

Delivered.

The Global Logistics Magazine

ISSUE 02/2021

BUSINESS

AMERICAN DREAM

Discover why the U.S. is on the road to post-pandemic recovery

SOLUTIONS

SECRETS OF SUCCESS

Understand the skills that can help you achieve success in business

VIEWPOINTS

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PUBLISHED BY DEUTSCHE POST AG

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DE 16w9838187

Commercial Register No.
Registration court Bonn,
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VIDEO LINK

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Dear Reader,

We are making some exciting changes at *Delivered*. The magazine will now be exclusively available on our online platform, **delivered.dhl** – so the issue you are holding in your hands will be the last print version.

From the outset, *Delivered* was created to give our customers and readers a regular round-up of news, views, analysis, trends and insights from the world of logistics and business. Over the years, key executives from some of the world's greatest companies, academics from leading institutions and a colorful mix of personalities have graced our pages.

Our reach has been truly global. We've reported from countries all over the world, traveled the Silk Road, sailed through the Panama Canal, and even blasted off into outer space. Looking ahead, our mission will be to continue to educate and inform.

However, the pandemic has altered traditional marketing channels, highlighting the need for us to prioritize digital content. Indeed, our engagement with customers has become stronger than ever on online platforms. That's why we have reached the decision to sharpen the focus of *Delivered* and make it an exclusively digital experience.

But while our format is changing, our remit has not – and the content we produce will always be of the same high quality that you have come to expect. So please remember to bookmark **delivered.dhl** so that you can continue to enjoy the latest stimulating business and logistics articles, interviews and thought leadership essays online.

In the meantime, I hope you enjoy this last print issue, which includes a report on the **technology sector** boom of the last year and the unprecedented supply chain challenges created by this spectacular surge in demand. There's also an **Executive interview** with the Head of Supply Chain Sustainability at Cisco Systems to find out how the company is supporting the circular economy; a look at what the new **African Continental Free Trade Area** could mean for African regional and international trade; and the ways in which leading entrepreneurs develop **strategies and tactics for business success**.

Enjoy your read and see you online!

Sincerely,

Katja Busch
Chief Commercial Officer, DHL

NEWS



BENVENUTO IN THE NEW SOUTHERN HUB

DHL Express has cut the ribbon on a new international logistics hub at Malpensa airport in Italy. The state-of-the-art Milan site is strategically located in the cargo gateway to southern Europe, where DHL will be able to operate more than 30 daily flights and process nearly 38,000 pieces per

hour through automated sorting and scanning systems. The facility, which employs 900 people, has been built at a cost of €110 million (\$118 million), a third of DHL Express's total investments in Italy. Joining hubs in Leipzig, Brussels and East Midlands (U.K.), it is the fourth biggest in Europe.



VISUALIZING THE FUTURE

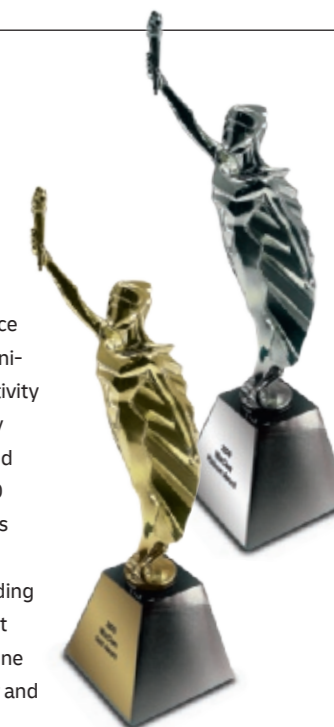
Holograms are nothing new; the technology is some 70 years old, with the first optical holograms created in the 1960s. But producing them on a computer has traditionally been time-consuming and needed vast amounts of processing power. Now, researchers at MIT have developed a way to create holograms almost instantly, using a deep learning application that

can run on a laptop. The new method, called tensor holography, could enable the creation of real-time, moving-image holograms for virtual reality, 3D printing, medical imaging and more. The technology, which can even run on a smartphone, could finally bring commercially available holograms within reach.

 bit.ly/tensorholography

ACCOLADES FOR DELIVERED.

Delivered magazine has been honored in the annual MarCom Awards, which recognize excellence in marketing and communication as well as the creativity and hard work of industry professionals. Issues 2 and 3 of *Delivered* from 2020 won a total of nine awards – six platinum and three gold – in categories including Corporate Magazine, Print Magazine Design, Magazine Concept, Magazine Cover and Feature Article.





LEADING THE CHARGE

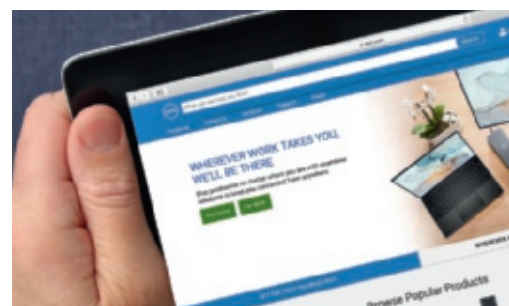
Electric freight vehicles have so far mainly been used within cities and urban areas. Now DHL Freight has joined forces with Volvo Trucks to speed up the introduction of heavy-duty electric trucks on longer distances. The partnership will include pilot tests of an electric Volvo FH truck, which can carry gross combination weights of up to 60 metric tons. The truck began operating in March between two DHL Freight terminals in Sweden, a distance of 150 kilometers (93 miles). DHL recently introduced the first purpose-built electric Volvo truck for city use in London, and Volvo wants its entire truck sales range to be fossil-fuel-free by 2040.

 bit.ly/electricpartners

THE FAST LANE WITH DELL

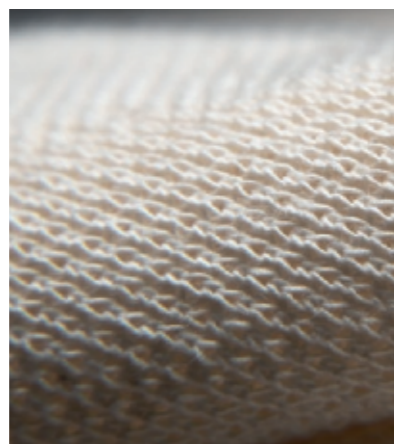
DHL Customer Solutions & Innovation (CSI) managed to accelerate business for Dell Technologies and its rising yearly volumes by teaming up with DHL Global Forwarding, DHL Freight and DHL Parcel U.K. Together, they designed a direct shipping supply chain that significantly reduces lead times for Dell's tech products coming out of China. Shipments go through fewer facilities, instead using DHL's Amsterdam base to reach their destinations in France, Germany and the U.K. in under 10 days. The result? Hospitals, schools and universities have faster access to the technology needed to fight the pandemic.

 bit.ly/dellaccelerated




\$100 TRILLION

The total investment needed to meet the 2050 Paris Accord climate targets over the next 30 years, according to banking chiefs at HSBC



FIBER FASHION

Plant-based diets are quite the thing, but what about plant-based clothes? Or handbags and shoes? Illinois-based startup Natural Fiber Welding is taking plant-based materials and melding them into fibers that behave like synthetics but feel like leather. Their leather-like Mirum can biodegrade or be recycled easily, leading to less waste, all benefiting the circular economy.

ROBOTS GET A GRIP

A Danish robotics company has launched a new magnetic gripper which, they say, will allow for unprecedented levels of control. While conventional grippers only provide simple on/off functionality, OnRobot's MG10 offers adjustable force settings to allow it to tackle different sorts of tasks, and will have a wide variety of applications in the manufacturing, automotive and aerospace sectors. The installation of industrial robots more than tripled worldwide – to 381,000 – between 2010 and 2019.



Photos: DHL (3); Adobe Stock (2); OnRobot Natural Fiber Welding; True Images/mauritus Images; Bremen Linsley/dpa; Josh Partee/courtesy of MAG/Michael Green Architecture



TURN TO STONE

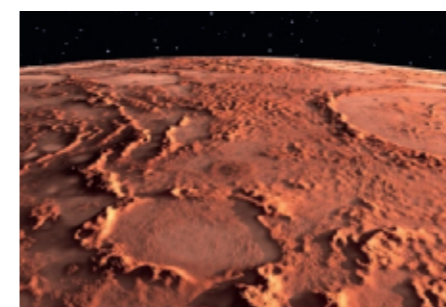
On a hillside in southwestern Iceland, workers are bringing together an ambitious plan to extract carbon dioxide from the air and turn it into stone underground. Icelandic firm Carbfix is collaborating with Swiss company Climeworks on the project, called Orca, which will use eight shipping container-sized collectors, each with 12 huge fans to suck in air and filters to trap carbon. The captured carbon is combined with water to form an acid that is pumped between 800 and 2,000 meters below ground, where 95% of it will petrify

– or turn to stone – within two years, locking up the greenhouse gas for millions of years. A pilot scheme at the site has already been able to catch and store 50 metric tons of carbon each year, and it is hoped that could increase to 4,000 metric tons when the plant is fully online.

To read more about carbon capture, turn to page 19.

FAREWELL TO THE CONCRETE JUNGLE

Could wood be the 21st century's concrete and steel? Vancouver-based architect Michael Green certainly thinks so, and is pioneering the use of cross-laminated timber (CLT): panels engineered by gluing layers of wood together, giving them enough strength to build skyscrapers. Among the many benefits of the new generation of so-called "mass timber buildings" is that wood acts as a natural carbon store and, if it is sourced from sustainable plantations, can help reduce deforestation. CLT is surprisingly fire-resistant, and greatly reduces construction times when used in building. Importantly, Green believes, using natural materials in urban environments can be good for our physical and mental well-being too.



IS THERE LIFT ON MARS?

NASA's Perseverance mission to Mars has achieved an exciting first. Ingenuity, a small helicopter drone, lifted off and was airborne for less than a minute, but has now proved that it's possible to perform powered, controlled aircraft flight in the thinner Martian atmosphere and with its reduced gravity. This now opens up the potential of sending more advanced aerial vehicles to the Red Planet, which could then explore previously inaccessible areas.

 bit.ly/ingenuityonmars

SEISMIC SHIFT FOR B2B

Just as the past year has seen a sea change in the consumer retail market, experts predict a similar effect to wash over the B2B e-commerce sector too.

A new white paper from DHL Express predicts that 80% of all B2B sales interactions between suppliers and professional buyers will take place digitally by 2025 – and by 2027, the market will increase by more than 70% to \$20.9 trillion. The white paper looks at the factors driving this shift – from trends that have been accelerated by the pandemic to the tech-savvy millennials whose purchasing power is making its mark – and explores how businesses can adapt to this new landscape.

Download the white paper at:

 bit.ly/ecomgrowthwhitepaper



676



The number of passenger coaches being moved by DHL Industrial Projects – the largest order of rolling stock in Hungary's history. The coaches are being transferred from their production site in Dunakeszi to Egypt over the course of 32 months.

 bit.ly/coachescrosscontinents

TECH-TONIC SHIFT

In a tumultuous year, the technology sector has boomed. But stronger than expected growth has brought its own supply chain challenges.

10

Percentage by which PC sales spiked in 2020, after a decade of decline, increasing to around 300 million units

The humble laptop computer is the unsung hero of the technology world: widely used, but rarely loved. Journalists and industry analysts have been forecasting the demise of the category for years. Supported by the internet and cloud computing technologies, smart phones and tablets can already do most things people once needed a “proper” computer to accomplish, and those devices don’t need to be lugged around in a heavy, dedicated bag.

