in a CES presentation. Chew on this ... a typical car had 10 million lines of code in 2010. Bosch estimates there will be around 500 million lines of code in your car as autonomous and semi-autonomous technologies go into production. Nothing can go wrong, right?

In addition to exciting advancements in autonomous technology, the move to low-cobalt batteries, which will be better for the environment and less costly, is good news on the EV front. Here is some of the cool technology that was on virtual display at CES 2021:

Mercedes Hyperscreen

Mercedes-Benz EQS hyperscreen



If you pop for a Mercedes-Benz EQS electric luxury sedan this year, make sure everybody looks at your dashboard because it's going to be well, impressive.



You and your passenger will each get 12 x 3-inch personal screens with an 18-inch control panel screen in between. Mercedes says the Hyperscreen, with its all-touch functionality, will prevent distractions, although it's kind of hard to imagine how with a 55-inch HD screen immediately under your windshield.

GM Brightdrop

General Motors was all-in on CES this year, announcing lots of stuff that ranged from practical to concepts (flying taxi) that are likely to never see the light of day. One thing that will be showing up is [BrightDrop](#), their electrified and connected delivery ecosystem. The EP1 delivery box can move up to three miles per hour, guided along by the touch of a delivery worker as he moves goods around the warehouse or delivers packages to homes. The box can carry up to 200 pounds of cargo. The EV600 is a light commercial delivery truck with a 250-mile range. Its sidewalk side opens up like the awning of a food truck for quick loading and unloading. Given the new reality that we're shopping less in brick-and-mortar stores and ordering more online, technologies that make life easier on delivery workers is a very good thing.



GM EV600, BrightDrop ecosystem

Panasonic AR HUD

Panasonic's new 4K-resolution [heads-up display](#) (HUD) mixes 2D information such as vehicle speed, speed limit, and fuel range with 3D overlays of navigation directions, which appear to be cast spatially onto the road ahead. The system calls out bicyclists with a yellow symbol on the display and highlights objects in the road, as well as accidents ahead. It has a 180-degree field of vision and can see 90 meters ahead across three lanes, detecting and displaying new information in less than 300 milliseconds.



Panasonic Heads Up Display

Cadillac's Flying Taxi

What's CES without a flying taxi? This year it was Cadillac's turn, with a single-seat, all-electric, self-contained aircraft. It's like a little commuter drone to get you from your home terrace to your office rooftop. The vehicle would be completely autonomous, which is good because flying this thing looks kind of terrifying.



Cadillac flying taxi

What's CES *without* a flying taxi?

Sion Electric Car

[Sono Motors' Sion electric car](#) is covered with 245 solar "pucks" combined with a 35-kWh battery that can be charged through a standard EV charger. Its maximum range is 158 miles, but it can recharge itself enough for up to 21.7 miles daily if it's sunny. Built in Sweden, it will launch first in Europe with an anticipated list price around \$26,000.



Sono's Sion Electric Car with 245 solar "pucks"



CES 2021 Report

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