

X =

Delivered.

THE GLOBAL LOGISTICS MAGAZINE

ISSUE 05/2017

BUSINESS POLE POSITION

Discover why Poland is one of Europe's most resilient economies

SOLUTIONS GOOD ENVIRONMENT FOR JOBS

Explore employment opportunities offered by the green economy

VIEWPOINTS HAULING THE SHOTS

Meet Dr. Seth Berkley – on a mission to improve vaccine delivery

FOCUS

FINE-TUNING

How the car industry is responding to revolutionary change



DEAR READER,

Are you still driving your car as you always have? I bet you already appreciate lane warnings or use guided parking assist. Perhaps you or your family have already started to use Uber and Didi Chuxing, or jump in a Zipcar or Car2Go for a shopping excursion?

There are many changes facing the automotive industry. This is an industry that has always taken pride in a culture of constant innovation. Automotive now has to adapt to a new set of disruptions and fundamental changes as the sector embraces using new technologies in what is evolving into the autonomous mobility sector. Find out more in our focus story The Mobility Revolution. Automotive is one of several sectors that are particularly strong in Poland, a country that has weathered economic storms with remarkable resilience. Experts predict Poland will be one of Europe's major growth engines by 2025 find out what's on the road ahead in Building a Bridge to the Future.

Sustainability matters – and the circular economy is becoming an ever more popular model for companies who make sustainability part of their core business. Dr. Kirstie McIntyre, Global Director for HP Inc.'s sustainability operations, explains her company's approaches in Sense & Sustainability.

2017 has been a tough year in terms of natural disasters - with floods, earthquakes and hurricanes causing immeasurable damage and devastation. At DHL we are proud of our team in daily operations and those who are part of our specialist DHL Disaster Response team who are often among the first "in" after a major disaster. Weathering the Storms tells the story of DHL teams in the Caribbean who kept critical logistics flows going in Puerto Rico and the Caribbean in the aftermath of Hurricanes Irma and Maria.

I hope you have an interesting read and enjoy the topics we have selected for you. Sincerely,

Kill Meahl

Bill Meahl Chief Commercial Officer, DHL

PUBLISHED BY DEUTSCHE POST AG

Represented by Prof. Dr. Christof Ehrhart EVP Corporate Communications & Responsibility

Anita Gupta **SVP Global Media Relations**

2

Editor-in-Chief Michelle Bach michelle.bach@dhl.com **Project Manager** Salvinija Buivydaite **Editorial Assistant**

Address Deutsche Post AG Charles-de-Gaulle-Strasse 20 53113 Bonn, Germany Tel. +49 (0) 228-18 20 **Commercial Register No.** Registration court Bonn HRB 6792

Turnover Tax ID No. DE 169838187 Website www.delivered.dhl.com

Editorial Production Content to Results GmbH Bei den Mühren 1 20457 Hamburg Editor Charlie Jones (freelance)

Project Manager Birte Kleinebenne Art Direction Christina Göttsche Photo Editor

Cover photo: 1971yes/Getty Images



NEWS 04

FOCUS: AUTOMOTIVE

- 80 The mobility revolution The automotive sector is changing – and so must its supply chains and logistics processes
- Automotive sustainability: beyond the 14 electric vehicle How the car industry is addressing its environmental impact
- 17 China's automotive sector: pulling ahead How the world's largest car producer is leading the field in automotive innovation

Photos on this page: DHL ; Viaframe/Getty Images; Victoria Adamson for Delivered; Seijkens/Gavi







BUSINESS

- 19 A better human? The booming market for bionic implants and artificial body parts
- 22 Building a bridge to the future Is this gateway of east-west trade ready for a seat at the EU's top table?
- 26 Sense & sustainability How HP Inc. is driving ambitious sustainability programs across the globe

SOLUTIONS

- 29 A different formula How differentiated logistics are making the chemicals sector more competitive
- 30 Under the madding crowd The London Postal Office's underground rail network - an early logistics marvel
- 32 The future is green How will the drive toward a greener economy create a boom in "green" jobs?

VIEWPOINTS

- Delivered. talks to... 34 Infectious disease specialist Dr. Seth Berkley on making vaccines available to all
- Digitalization a revolution for 36 logistics? An essay by Amadou Diallo
- What's the story, Mr. Wolfs? 38 Dealing with the aftermath of Hurricanes Irma and Maria

© 2017 Delivered. All rights reserved. The content may not be reproduced in whole or in part without the prior written permission of the publisher. The opinions expressed in Delivered. magazine are not necessarily those of Deutsche Post DHL Group.

Contributors

Simon Barker, Amadou Diallo, Tony Greenway, Paul Rubens, Julia Szyndzielorz, Jonathan Ward, Rhea Wessel

Paper This magazine is made from

100% recycled paper. We are committed to

protecting the environment and the world's resources.

Print optimal media GmbH Glienholzweg 7 17207 Röbel / Müritz Print Coordination Heiko Belitz (resp.), Matthias Richter





VIDEO LINK (\mathbf{b})

The icons above indicate additional online resources.

www.delivered.dhl.com

3



"THIS IS YOUR CAPTAIN BLEEPING ... "

We're hearing a lot about driverless cars and even pilotless drone taxis, but what about autonomous cargo transport? Well, a report from UBS Evidence Lab reckons that pilotless freight aircraft could be operating as soon as the beginning of the next decade, delivering cost savings for the airline industry of more than \$30 billion (€25.5 billion) a year. Researchers surveyed 8,000 people and found that they were open to the idea of pilotless freight planes – but less so when it came to being passengers on such flights.

STAY IN LANE

A U.S. company has proposed special dedicated lanes for self-driving vehicles. Hyperlane says its lanes would be computer controlled, allowing self-driving cars to travel at more than 161 kilometers per hour. Hyperlane's founders, Berkeley graduates Anthony Barrs and Baiyu Chen, claim their system would only cost \$12 million a mile – as opposed to the \$139 million-a-mile price tag of a proposed high-speed rail network in California.



THE WEB AT WORK

The internet of things (IoT) – turning everyday objects into smart devices and exchanging data between them – is bringing ever-greater efficiencies to all walks of life. DHL Supply Chain has used it to streamline yard management at a port handling automotive parts on their way to production. The narrowband IoT app allowed arriving drivers to check in via their phones and be given a queue number and estimated waiting time. When a dock became free, the driver was given a real-time update via the app. The process halved drivers' waiting time from an average of 40 minutes. The trial, which ended in September, was run in partnership with Huawei Technologies at a site in Liuzhou, China.

bit.ly/dhl-huawei-iot



MANAGING RISK

Recent months swept a particularly harsh hurricane season into the Atlantic basin. On August 25, Hurricane Harvey became the first major hurricane to land in the U.S. in over a decade. Following the widespread destruction and closure of infrastructure, evacuations and loss of life, how can companies maintain supply chain visibility and make contingency plans? The new DHL Resilience360 Analytics module creates sector-specific analyses from various supplier risk profiles to help identify supply chain risk pain points by combining historic and forward-looking risk information with supplier data to create industry benchmarking dashboards. Harvey disrupted about 33 percent of U.S. chemical production and Resilience360 Analytics showed that the Automotive, Life Science & Healthcare and Electronics sectors would likely be impacted. This complements Resilience360's existing early warning capabilities to help organizations take quick action and prepare ahead of the inevitable.

www.resilience360.com

WEB FIRST FOR DHL ECOMMERCE

DHL eCommerce has held its first webinar on growing your e-commerce business. Experts looked at how the e-commerce market is undergoing rapid growth, notably in the Asia-Pacific region, how new technologies like augmented reality are helping boost businesses and how logistics is a key differentiator. If you missed it, you can listen to the webinar and view the slides at:

www.future-of-ecommerce.com/webinar

DRONE ZONE

DHL has signed on as sponsor of this year's DR1 drone racing series in which the world's top five teams will compete in iconic locations, including Death Valley in California, the Mojave desert and DHL's own headquarters in Bonn, Germany. DR1 Presents the DHL Champions Series Fueled by Mountain Dew is being televised and streamed by Eurosport, Fox Sports Asia and Twitch.TV, reaching a potential audience of 300 million homes in more than 100 countries. DHL is already a frontrunner in the use of drones for logistics, with its Parcelcopter being deployed successfully in challenging areas such as the Bavarian Alps.

www.dr1racing.tv

JUNE 2018

The month when women in Saudi Arabia will be able to drive cars for the first time since 1979

TRUNK CALL

DHL Parcel has partnered with Volkswagen to offer an innovative logistics solution: delivering parcels to the trunks of recipients' cars. Selected customers in Berlin will be able to trial the new service using 50 Polos provided by Volks-

wagen. They have been fitted with "We Deliver" technology, allowing DHL couriers to access the vehicle's trunk using a single-use, time-limited code. Customers simply enter the car trunk as the delivery "destination" for the parcel and, as long as the vehicle is parked in an accessible place, the parcel will be delivered there. The DHL courier receives an exact GPS location for the car via the DHL Delivery app. Customers can also leave returns in the trunk to be picked up.



bit.ly/dhl-vw-trunk-deliveries



REINVENTING OUR WHEELS

The automotive industry is facing a revolution as radical as the one Henry Ford set in motion when he launched his Model T car. Technology is now as important as the mechanics under the hood as motorists expect ever-greater levels of gadgetry and connectedness in their vehicles. A new white paper commissioned by DHL, "The Quiet Revolution: Convergence and the Future Automotive Supply Chain," explores the new business model facing the car industry. The report explores how the technology and automotive industries are merging to create one super-sector and how companies will deliver this new style of supply chain. Download the white paper at:

GAMING AT THE SPEED OF THOUGHT

Virtual reality may be the buzzword among computer gamers at the moment, but the next leap forward could really blow your mind: controlling a game with your thoughts. Boston-based tech startup Neurable is developing a "computer mouse for the mind," combining a virtual reality headset with



sensors that can read your brain waves for the ultimate in hands-free gaming. The technology is in its infancy, but has much potential. One Silicon Valley startup hopes to use it to help people who are blind, deaf or paralyzed. And Facebook is said to be working on a system that would allow users to "type" five times faster with their thoughts.