Then the world changed. In 2020, after years of stagnant growth, PC sales spiked by more than 10% to around 300 million units. You don’t need to be a market research specialist to see why. The COVID-19 pandemic forced work, study and social lives to change overnight. Instead of catching up on emails in the airport business lounge, jet-setting executives were confined to their home offices or spare rooms for months. Teachers taught classes via video conference. Even family gatherings shrank to a grid of faces on a screen. In this strange new environment, the



unglamorous laptop suddenly looked like the best tool for a multitude of jobs.

It wasn’t just end user devices that experienced an unexpected boom during 2020. Behind the scenes, a wide range of technology-based companies also saw a surge in demand. Providers of video conferencing services had to cope with thousands of new users. E-commerce activity spiked as health protection measures kept shoppers out of stores. Many of the organizations that provide these services needed to buy or rent significantly more server capacity to keep their systems running.

Meeting the need

In a period when the global economy was enduring its deepest recession since World War II, forecast-beating sales figures put the technology sector in an enviable position. Yet fulfilling last year’s surging demand created significant challenges across the industry.



DATA DRIVEN: Tech organizations need more server capacity to keep up with demand.

OUR OWN DEVICES: COVID-19 has made us even more reliant on tech connectivity.

Photos: Benis Arapovic/Adpp (previous page); Adobe Stock (2); Deepol/plainpicture; Dmytro Zinkevych/mauritus images; Zhai Huyong/dpa

The sales spike wasn’t the main problem. In a business driven by rapid innovation and short product lifecycles, technology players had become extremely adept at ramping production and distribution up or down as needed. But until now, they haven’t had to perform these supply chain gymnastics in the middle of a pandemic.

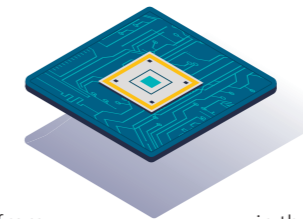
For equipment makers, the initial worry was manufacturing capacity. The countries hit first by the pandemic were the same countries that play a central role in much of the technology supply chain, from the production of semiconductors to the assembly of finished products. The strict lockdown in China’s Hubei province sparked fears that government-imposed restrictions would paralyze economies across the region, with factories forced to close.

Ultimately, however, it was wider supply chains that proved the more significant challenge. The effective response by health authorities across Asia allowed countries to keep their economies moving, but the growing crisis disrupted economic activity right around the world, forcing companies to rethink their global logistics and distribution networks.

Every industry faced logistics complexities during the pandemic as countries introduced tighter border restrictions, delaying the movement of critical shipments. In the technology sector, however, it was the dramatic reduction in airfreight capacity that created the biggest problems. High-tech companies have long relied on airfreight to distribute their small, high-value products, and much of that freight travels as belly cargo in scheduled passenger jets. When the crisis brought international passenger travel to a standstill, that capacity disappeared from the skies.

“There was obviously a lot of work required to replace belly-cargo capacity,” says Alexander Gunde, President, Global Technology Sector, DHL. “But we also saw our technology clients changing their logistics models to accelerate the flow of products to their customers.”

For a number of customers, he continues, this involved bypassing regional distribution centers altogether and shipping products directly to end users. “They had supply chains that were set up for B2B logistics, with large shipments to a small number of destinations. Suddenly, they needed to operate in a B2C mode, moving individual products to thousands of customers around the world.”



CHIPPING IN: China, one of the largest semiconductor makers, is key to the tech supply chain.

The next phase

A year into the pandemic, the situation is beginning to stabilize. Technology companies are meeting customer demand for most products, although supply in some component categories remains tight as companies ramp up production or build inventories in anticipation of a broader economic recovery. But the crisis may have a long-term impact on the design and operation of supply chains.

“The most obvious change among many of our customers is an increased focus on risk and resilience,” says Gunde. “Traditionally, technology companies have tried to balance cost and speed in their supply chains. Now they are also asking how those supply chains will perform in the face of disruptive events.”

COVID-19 certainly brought the importance of resilience to the front of the mind, but the issue has

“Good visibility and transparency in the supply chain are critical when you need to make quick decisions in the face of disruption.”

Alexander Gunde, President, Global Technology Sector, DHL



DIGITALIZATION: Firms with advanced digitalization of their supply chains and operations respond better to the pandemic.

been climbing the agenda for some time. Researchers at the McKinsey Global Institute estimate that companies experience a supply chain disruption lasting a month or more once every 3.7 years. And that's a cross-industry average.

The tools available to improve supply chain resilience are also quite well known, if not yet universally applied, says Gunde. "Good visibility and transparency in the supply chain are critical when you need to make quick decisions in the face of disruption. Over the past year, companies that were more advanced in digitalizing their operations and their supply chains were better able to respond to the challenges of the pandemic. Now everyone wants to be in that position, so we expect the crisis to further accelerate the digital trend."

The desire for better information flows is also encouraging technology players to expand the scope of their supply chain risk management activities. "Companies realize that knowing the situation in your distribution network and at your first-tier suppliers is not enough," says Gunde. "You also need visibility on the state of the supply chain in the second and third tiers, and beyond."

Then there's the question of geography. Before the coronavirus, rising trade tensions were already encouraging U.S. companies to reduce their reliance

on China for critical components and manufacturing services. Now technology companies all over the world are re-evaluating the risks and benefits of having large parts of their supply chains concentrated in just a few locations.

"There has been a lot of discussion about reshoring production from Asia to the U.S. or Europe," says Gunde. "And we do expect a certain amount of supply chain reconfiguration, especially in the final assembly of products. Assembling closer to the end user makes a lot of sense with complex or highly customized products, allowing companies to respond quickly to shifts in demand."

Nevertheless, today's supply chain setups have some compelling advantages, including established networks of suppliers and access to technical expertise. "Technology companies want to manage risks while retaining those benefits," says Gunde. "One way they are doing that is by expanding production to other countries within Southeast Asia. In recent months, we have seen a significant rise in shipments from Vietnam to Europe and North America, for example."

Climate change – a hot topic

Some risks can't be mitigated by smart supply chain reconfiguration. The COVID-19 pandemic is

estimated to have caused a 3.5% reduction in global GDP during 2020.

As the world plots its path out of the current crisis, there is broad consensus that action on climate change is now urgent. Governments, investors and consumers are all putting pressure on companies to create clear plans to reduce or eliminate greenhouse gas emissions by the middle of the century.

"Previously, we considered digitalization, resilience and sustainability as separate topics," says Gunde. "We see now that they are interconnected. Supply chain visibility helps companies to become more resilient and cost effective in the long run. And supply chain optimization helps to reduce carbon emissions through more efficient planning of loads, routes and transport modes."

In the coming years, the drive for more sustainable technology supply chains is likely to spur innovation on multiple fronts. "In transportation, you can become more sustainable in two ways," says Gunde. "You can burn less fuel by minimizing travel distances or switching from air to rail or sea. And you can burn cleaner by using electric vehicles for the short routes and alternative fuels for longer routes. Over the long term, a combination of both approaches will be required." ■ **Jonathan Ward**

EXPANDING PRODUCTION: There has been a rise in shipments from Vietnam to Europe and North America.



Photos: Shutterstock, Adobe Stock (2); DHL

3 QUESTIONS FOR...

1. How have technology supply chains been affected by the coronavirus crisis?

The sector has been through two distinct phases already and is now entering a third. At the onset of the crisis, our customers had to contend with supply constraints, as production and logistics capacity were limited by pandemic response measures. After that, many saw a dramatic increase in demand, driven by the global shift to working from home, e-commerce and digital social interaction. Now we are in a recovery phase, which is putting further pressure on capacity, as customers rebuild inventories and ramp up technology projects that were delayed or postponed last year.

2. Has the last year changed the structure of technology supply chains?

I believe we have seen a significant acceleration of trends that were already underway. In particular, the gap between B2B and B2C supply chains has narrowed. Companies that previously shipped in bulk to resellers or distribution centers have been delivering more product directly to end customers. We have also seen a shift in our customers' priorities. Cost and efficiency are still important, but there is also more focus on visibility and resilience.

3. What's the next challenge for the sector?

We all hope that this year will be about recovery from the crisis, but we know that recovery will put more pressure on the sector to meet delayed demand. Technology companies already have some of the most sophisticated supply chain processes in the world, but they will need to adapt to further complexity as the industry seeks to drive simultaneous improvements in efficiency, resilience and sustainability.

Alexander Gunde
President, Global
Technology Sector, DHL

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THE SWITCH THAT CHANGED THE WORLD

Digital technologies have been the catalyst for huge social and economic transformation. But none of it could have happened without innovation at the smallest possible scale.

It was an idea that nearly became a mere footnote in history. In the early 20th century, physicists, materials scientists and electrical engineers were experimenting with a class of substances that exhibited strange electrical behaviors. Semiconductors, as they were known, occupied a middle space between electrical insulators, such as rubber or glass, and conductors like copper or iron. More peculiar still, the electrical conductivity of these materials, which include germanium and silicon, could be made to vary dramatically by exposing them to changes in temperature or electric fields.

In 1926 Julius Edgar Lillienfeld, an Austrian physicist, obtained a patent for a device that could use the semiconductor “field effect” as an electrically controlled switch. Lillienfeld’s transistor was simple, elegant and theoretically highly efficient. There was only one catch: nobody could build one that actually worked.

So, the world moved on. Abandoning the field effect, semiconductor engineers pursued other approaches in the 1930s and 1940s with considerable success. The devices they produced were bulky and tricky to make, but they began to find application in everything from military radar installations to domestic radio receivers.

It wasn’t until the late 1950s that scientists working at Bell Laboratories in the U.S. devised a way to make a practical field effect transistor. Their approach, which involved coating pure silicon wafer with a very thin layer of silicon oxide, would go on to transform society.

The integration game

The Metal Oxide Semiconductor Field Effect Transistor (MOSFET) remains the basic building block of today’s digital technologies. Compared to their predecessors, MOSFETs were efficient, fast and easy to manufacture at scale. Engineers could use a lithographic process to etch multiple MOSFET devices on to a single piece of silicon. And they could connect devices together in the same way to create complete “integrated circuits” in one go. That paved the way for complex digital logic: networks of interconnected transistors that could compare signals or perform calculations with binary numbers.

Sixty years on, the technology sector has taken that idea and run with it. In 1965 Gordon Moore, who would later found chipmaker Intel, noted that the number of transistors on a chip of a given size was doubling around every two years. At the time, Moore predicted that his “law” was likely to hold for “at least 10 years.” The industry has now maintained that pace of development for almost 60.

The chips in the latest smartphones and computers include more than 10 billion transistors, packed on to a sliver of silicon around 10 millimeters wide. Shrinking those transistors to such a minuscule size hasn’t been easy. Semiconductor manufacturers must use elaborate techniques to create features just a few nanometers across, and their designs must account for the strange quantum effects that occur at tiny scales.

The advantages of miniaturization, however, are many. Smaller transistors allow more features to be packed onto a single chip, for example. Today’s most advanced “system on a chip” designs include many of the elements that once required separate components in a computer, including multiple processing cores, memory and communications circuits. Small, tightly packed components also work faster. And they require less energy – a critical consideration in a world of portable devices that must seek out precious battery power.

While transistors have been shrinking for decades, the industry that makes them has grown and transformed. The first semiconductor companies were highly integrated, handling the design, development and production of chips in-house. Today, most big players are specialized. “Fabless” manufacturers focus on the design and sale of semiconductor products, while production (or “fabrication”) is outsourced to dedicated foundries. The products they make have become more specialized too, with a shift from general-purpose chips to highly optimized designs dedicated to specific applications such as smartphones, laptops or low-power Internet of Things (IoT) devices.

Connecting the world

The MOSFET is the most significant building block of the digital revolution, but it isn’t the only essential element. Today’s electronic devices are not only more capable than those of the past, but they are also better connected. This relies on innovation in other areas. Networking technologies allow digital signals to be transmitted as electrical pulses along copper cables, as flashes of light through optical fibers or over the air in radio waves. And engineers have used semiconductors to create novel sensor technologies, allowing chips to measure an array of physical attributes – from pressure and temperature to the color and brightness of incident light. In the aftermath of the 2011 Fukushima nuclear disaster, one Japanese cell phone maker even produced a handset with an in-built radiation detector.

And there’s no sign that the pace of innovation is slowing down. Smaller transistors and more powerful chips are an annual occurrence, but other parts of the sector undergo periodic step changes in performance as new approaches augment or supplant older ones. Right now, one such step change is underway in wireless communications, with the large-scale deployment of 5G technology.

“5G will dramatically increase both the speed and the capacity of mobile networks, but the benefits don’t end there,” says Alexander Gunde, President, Global Technology Sector, DHL. “This new technology also promises to reduce latency: the round-trip time for messages travelling between a device and the network. That will allow the remote execution of

complex tasks – so a simple, portable device can take advantage of the power of a large data center.” Those capabilities will be essential in applications such as autonomous driving or truck platooning, he adds. They will also assist IoT development.

Positive charge

The impact on society of semiconductors and related digital technologies is hard to overstate. Smartphones and personal computers have become ubiquitous; without them, last year’s mass transition to home working would not have been possible. Billions of other chips are hard at work behind the scenes: running domestic appliances; operating the data centers that stream music, video and web content; or tracking our health and activity levels in wearable devices. Electronic devices account for 40% of the cost of a modern car, and even more in the latest generation of electric vehicles.

“Digital technologies have become central to our working and home lives, and that trend is going to continue as digital devices and services become more capable and more accessible,” says Gunde. “Of course, change on such a scale is not without problems, but the COVID-19 pandemic has reinforced the point that the impact of these technologies has been overwhelmingly positive.”

“As users, we tend to think about the services our digital devices provide, whether that’s the ability to talk to your family on a video call or track the precise location of a package with your phone,” Gunde concludes. “It’s easy to forget that these services can only exist thanks to the technology sector’s scientific and manufacturing knowhow, and its extraordinary ability to continually improve and reinvent its products.” ■ **Jonathan Ward**

“5G will dramatically increase both the speed and the capacity of mobile networks, but the benefits don’t end there.”

Alexander Gunde, President, Global Technology Sector, DHL

60

Number of years during which the number of transistors on a chip doubled every two years

40

Percentage of the cost of a modern car attributable to electronic devices



JACK ALLEN:
Head of Supply Chain Sustainability, Circular Economy, Security, Risk, and Resiliency, Cisco Systems

CIRCLING BACK

A major player in internet infrastructure is building new networks to support the circular economy.

Founded in 1984, Cisco Systems made its name in the end-of-the-millennium dash to connect the world's computers together. The U.S.-based multinational provided the vital hardware and software required to route packets of data through the networks that were springing up in offices, on university campuses and across the world.

Cisco is still a leading player in global networking, although its offerings have expanded over time to encompass a broad range of categories, from internet-connected telephone handsets to cloud services and IT security software. In 2020, at the height of the coronavirus pandemic, the company reported that use of its Webex video conferencing system had tripled, with almost 600 million users worldwide.

Scaling up a service so rapidly sounds like a software challenge, but last year's skyrocketing demand involved the deployment of plenty of hardware too. "It is a fabulous tool, but did we plan on running the world's business on Webex last year? We certainly did not," says Jack Allen, the company's Head of Supply Chain Sustainability, Circular Economy, Security, Risk, and Resiliency. "We had to move an incredible amount of servers and equipment all around the world at very short notice to create the necessary network capacity for the world to work from home."

And Webex wasn't the only part of Cisco's operations affected by the pandemic. The company also had to take radical action within its manufacturing networks. "With only a few days' notice, we were having to move all the inventory and all the equipment from one factory to another," says Allen. "We had plans in place to do that, but we'd never had to execute those plans."

From risk to resilience

While 2020 was a year of exceptional events, Cisco is no stranger to complex, fast-moving supply chains. In a "normal" day, the company ships around 385,000 items through its global network. It manufactures 80,000 circuit boards every day, using 104,000 different component types sourced from more than 600 suppliers. "Our portfolio ranges from things that are really simple, like a phone, to really

complex, like giant routers bigger than refrigerators that handle petabytes of traffic," says Allen.

Much of the company's product portfolio is also mission-critical for its customers. Today, the overwhelming majority of those customers are businesses and institutions that rely on Cisco equipment to keep their networks running. That makes reliable service a key supply chain theme, and a big part of Allen's overall responsibility.

While COVID-19 has forced many companies to think harder about supply chain risk, the topic has been a key area of focus at Cisco for more than a decade. "You can look back to 2010 and find Cisco white papers on supply chain risk," says Allen. "Today, we are moving into a new approach, where we don't just think about risk, but also resiliency."

Cisco's resiliency program has three elements, he explains. "We talk about the 'Shield,' which involves identifying risks to the supply chain and taking steps to mitigate those risks. Then we have the 'Twins,' which is about building extra inventory and production capacity so we can continue to deliver to our customers even if there is a problem in our network. And finally, there is the 'Spring,' which is about how you bounce back quickly to restore operations after a problem."

The company is still developing its resiliency framework, but the past year has provided a significant test for the new ideas, says Allen. Cisco coped well, he says, although the unprecedented scale of the pandemic has also "taught us a lot."

"We used to think about resilience in terms of point problems," he says. "Things like hurricanes, where you have a big disruptive event, and you need a backup plan to cover a few days or a few weeks. With COVID-19, we've seen that disruption can continue for months or longer."

The duration of the pandemic has also created unexpected challenges, says Allen. Digital technology made the transition to working from home remarkably smooth, for example, but now many staff are struggling after months of lockdown and limited social contact.

Above all, the coronavirus has reinforced the point that resilience requires a mindset change.

**600
MILLION**

Number of Webex video conferencing system users worldwide in 2020

"I believe we need to broaden our view on what resilience is really about," he says. "It isn't just the big shocks. Everyday things, such as parts shortages or lead time problems, are really resilience events." That insight is encouraging the company to consider the costs and benefits of resilience-boosting decisions as part of its everyday business planning. "With risk, you can look at the potential cost of an event and its likelihood, then decide how much you should spend to mitigate the risk," he says. "We are working to develop the same approach for resilience, so we evaluate the costs and benefits of different strategies, then invest where it makes most sense to do so."

A circular business

If the transition from risk to resilience represents one sort of mindset shift in Cisco's supply chain, another even larger one is underway in the company's approach to sustainability. Like risk, Environmental, Social and Corporate Governance (ESG) isn't a new topic for Cisco. The company took the number-four spot in Fortune's "100 Best Companies to Work For" list in 2020, topped that list in 2021, and has been a feature on it for more than two decades. It has established ambitious targets aimed at reducing the quantity of manufacturing waste, packaging and end-of-life products, and product return and reuse. As part of an effort to reduce consumption of virgin plastic by 20% by 2025, Cisco has started to offer collaboration devices manufactured using post-consumer recycled resin.

"We have made great progress in areas like waste reduction and recycling," says Allen. "And recycling is better than landfill, but it is one of the lower levels of value in the circular economy. The real value is to reuse, repurpose and redeploy equipment. This is one of the biggest drivers of carbon reduction."

Those circular economy principles have become central to Cisco's efforts to reduce its impact on the environment. The company was a founding member of the Ellen MacArthur Foundation, established in 2010 by the former round-the-world yachtswoman to promote them. In 2018, Cisco CEO Chuck Robbins

joined eight other senior technology sector executives in signing a pledge to take back 100% of the company's products for reuse, remanufacture or recycling upon request.

Increasing the fraction of Cisco's products that are reused is, says Allen, both a huge opportunity and a significant challenge. On the opportunity side, many Cisco products have a lot of life left in them when retired by their original user. When people replace Cisco products, it is usually because technology has moved on, or the user's needs have changed, he notes. Those products may still offer significant utility to somebody else, especially as many modern network devices can benefit from ongoing software updates and upgrades.

The challenge is building the incentives and business models to support that re-use. "The overwhelming majority of our products are sold by resellers, so we don't have a direct relationship with the end user," says Allen. "Just getting things back presents a complex market dynamics problem."

Re- and upcycling

Cisco is experimenting with a number of approaches to capture more end-of-life product. For example, users can use a phone app or website to arrange free-of-charge collection of any surplus equipment. It is exploring the use of incentive schemes to encourage third parties to collect and return used products. And the company is willing to receive other manufacturers' equipment as well as its own.

Then there's the question of the best markets for second-life products. Here again, Cisco is working on multiple approaches. In developed markets, the company offers a line of certified remanufactured products under the "Cisco Refresh" brand, and a rigorous testing and quality-control regime allows some second-life components to be built into new products. That's an area that might be expected to grow over time, as more products are designed and manufactured with re-use and remanufacturing in mind.

"One really interesting area for us is the potential for second-life products to open up entirely new opportunities in new markets," says Allen. As emerging economies develop their communications infrastructure, he notes, access to latest-generation technology may be less important than robust, high-quality equipment at a reasonable price.

"We know there is a real opportunity here, but there's a lot of work to do in developing the channels, educating the market and building a community of technicians to install and support the product," says Allen. Work is underway on all fronts, he adds, but "it is going to be a marathon, not a sprint. We are just in the early stages of a 30- or 40-year journey to circularity." ■ **Jonathan Ward**

 www.cisco.com

BUSINESS



EXPLAINED: CARBON CAPTURE

Capturing and storing carbon dioxide released into the Earth's biosphere is a complex and expensive process, but one that's increasingly seen as essential to meeting global targets for reducing greenhouse gas emissions.

In humanity's urgent quest to arrest global heating, achieving zero emissions of carbon dioxide may no longer, on its own, be enough. According to the Intergovernmental Panel on Climate Change (IPCC), the temperature targets set in the Paris climate accord of 2015 are unlikely to be reached without the widespread application of carbon capture and storage (CCS) as well.

While carbon removal (and offsetting) is already a familiar idea through afforestation, with newly planted trees storing carbon, there has also been research into filtering carbon directly out of the air through chemical processes. So far, these processes have proved prohibitively expensive, though recently, in the U.S., United Airlines announced a multi-million-dollar investment in 1PointFive, a company

that is licensing direct air capture technology from the startup Carbon Engineering. A single air capture facility could potentially suck in as much carbon as 40 million trees. The carbon would then be stored underground by oil giant Occidental Petroleum, the major partner behind 1PointFive.

A more widespread and fully developed method than direct air capture is to retrieve carbon from power stations as soon as it is burned, followed either by storage underground or by using the carbon to enhance oil and gas recovery. It is far easier (and about 10 times cheaper) to filter out carbon at a power source than it is to capture it directly from the air.

Nevertheless, some environmentalists oppose carbon capture precisely because, they believe, it assists the heavy-emission industries it is designed to make less dangerous.

Carbon capture that pays

One country strongly advocating carbon capture is Norway, which established the CLIMIT national program to develop expertise and technology to reduce the cost of CCS. One of its support schemes, CLIMIT Demo, run by state enterprise Gassnova, has co-financed about 370 CCS projects.