ROCKETING AHEAD

NASA has announced it has successfully used 3-D printing to create a rocket component from two different metals. The technique has been used to manufacture spacecraft parts in the past, but only in a single metal. Now engineers at the Marshall Space Flight Center in Alabama have made a rocket engine igniter – a complex piece of machinery usually made by bonding two metal alloys together with a filler. NASA says the method could cut manufacturing costs by a third and be twice as quick.

bit.ly/3d-printed-rocket-engine



WASTE NOT, WANT NOT

A new startup is aiming to break society's addiction to consumption with a range of flatpack furniture made from waste. Pentatonic is developing an injection-molding process to transform waste materials as diverse as smartphones, cans and cigarette butts. Items like chairs and tables are designed to be assembled without tools, with no toxic glues or resins and with minimum waste.

www.pentatonic.com



LESS IS MORE FOR BRANSON

Sir Richard Branson has long been an enthusiastic champion of tackling global warming with his Carbon War Room initiative. Earlier this summer, he was in the U.S. to highlight how the trucking industry – which can have a huge carbon footprint – is ripe for innovation. Alongside Shell, PepsiCo and the North American Council for Freight Efficiency, the Virgin boss co-hosted a series of road shows called Run On Less to showcase advancements in freight efficiency. Branson estimates that if the 1.7 million trucks in the U.S. and Canada achieved Run On Less efficiencies, some 98 million tons of carbon dioxide would be saved each year not to mention \$24 billion in operating costs.





in the northern hemisphere



POWERING ON

Tesla is making good on its pledge to outfit Puerto Rico with its advanced energy storage systems following the island's recovery from Hurricane Maria. The first installation of the electric car company's solar panels and Powerpack batteries has begun at San Juan's children's hospital, Hospital del Niño. Tesla reported that the hospital is the "first of many" locations for its renewable energy systems in the country.

∰

WE'LL ALWAYS HAVE PARIS

Logistics and supply chains are often the areas in which companies generate the most carbon emissions but, as for any other industrial sector, 2015's Paris Climate Agreement does not include specific stipulations regarding international transport. What impact then does the global pledge to cut greenhouse gases have on businesses? Under the terms of the agreement, the 195 signatories pledged to use nationally determined contributions (NDCs) to combat climate change, with the overall aim of keeping the global rise in temperature to below 2 degrees Celsius above pre-industrial levels during this century. Progress will be monitored through a global "check-in" meeting every five years. So what can businesses do? With no specific goals set, it is up to each company to create its own sustainable logistics chains. The private sector has a vital role in closing the emissions reduction gap that will help each country meet its objectives. To help in this, companies are able to set science-based targets, and a consortium including the CDP and the World Wide Fund for Nature (WWF) have created an initiative to provide a clear path to achieve this. It is by using these proof-based methods alongside combined public and private initiatives that we can all aim to meet the Paris targets. Deutsche Post DHL Group has joined one such initiative, which aims to better define what science-based targets mean for the transport sector and therefore provide necessary guidance on how businesses can contribute. Read the full article at:



MISSION 2050: ZERO EMISSIONS

PARTNERS IN CLIMATE PROTECTION

In November the city of Bonn, seat of the United Nations Climate Secretariat (UNFCCC), hosted this year's U.N. Climate Change Conference (COP 23) over the course of 11 days. Deutsche Post DHL Group (DPDHL) supported COP 23 as official partner to Fiji, which held the COP 23 presidency. DHL provided carbon-neutral logistics to the U.N., the Fijian government and various organizations engaged in the fight against climate change.

DHL's carbon-neutral services are part of the DPDHL Group's Mission 2050 program, which aims to reduce its logistics-related emissions to zero by 2050, thereby contributing to climate protection and preserving the planet.

www.cop-23.org



www.dpdhl.com/cop23



1. Mission 2050 sets a very ambitious goal for your company, but you are optimistic about achieving it. Why?

Deutsche Post DHL Group has taken on a lead role in the logistics industry, one we take very seriously. As early as 2008, we established a goal to increase carbon efficiency by 30 percent by 2020 as compared to 2007 levels. At the time, that was also ambitious planning, but we succeeded nevertheless. In fact, we reached that target in 2016, four years earlier than planned! Moreover, we have formulated four clearly defined interim goals for the year 2025, which will enable us to build and maintain momentum as we move towards 2050.

2. What are the interim goals?

First, we want to increase our carbon efficiency by 50 percent over 2007 levels. Second, we want to operate 70 percent of our own first- and last-mile services with clean pickup and delivery solutions, such as electric vehicles or bicycles. Third, we want to support our customers with green logistics products and services, which is why more than 50 percent of our sales will incorporate Green Solutions. And fourth, we will train 80 percent of our employees to become certified GoGreen specialists. Environmental protection can only succeed if we work together, and we will need our 510,000 employees to get involved and engaged!

3. Have there been any early wins on the road to Mission 2050?

Yes, guite a few. For example, we have expanded production capacities of our own electric delivery vehicle, the StreetScooter, to 10,000 units per year. and even plan to increase production capacities up to 20,000. We have also expanded our bike delivery solutions in DHL Express, including the introduction of our Cubicycle cargo bike and the innovative trailer city hub concept for dense urban areas. And I'm proud to report that we are planting our first million trees this year together with partners!



THE MOBILITY REVOLUTION

When an industry undergoes a transformation, so must its supply chains and logistics processes. That's what's happening in the automotive sector right now.



he automotive industry prides itself on a culture of constant innovation and change. The lean manufacturing principles that have made the sector a productivity powerhouse are based on the relentless reassessment of established methods and processes. If a better way to do something can be found, it is quickly standardized and adopted across the world.

Some changes, however, go beyond the incremental. Right now, automotive companies in every part of the industry and every tier of the supply chain are riding a wave of disruption that may transform the very basis of their businesses. When consultancy KPMG asked automotive executives earlier this year to rate the chances of major business model disruption in the sector, 83 percent said they thought such change was likely, up from only 12 percent two years ago.

Going glocal

The first of these forces is geography. Global demand for cars is still growing and annual motor vehicle production is expected to pass 100 million by the end of this decade. That growth is far from evenly distributed, however. Car ownership levels have stabilized in many developed economies, but they are rising rapidly elsewhere. Since car making is now a global business, that matters for all the original equipment manufacturers (OEMs) and their major suppliers. Adapting production and supply networks to match the distribution of new customers hasn't been easy, however. Of the four BRIC countries seen as key target markets at the turn of the century, two – Brazil and Russia – have been hit by recessions. India and China, by contrast, continue to grow rapidly.

Vehicle manufacturers depend on highly orchestrated just-in-time logistics links with suppliers to meet their cost, quality and delivery goals. The challenges involved in running those supply chains are compounded by global manufacturing footprints. The rapid expansion of production in emerging regions is putting local logistics infrastructure under strain, for example. In some countries, such as China and Mexico, road networks and air and sea terminals are already struggling to cope with the demands of the automotive sector, and demand on that infrastructure continues to rise faster than supply. And it isn't just physical infrastructure that's in short supply. It can also be tough to secure the skilled workforces required in automotive production and logistics operations in these new markets.

While carmakers often pursue local sourcing strategies, developing the necessary capacity often takes time, forcing them to feed their plants with components from elsewhere in the world. That brings a host of tough

> IN PRODUCTION: Automotive manufacturing requires a skilled workforce – but finding it isn't always easy.



executives expecting a

major business model

disruption in the sector



SMART THINKING:

The technology powering autonomous cars is reshaping automotive supply chains.

challenges, from the need to manage customs controls to increased risk of in-transit disruption and delay. To meet them, automotive players are ramping up their logistics and supply management capabilities, investing in dedicated tools to assess and manage risks across their networks, for example, and implementing 24/7 logistics control towers so they can respond more rapidly to incidents and delays.

Technology on wheels

Then there's technology. Today's cars contain dozens of separate computer systems, controlling everything from the performance of the engine to the position of the passenger seats. New features, such as autonomous driving capabilities, are increasing the power and complexity of those in-vehicle computer systems. And cars are no longer isolated computer networks on wheels. A growing number of features call for internet connectivity too, allowing users to access online services on the move and vehicles to share data on their condition and location across the cloud.

Technology is reshaping automotive supply chains in many different ways. Electronic components tend to be smaller, lighter and more valuable than traditional car parts. They can be more fragile too, requiring protection from extremes of temperature, electrostatic discharge, shock and vibration during transportation. That requires companies to think hard about their choice of transport mode, storage and packaging. Some technology products, like integrated circuits or advanced sensors, require highly specialized production capabilities too, which means they tend to be manufactured in a few locations and shipped worldwide.

High-technology products are also altering the relationship between carmakers and their suppliers.

"High-technology products are altering the relationship between carmakers and their suppliers."

New players are entering the market, many of them huge companies in their own right, with customers spread across dozens of industries. That can expose carmakers to capacity constraints created by demand peaks from other sectors and makes it harder to negotiate the tough cost and quality improvement agreements that the industry is used to.

But technology is an enabler as well as a challenge in automotive logistics. Robotic systems, from automated guided vehicles to "cobots" that can work safely alongside human operators, are now being applied beyond the production environment and in the supply chain. That can improve the speed and accuracy of logistics processes and help companies overcome staffing challenges. The internet of things is helping to improve supply chain visibility, with robust, low-cost tracking devices that can monitor and report the precise location of shipments. Automotive companies and their logistics partners are also making use of advanced analytics techniques to comb through gigabytes of supply chain data to spot potential problems earlier and find new ways to streamline processes and cut costs.

A cleaner future

Even the internal combustion engine, the fundamental technology of the automotive industry, is facing the threat of obsolescence. Concerns about the impact of vehicle emissions on the global environment and local air quality are accelerating the development of alternative powertrain technologies. Electric propulsion, in the form of plug-in hybrid designs or pure electric vehicles, is the current leader in this area. Volvo, for example, announced in July that by 2019 every vehicle it produces will incorporate an electric drive of some form. Other technologies are under development too. Several manufacturers are already producing hydrogen fuel cell-powered vehicles in small volumes. Honda and GM have announced plans to invest \$85 million in a joint venture to manufacture fuel cells in the U.S., for example.

Alternative powertrain components present unique logistics challenges. The lithium-ion batteries that power the current generation of electric and hybrid vehicles are expensive, heavy and highly flammable. They are categorized as Class 9 Dangerous Goods under international transport regulations. Some battery technologies need careful temperature control during storage, or must be cycled to keep them in top condition prior to installation in the vehicle. Batteries also have particular requirements at end of life, which may occur in the middle of the lifecycle of the vehicle they power. Used batteries, which may be damaged or in poor condition, require specialist packaging for safety reasons.