The technology for carbon removal exists and could reduce greenhouse gases significantly, but it will not be adopted if it remains too expensive. If captured carbon can be put to commercial use, however, it could become more financially viable. Possible applications for captured carbon that have the potential both to reduce emissions and generate revenue include fuel production, concrete enrichment and power generation.

Of these, the first is certainly technically achievable (though, as yet, less so economically) as carbon can be converted into most types of fuel otherwise derived from petroleum.

Meanwhile, using captured carbon in the manufacture of cement (the binding element in concrete), which accounts for roughly 8% of global carbon emissions, would sequester it in our buildings, bridges and sidewalks.

As to power generation, its emissions could be reduced by using carbon to run turbines more efficiently.

CCS technologies are not yet being developed at the required speed and are still too expensive, but emissions reductions and carbon capture need not be treated as contradictory objectives. The way forward will almost certainly be to utilize both. ■

GP Newington

8

Percentage of global carbon dioxide emissions attributable to the manufacture of cement

MEETING DEMAND: Use of Cisco's Webex video conferencing system tripled during the pandemic.





REBIRTH OF A NATION

As it begins to emerge from the economic ravages of the COVID-19 pandemic, the U.S. is in full recovery mode, and reconfiguring and reconsidering its markets and supply chains.

After the pandemic in the U.S. struck entire industries, left tens of millions financially strapped and prompted the government to deliver historic levels of assistance to individuals and companies, things now seem to be rapidly returning to normal.

Nevertheless, corporations will need to reconsider business strategies and tactics, shifting labor patterns, short-term inflation threats and longer-term concerns about how to adapt to the near future.

Economic recovery post-pandemic

Examining the context of where things have been helps better understand a recovery.

“The country entered into a recession in February 2020 that endured through March and April,” says Scott Sureddin, CEO North America, DHL Supply Chain. “While we saw a recovery in the third and fourth quarters, last year saw an overall GDP decline of 3.5%.”

Unemployment hit 14.7% in April 2020. March 2021 saw an improved level of 6%, but this continues to be an elevated figure. “Jobs are still down by 5% [from pre-pandemic levels],” says Rhea Thomas, an economist at wealth and institutional services firm Wilmington Trust. That doesn’t count people who

dropped out of the labor market, so “the economy is even weaker from a jobs view.”

Sectors vary in what a return to pre-pandemic levels requires. Energy and hospitality and leisure were hard hit by the massive and swift cessation of mobility and travel. Others also faced pain because of multiple supply chain disruptions. If parts aren’t readily available, entire production lines could come to a halt.

“One sector that fell off because of supply chain disruptions was automotive,” says Mike Parra, CEO, DHL Express Americas. “That is slowly rebounding, although right now there’s a challenge with semiconductor chip manufacturing that’s going on.” A single car can incorporate hundreds of dollars’ worth of the devices.

Semiconductors weren’t the only shortages the auto industry faced. “Tires are being shipped by airfreight,” says David Goldberg, CEO, DHL Global Forwarding USA. The move is unusual because such bulky and heavy goods typically ship by sea to reduce handling costs, but dealers can’t sell cars without tires.

Some sectors became stronger. “The strain on the U.S. economy resulted in an uptick in companies and entrepreneurs pivoting to creating new product

lines to meet demands, such as personal protective equipment, or PPE, and other items,” according to Lee Spratt, CEO, DHL eCommerce Solutions Americas. “Additionally, many companies with an online presence were also forced to ramp up and accelerate investments in their e-commerce capabilities.”

Consumers made substitutions in their consumption. Pickup and delivery replaced sitting in restaurants in many areas. As movie theaters went dark, streaming services from the likes of Netflix, Disney+ and Amazon lit up.

Supply versus demand

Whatever their current point, all sectors face a challenging battle between demand and supply.

“We have a huge fiscal [and monetary] stimulus, vastly larger than we saw in [the financial and economic collapse of] 2008,” says Aleksandar Tomic, program director for the master of science in applied economics at Boston College. Unlike in 2008, much of the stimulus went to individuals, so many consumers have cash to spend.

Economists and business leaders have largely assumed that, with the psychological feelings of isolation and deprivation over the last year, the result will be a large wave of consumer consumption.

“We have a very optimistic view for growth this year,” owing not just to stimulus but progress in vaccination and curtailing virus spread, says Thomas.

Estimates of growth from 5.6% to as high as 7% “are all pretty attainable,” says R. Andrew Butters, an assistant economics professor at Indiana University. But year-over-year comparisons start with disastrous 2020 results, so numbers aren’t necessarily as good as they seem. Butters believes at least 6%

GDP growth is necessary to get above pre-pandemic levels.

“Without a shadow of a doubt, online marketplaces, whether B2C, C2C, or B2B, will continue in the fashion they have,” Parra says.

“With e-commerce – particularly in retail – having accelerated beyond anyone’s expectations, I think you will see a lot of that growth stick even as traditional retail outlets begin to reopen,” says Sureddin.

According to figures from the U.S. Census Bureau, e-commerce in the first quarter of 2020 totaled \$160.4 billion. The number spiked to \$211.6 billion in the second quarter, when shutdowns came into full force. In the last quarter, that slowed to some degree, but still amounted to \$206.7 billion.

ON THE ROAD AGAIN:
The automotive sector is beginning to rebound after COVID-19.



Photos: Getty Images; Adobe Stock

3.5

Percentage of overall decline in the U.S. GDP in 2020

7

Upper estimate of percentage growth in the U.S. economy in 2021

211+

Value, in billions of dollars, of U.S. e-commerce in the second quarter of 2020

MADE IN THE USA: Intel has large semiconductor manufacturing facilities in the U.S.



Spratt notes that many bricks-and-mortar retail stores shifted their fulfillment strategies because of shutdowns. “For some, this meant a permanent shift to a ‘dark store’ model, in which traditional retail stores are converted to local fulfillment centers,” he says. Customers can opt for pickup or delivery while reducing strain on main retailer fulfillment hubs.

Other areas, like energy, will also improve. “People will start driving again,” says Thomas. And food services as well as hospitality should begin to rebound, though it will take time for the extent and manner of growth to become clear.

Some sectors, however, may be more up in the air. Increased demand during the lockdown for bigger living spaces that better facilitate remote work and study led to a shortage of houses on the market – which pushed prices up and precipitated a building boom. Yet nearly three million homeowners are behind on their mortgages, according to government figures. That could mean a wave of foreclosures and a fall in housing prices.

Challenges ahead

The basics of supply chains are strong, but there are significant hiccups that can impact on demand satisfaction. “COVID-19 and this year-long global crisis have affected supply chains,” says Ben Ruddell, professor and director of the School of Informatics, Computing and Cyber Systems at Northern Arizona University. “There have been a lot of small disruptions and changes.”

Take paper goods, such as paper plates and towels, as an example. Normally, half of consumption is at commercial establishments: restaurants, entertainment venues, stores and office buildings. There wasn’t enough consumer supply when people had to stay home. Jumping from one customer segment to another isn’t easy.

“You think of all the stuff that has to change for those materials to be delivered to another consumer,” Ruddell says. “You have to abandon one set of contracts and very rapidly build another set of contracts. Ships and trucks and planes are going to be packed.” There will be backlogs. Many prices are already on the rise as a result.

“Companies are urged to have a solid logistics strategy and a multicarrier approach in place to be prepared for surges in volume, and for the 2021 holiday peak season,” says Spratt. “A multicarrier approach provides the flexibility to tap into various existing relationships with logistics operators to help reroute or expedite shipments when needed.”

Supply chains involve trade. “By and large, the trade flows haven’t changed,” says Goldberg. Continuing tensions between the U.S. and China, though, could mean more ongoing issues in economic cooperation. Nevertheless, given the interdependence between the U.S. and China, those major trade relationships will continue.

“There is always tension because it’s competitive and there is always trade,” Sureddin says. “Beyond a successful vaccine rollout, I think the most positive thing we can expect from the outset is a normalization of trade relationships with partners around the world. Today, it’s so global, products are going to move.” Relations with China, in particular, won’t seriously deter trade. “China is such a large economy, there are so many imports coming from there, it is just going to happen.”

Still, trade tensions drove multinationals to better diversify their supply chains into other countries to avoid being stuck. Another possibility would be to bring certain types of sensitive manufacturing – semiconductor chips or medical products, for example – back to the U.S. The reduction of supply risk can more than make up for the loss of somewhat lower production prices overseas.

“Puerto Rico was a big manufacturer of life science products,” says Goldberg. And it could be again. Intel has large semiconductor manufacturing facilities in the U.S., and other companies could follow suit. But no matter what the industry, rebuilding capacity takes time and investment and also raises a question: “Do we have the technical capabilities to



SHIFTING STRATEGIES: Businesses have had to adapt their operating models to keep the flag flying.

LONG-TERM VIEW: Video streaming has been popular – but will it stay that way?



produce things in the U.S. that we haven’t produced in a long time?” he asks.

Smaller businesses also face disruption risks. Whether directly or indirectly, all businesses depend on supply chains. New COVID-19 variants could complicate risk mitigation efforts. Should new upswings in infections and resulting shutdowns occur anywhere in Asia or Europe, that could again affect supply chains and have “an impact on micro-sized and medium enterprises,” said Parra.

Needed changes

Whatever the industry, companies must consider operational and strategic adaptations they might have to make.

“People throw around the phrase ‘the new normal’ because it’s fun to say, but we have to think of what the implications of the new normal are,” says Giacomo Santangelo, a senior lecturer in economics at Fordham University.

An example is video streaming. As people get out of isolation, chances are good that figures for streaming will drop and that audiences might shrink. “At this point, everyone in the United States of America who was going to get Netflix got Netflix,” Santangelo says. Where can companies in that space expand next?

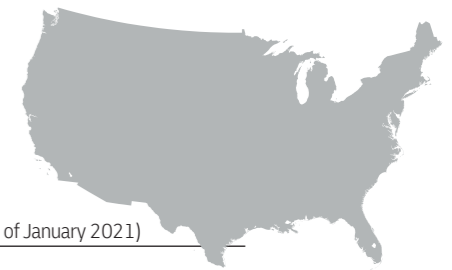
People who feel uncomfortable near others as businesses reopen might demand bigger waiting spaces. In motor vehicle care, for example, one

popular U.S. auto repair chain allows customers to stay in their cars while getting an oil change. Competitors might need to match the feature.

But such considerations are part of the constant change that businesses face. Strategies change and companies always need to adapt tactics. Despite all the concerns, it’s important to remember the many reasons to be positive.

“Our outlook is bright,” Parra says. “We saw a boom in e-commerce and B2B. We’re moving vaccines. Right now we see a brighter light as millions a day are vaccinated. More than a million people are flying every day again. Maybe we’ll see the hospitality sector come back as well. We see hope in the U.S.” ■

Brian Mulvey



UNITED STATES

Population: 328.46 million (as of January 2021)

GDP: \$20.93 trillion (2020)

World Economic Forum’s Global Competitiveness Report 2019: 2nd out of 141

World Bank Group’s Ease of Doing Business Index 2020: 6th out of 190

DHL Global Connectedness Index 2019: 37th out of 169

Photos: Tim Herman/Intel Corporation; ZUMA Wire/Imago; ImageBROKER; Adobe Stock



MAKING SUSTAINABILITY YOUR BUSINESS

With its new Sustainability Roadmap, Deutsche Post DHL Group has announced an ambitious plan to support the UN's Sustainable Development Goals and lead the logistics industry toward a greener and more sustainable future.

The logistics industry may be an essential driver of global trade and economic growth, but it leaves a large environmental footprint on the planet. As the world's leading logistics company, Deutsche Post DHL Group aims to play a significant role in carbon emissions reduction. In 2020, the company's share of the sector's emissions was 0.4%, despite being the world's 11th largest private employer

with a team of about 570,000 people working across 220 countries and territories worldwide.

Sustainability is a responsibility

With the intent to make a positive ecological impact on the planet, the Group recently announced a new roadmap for sustainable business that supports the U.N.'s Sustainable Development Goals (SDGs).

It sets out a specific plan of action while making the company's approach more holistic, recognizing that sustainable business must go beyond environmental protection to encompass social and governance issues.

"We are turning our yellow Group into a green company and making an important contribution to our planet and society," says Frank Appel, CEO of Deutsche Post DHL Group. "Sustainable, clean fuel alternatives are elementary for climate-neutral logistics in a globalized world ... That's why we will engage even more intensively in initiatives and strengthen cross-industry exchange to develop a global strategy and standards here."

The new roadmap builds on past achievements while setting a course for the future. Over the past 15 years, the company has continuously improved carbon efficiency while introducing innovative green logistics solutions to make supply chains more sustainable and help customers achieve their environmental goals. In 2017, Deutsche Post DHL Group became the first logistics company to commit to a zero-emissions target. In 2019, the company incorporated sustainability as a cornerstone of its corporate strategy.

Turning yellow into green

The Group is now picking up the pace of its decarbonization efforts. First, the Group has set themselves a goal through the Science Based Target initiative to reduce greenhouse gas emissions by 2030 in line with the Paris Climate Agreement. If no action were to be taken, the company's annual emissions would likely rise to 46 million tons by 2030, due to its anticipated growth in global logistics activities. Instead, Deutsche Post DHL Group has committed to reducing its annual carbon emissions to below 29 million tons.

To get there, the Group will invest €7 billion over the next 10 years in clean operations and climate-neutral logistics solutions. Using the money to electrify 60% of its last-mile fleet by 2030, it will put more than 80,000 e-vehicles in service on the road. The company will also increase its use of sustainable aviation fuels to more than 30% by 2030.

PHOTOS:

Furthermore, all its new buildings will be designed to be carbon neutral, and it plans to offer green alternatives for all core products and solutions.

A great place to work

Nevertheless, it is people who power a logistics company. A sustainable global business must unite people from different countries and cultures and foster a motivated team. Deutsche Post DHL Group's new roadmap also illustrates its aim to become a safe, inclusive and purpose-driven workplace that offers equal opportunities and attracts and retains the best talent.

To achieve this, the company is running various programs and initiatives, such as increasing the proportion of women in management to 30% (from 23.2% in 2020), and reducing LTIFR, or Lost Time Injury Frequency Rate – an indicator of workplace safety – to below 3.1 by 2025, among other goals.

A trusted leader

The new roadmap also features the closer alignment of the company's Supplier Code of Conduct with sustainability criteria, the introduction of a new policy statement on human rights, the offer of relevant training to management, and the implementation of state-of-the-art data security.

To ensure the company stays on course to reach its environmental, social and governance goals, key performance indicators have been integrated into internal and external reporting, and corporate board remuneration is planned to be tied more closely to ESG-related targets.

As its motto indicates, Deutsche Post DHL Group is driven by the goal of "connecting people and improving lives." Yet it also recognizes that everyone must make sustainability their business. That is why the

Group is a longstanding and dedicated partner of the U.N. and is committed to its SDGs.

"There is no way around sustainable logistics in the future," says Frank Appel. "We are deciding today what kind of world we and our children will live in 30 years from now." ■ **Matthew Baird**

 www.dpdhl.com/en/sustainability.html

7
BILLION

Amount of investment, in euros, that DPDHL will invest in clean operations and climate-neutral logistics in the next 10 years



30

Percentage of women in management roles by 2025 according to DPDHL Group's sustainability roadmap

FUEL OF THE FUTURE?

As the power sector focuses increasingly on renewable energy sources, attention is turning to transportation and how it can play its part in decarbonizing the economy – with the spotlight on hydrogen fuel.

Aircraft fuel efficiency has continually improved over the years, and a conventional flight today produces half the carbon greenhouse gas of a flight in 1990. But the industry has been growing so rapidly that, by 2020, aviation emissions were 70% higher than in 2005, and they could triple by 2050 if no action is taken.

At the same time, climate science says that we need a net-zero global economy by 2050 to limit temperature rises to 1.5 C above pre-industrial times. Aviation will have to play its part and is already facing increasingly stringent legislation globally.

There are a number of potential solutions, including batteries, biofuel and hydrogen.

Although some small aircraft have flown with batteries, the technology is limited by the power-to-weight ratio of current devices – batteries powerful enough to get a large aircraft off the ground are just too heavy to do so. Biojet fuel could be a short-term option to improve the industry's carbon footprint, says Professor Pericles Pilidis, head of Thermal Power and Propulsion Engineering at Cranfield University in the U.K., but it still emits greenhouse gases into the atmosphere.

Boeing has recently committed to having all of its new commercial aircraft operating on 100% sustainable aviation fuel (SAF) by 2030, says Tim Boon, Aviation Analyst at research group IBA. "Boeing has stated that further studies on the feasibility of hybrid electric and hydrogen propulsion systems

100

Percentage of new commercial aircraft Boeing has committed to operating on sustainable aviation fuel by 2030

continue to be carried out, but SAF is the main focal point for the airframer over the next decade."

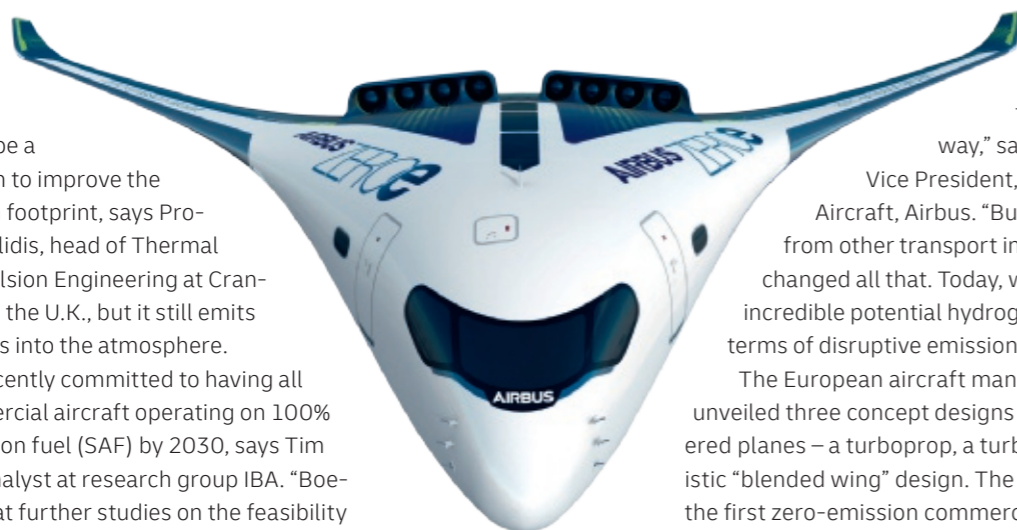
Deutsche Post DHL Group is pushing for the development and use of fuels produced from renewable energy sources. By 2030, at least 30% of fuel requirements in aviation and line haul are to be covered by sustainable fuels. "As the world's largest logistics company, it's our responsibility to lead the way and guide the logistics industry into a sustainable future," says Frank Appel, CEO, Deutsche Post DHL Group.

Hydrogen to help reduce carbon

Many others in the industry believe that hydrogen holds real promise, not least as the "hydrogen economy" starts to be rolled out in other sectors, with much of it being produced using renewable energy.

"As recently as five years ago, hydrogen propulsion wasn't even on our radar as a viable emission-reduction technology pathway," says Glenn Llewellyn, Vice President, Zero-Emission Aircraft, Airbus. "But convincing data from other transport industries quickly changed all that. Today, we're excited by the incredible potential hydrogen offers aviation in terms of disruptive emissions reduction."

The European aircraft manufacturer has unveiled three concept designs for hydrogen-powered planes – a turboprop, a turbofan and a futuristic "blended wing" design. The company believes the first zero-emission commercial widebody aircraft could be carrying passengers by 2035. To



SMALL WONDER: ZeroAvia's six-seater aircraft is powered by a hydrogen fuel cell.

meet this ambitious target, Airbus says it will need to launch the ZEROe aircraft program by 2025.

The ZEROe aircraft all use hybrid-hydrogen, meaning they have not only modified gas turbine engines that burn liquid hydrogen, but also hydrogen fuel cells that create electric power.

At the other end of the scale, startup ZeroAvia is looking to build hydrogen powertrains and has already flown a six-seater aircraft powered by a hydrogen fuel cell. It is now looking to scale up its technology to fly a 19-seater vehicle by the end of 2023. "The six-seater is a demonstration project to show that it is safe to fly with hydrogen," says Sergey Kiselev, head of Europe for the company. "The 19-seater is the smallest commercially relevant aircraft. In time we hope to produce a powertrain big enough for planes that seat 40-70 passengers, both with a range of up to 500 nautical miles [926 kilometers]. More than half of flights are below this range."

Changing the anatomy of aircraft

The company hopes that its powertrain will initially be retrofitted to existing aircraft, but it is talking to manufacturers about integrating it into new aircraft as well.

At the longer ranges required for long-haul flights, the simplest answer is to burn liquid

hydrogen, but this still produces non-carbon emissions such as nitrogen oxides, which are harmful to human health.

Another challenge of using liquid hydrogen is that it needs to be stored below -252.8 C, but this also creates the opportunity to introduce superconductivity into electrical systems, which would make those systems much more efficient and lighter, Pilidis says. In turn, this brings "opportunities to change the anatomy of the aircraft to make it less energy-intensive."

The blended wing design integrates the wings, fuselage and engines, which are traditionally separate elements of the aircraft, so that the entire aircraft creates lift and minimizes drag. This shape helps to increase fuel economy and creates larger payload (cargo or passenger) areas in the center of the aircraft, according to NASA.

Pilidis believes that some of the first users of hydrogen wide-body aircraft will be logistics companies like DHL. "Many aircraft are tested first as cargo aircraft and then go into passenger service. I would expect history to repeat itself."

There is still a long way to go, but the rapid development of the hydrogen-fueled aviation sector opens up the possibility of making zero-carbon flying a reality before the middle of the century. ■

Mike Scott

2035

The year by which Airbus believes the first zero-emission commercial widebody aircraft could be carrying passengers



ALL FOR ONE AND ONE FOR ALL

The African Continental Free Trade Area (AfCFTA) offers the continent a path to sustainable development, the need for which is only more heightened due to COVID-19's economic fallout. But getting the 54 undersigned countries to coordinate and enact the measures needed will be a challenge.

Originally agreed in 2018 and committed to by all 54 African countries, the African Continental Free Trade Area (AfCFTA) came into effect in January 2021 after being delayed by the COVID-19 pandemic. Some are hailing it as a game-changer for African regional and international trade, one that will “enhance competitiveness and stimulate investment, innovation and economic growth by increasing efficiency and eliminating barriers to trade,” according to a Foreign Policy article published at the end of 2020. So far 36 countries have ratified the agreement, including big economic players such as Nigeria and South Africa – an encouraging sign, as Amadou Diallo, CEO, DHL Global Forwarding Middle East & Africa, notes.