New model armies

The third big disruption comes from customers. On the design side, companies must cope with growing diversity in customer requirements. Middle-class buyers in emerging economies want simple, reliable vehicles that don't cost too much to buy or run. Wealthy buyers across the world still want high levels of performance and comfort, and rich feature sets. Companies must attempt to meet all those needs while still retaining the economies of scale provided by global standardization in platforms and vehicle architectures. And they must repeat the trick with increasing frequency. Over the past two decades the lifecycle of a typical vehicle model has shrunk from 10 years to four or five. Getting new product development right is critical for profitability. Consultancy McKinsey estimates that a six-month delay in the launch of a new product can reduce its lifetime profit by 30 percent.

Logistics plays a critical role in the automotive product development process. Automotive companies now do much more of their development and validation work in virtual environments using advanced computer-aided design and simulation tools, but they still need to ship prototype parts and complete vehicles around the world for testing, and to support launch marketing efforts. And once production starts, new supply chains take time to stabilize as teething problems are overcome. By one estimate, logistics account for 10 percent of the cost of a new vehicle launch, and problems in logistics are at the root of around 30 percent of launch delays.



Perhaps most profoundly, consumer attitudes to vehicles, and vehicle ownership, are changing. Customers in many markets are becoming as interested in the connectivity of their cars as they are in traditional features like power or fuel economy. And some customers are eschewing car ownership altogether, opting instead for a new generation of mobility-on-demand services, including ride-hailing services such as Uber and Didi Chuxing or car-sharing services such as Zipcar or Car2Go.

Shifting value

These macro-level changes are impacting the core of vehicle manufacturers' business: designing, building and selling cars. But it is also rippling out through the supply chain both upstream and downstream. OEMs have been shifting complexity out of their own final assembly plants and onto suppliers for years, asking them to deliver ever-larger and more sophisticated modules. As more of the value of the finished vehicles is embedded in its electronics, that trend is accelerating.

If car companies are ceding more upstream value to suppliers, they are actively pursuing opportunities to capture new sources of value once the vehicle is in the hands of the end customer. The connected car provides a platform for the delivery of a wide range of services.

TOUCH AND GO: Some people are newing car ownership

eschewing car ownership and using technology to call up ride-hailing services such as Uber.

10 PERCENT The share of costs

attributable to logistics when launching a new vehicle Some of those are already established, like entertainment, navigation and traffic information. Others are just emerging. DHL's parcel delivery arm is piloting a car drop service in four German cities that allows a courier to locate a customer's vehicle while it is parked outside their workplace and gain one-time access to the trunk to deposit or pick up packages. Electric vehicles may play a part in home or neighborhood energy networks, accumulating electricity when it is available at low cost and returning it to smooth peaks in demand.

Emerging business models have implications for vehicle design too. Today, cars destined for shared use are usually standard models modified with appropriate remote access and location tracking systems. In the future, dedicated vehicles may appear, with the ability to configure themselves automatically to suit the needs and tastes of different drivers, for example.

Mobility services also make different demands on vehicle reliability. Sharing models typically result in much higher utilization levels, which puts more stress on components and creates extra pressure to keep vehicles on the road, earning money. That's going to drive the adoption of predictive maintenance technologies and the supply chains and logistics processes required to support them.

Do all these trends mean the end of the car company as we know it today? Fathi Tlatli, President, Global Automotive Sector, DHL Customer Solutions & Innovation, doesn't think so. "Mobility services, like car-sharing or ride-hailing



Components for electric and hybrid vehicles – such as this Audi e-tron Sportback concept car – present unique logistics challenges.

schemes, still need vehicles to operate them. And there are millions of people in emerging markets who want the opportunity of car ownership," he says. "At least for the fore-seeable future, car companies are not going away. Instead they are going to increase the scope of the products and the services they offer, so they can meet the mobility needs of a wider variety of end customers." I Jonathan Ward

QUESTIONS FOR

Fathi Tlatli, President, Global Automotive Sector, DHL Customer Solutions & Innovation

1. The automotive industry has continually evolved for more than 100 years. What's different about the changes it faces today?

The automotive industry is linked to its environment, and right now there are some macro trends that are driving big changes in approach. Those trends include globalization, digitalization and sustainable development. If a car company launches a new product or service today, customers all over the world may want it. A set of related developments, including the internet of things, big data and cloud computing, mean that digital technologies are having a huge impact on the industry, both in the way customers buy and use cars and the way they are built and run. Combined with the drive for improved efficiency and environmental sustainability, we are moving from the concept of "automotive" to the concept of "mobility."

2. How is the industry responding to those trends?

The products themselves are changing. We are seeing rapid growth in alternative powertrains, like electric propulsion, for example, and we are seeing closer links between automotive companies and the technology sector. That affects not just what goes into a vehicle, but also how it is designed and made, with shorter product lifecycles and an accelerating pace of innovation. Then there's a new focus on the customer experience. The industry no longer just sells cars, it sells a wide variety of services too.

3. What role does logistics have to play in the evolution of the industry's new business models?

Across the sector, digitalization is creating opportunities to optimize logistics. Low-cost sensors and cloud computing are improving visibility across globalized networks. Robotics and automation are boosting productivity in plants and in warehouses. The future automotive supply chain will be much leaner and more transparent, more automated and more cost efficient. The growth of mobility services will also require automotive companies to adapt their aftermarket supply chains to support vehicles throughout their lifecycles. Convenience and speed will be key customer requirements. That's going to create demand for new logistics solutions, like local distribution that can supply fast-moving parts on very short lead times, or proactive logistics solutions that use information from sensors in the vehicle to understand when a part needs to be replaced, then synchronize the delivery of that part to the arrival of the vehicle at a service center. At DHL, we are already running such "maintenance-on-demand" services for commercial vehicles and applying them to our own fleets.



AUTOMOTIVE SUSTAINABILITY: BEYOND THE ELECTRIC VEHICLE

The car industry is accelerating efforts to address the environmental impact of its activities. But eliminating tailpipe emissions is only part of the story.

lectric vehicles are on the charge. In the face of stricter regulations, and in the wake of damaging fraud scandals, the automotive sector is investing huge resources in electric powertrain technologies. Carmakers are rushing to introduce battery-powered vehicles and integrate some degree of electric propulsion across their portfolios.

The transition to vehicles that produce zero driving emissions is becoming a race between manufacturers and regulators. Regional and national governments have proposed bans on the production of new vehicles with internal combustion engines by the 2040s. The industry expects to beat those deadlines by a comfortable margin. Reducing the fumes and particulates emitted by vehicles on the road is undeniably valuable, especially for people living in cities plagued by poor air quality. But the tailpipe is only part of the environmental story. Carmaking affects the environment in numerous other ways, from the energy consumed in the manufacture, assembly and maintenance of vehicles to the potentially toxic materials used in those activities.

The automotive industry's progress on the issue of driving emissions is increasing the relative significance of these other environmental challenges. Toyota, for example, has conducted cradle-to-grave life cycle assessments (LCAs) to quantify the total environmental impact of several models in its portfolio. If renewable energy is used to charge its battery overnight, the company's Prius plugin hybrid has lifetime carbon dioxide emissions of around 30 percent lower than the comparable conventional hybrid model, but the share of those emissions that results from production and assembly activities rises from less than half to around two-thirds.

Routes to zero life cycle emissions

The industry is not ignoring the implications of that change. Toyota wants to eliminate carbon emissions from both its vehicles and its factories by 2050, and ultimately aims to achieve zero emissions across the complete vehicle life cycle. Other carmakers and suppliers have also set sustainability targets that consider the full scope of their activities and supply chains. By 2020 BMW, for example, aims to reduce the quantity of water, energy waste and solvents consumed in the production of a vehicle by 45 percent (taking its 2006 performance as the baseline). Tiremaker Michelin plans to improve energy efficiency by 38 percent as part of a program to achieve a 50 percent reduction in the environmental impact of its own operations by 2020.

In many cases, environmental performance goals are fully aligned with the metrics that automotive companies already strive to optimize. Efficient, high-quality processes mean less material wasted as scrap and lower energy consumption, for example. But the pursuit of zero emissions is encouraging the adoption of new approaches and technologies too.

Generating the energy required to power assembly activities from renewable sources is a relatively straightforward way to cut carbon emissions at the plant level. Some carmakers choose to buy renewable energy from external providers and import it through the grid, but a growing number are taking a more active role in power generation. Ford has partnered with U.K. renewables company Ecotricity to install three wind turbines that power its engine production site in Dagenham, East London. Tesla says its Gigafactory lithium battery plant in the U.S. state of Nevada will run entirely on renewable energy sources. The rooftop solar array planned for the site is expected to be the largest such site installation in the world.

Recycle, reuse

To avoid the energy expenditure required for the primary production of materials and reduce end-of-life waste, carmakers are turning to the use of recycled materials. In Japan, Nissan melts down used aluminium wheels at its Yokohama plant, for example, and uses the metal to produce components for new vehicles. It has also developed a process for the recycling of bumpers damaged in accidents. The broken parts are collected by dealerships and ground down into pellets that can be used in the manufacture of new parts. Automotive players are also exploiting external sources of recycled materials. Used plastic bottles, for example, can be transformed into polyester fibres for interior trim or acoustic insulation panels.

Grinding or melting down used parts still consumes energy, of course, as does transforming that material back into a usable product. To avoid those inputs, the industry is ramping up its "remanufacturing" activities. Remanufacturing involves the collection of worn or damaged components from repair shops or vehicle dismantlers and overhauling those parts to "like-new" condition so they can be returned to the market. As well as making new parts for many major automotive OEMs, tier-one supplier GKN remanufactures more than 600,000 drive shafts every year at plants in France and Spain. The company says its process requires 80 percent less steel than the manufacture of a new component. It has even developed a process that collects and reprocesses excess grease from its OE production lines, then uses that material to lubricate remanufactured parts.

The role of logistics

Logistics operations have an important role to play in many aspects of the automotive industry's sustainability efforts. Recycling and remanufacturing activities require specialist logistics services for the collection and recovery of input materials or the return of used "cores" for reprocessing, for example. Logistics activities also make up a significant part of the overall environmental footprint of automotive operations. BMW estimates that its logistics operations generate 1.4 million tons of carbon every year, roughly equalling the total direct and indirect emissions generated by the company's own facilities and employees.