“It’s a new baby, it needs to grow, learn to walk and talk,” says Diallo. “The intention is great, but it’s

completely in its infancy. Its success totally depends on the implementation of its measures.”

If all goes to plan over subsequent months and years, the agreement will eventually cover a market of more than 1.2 billion people and up to \$3 trillion in combined GDP, according to the U.N. Economic Commission for Africa. It notes the agreement could increase intra-African trade – which lags far behind the internal trade of other continents – by over 50%. Only 14.4% of official African exports went to other African countries in 2019, a small proportion compared with the 52% of intra-Asian trade and 73% between European nations that year, according to Afreximbank, a Cairo-based, multilateral trade finance institution.

“Between 2012 and 2014, more than 75% of the continent’s exports were extractives,” says Hennie

Heymans, CEO, DHL Express Sub-Saharan Africa. “Yet less than 40% of intra-African trade was extractives during the same period, according to the African Union (AU), further underscoring the need to boost trade within the continent.”

Is the creation of the largest free trade area since the establishment of the World Trade Organization the answer to Africa’s economic challenges? Or, as its critics suggest, is AfCFTA a white elephant that distracts from first tackling more pertinent logistical and trade challenges? The answer appears to lean toward the more hopeful side – though achieving success will undoubtedly take time, with much to overcome.

The AfCFTA represents a major opportunity for countries to “boost growth, reduce poverty and broaden economic inclusion,” says a World Bank report. It estimates the trade pact could lift 30 million Africans out of extreme poverty by 2035 and, by reshaping the continent’s markets and economies, create new industries and expand key sectors, boosting regional income by 7% to the tune of \$450 billion. Most of AfCFTA’s income gains – \$292 billion – would come from measures cutting red tape and simplifying customs procedures, lowering compliance costs for businesses engaged in trade, and making it easier for African businesses to integrate into global supply chains. The remainder – about \$153 billion – would come from income boosted by tariff liberalization and the reduction of non-tariff barriers such as quotas and rules of origin.

Stitching a continent together

In the longer term, AfCFTA can provide a much-needed path to better continental integration by replacing the current patchwork of regional agreements that result in some very lopsided arrangements.

“The key to this sits in the execution and will be dependent on how quickly these reforms are executed at ground level, i.e., at the borders,” explains Heymans. “It will hinge on how quickly custom regulations will be adapted and their officials trained, how quickly and effectively borders will be automated and corruption eradicated, and how quickly and effectively the different trade blocs will adopt this new trade agreement.”

“Currently it’s easier to travel to Kenya from Paris or from China than it is from Senegal,” says Diallo, who comes from Senegal. “Visa applications are very difficult across Africa; many countries don’t have representation in others. Hence, it’s easier for Germans or Brits to travel to East Africa.”

In addition to forging a truly connected continent by enabling goods, capital and information to flow freely and easily across borders, the treaty would, through its economic gains, help countries augment their resilience to future economic shocks. Opening the continent would increase employment opportunities and better incomes, helping to lift around 68 million people out of moderate poverty and making African countries more competitive, Albert Zeufack, the World Bank’s Chief Economist for Africa, has commented.

Heymans concurs. “There is also an enormous opportunity for services under this agreement. In addition, the free movement of labor will be critical as this will strongly complement the objective of the free trade agreement.”

Countries that enact legislation to streamline border procedures and trade flow would be more likely to attract foreign investment. Diallo highlights how DHL Global has already benefited from customs becoming automated in countries like South Africa, Ghana, Cote d’Ivoire and Senegal.

This would also spur local competition, which in turn increases productivity and innovation by domestic firms. “The creation of local champions on the continent will inspire competition,” Diallo says. “It would also generate better discussions locally than when foreign companies come and advise on how to do something. People have more aspiration if they see their neighbor doing it.”

30
MILLION

The number of Africans the AfCFTA will help to lift out of extreme poverty by 2035

TRADING PLACES:

Africa’s new free trade area has been hailed as a game-changer.



76
BILLION

The amount in dollars that the AfCFTA's payoffs could add to global income

Playing the long game

Yet the challenges are vast. Even AfCFTA's Secretary General Wamkele Mene cautions that "it's going to take us a very long time." He notes that some countries that have ratified the agreement lack the customs procedures and infrastructure to facilitate tariff-free trade. Other critics more bluntly say that there are African countries decades away from being able to comply.

"Everyone struggles to put vision into practice, that's the case all over the world," Diallo says. "There are too many negative and distracting conversations. People talk about small African countries being particularly challenged. Mauritius is a small country, but it aspires to be the next Singapore. In Europe you have Switzerland, which is influential. What's more important is the people living in a country and what they do."

Nevertheless, intra-African trade remains monopolized "by a handful of countries selling a handful of products," Foreign Policy reports. While this situation is improving, simply increasing intra-African trade would not resolve the root issue. Diversification of trade while enhancing the value chain is needed for Africa to benefit fully from the free trade agreement. This requires the amendment of current trade agreements that favor raw materials such as agriculture and mineral products being exported – approximately 70% of value addition occurs outside the continent – to the detriment of

SEWING SUCCESS:
An African single market could be a big benefit for manufacturers.



processed product exports. Scaling the value chain, however, depends on more capacity for processing and packaging. But the power needed to conduct those operations is often inadequate, expensive and unreliable.

Such hurdles could be mitigated by neighbor countries providing what another country lacks until it develops the necessary resources, Diallo notes. Foreign investment and assistance remain key, too. A 2020 report from the management firm Palladium notes that the "mobilization of global private capital" can "drive mutually beneficial economic growth that addresses key priorities including job creation, infrastructure development and improved social services."

Trade experts say an African single market can offer investors economies of scale, potentially enabling them to manufacture goods in one country and export them tariff-free to the whole continent. Jeffrey Peprah, CEO, Volkswagen Ghana, has said he hopes eventually to export cars assembled in Accra to other West African countries. The World Trade report notes that the AfCFTA's payoffs could add \$76 billion to global income.

It's been noted how the U.S. under the new Biden administration already has a suite of tools and institutions that can help drive investment toward the AfCFTA. At the policy level, this includes the likes of Power Africa, a U.S. Agency for International Development initiative, which could help address the energy supply challenge by creating more than 30,000 megawatts of cleaner, more efficient electricity generation capacity and 60 million new home and business connections through private-public partnerships.

DHL is also actively committed and involved across key markets in Africa – for example, with the deployment of its GoTrade initiative, which seeks to help developing countries and their SMEs to access the global market, in cooperation with the German governmental agency Gesellschaft für Internationale Zusammenarbeit (GIZ). "Two key projects include our Pan-African e-Commerce Initiative (PeCI) in Kenya, Rwanda, Ghana and Tanzania; and the pre-arrival and pre-department processing program in Kenya, Ghana, Rwanda, Cote d'Ivoire and Tanzania," says Heymans.

Making it happen during a pandemic

The goals of the AfCFTA have an added urgency given the economic ramifications of COVID-19. Due to the pandemic, AfCFTA is also unrolling in a world that is markedly different from the one in which it



DRIVING CHANGE:
African countries want to reduce their dependence on foreign exports.

was created. The pandemic caused major disruptions in trade across Africa during 2020, resulting in an estimated \$79 billion in output losses. The continent faces "an unprecedented health and economic crisis that threatens to throw the region off its stride, reversing the development progress of recent years and slow the region's growth prospects in the years to come," states the International Monetary Fund in its report on sub-Saharan Africa, "COVID-19: An Unprecedented Threat to Development."

But Diallo points out that, given Africa's size, the continent's percentage of the global number of infections (about 3.5%) and deaths (roughly 4%) from COVID-19 is surprisingly small. And while the pandemic's impact on western countries is forcing them to focus on domestic markets, potentially reducing Africa-bound trade and investment, this is compelling African countries to reduce their dependence on foreign exports.

"This will be good for African countries' trade balances and will generate more intra-trade on the continent out of necessity," says Diallo, who notes how, in Senegal, the government is striving for agricultural self-sufficiency rather than depending on Asian rice imports. He also highlights how African countries are having to think about "making their healthcare systems more resilient" due to reduced foreign supplies and assistance.

But can so many politicians across so many African countries coordinate putting the grand vision into practice? The continent's predominantly youthful population – one of the reasons for Africa's relative resilience to COVID-19's fallout – could feature heavily in spurring politicians to implement measures needed for the trade agreement to work, Diallo notes.

"Younger people are using modern technology, are more educated, open minded and have a much better idea of what is going on in the world," Diallo says. "They will not accept living in the same old ways. This makes the trade agreement not just an aspiration but an obligation for politicians if they don't want to be pushed." ■ James Jeffrey

 www.au.int/en/cfta

3
TRILLION

The amount of combined GDP that the AfCFTA will cover, in dollars

"The intention is great, but it's completely in its infancy. Success depends on the implementation of its measures."

Amadou Diallo, CEO, DHL Global Forwarding Middle East & Africa

Photo: Kay Nietfeld/epa; Friedrich Stark/Imago

80
BILLION

Potential value in dollars of the market opportunity in the sustainable mass air transport industry

900

The approximate initial flight range in miles (1,500 kilometers)

Cruise speed:	300 miles per hour (500 kilometers per hour)
Initial operating range:	900 miles (1,500 kilometers)
Maximum takeoff weight:	50,000 pounds (22,500 kilograms)
Operational window:	15 hours (night operation possible due to lower noise pollution)

30-40


Percentage of potential reduction of carbon dioxide and nitrogen oxide emissions using HERA's battery technology

WHISPER ON THE WIND

Is the aviation industry going electric? As one of the first companies to venture in that direction, the U.K.-based Electric Aviation Group (EAG) has combined conventional and electric propulsion in the world's first 70+ seat Hybrid Electric Regional Aircraft (HERA), which will have an initial operating range of around 900 miles (1,500 kilometers).

HERA, named like the Greek goddess Hera, would be able to make use of smaller regional airports and therefore deliver cargo closer to warehouses, and passengers closer to their inner-city destinations. This would be made possible by its whisper-quiet, short takeoff and landing performance, widening the operational window for night flight. One version could also be rapidly converted from daytime passenger to night-time freight transportation, maximizing revenue potential.

The aircraft has been designed to limit noise pollution and secure an end-to-end reduction in carbon dioxide and nitrogen oxide footprint – 30% to 40% with its battery technology alone, and an estimated net zero when combined with sustainable fuels. As battery technology evolves, it is capable of becoming fully powered by electricity. With these attributes, EAG's design is in a good position to take full advantage of what is reckoned to be an \$80 billion opportunity in the sustainable mass air transport market. HERA's rollout is set for 2028. ■

 electricaviationgroup.com/electric-flight

RICH PICKINGS: THE TOP SECRETS OF ENTREPRENEURS

Through their years of experience, skillful entrepreneurs develop strategies and tactics for success. And the good news is that we can all get ahead in the workplace by adopting them.

People tend to think of top entrepreneurs as a breed apart, somehow. Marching to their own drum. But are they so different, the Elon Musks, the Jeff Bezoses, the Richard Bransons? And what is it that makes them so successful?

Amy Wilkinson decided to do more than just speculate. Over five years, from 2010, Wilkinson, then a Senior Fellow at Harvard, conducted rigorous interviews with 200 business leaders, as well as the founders of LinkedIn, Chipotle, eBay, Under Armour, Spanx, Airbnb, PayPal, JetBlue, Gilt Groupe and Dropbox, in an attempt to discover their secrets, and then used scientific methodology to analyze the results.

In her landmark book, “The Creator’s Code: The Six Essential Skills of Extraordinary Entrepreneurs,” published in 2015, Wilkinson revealed that successful entrepreneurs do indeed have basic skills that we can all learn and practice – and it turns out they are more relevant than ever in the era of COVID-19.

“With COVID-19, you’re forced into navigating turbulence like an entrepreneur does, even if you’re in a traditional company,” says Wilkinson, who now teaches at Stanford University and runs Ingenuity, a San Francisco-based global innovation company that advises executives, entrepreneurs and investors.

The six essential skills

Find the gap: Entrepreneurs look for gaps and problems and then fill or solve them. They spot opportunities that others don’t see. “One way to do that is to be a sunbird,” Wilkinson says. “You take an idea from one place, pick it up, fly it over and reapply it somewhere else. For example, there’s a sporting goods manufacturing company that used to make protective equipment for hockey players. Now it makes face shields for healthcare workers.”

Drive for daylight: Think about the future – the long term as well as short term. “Short term, you have to make sure you’re looking after your customers now, and your employees, who are probably working

from home, dealing with kids at home, and so on,” she says. “But we also ask our clients: ‘What do you want to have achieved when you look back five years from now?’ That’s important for employees at all levels to be thinking about, to guide today’s actions.”

Fly the OODA loop: Observe, Orient, Decide and Act. That means assess situations, make decisions and act quickly. Entrepreneurs are nimble, and we should be, too. “I’ve heard a lot of CEOs and managers at all levels say they’ve made 10 years’ worth of decisions within the past year,” says Wilkinson. “In the past, everybody thought large industries couldn’t move fast, but they’ve shown that they can.”

Network minds: Instead of thinking you already have a small team that knows the answer, look for brain power from all sides in order to solve a problem. Ask your business partners how you can better collaborate.

Fail wisely: There is a perception that top entrepreneurs are successful all the time, from the beginning. The reality is that they factor in failure but, crucially, they manage risk and fail small. “Being smart about experiments is essential,” says Wilkinson. “That means, if I give you \$100, don’t place one \$100 bet, place 10 \$10 bets.”

Gift Small Goods: Right now, this could mean the company helping out a partner who is stuck or employees scheduling meetings to help facilitate those who are juggling family and work responsibilities. Being helpful is good for everyone’s mental health and, in the long term, often pays dividends.

Concept of Effectuation

Wilkinson isn’t the only one to have done a deep dive into the minds of innovators. Saras D. Sarasvathy, Associate Professor at the Darden Graduate School of Business Administration at the University of Virginia, studied 27 of them closely in an attempt to determine

the “characteristics, habits and behaviors of the species entrepreneur.” She came up with the concept of Effectuation, which has five principles:

Bird in Hand: Expert entrepreneurs don’t hang around waiting for the perfect opportunity. Start taking action, based on what you have readily available.

Affordable Loss: Evaluate opportunities based on whether the downside is acceptable, rather than on the attractiveness of the predicted upside.

Crazy Quilts: Form partnerships with people and organizations willing to make a real commitment to jointly creating the future – product, firm, market – with you.

Lemonade: This is the “when life gives you lemons, make lemonade” theory: embracing the surprises that arise in uncertain situations, and staying flexible rather than tethered to existing goals.

Pilot in the Plane: Focus on the things that are, at least to a certain degree, within your control.

Thomas Blekman, Dean of the Global School for Entrepreneurship in Amsterdam, has adapted the Effectuation principles for the corporate sector.

“It’s actually an approach to problem solving,” he says. “With Bird in Hand you ask yourself, ‘What am I trying to achieve?’ And then, ‘What means do I have to do it?’ Then you use Affordable Loss to take small steps and figure out what works and what doesn’t. And if the solution lies outside your available means, then you co-create, which is using Crazy Quilt.”

Creative problem-solving

Blekman says that to be a successful entrepreneur – or “intrapreneur,” a manager within a company who promotes innovative product development and marketing – the important thing is to adjust your mindset.

“In reality, most of the things that are successfully adopted in the market are connected to things we already know, which again is Bird in Hand – starting with what you have.

“At the school we also teach the people who want to become intrapreneurs that there is always risk, but if you can manage the downside – the Affordable Loss principle – you can take steps toward the future.

“Entrepreneurs are seen as lone wolves, especially those working in existing organizations,” Blekman continues. “But you can’t be a lone wolf because you need allies in order to leverage the means of the organization. So Crazy Quilting is essential, also, for intrapreneurs.”

Finally, Wilkinson points to another skill top innovators try to hone.

“Something else that is really important is not getting worn out yourself – and entrepreneurs talk about this all the time, because the toll on mental health can be great. Are you sleeping enough? Are you eating healthily? Do you take a day off if you really need it?”

These days, for entrepreneurs, as for all of us, the ability to take care of yourself and your employees may be the most vital talent of all. ■ **Cathy Dillon**

6

Number of skills identified by Amy Wilkinson that we can learn from entrepreneurs

200

Number of business leaders Amy Wilkinson studied for her landmark book



Illustration: Danae Diaz



Delivered. goes green and clean with...

SAMIR LAKHANI

The founder and CEO of humanitarian organization Eco-Soap Bank reveals how he had the idea to recycle leftover soap and donate it to schools, clinics and communities in developing countries.

The course of Samir Lakhani's life changed in a single moment. As a result, the course of other people's lives has changed, too – dramatically, and for the better.

It happened in 2014 when, as a student at the University of Pittsburgh, Lakhani spent time traveling abroad. He went to East Africa and India, and also visited Cambodia where, in one village, he was appalled to see a woman scrubbing her child down with harmful laundry detergent. It dawned on him that she wasn't doing this by choice; it was because no one in the village had access to soap – it was too expensive – so this was the only alternative she had.

Lakhani also realized that this lack of soap was causing illness among the locals because everyone he met was suffering from some sort of ailment, from infections to diarrhea. "I'd identified the problem," he says. "A simple bar of soap, which so many of us take for granted, would stop the spread of preventable disease, and improve the villagers' lives."

Later, back in his hotel, Lakhani identified the solution. A brand-new bar of soap had been left in his bathroom, but what had happened to the one he'd unwrapped only the day before? Had it simply been thrown away? "I suddenly knew where I could find a sustainable, environmentally sound supply of soap, rather than buying millions of new bars from a factory," he says. "So, the next morning, I went from hotel to hotel, asking managers for their leftover soap. They must have thought I was out of my mind."

This lightbulb moment led to the foundation of Eco-Soap Bank, a humanitarian and environmental non-profit organization that has since partnered with 1,220 hotels and 206 distribution partners in 10 countries to recycle over 1.4 million pounds of soap. To date, Eco-Soap Bank has turned old soap into more than 9 million new bars, which it has given to schools, health clinics and village communities in impoverished countries.

It's a brilliant – and brilliantly simple – idea, based on one undeniable fact. "The global waste of soap is astronomical," stresses Lakhani, a CNN Heroes Award winner who was named on last year's Forbes 30 Under 30 social entrepreneur list. "It's criminal to think of old soap winding up in landfill when it could

be recycled and redistributed to people who desperately need it."

When you approach hotels with the idea of recycling their leftover soap, what reaction do you get?

It's not just hotels now. We also collect thousands of metric tons of virgin soap waste from soap factories and manufacturers every year. These stakeholders see this as an obvious win-win, because we take what is effectively trash from them and turn it into treasure that saves lives in less developed and impoverished countries.

How logistically difficult is the collection, recycling and delivery process?

We have the great fortune to employ 160 disadvantaged local women in 10 developing countries to collect the soap and then hand-recycle it. As the project expanded, we began parcel-shipping our soap; but now we regularly engage with global freight in order to send our recycled soap to, for example, disaster response settings and to refugee camps. Our soap is wrapped in upcycled newspaper, and the boxes we use to send it out are collected from the local area, and sealed using string taken from large bags of rice. Everything has been completely recycled, or upcycled.

4
MILLION

The number of people who have received soap and hygiene education through Eco-Soap Bank

How is the soap recycled?

We use a non-electrified, zero-carbon-emitting recycling press machine that is no heavier than 40 pounds, but can provide gainful employment to six to 10 women across the world. So, the work we do has a clear environmental benefit, a clear female empowerment benefit – and, of course, a massive public health impact.

You also provide communities with hygiene education. What impact does this have?

Hygiene is overlooked as a public health intervention, so we target schools in particular because we cannot afford to lose another generation through lack of hygiene awareness or poor hygiene habits. We work in partnership with hospitals and health clinics to ensure that outpatients leave not only with soap, but also with healthcare education delivered by a healthcare provider. We also employ an additional 41 women who serve as hygiene ambassadors. They go from household to household – when it is safe and appropriate to do so – providing soap at an affordable, subsidized cost so that they can support their own livelihoods, while giving some of the world's most remote families essential hygiene education. ■

Tony Greenway

 www.ecosoapbank.org

DIGITAL GLOBALIZATION BOOM: PANDEMIC CRUTCH OR SPRINGBOARD TO THE FUTURE?

Digital information and data flows surged in 2020 as COVID-19 forced personal interactions to go online. But digital globalization is still limited, and this pandemic-era savior faces powerful threats.



STEVEN A. ALTMAN

is a Senior Research Scholar at the New York University Stern School of Business and Director of the DHL Initiative on Globalization at NYU Stern's Center for the Future of Management. His research examines international flows of goods and services, capital, information and people; how cross-country differences and distances shape those flows; and their implications for business and public policy.

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First, the good news. Internet links across national borders have kept us far more connected despite social distancing than would have been possible just a decade ago. International internet traffic soared 48% in 2020 according to data from the telecommunications research firm TeleGeography, and there have also been double-digit increases in international voice calls and e-commerce sales during the pandemic.

The sudden spike in digital flows last March was so large that many asked, “Will the coronavirus break the internet?” YouTube and other streaming services had to reduce video quality to save

bandwidth, but telecommunications networks and internet platforms held up remarkably well as country after country went into lockdown.

The growth of digital flows last year stands in stark contrast to other aspects of globalization. The 2020 edition of the DHL Global Connectedness Index showed sharp drops in international trade, capital and people flows at the onset of the pandemic. Trade in goods has rebounded strongly, but foreign direct investment remained weak through the end of 2020, and international travel was still down more than 80% in January 2021. Digital interactions

don't perfectly replace in-person contact, but online connections have been crucial while travel has largely been put on pause.

Looking back on the 2020 surge in digital flows, we should avoid the misconception that national borders don't matter online. The internet is still used mainly to connect within countries rather than between them. For instance, just about 7% of voice calls, including calls over platforms such as WhatsApp and WeChat, are international. Less than 15% of friendships on Facebook cross national borders. And only 10% of global e-commerce sales are international.

Thus, most of the COVID-19 surge in digital flows was probably domestic rather than international. Online meetings likely replaced far more local gatherings than international ones, simply because most business and life interactions take place within national borders. Just about 21% of economic output ends up in a different country from where it was produced, and a mere 3.5% of people live outside their birth countries.

Cost of a “tech cold war”

Policy barriers, however, have also crimped the growth of digital flows across borders, and they represent a growing concern moving forward. Data localization laws have proliferated in recent years, slowing productivity growth and services trade. And the prospect of a U.S.-China “tech cold war” has threatened to further fragment the internet. A recent Deutsche Bank analysis estimated that this could come at a cost as high as \$3.5 trillion, due to reduced demand, costs of operating across rival platforms and costs of relocating supply chains.