Transport technology has a role to play in the reduction of logistics-related emissions. Consultancy Mc-Kinsey predicts that trucks using electric powertrains will soon be cost competitive with their diesel counterparts. It thinks that some segments, especially the lightand medium-duty vehicles often used in aftermarket part delivery or collection operations, will see significant adoption by 2030.



The amount of carbon, in metric tons, generated by BMW's logistics operations every year

WATERED DOWN:

The amount of water needed to manufacture a VW Golf has been reduced by 1,140 liters.





Leading carmakers are also working closely with logistics providers – including DHL – to tackle the environmental footprint of their logistics activities. They are capturing improvements in numerous ways. Sharing transport assets or warehouse facilities can drive up utilization, reduce driving distances and cut empty miles. Returnable containers reduce or eliminate packaging waste and often provide improved protection for components. Collapsible designs, such as DHL's IsoBin, allow more empty containers to fit into a truck



THROUGH THE ROOF:

The rooftop solar array planned for Tesla's Gigafactory in the U.S. state of Nevada is expected to be the largest installation of its kind in the world.

or shipping container, improving the overall efficiency of the transport loop.

Multimodal supply chains are helping companies to use more efficient options for particular route segments. Often these strategies can save time and money while simultaneously reducing emissions. Moving loads away from ports along inland waterways can be cheaper and more energy efficient than making the same journeys by truck, and is a useful way to avoid congested roads and loading facilities. Shipping a container load of parts from China to Europe by rail generates 3.6 metric tons of carbon, compared with more than 90 metric tons if the same load has to travel by air. Rail also generates significantly lower emissions of hydrocarbons, sulphur dioxide and nitrogen oxides than road, sea or air travel.

Smart warehouse design can simultaneously reduce operating costs and environmental impact. LED lighting, efficient glazing and optimized heating can significantly cut the energy required to run a facility. Warehouse roof space is often ideally suited for solar panel installations that can generate electricity or hot water for the facility. Larger warehouse installations are increasingly making use of combined heat and power (CHP) installations that use the waste heat from on-site electricity generation for space heating. Critically, such investments often offer a rapid financial return alongside their environmental benefits. The payback for large rooftop photovoltaic installations can still be as much as 15 years, but energy efficiency measures usually recoup initial costs in five years or less.

A long road ahead

Unlike the switch to electric mobility, the zero-emission automotive value chain won't be achieved by a single technological shift. Car companies and suppliers will have to fight a battle on multiple fronts, with changes that touch every aspect of their operations, from product design and sourcing strategies to infrastructure investments and business models.

This is a challenge that plays to the industry's strengths, however. Automotive companies are used to the precise measurement and management of operational performance. Their philosophy of continuous adaptation and improvement is based on the relentless identification and elimination of waste. The lean manufacturing philosophy that powered the sector's dramatic quality and productivity improvements in recent decades has equipped it with skills and capabilities that are now being used to build a cleaner industry.

Jonathan Ward

CHINA'S AUTOMOTIVE SECTOR: PULLING AHEAD

In less than two decades, China has transformed itself from an automotive minnow into a whale. Now the world's largest producer and consumer of cars, the country is also becoming a leading innovator in the industry.

n the year 2000, there were only 16 million cars on China's roads. That's one vehicle for every 79 people in its 1.2 billion population. Today, the country's vehicle parc (number of vehicles in use) is more than 10 times larger at more than 190 million. Most of that growth has taken place within the last nine years, driven in part by economic stimulus efforts introduced after the global financial crisis of 2007–2008.

There's plenty of further sales potential. Vehicle ownership in China now stands at 140 per 1,000 people, compared to around 250 per thousand in Brazil and almost 800 in the U.S. China has a billion people of driving age, and while car ownership is still out of reach for many, the fast-growing economy makes it a possibility for many more each year. The country's wealthier urban population is growing at almost 20 percent a year: by 2020, for example, more than 60 percent of the population will live in cities.

China's economic liberalization has made plenty of people rich by global standards. The country is on track to become the world's largest luxury car market by 2020, and the premium vehicle segment is forecast to grow at twice the overall market rate. Global automotive executives now see China as the best place to launch new products and services, ahead of the U.S. and Germany.

Production ramps up

China isn't just buying cars, it's making them too. In 2010, the country overtook the U.S. to become the world's largest car producer. By 2015, China's annual output of 24.5 million vehicles accounted for 27 percent of global vehicle production. Most of those cars, trucks and buses were destined for its domestic market, but exports are forecast to reach 3.7 million units a year by 2020. In 2016 the U.S. was the largest market for Chinese-made vehicles, followed by Iran, Germany and the Russian Federation.

While Chinese-branded vehicles are still a rarity on European roads, the country's industry has truly global markets in its sights. Chinese automaker Geely bought Sweden's Volvo in 2010, for example, and Dongfeng Motors invested €800 million (\$920 million) in PSA Peugeot Citroen in 2014 as part of a rescue deal involving a similar investment from the French Government. The country is also the world's fourth-largest exporter of automotive components, after Germany, the U.S. and Japan. China's government is actively encouraging its automotive players to pursue further foreign acquisitions, seeing the deals as a way to access technology and design capabilities, as well as open new export markets.

From low cost to high tech

Government action is encouraging China's automotive players to move up the technology curve. A key element in the country's long-term economic plan is a shift away from the labor-intensive low-value manufacturing that powered the country's economy in the past. Automotive technology, specifically in fuel-efficient, environmentally friendly vehicles, is one of 10 sectors targeted under the China Manufacturing 2025 plan, which is intended to transform the country's innovation and productivity. The automotive sector also stands to benefit from other target areas in the plan, including industrial IT and robotics.





China aims to become the leading global producer of electric vehicle (EV) technologies. The country's largest electric carmaker, BYD, started out as a battery manufacturer, moving into the automotive space in 2002 with the purchase of Tsinchuan Automobile Co. With strong encouragement from the government, Chinese companies are investing heavily in lithium battery production, both at home and overseas. If all the current plans are realized, Chinese companies will be able to manufacture more than 120 gigawatt hours of battery storage per year by 2020. Forty percent of that capacity will come from a single plant: Contemporary Amperex Technology Limited (CATL), a new factory under construction in Ningde on the northeastern coast of Fujian province, which will be around 50 percent bigger than Tesla's rival Gigafactory 1 in the U.S. state of Nevada.

On a charge

China's policy push toward environmentally friendly vehicles is already having an effect. The government has introduced incentives for producers, including corporate average fuel consumption targets and tax credits for companies that produce a minimum percentage of new energy vehicles (NEVs). Currently set at 8 percent, that



POWERED UP:

A car being tested at the country's largest electric carmaker, BYD. China aims to become the leading global producer of electric vehicle technologies.

target is set to rise to 12 percent by 2020. For customers, the registration fee payable on a new vehicle at the time of purchase is waived for NEVs, an incentive that can be worth almost \$29,000 to the buyer of a high-end car.

NEVs are now seen as the key competitive battleground in the Chinese automotive market, with both foreign and domestic manufacturers fighting hard to develop appealing products for every sector of the market, from luxury vehicles to mass-produced models. In 2015, a year in which global production of NEVs reached 500,000 units, sales in China were 330,000 – two-thirds of the total. For the Chinese market, that figure represented annual growth of 180 percent on the previous year. Around 75 EV models are on sale in China, the widest range of any market. Government targets call for annual production of 5 million NEVs by 2020, although it remains to be seen if the country can install and operate the millions of charging stations required to support that level of growth.

Buyers switch on

New automotive technology isn't just being pushed by the government, however, it is also demanded by customers. Research by consultancy McKinsey & Company suggests young Chinese customers are embracing new mobility services like car sharing and ride hailing just as fast as their peers in the West. And a PwC survey found that 40 percent of Chinese consumers would be willing to switch brands if the alternative offered better in-car connectivity features. They are savvy shoppers too, using online tools to find information on new vehicle options and seek out the best deals. Intense competition has been driving new car prices down by an average of 4 percent a year over the past 10 years.

Keeping the industry flowing

The dynamic nature of China's automotive market is having a knock-on effect on demand for logistics services. Some of that demand is simply a function of market growth. The dozen or so new vehicle assembly facilities currently under development across the country will need just-in-time delivery of parts or modules from suppliers. The industry's foreign investments are accelerating the development of global supply chains, which will require the management of complex flows of parts and materials between local manufacturing sites and operations overseas. And China's growing importance as an exporter of finished vehicles will require suitable sea and rail capacity. Within the country, new regulations designed to improve the safety and efficiency of road transport activities are creating demand for specialized vehicle transporters.

Other challenges are new for the country. China's vehicle market is maturing after years of frenetic growth, ramping up competitive pressure on manufacturers. In an increasingly crowded marketplace, carmakers must work harder to secure customer loyalty, and that calls for efficient sales and service networks as well as appealing products. In 2018, the average age of a Chinese car will reach five years, the same as in the U.S. And higher-quality vehicles mean customers now expect a lifespan of a decade or so. The second-hand car market, which didn't really exist in the country 10 years ago, is now a significant route to car ownership for many people. Ensuring parts are available for those older cars, especially in the country's hundreds of second- and third-tier cities, will require the development of entirely new service and logistics networks.

Then there are challenges that are new to the world. Nobody has experience of the large-scale export of electric vehicles or automotive lithium-ion batteries, for example. But building such capabilities will be essential if the country is to achieve its goal of becoming a global leader in the sector. **I** Jonathan Ward

BUSINESS

A BETTER HUMAN?

The market for bionic implants and artificial body parts that enhance mental and physical performance will be worth billions of dollars in the next few years.

f you had mentioned human enhancements 40 years ago, people would have thought about Steve Austin, the Six Million Dollar Man from the 1970s TV series who had superhuman strength thanks to bionic implants in the muscles of his arms and legs.

But fast-forward to today and the potential for human enhancement also includes mental abilities: perhaps the possibility of connecting an individual's brain to a computer system to harness the power of artificial intelligence.