Online criminal activity has also spiked amidst the digital flows boom. Cybersecurity complaints to the U.S. Federal Bureau of Investigation (FBI) more than tripled early in the pandemic, with large increases in phishing and malware attacks. And 2020 ended with the revelation of the SolarWinds Orion breach, which Microsoft President Brad Smith characterized as the “largest and most sophisticated attack the world has ever seen.”

Additionally, before the pandemic, the growth of the internet itself had slowed. International internet bandwidth grew at the slowest pace in 15 years in 2019, and the number of people using the internet increased just 5%, the lowest growth rate of internet users on record.

Lasting boom or return to pre-pandemic trends?

Looking forward, telecommunications carriers predict that the pandemic-era boom in internet traffic will return to this slowing growth trend. Digital flows have been key to keeping the world connected through the pandemic, but rather than celebrate, we

should work to preserve and strengthen our digital connections.

One positive development is the inclusion of protections for international data flows in recent trade agreements, such as the U.S.-Mexico-Canada Agreement (USMCA) and the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP). New regulations protecting the free flow of non-personal data across the EU are also a step in the right direction. But more still needs to be done. Four principles can guide the way forward.

Cybersecurity plus interoperability

First, prioritize cybersecurity. It is time to take digital security challenges as seriously as other threats that have demanded responses across the whole of society, such as nuclear weapons and international terrorism – and now the COVID-19 pandemic. This latest crisis is particularly apt, since it hit many countries unprepared despite repeated warnings, with enormous human and economic costs.

Second, emphasize interoperability. Even as countries take different paths on data privacy and content moderation, interoperability should be maximized. Countries should pursue common standards where possible, but it is even more crucial from a global perspective to preserve common platforms and facilitate secure mechanisms for data flows between areas with different regulations.

Protect, but without protectionism

Third, don't automatically equate distance with danger. Countries and companies vary widely in terms of their technical capabilities and regulatory structures for protecting sensitive data. Sometimes keeping data close by can make it more secure, but this is not always the case. Data localization entails costs as well as risks. Focused regulations, where the benefits clearly outweigh the costs, should be favored over blanket data localization requirements.

Fourth, resist digital protectionism. As more of the world's business takes place online, international opportunities increasingly revolve around digital activity. Digital trade has enormous potential to expand prosperity and wellbeing around the world. The necessary regulatory structures for this emerging world are still being developed. They should aim to address societal concerns while fostering a level playing field for international innovation and business competition.

The COVID-19 pandemic has highlighted the benefits of a digitally connected world. But the pandemic-era surge is masking major limitations and challenges. We must not take digital globalization for granted. Rather, we should strengthen our digital ties to accelerate the recovery from COVID-19 and to build a safer and more prosperous future. ■

→ THE DEBATE ←

THE ROBOT REVOLUTION

Artificially intelligent robots are here – and they are increasingly lifelike. But will they bring positive change to the world and what might human-robot interaction look like? Two leaders in the field of robotics technology reveal their hopes for the future of android innovation.

Professor Ishiguro: A robot is an extreme example of technology. Those of us working in robotics always want to push at the technological boundaries because it's a way to expand the realm of human possibility. Robots and AI are mirrors that reflect our humanity and can help us explore big questions, such as: "What does it mean to be human?" and "Why are we here?" This is why I developed Erica, a fully autonomous android.

In the past, Hollywood has been responsible for much of the negativity surrounding robots because, in films like "The Terminator," they're always destroying the world. I think this is a big cultural difference between America and Japan. In my country, the robot has been seen as a friend from the very beginning. Having said that, Hollywood is now crazy for the technology and, in a couple of years, there are plans for Erica to star in her own \$70 million sci-fi movie.

Still, at the moment, Erica's abilities are quite limited. She sits in the lobby of our research institute and talks to our visitors and, because she is friendly, people accept her as "human-like." That says a lot about how accepting we are as a society – although Erica is very far from being human.

As a child grows, they develop more complex conversational abilities, and Erica will do the same. As her capabilities improve, she'll have an even better relationship with humans. Of course, if we want to create a perfect robot copy of a human being, we'll need a leap forward in technology. Yet many interesting things are happening right now, such as computer scientists improving computational powers, and materials scientists improving robot skin.



One of my challenges will be to give Erica a more natural, human-like intelligence – although the big difference between artificial intelligence and human intelligence is that AI is based on big data, whereas human intelligence is derived from our interactions with the world around us.

I believe robots will enrich society. For example, we did an experiment to find out whom people would prefer: an android shopkeeper or a human shopkeeper? Actually, android shopkeepers were very popular, especially on the men's floors of department stores. Japanese men dislike to talk to human shopkeepers when buying clothes. We are shy. It is not the samurai spirit. Samurai spirit is all about not caring how you look or dress. If a human shopkeeper says, "That looks good!", we never trust it. But when androids say the same thing, we accept it, because androids never tell a lie.

Professor Hiroshi Ishiguro received a D. Eng. in systems engineering from Osaka University, Japan, in 1991. He has been Professor of the Department of Systems Innovation at the Graduate School of Engineering Science at Osaka University since 2009 and Distinguished Professor of Osaka University since 2017. He is also visiting Director of Hiroshi Ishiguro Laboratories at the Advanced Telecommunications Research Institute International (ATR). His research interests include sensor networks, interactive robotics and android science.

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In Hollywood films, robots are usually portrayed as extremely intelligent and human-like – but rarely benign. Indeed, at some point during the movie, you can bet they'll blow a fuse and try to take over the world. So as AI and android technologies develop in real life, no wonder the concern is that robots could become too clever for their own good.

Yet, in this installment of The Debate, two distinguished professors of robotics – Gordon Cheng from the Technical University of Munich, Germany, and Hiroshi Ishiguro from Intelligent Robotics

Professor Cheng: I am biased, of course, but I believe AI and robots can help us become more productive and live better lives. Robots can certainly fill productivity gaps in areas such as hospitals, logistics and farming.

For instance, I was talking to a farmer in my home country of Australia recently. Because of lockdown, vocational workers were unavailable to help pick fruit, so it was going rotten before it was off the tree. That's a massive waste, so the long-term solution is to get robots to pick the fruit instead. It's also more efficient. As an example, an olive farmer told me that robots can detect which olives have parasites and which don't, something that's difficult for humans to do. I also spend time talking to doctors about the way healthcare is delivered. We can modernize a lot of treatments with AI and robots to give patients a better experience.

Meanwhile, the logistics industry is under pressure because of a massive staff turnover every year – so this is a sector where robotics will increasingly come into play. Staff shortages are not just an issue in the western world, either. Chinese factories also have to deal with this problem, and have brought in automation to stop supply chain disruption.

There is, of course, the old argument about robots taking people's jobs. But the point is that people don't want to do dirty, low-paid or unsafe jobs – such as cleaning the outside of high-rise buildings – and they shouldn't have to!

There are two ways that robot-human interaction can develop. One is that robots will simply do what we tell them, much like Alexa or Siri do now. The other is that they will learn our habits, and become

Laboratory at Osaka University, Japan – reveal that, while huge strides are being made in this field (both have created robots with human form), we are some way off from developing an emotionally intelligent robot.

Even so, we'll increasingly see robots (humanoid and otherwise) in our homes and workplaces, and must learn to accept them, and even work in partnership with them. Professor Cheng and Professor Ishiguro highlight what this human-robot interaction could look like, and where we might encounter them in the years ahead. ■

more like companions. Personally, I think robots should have some form of emotional intelligence (EQ), otherwise our interactions with them won't be meaningful and the robots will just be reciting a script. But creating EQ in robots? That's a major challenge.

People might find robot-human interaction difficult to come to terms with at first, but remember: 100 years ago, people adapted to seeing motor vehicles – rather than horses – in the streets. A year ago, not many of us were using Zoom, but now most of us use it, every day. Yet I'm not for forcing change on people suddenly. I'm for slow adaptation. Nowadays, I think engineers can be too forceful. They make certain assumptions and expect the user to immediately conform to it. I don't think that's the best way to introduce any kind of meaningful interaction, particularly with robotics.

Ultimately, we have to ask ourselves: How do we get human-robot interaction working in a bidirectional and meaningful way? And how can we use robots to best serve human intention? Those will be our biggest challenges.

Professor Gordon Cheng has been making award-winning contributions in humanoid robotics, neuroengineering and artificial intelligence – including the development of a robot skin system – for the past 20 years. Since 2010, he has held the Chair for Cognitive Systems (which he also founded) in the Department of Electrical and Computer Engineering at Technical University of Munich (TUM), Munich, Germany.

 www.ei.tum.de/ics

WHAT'S THE STORY, MS. GONZALEZ?

READY TO HELP IN A CRISIS

As a volunteer with DHL's Disaster Response Teams, Monica Ramirez Gonzalez is on standby to fly to parts of the world affected by natural disasters to assist and supervise the movement of humanitarian supplies.

In my day job, I'm a Customer Service Supervisor for DHL Express U.S., based in Costa Rica. I love working for this organization, and what really keeps me engaged is volunteering for DHL's Disaster Response Teams (DRTs). When called on by the U.N., the DRTs travel to areas of the world affected by natural disasters to provide logistical support for the movement of humanitarian goods. We work at disaster site airports to prevent bottlenecks and get supplies out quickly – and help save lives.

I'd always been involved with volunteering projects in Costa Rica, so when I found out about the DRT initiative I wanted to be part of it. My first deployment was in Peru after the devastating earthquake of 2007, when I was part of the team working out of

the military air base in Pisco on the southern coast, helping to store aid supplies in two hangars. I've also been deployed in my home country of Costa Rica following hurricane Otto in 2016 and tropical storm Nate in 2017. I was Team Lead on both occasions.

Working in a disaster zone is not for everyone. First, you're in basic surroundings – there are no creature comforts! You also have to face your fears. Ever since I was little, I've been afraid of earthquakes; and in Peru, after the 2007 earthquake, we were in the area when the aftershocks started, which was terrifying. I know there is a risk, but I also know that DHL will always take good care of us, and the DRTs feel very well supported. Plus, I've learned a lot about myself. I now know how to handle my fear of earthquakes, and I deal with them totally differently. Also, I never thought I'd be managing a team of volunteers, working in a warehouse and prioritizing pallets of goods.

Someone told me that I was one of the first women to join the DRT in the Americas. I said: "Really? I hadn't noticed!" That's because we're such a good team that I never thought about it that way. Whether we're training new volunteers or out on deployment, we have our own roles and responsibilities – but we work together as one. We're like a family. And we never forget that we are there to support the humanitarian effort. ■ **As told to Tony Greenway**



www.dpdhl.com/en/sustainability.html

FACT: DHL's Disaster Response Teams were established in 2005, work in cooperation with the U.N. and cover nearly all parts of the world considered vulnerable to natural disasters.

700

The number of specially trained DHL employees who volunteer their time to be a part of the DRT initiative

40+

The number of deployments worldwide that DRTs have undertaken since 2005

Photos: DHL (2), Adobe Stock

7 BILLION

The amount in euros (\$8 billion) that Deutsche Post DHL Group will invest in climate-neutral logistics by 2030 under the terms of their new Sustainability Roadmap. Their investment will be focused on clean operations: to reduce carbon emissions from 33 million metric tons in 2020 to under 29 million metric tons in the next 10 years. The funds will be channeled into alternative aviation fuels, the expansion of the zero-emission electric vehicle fleet and climate-neutral buildings. By 2030, 80,000 electric vehicles will be deployed for last-mile deliveries, resulting in 60% electrification of global delivery vehicles.

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