Far-fetched? Not according to Elon Musk, the CEO of Tesla and SpaceX. "Over time I think we will probably see a closer merger of biological intelligence and digital intelligence," he told a crowd in Dubai recently. To this end Musk has launched a company called Neuralink, which is working to develop a type of brain-computer interface. Neuralink's ultimate aim is to develop brain implants that can communicate directly with software running in computers.

It is early days for this type of technology, but the market potential is huge: Mordor Intelligence predicts that the global artificial organs and bionic implants market will grow to \$70.7 billion by the end of 2021, increasing at a compound annual growth rate of 11.4 percent.

CYBATHLON

In the nearer term, humans will have to be satisfied with interfacing their brains with computers using technology such as augmented reality glasses or headsets. These can display relevant information in a user's field of vision so that, for example, an aircraft engineer can see a schematic of an engine part or even a repair instruction video as he examines a broken engine. The augmented reality market was valued at \$2.39 billion in 2016 and is expected to reach \$61.39 billion by 2023, growing at a CAGR of 55.71 percent during the forecast period, according to research carried out by MarketsandMarkets.

While brain-computer interfaces are at the frontier of current technology, human augmentation in simpler forms has arguably been going on for thousands of years says Amal Graafstra, a technologist and amateur biohacker from Seattle. "Since the first humans picked up sticks and rocks and started using tools, we've been augmenting ourselves," Graafstra pointed out in a BBC interview.

While Steve Austin's bionic implants in "The Six Billion Dollar Man" were clearly very advanced, Graafstra

BILLION The estimated value of the augmented reality market by 2023 has shown that in real life, humans can be enhanced with relatively simple implants. He has inserted radio frequency identification (RFID) chips under his skin that allow him to unlock his front door, log on to his computer and even start up his motorcycle – just by moving the hand with the chip implants in front of a sensor. RFID chips are more commonly used to track materials and finished goods as they move through the supply chain.

Graafstra is not alone in spotting the potential of RFID implants. Employees at a Swedish company called Epicenter have volunteered to have RFID chips injected into their bodies, enabling them to use photocopiers, open doors and even pay for food in the company cafeteria. Workers at a company in Wisconsin in the U.S. have done the same.

Although the number of people who have agreed to have RFID chip implants is currently tiny, should implants become popular the effect it could have on the RFID market would be significant: together with readers and associated software, the RFID chip market is forecast to be worth about \$15 billion by 2022, but if just 10 percent of the global population chooses to have an RFID implant then that forecast might have to be doubled.

The use of implants is not new, but to date most are medical devices, such as pacemakers or heart pumps,

b b BILLION The value of the RFID chip market by 2022 designed to treat people who are unwell. Anders Sandberg, a doctor of computational neuroscience and a researcher at the Future of Humanity Institute at the University of Oxford, says that many people have ethical reservations about implants that enhance human capabilities rather than just treat illnesses. A heart pump that could work faster than any human heart, resulting in superhuman athletic performance, would be unlikely to be as acceptable to society as one that simply allowed the implantee to lead a normal life, he believes.

"The medical normalization issue comes up quite a bit," says Sandberg, referring to the view held by some that medical treatment should only be used to cure the sick and return them to a "normal" state. "Anything beyond that is problematic (to them)," he says.

But Sandberg believes that this view does not bare closer scrutiny. He points out that vaccination is a type of medical treatment that is given before a person gets sick to enhance that person's immune system, so the distinction between medical treatment and human enhancement is blurred. He adds that because of the phenomenon of herd immunity, vaccination should

> BRAIN WAVE: Brain-computer interfaces are at the frontier of current assistive technology.



also be thought of as a type of collective human enhancement.

For people who have suffered spinal cord injury there is also a huge potential demand for neural implants to overcome paralysis by allowing communication between the brain and real (or prosthetic) limbs, bridging the damaged area of the spinal cord.

Today the brain impulses picked up by implants can be sent via a computer to real or prosthetic hands, allowing them to be controlled with some dexterity. Professor John Donoghue, founding director of the Wyss Center for Bio and Neuroengineering in Geneva, says that communication between brain implants and limbs is becoming a two-way street, allowing prosthetic fingertips to send messages back to brain implants to give people the sensation of touch. "It's not the same as a real touch sensation, but it's certainly a crude version of that," he says.

He believes that the ability to send information to the brain that is interpreted as touch sensations could one day be used to provide enhanced touch sensation – perhaps optimized to enable a blind person to read braille more efficiently. "If you can give someone who is blind a better sense of braille then to me, personally, that would be ethical," Donoghue says. If the sense of touch can be enhanced in this way then it may also be possible to enhance other senses – perhaps enabling humans to smell as well as a tracker dog.

Current brain-computer interfaces rely on a wire from the implants coming out of the head through a hole in the skin, but Donoghue is working on a "brain radio" placed inside the head that would allow implants to communicate wirelessly with a prosthetic limb via a computer. Such communication will have to be encrypted to ensure that it is not possible to "brainjack" someone by sending malicious radio signals that could take control of prosthetic limbs, Donoghue adds.

"If someone has a nervous system problem and a brain-computer interface can restore movement, we want it to be invisible. We want to be able to send impulses from the brain to a small smartphone on their belt, and then on to their arm so they can move or feel, without a wire coming out of their head that could get caught on something. That is the goal," Donoghue says.

Although Donoghue's aim is to build systems to treat people with medical conditions, the technology he is developing looks to be a very simple version of what will be needed to further Musk's vision of a merger of human and artificial intelligence.

But if implants are to become more commonly used purely as human enhancements (rather than for any medical purpose), then there is one important question that needs to be answered: who will pay for them? They can be extraordinarily expensive to develop, and it is not clear that there is a huge market of people who want to enhance themselves lining up for them.



CHIP IN: People with RFID chips inserted under their skin can unlock doors or log on to computers by moving their hand in front of a sensor.

In fact a survey carried out by the Pew Research Center found that the majority of U.S. adults (66 percent) would definitely or probably not want to get a brain chip implant (of the type that Elon Musk is considering) to improve their ability to process information.

It is possible that a limited number of extremely rich people might want to enhance their minds with expensive brain implants, which could lead to a wealthy mental elite. But Sandberg points out that it may be "low mental performers," as he puts it, who benefit most from brain implants, leading to greater mental equality rather than less.

Sandberg believes that the military establishment is the most likely to be interested in human enhancements, and it has the funds to pay for it: the U.S. military alone has a science and technology program with a budget of \$12.5 billion. But he says that they are unlikely to be interested in "permanent enhancements" of the Steve Austin or Elon Musk types. "It's more likely they would be interested in ways to allow people to control hunger, or use energy more efficiently," he says.

As for the chances of seeing a human enhanced with robotic parts to make them perform more efficiently anywhere from the battlefield to the workplace, Sandberg sees them as minimal for the foreseeable future. "Making a limb as versatile as an actual limb is very hard, so we are a long way from wanting to replace a real limb with an artificial one," he concludes. **D** Paul Rubens

66 PERCENT

The number of U.S. citizens who would not want a brain chip implant



BUILDING A BRIDGE TO THE FUTURE

A strong manufacturing base and great logistics infrastructure have made Poland one of Europe's most resilient economies. Now a gateway of east-west trade, is the country ready to move ahead even further?

> olange Olszewska, CEO and co-owner of Solaris Bus & Coach, is one of very few women occupying a top-level position in the European automotive sector. With 2,500 employees and Solaris buses, coaches and trams running in 32 countries, her company is one of the leading bus manufacturers in Europe. But Olszewska still recalls the uncertainty of the 1990s when, shortly after communism fell, she and her husband decided to return to Poland and manufacture buses: "I had nothing and he had nothing so, together, we had enough to build a factory."

Olszewska's success illustrates the development of the Polish economy over the 26 years since the country completed its transition from communism to a free market economy. Founded in 1994, her company is an example of the increasing technical sophistication of Polish industry generally – but also shares some of the growing pains of other Polish businesses.

Scale and location

Ranked 24th in the World Bank Group's recent Ease of Doing Business survey, Poland remains perhaps the most attractive country in the region for investor due to its scale and central location within the EU. With Germany, the Czech Republic, Slovakia, Ukraine, Belarus, Lithuania and Russia as neighbors and sea access to the north, transferring goods is easy. Gdansk, Poland's sixth-largest city, boasts the second-largest container port on the Baltic Sea. It has become the principle maritime gateway for Central Europe, with container ships with an average gross tonnage of 18,304 handling more than 37 million metric tons of cargo in 2016.

Although trade with Russia faltered following the conflict over Crimea, Poland has recently become the primary gateway for intercontinental rail transport between Europe and Asia. China's One Belt One Road Initiative sees goods bound for Western Europe come from Chinese megacities to be consolidated in various forwarding facilities – most notably in Poland's largest freezone, Małaszewicze (see box).

While Poland's population of 38 million counts as one of the larger in Europe, wages are still considerably lower than in Western Europe – another important factor for foreign investors. In 2015, the average hourly labor cost in industry, services and construction was $\notin 9$ (\$11) per hour, one euro lower than in the Czech Republic or Slovakia and less than a third of equivalent wages in Germany. Meanwhile, workers in the information and communications technology sector make $\notin 15$ per hour on average, compared to the EU average of $\notin 28$ per hour and $\notin 44$ per hour in Germany, according to McKinsey. While some manufacturers have relocated to Romania, which has even lower wages, most of them stay in Poland due to lower corruption levels and better infrastructure, as well as a larger domestic market.

Over the years, Poland has developed into one of Europe's major manufacturing locations. Specializing in skilled but not high-tech manufacturing, the country lists machinery, vehicles, electrical equipment and furniture as its top four export sectors in 2016. Industry giants such as BSH or Whirlpool make home appliances in the country and the automotive sector has a strong presence too, with Volkswagen, Fiat, GM, MAN and Mercedes-Benz all maintaining plants there. The country has turned into a brand in its own right, says Olszewska: "We are proud to see our trademark, a green dachshund, on buses across Europe. Our goal is to stand out as a great bus manufacturer – and as a Polish brand."

According to a report by Stratega Market Research, Poland is the fastest-growing e-commerce market within the EU, with 31 percent of the population having shopped online in 2016 – an increase of 25 percent compared to 2015. Tomasz Buraś, Managing Director of



DHL Express Poland, has been witnessing this growth first hand. "We have experienced Poland's e-commerce boom in our own business. Over the past four to five years, the proportion of our e-commerce-related business has risen steadily and it is now at 28 percent of our business volumes, but growing steadily," said Buraś. He identifies the country's rapid economic growth and improving infrastructure as the key factors of success. "Between 2002 and 2016, the international parcel delivery market has tripled. Polish exports are growing, and an increasing number of Polish companies are successfully selling their products abroad."

A parcel sent from Warsaw takes a little bit more than an hour to reach Berlin by plane or roughly six hours via road transportation. As noted by Hendrik Venter, CEO Central Europe at DHL Supply Chain, "Poland's central location, as well as its improved road and railway infrastructure, have made the country the center of gravity for regional distribution centers and a cost-effective location for e-commerce return centers along the German border."





COACHING SESSION: Engineers train at Solaris, one of the leading bus manufacturers in Europe. Right: the company's coowner Solange Olszewska.

Labor shortages and Economy 2.0

Emerging from the role of cheap labor provider and Europe's back office constitutes a major challenge for the Polish economy. The development of high-tech and innovative ideas-based industries is seen as a key enabler of this transformation. According to McKinsey's 2016 Digital Poland Report, Poland's productivity levels are still far below those of Western Europe: the gap between Poland and the EU-15 is estimated at 32 percent. Resources such as raw materials, labor, skills, equipment, land, intellectual property, management, technology and capital could all be used far more effectively, thus adding value to the Polish economy. Increased digitalization could help reduce the current productivity gap between Poland and the EU-15 by an additional 27-47 percent, though this doesn't appear to be a priority for the government as yet, choosing as it is to focus on mining and other fundamentally labor-intensive industries over clean energy or other innovations.

That said, some companies are already making Industry 2.0 a reality. According to Polish Startups Report, there were almost 2,700 such businesses in the country in 2016, compared to roughly 6,000 startup founders in Germany, a country with twice the population. The cities of Krakow, Poznan, Warsaw, and Wrocław are considered the major hubs. Warsaw-based Saule Technologies is a great example of a new Polish company, delivering revolutionary solar panels in the form of low-cost, flexible and lightweight foil. Wrocław-based Sky Tronic develops drone steering mechanisms based on artificial intelligence – one of very few companies in the market anywhere in the world. Meanwhile ChallengeRocket, another Wrocław-based startup, has developed a platform that enables companies like Honda, Vodafone and Philips to 40 PERCENT The number of women in

The number of women in top management roles (compared to the EU average of 26 percent) recruit IT specialists through international programming contests known as hackathons. There is much work to be done before Poland is a world leader in information technology industries, however: according to McKinsey, Poland could become an even stronger digital economy if it manages to increase the number of graduates in technical subjects – and stop the outflow of talent.

The enlargement of the EU in 2004 was a major step for Poland, as the ex-communist country started benefiting from a dynamic growth process. However, the opening of the EU labor market resulted in a major problem for Poland's service and industry sectors: more than 1 million predominantly young Poles left the country seeking better-paid jobs in other corners of the EU. Far from slowing over time, this level of emigration appears to be the new normal - remittances exceeded 1 billion euros a year in 2008 and have remained at that level since, strengthening the domestic economy while reducing its workforce. These factors, as well as increasing wages in Poland and a historically high employment rate, have resulted in a growing shortage of skilled labor put simply, the healthy economy means Poles can afford to be pickier about the work they do, and jobs frequently go unfilled. "There is competition among employers for labor. We feel it very strongly in the automotive sector and resort to employing workers from other countries, for example from Ukraine," said Olszewska. Her experience isn't unique: a recent influx of more than a million economic migrants from Ukraine is saving the economy from an even more severe shortage. Like Olszewska, Buraś notes a similar need for experienced labor. "What I hear from my customers, as well as my experience at DHL Express, indicates that the gap between the availability of and demand for skilled people is growing," he



GOING DIGITAL:

Poland's high-tech and innovative ideas-based industries are attracting global players such as Google. said. "Companies need to review existing HR approaches and adopt new smart strategies in terms of recruitment, onboarding, remuneration, incentives, development and training in order to attract and retain the best talent. It is not a one-time exercise but a constant review and adaptation process that we are implementing."

However, increasing the participation of women in the labor market would also be beneficial. Despite making up 40 percent of senior management roles (compared to the EU average of 26 percent), Polish women remain underrepresented in the workforce as a whole, with 61.4 percent currently professionally active compared to 67.1 percent in the wider EU.

The labor shortage challenge is also present in logistics. To help address it, DHL Supply Chain has started to implement smart warehouses and develop mechanization and automation so as to help the staff that *are* available perform tasks as efficiently as possible. Technologies such as augmented reality glasses and improved hands-free scanners, as well as the implementation of autonomous transport inside the warehouses, are aimed at increasing overall productivity without necessarily making many more hires. "Supply chains of the future will have to be more agile, scalable to demand and connected," says Venter.

Challenges for the future

While EU membership brought great demographic changes, it was also a source of huge investment: Poland became the largest net recipient of EU funds and is expected to receive a total of €106 billion (\$125 billion) from the 2014-2020 EU budget pool. Citizens have become more affluent: According to the European Commission, Poland's GDP per capita expressed in purchasing power was 69 percent of the EU average by 2015, up from 53 percent in 2007. The results are tangible: Flags showing EU financing are visible on recently completed highways and other developments, and young entrepreneurs have also benefited from EU loans to fund their businesses.

Could Poland become an economy of similar size and power - to Italy or Spain? According to McKinsey, it will have to invest in innovation, further improve its infrastructure, simplify regulations and move in the direction of specialized manufacturing and technologies. To that end, Solaris is currently focusing on manufacturing emission-free buses. But Poland, like the bus company and all the other companies that have contributed to the good state of its economy, needs to focus on the demands of tomorrow's markets in order to continue its growth. To make that possible, both government and industry will have to maximize the potential heralded by the digital revolution and increase productivity across the board. The foundations are there. But it's up to the Polish people, industry and government to build on them. *Julia Szyndzielorz*



MAŁASZEWICZE – POLAND'S LARGEST FREE CUSTOMS ZONE

The town of Małaszewicze, located 120 kilometers from the Ukrainian border and just five kilometers from Belarus, boasts the largest free customs zone in Poland with more than 410 acres (166 hectares) of development area. The dry cargo port has enjoyed increased international importance ever since the Chinese government started investing in the One Belt One Road Initiative. The facility has a handling capacity of 24,000 tons per 24 hours.

Goods from Asia arrive in Małaszewicze via broad-gauge railway and are then transferred onto other, standardgauge trains or onto trucks, commissioned or stored. The free customs zone is conveniently located along the E 20 railway and the E 30 road, the main transit routes from the EU to Russia. It also serves as the gateway for European shipments to Asia.

"Małaszewicze is becoming a boom town, with all the major logistics companies, including DHL, opening offices and warehouses in the area to offer a broad range of logistics services," says Thomas Kowitzki, Head of Multimodal, DHL Global Forwarding. The importance of having an efficient customs zone is also being acknowledged by the Polish government, which recently transferred several dozen customs officers to work in the zone. The government in Warsaw hopes that maintaining a good relationship to China will boost Polish exports to Asia. One of the projects being discussed by the governments in Beijing and Warsaw is the opening of a joint parcel distribution center for the Chinese and Polish postal services in Małaszewicze. And the growth story is just beginning -Cargotor, the administrator of the railway infrastructure in Małaszewicze, has already commissioned a study of the potential for further modernizing the cargo terminals.



SENSE & SUSTAINABILITY

At HP Inc., Dr. Kirstie McIntyre and her team are part of driving forward ambitious sustainability goals across the globe.

hat do you get when 70 men and two women attend an environmental engineering course at university? Powerful business leaders like Dr. Kirstie McIntyre, Global Director for HP Inc.'s sustainability operations and an early pioneer in green supply chains. She "fell into her degree," says McIntyre. "I was enrolled by my mother while I was on a gap year in South America. She went to an information fair and thought the course looked like it had great prospects." McIntyre emerged from her studies with a doctorate in engineering and got sponsored to do further studies in manufacturing and supply chain. This led her to be part of the team at Surrey University, U.K., that developed ISO 14040:2006, which describes the principles and framework for life cycle assessment (LCA) – again, pioneering work in the green arena.

Today at HP Inc., McIntyre globally manages a range of sustainability programs that are close to the company's heart, such as closed-loop materials, takeback and recycling. Her remit covers all-product and service-related environmental laws and market access agreements on energy efficiency, chemical/material restrictions and end-of-life considerations. A core part includes liaison with government entities, industry associates, supply chain partners and HP's customers on environmental regulations, recycling and other sustainability aspects of HP's products.

Operating in 170 countries, HP believes that sustainability is a powerful force for innovation. This belief is a driving factor across many aspects of the company's business, from product and service design through to new business models around new technologies such as 3-D printing and supply chain digitization.

Increasingly, the company is shifting its business mode toward a fully sustainable approach – with McIntyre acting as co-lead of HP's circular economy program, helping to steer operations toward a full circular economy model.

Sustainability goals

The company has set itself bold sustainability goals, intended to drive progress across its entire value chain. These encompass a 25 percent reduction of absolute greenhouse gas emissions by 2020. To meet that goal, HP produces low-carbon solutions and energy-efficient products, aiming to reduce environmental impact through safer materials and greener packaging. Materiality assessments help to shape the sustainability strategy and investments, as well as identify emerging issues and new leadership opportunities for HP. By setting goals related to its most material issues, the company drives both progress and long-term goals.

"In addition," says McIntyre, "HP Inc. places key importance on societal impact. People matter, and we intend to develop skills and improve the wellbeing of some 500,000 factory workers by 2025, an initiative that was started in 2015. We also want to be a key enabler in education, generating better education outcomes for 100 million people by 2025."

Green supply chains were an early focus for McIntyre, as they formed part of her doctoral thesis some 25 years ago. At the time, supply chains were a rather unusual topic for a doctorate – while today, says McIntyre, they are of key importance, due to their ever-growing complexity and ability to optimize business strategy. In addition to traditional, straightforward supply chains, reverse loops for materials and products have become a key focus at HP, and one McIntyre finds among the

HP IN HAITI

Haiti's plastic waste is now more of a genuine commodity thanks to an initiative led by HP Inc. The tech giant, in an embrace of the circular economy, is offering educational opportunities and health care to communities of waste collectors in the notoriously garbage-laden country in exchange for plastic water bottles to process into new ink cartridges. As an attempt to break the so-called "material loop," HP's program is another step in the company's continuous effort to reimagine their supply chain while also creating feasible and regular employment for those most harmed by the consequences of wasteful manufacturing. There are alternatives to the traditional linear life cycles of products, and HP and Haiti understand that.

bit.ly/hp-cartridge-recycling



HP'S ENVIRONMENTAL GOALS

- Reduce first-tier production supplier- and product transportation-related GHG emissions intensity by **10 percent** by 2025 as compared to 2015
- Prevent 2 million metric tons of CO2e emissions from suppliers between 2010 and 2025
- Reduce GHG emissions from global operations by **25 percent** by 2025 as compared to 2015
- Commit to 100 percent renewable electricity in global operations, achieving 40 percent by 2020
- Reduce fresh water consumption in operations **10 percent** by 2025 as compared to 2015
- Reduce the GHG emissions intensity of the HP product portfolio by **25 percent** by 2020 as compared to 2010.
- Achieve zero deforestation caused by HP paper-based products and packaging by 2020
- Recycle **1.2 million metric tons** of hardware and supplies by 2025, beginning in 2016

most interesting: With new, refreshed and refurbished products, she sees HP able to offer multiple life cycles for a product, and with some five million units of hardware repaired in 2016 alone, it's clearly a growing trend.

In order to enable products to have several life cycles, HP continually aims to improve its product design,



IFIXIT

iFixit is an online community dedicated to giving consumers

proper access to their own products. Under the mandate that "repair is noble," the California-based company seeks to reduce global electronic waste with a user-generated database of repair manuals for common home technology. Guidebooks for fixing HP Inc.'s laptops are available on iFixit.com and regularly receive perfect "10/10" repairability review scores from users.



paying key attention to better design for easier repair, reuse and refurbishing.

So, where next on HP's sustainability path? McIntyre sees plenty of room for growth in sustainable supply chain design, manufacturing and reverse logistics. A key growth area is device as a service (DaaS), with HP leasing the products to customers and managing supply, repair and returns, thus enabling businesses to focus on operating expenses rather than adding capital expenditure to their balance sheet – something she believes procurement departments need to focus on much more. McIntyre sees demand from customers growing steadily: "I believe that the growth of the service/ sharing economy with players such as Netflix and Airbnb has opened minds to the concept of not owning fixed assets."

"Ultimately," says McIntyre, "it's about trust and collaboration. The way toward a sustainable future is built on the foundation of trust between suppliers and customers, creating partnerships to ensure a more sustainable future – for business, for people and for the planet."







A DIFFERENT FORMULA

Differentiated logistics services can improve competitiveness for chemicals companies while offering additional value to their customers.

cross industries, customers want products and services that are precisely tailored to their needs. Increasingly, they are getting them. Technological advances, such as advanced data analysis tools and flexible manufacturing systems, are helping companies understand their customers' requirements more accurately and adapt their offerings to suit.

That trend is most visible in B2C markets, as big e-commerce players use smart algorithms and flexible distribution models to give customers unprecedented choice and a great service experience. It is becoming equally important in B2B contexts, however. The availability of a product in the right quantity, at the right time, in the right packaging and with the right delivery lead-time can be every bit as important as price if it helps the customer to run their own operations more smoothly.

The chemicals industry is one sector right in the middle of the transition to such a customer-focused approach. Chemical companies, especially those operating in high-cost regions, are seeking competitive advantage through differentiation. They are exploring a broad range of new service offerings, including custom packaging and labeling, vendor-managed inventory programs, direct delivery of smaller quantities to end users and the premixing of products to meet the needs of the customer's downstream production activities. A key challenge for such companies lies in ensuring that



The full white paper "Differentiated Logistics Services" can be downloaded at



they get these offerings right for every customer. Offering customers services that they don't really need risks eroding profitability and competitiveness by adding unnecessary cost.

A new DHL white paper entitled "Differentiated Logistics Services" describes two new tools that can help companies avoid those pitfalls. Developed by Kompetenzgruppe Chemielogistik, an independent team of experts in chemical logistics, and chemicals company Evonik Industries, the two tools – the Logistics Service Cube and the Cost-Benefit Scale – are designed to help chemical industry stakeholders make the best decisions whilst exploring relatively new and untapped territory.

The Logistics Service Cube helps companies segment their offerings by product type, supply chain offering and service level. It gives companies a structured framework that allows them to identify the best logistics approach for each segment in collaboration with their customers and service providers.

Assessing the true value of differentiated logistics offerings is difficult, because they have an impact on multiple dimensions of both the customer's and supplier's business. The second tool – the Cost-Benefit Scale – helps companies understand and explore those trade-offs for different types of service. Guaranteed availability services, like vendor-managed inventory approaches, for example, inevitably incur additional storage and handling costs for the provider of the service. Those costs must be set against the benefits of the approach, which include the elimination of repeated order processing activities, simpler planning and the opportunity to drive long-term customer loyalty.

For Evonik, these tools are providing the analytical rigor it needs to target its investments in differentiated logistics services. "To successfully shift from familiar logistics services to modern logistics service bundles, we first need to evaluate the positive and negative effects on our own company as the basis for sound decision-making," says Hans Fraats, Head of Strategic Logistics Management, Resource Efficiency, Evonik Industries. **Jonathan Ward**

UNDER THE MADDING CROWD: THE MAIL RAIL

he historic tunnels of the London Postal Office's underground rail network – the "Mail Rail" – once moved millions of shipments daily beneath the city. The 10.5 kilometer electric railway, which operated from 1927 up until its closing in 2003, was a unique solution to the above-ground logistics challenges of early 20th-century London. Though unseen by most, a fleet of driverless trains would course through a narrow warren of tubes at speeds of up to 64 kilometers per

hour to transfer the mail uninterrupted between eight central stations and onwards to sorting offices. At its peak, the Mail Rail operated 22 hours a day, employing almost 220 staff. An early modern logistics marvel, these tracks are now an interactive heritage exhibit at the London Postal Museum, where visitors can ride original portions of the 70-foot-deep rail to better realize the remarkable feat of delivering shipments on time – and with a method quite ahead of its era.

www.postalmuseum.org



THE FUTURE IS GREEN

The growth in green jobs is a given. How fast and where those jobs will be created often depends on the skills available.

or years, fighting climate change was seen as something that could really only be done at the expense of an economy's economic growth. Today, it is widely accepted that striving for a clean environment does not preclude the growth of a healthy job market. In fact, most experts say that investing in green technologies has a positive impact on employment: Up to 60 million new jobs could be created globally by 2032 in the shift to a greener economy, according to the International Labour Organization (ILO).

Although there's still an open debate on what makes a job green and how to count such jobs, green jobs are generally seen as those that involve preserving the environment and/or conserving natural resources.

According to Moustapha Kamal Gueye, a policy specialist for the Green Jobs Programme at the ILO in Geneva, "We're already witnessing a measurable boom in jobs growth in some areas."

The renewable energy sector, for instance, employed 9.8 million people in 2016, and that number was expected to rise to 24 million by 2030, according to the International Renewable Energy Agency (IRENA), an intergovernmental body. Investments in green construction were expected to account for more than 3.3 million jobs in the U.S. by 2018. Two years ago, growth in green construction there had already begun to outpace that of conventional construction, one study said.

What's behind green jobs?

Leaders, policymakers and experts have repeatedly called the transition to clean energy "irreversible." Last year, then U.N. Secretary General Ban Ki-moon said, "The once unthinkable has now become unstoppable."

Indeed, individual forces have gathered their own momentum to usher in the green economy, including technology, policy, climate science and a desire by individuals and companies to live and work more sustainably. Often, the rise of clean energy is compared to the transition from wood to coal in the 1800s



and from coal to oil and natural gas in the 1900s, which each had dramatic effects on business and society. Many experts say what's different this time around is how fast the changes will take place.

As these trends gather force, some industries will be impacted more than others, including construction, farming, manufacturing and transportation. Companies will need workers with totally new skill sets or an expanded portfolio of green skills. And industries

are expected to go through phases of both job gains, for instance in highly skilled areas, and job losses, likely to come in low-skill

areas. Similarly, industries may experience waves of job relocation as economies begin to specialize in niche areas of the green economy.

Green opportunities in emerging markets

In emerging markets especially, policymakers have seen the potential of embracing green technology, says Rainer Quitzow, a researcher at the Institute for Advanced Sustainability Studies in Potsdam, Germany.

"Green technology is a huge opportunity because it often comes with new or emerging industries," says Quitzow. "This allows countries to jump in early in an industry that hasn't been formed. This is exactly the Chinese strategy."



China has been investing heavily in renewables, for instance. According to IRENA, green power companies employed 3.5 million people in 2015, compared with 2.6 million in the oil and gas industries in China, which has now become the world's biggest renewable energy market. Quitzow said, "Chinese leaders see a lot of opportunity for their industries to leapfrog into a greener economy where they also have a larger share of the value creation embedded in their national economy."

Similarly, in battery manufacturing, China is vying to win market share from other countries with strengths in this area, such as Japan and South Korea. Earlier this year, Beijing called for companies to double electric vehicle battery capacity by 2020, and the Financial Times, citing a bank study, reported that the market for the lithium-ion battery will be worth \$40 billion by 2025.

Skills - holding back green jobs?

As countries position themselves in the low-carbon environment, green job prospects look positive, but a skills shortage is often what holds back growth in green jobs. The European Commission and the OECD have called for more training in niche skills, along with science, technology, engineering and math.

According to Gueye from the ILO, "There are too few engineers and technicians working in solar and

3.3 MILLION The estimated number of people employed in green construction jobs

in the U.S. by 2018

wind energy in several parts of the world. And we have shortages of certified energy auditors who understand energy efficiency in buildings. The skill shortages at technical levels have already created problems."

Gueye pointed to Germany as a country that has done a good job in linking industry promotion with technical and vocational training, with properly skilled labor being one reason Germany is a leader in the green economy, particularly in clean energy.

Reinhard Hans Bütikofer, a German member of the European Parliament who is a member of the Green Party, recalled to reporters at a Green Growth conference what he was told by the president of the German Electrical and Electric Manufacturers Association: "A third of the small and medium enterprises we have in our sector would not exist today if you had not initiated the renewable policy. It gives us business, it gives us profits, it gives us an opportunity to create new jobs."

For Quitzow, it's clear that green is good for business, and those economies and industries that strike the right balance between public policy initiatives, private sector investment and consumer involvement in the transition will have a competitive advantage. According to Quitzow, "Green jobs are the jobs of the future. Those countries that green their economies successfully and cost-effectively will have those jobs." **Rhea Wessel**

VIEWPOINTS

DELIVERED. BOOSTS IMMUNITY WITH...

DR. SETH BERKLEY

nfectious disease epidemiologist Dr. Seth Berkley talks about the challenges of delivering vaccines to some of the poorest places on earth.

"The single greatest health intervention ever produced – and by far the most cost-effective – is immunization," says Dr. Seth Berkley. "Yet vaccines are not accessible to every child on earth, which is just crazy."

Berkley is CEO of Gavi, an international organization founded in 2000 – initially with funds from the Bill & Melinda Gates Foundation – with the aim of improving access to vaccines for children in over 70 of the world's poorest countries, including Chad, Somalia, South Sudan, Yemen and the Democratic Republic of the Congo. It's been astonishingly successful and, since its launch, has reached almost 640 million children in the poorest regions on earth. In 2016 alone, 62 million children were immunized with Gavi-supported vaccines.

Gavi has done this, notes Berkley, by creating a partnership between the public and private sectors, and convincing pharma manufacturers that supplying vaccines to developing countries is a win-win situation. "We're not looking for their charity," says Berkley. "Instead we are creating shared value. We ask them to scale up production of vaccines, which drives down cost. Poor countries then pay a nominal amount initially supplemented by Gavi funds; but as they get wealthier they pay more and more until they're able to take on the full amount. So, for the manufacturers, these countries become their markets of the future. We've also worked to create a healthy marketplace so that prices for vaccines in developing countries are around 95-99 percent less than they are in the West." And while Gavi doesn't have a ground presence in developing countries, it works with partners who do - such as the World Health Organization (WHO), UNICEF and individual countries' health ministries - in order to deliver its programs.

Before joining Gavi in 2011, New York-born Berkley led the drive to develop a vaccine for the AIDS virus as founder of the International AIDS Vaccine Initiative, and has since been named one of the 100 most influential people in the world by TIME magazine. So what's his proudest achievement? "I think the most important thing I've done is create trust and good working relationships between the public and private sectors, and between the United Nations, non-governmental organizations (NGOs) and others," he says. "Why? Because a giant problem like infectious disease is only going to be solved if we all work together."

What are the main challenges facing Gavi?

I'll give you two. The first is equitable uptake and coverage of vaccines. We're working in the poorest and most difficult countries in the world and we have to try to reach everybody – so an efficient supply chain is vital. The percentage of children receiving a single vaccine dose in

9 MILLION The number of deaths Gavi is estimated to have prevented

since its creation in 2000

300 MILLION

The children that Gavi aims to reach with vaccines in the four years between 2016 and 2020 these countries is now close to 100 percent. The problem is, they need to receive multiple doses in order to be fully immunized. For example, we estimate that 86 percent of children get their third dose of the DPT vaccine (for diphtheria, whooping cough and tetanus). Which means 14 percent aren't receiving it.

Secondly, there are now 66 million displaced people in the world – the highest number ever – because of war, environmental disasters and other factors. We have to find ways to supply vaccines to children in emergency situations and track them to ensure they become fully immunized and so able to realize their full potential.

How difficult is it to deliver vaccines to remote areas?

Getting vaccines from a national storage point out to the regions in a refrigerated truck is usually simple in most countries that have roads. The real challenge is then delivering them to remote areas or to those children who don't live within a short distance of a clinic. Technology helps a lot here, so we've created a program called INFUSE - Innovation for Uptake, Scale and Equity – to find interesting tried-and-tested logistics technologies that have the potential to improve vaccine delivery. For example, we're working with a drone-based system in Rwanda that's primarily designed to carry blood – but we're talking about the possibility of it carrying vaccines and antivenom for snake bites too. We're using geographic information systems to find off-the-grid houses so that the children who live in them can be immunized. We're working with companies that have supply chain monitoring capabilities, and want to get our vaccines barcoded. We're protecting vaccines with cloud-based temperature monitors; and we're working with DHL to increase efficiencies on the systems side.

What are the potential disease outbreaks that keep you awake at night?

As an infectious disease epidemiologist, I could have a lot of nightmares – although some outbreaks need to be kept in perspective. The world went hysterical about Ebola, for example, but the truth is that Ebola is not easily spread. On the other hand, flu can spread like wildfire and, as we know, the 1918-1920 Spanish flu killed around 50 million people. We will at some point get a strain of flu that is much more deadly – and the world isn't prepared for it. The most important thing for avoiding global outbreaks is that we control infectious diseases in their home countries with immunization.

Are you optimistic that, at some point, vaccines will be available to all?

Yes, but I'm also a realist. The world's population is estimated to grow from 7 to 11 billion by the end of the century. We're overcrowded and we're urbanizing, so more epidemics are inevitable. After Ebola, the world sat up and took notice – then attention dropped. The same happened with flu and the Zika virus. The challenge is to keep the world focused on the infectious disease problem. It's not going away. Tony Greenway



Digitalization – a potential revolution for the logistics industry?

More than in many other sectors, digitalization is set to revolutionize the logistics industry. Digital innovations have been introduced at a slower pace in the oldest and most global commercial sector than in other industries. But the now rapidly progressing digital transformation demands new digital business models to retain market positions.



AN ESSAY BY AMADOU DIALLO

Amadou Diallo is CEO Middle East and Africa at DHL Global Forwarding and was the founding CEO of Saloodo! He is also Chairman of Amref Health Africa in Germany, a Member of the Supervisory Board at Welthungerhilfe, Director @ Africa Risk Capacity, as well as a Limited Member of the Universal Business School in Mumbai and GBSN in Washington.

ignificant progress in 3-D printing may soon threaten the market. An increasing number of complex, highly individualized or small-batch products can be printed, including foodstuffs, entire houses and automobile bodies. The production of a commodity can take place where it is required – eliminating the need for transportation and warehouse storage.

Even greater potential for revolution can be attributed to the internet of things (IoT). Each device is connected to the internet and can send and receive information. The result is a global system of total networking. The IoT enables the exchange of information between all parties involved in the supply chain process. The result is improved planning, monitoring and control to the benefit of logistic providers and customers alike.

This is a great example of how information enables innovation and better decision-making accelerates processes and reduces costs while simultaneously increasing customer satisfaction. The role of information is, therefore, continuously increasing as a decisive factor of production and must be an essential element of any corporate strategy.

New logistics concepts are arising in reaction to these developments: DHL has developed a parcel copter that enables fast and flexible sending and receipt of parcels in geographically demanding locations. Rolls-Royce is developing connected drone container ships and several players are developing self-driving and connected cars. Connected wearable devices are revolutionizing the way people such as logistics employees interact with their environment. Goods on shelves are indicated by a Google glass, scanned and booked automatically.

Challenges to traditional logistics companies

The pressures of cost and competition will continue to drive digitalization. The value chain will change dramatically, and the importance of data-based services will continue to rise. Mobility and transportation are easy targets for the digital economy and will place established companies in direct competition with their digital counterparts. The tech giants have only just begun to transform the market.

Other industries have had to learn that monopoly-type constellations can form in a very short time, for example, eBay and Amazon for B2C marketplaces, Alibaba for B2B marketplaces and PayPal for online payments. Many established companies are helpless in the face of this technological change.

In the "old" world they knew their competitors and their strengths and weaknesses – but in the digital world, the "new" top dogs come from another place – the world of high tech.

For logistics companies, this means it's high time to react.

Digital choice

In order to thrive, logistic companies must choose between the development of a new digital organization and the digitalization of a traditional organization.

The creation of a digital startup offers some advantages – they are usually faster, more agile, innovative and more profitable than traditional organizations. This is partly because they do not have legacy systems and structures. Furthermore, you can recruit highly qualified and specialized staff, establish flat organizational structures, and be agile and capable of making information-based, fast decisions. The competitive edge of digital companies over analog ones lies in the development of and excellence in data and artificial intelligence capabilities to deliver real value added to their customers. End-to-end digitalization is crucial, including full digitalization of the backend processes to ensure efficient cost structures.

On the other hand, digital startups often lack the necessary industry expertise, partner organizations and a solid customer base at the outset. It follows then that startups have access to limited revenue sources initially and a lot of money must be invested in raising the company's profile and building the crucial mass of customers.

New competitors

New entrants offering innovative digital platforms on the IoT, such as Convoy, Flexport, Freigthos and UShip, are reshaping the freight business. What they all have in common is the desire to match the supply and demand for transport services by means of a marketplace, via an online portal. Even though these newcomers are not yet known to many logistics companies, they are already changing the sector and, backed by considerable financial resources, are radically disrupting the existing landscape.

These new digital competitors are breaking into the highly competitive logistics market from an entirely different direction. The goal is to network all parties involved in a supply chain – from the consignor, forwarding agent, shipper, dispatcher and driver through to the consignee – using an integrated information system. By combining, for example, information about the truck, trailer, superstructure, driver, order and product, the transportation and handling process is being significantly improved.

In the medium term, the entire logistics supply chain – from suppliers, purchasing, producers, warehousing, commissioning, distribution, logistics and trading to the end-customer – is to be monitored and optimized in real time.

Looking ahead

The logistics industry is being significantly transformed by digitalization. This is due to its many inefficiencies resulting from a large number of key players along the value chain and the intermittent exchange of information. Startups, digitalized logistics companies and automotive manufacturers are trying to address these inefficiencies and make life easier for established logistics companies through digital solutions and business models. However, everything comes at a price: will these solutions be worthwhile and if so, who for? Not all of the players can be at the top of the value chain and pocket the lion's share. This privilege will be reserved for a few players only. In most cases, monopoly-like structures have become established because customers do not want to run around in different marketplaces.

With a "Google" culture into the logistics market

With Saloodo!, DHL has created a digital marketplace for its logistics services that combines the best of both worlds: the speed and flexibility of a digital startup and the logistics expertise and capabilities of a market leader. The aim of this startup is to secure market leadership in the freight business through an innovative digital platform. Saloodo! has developed its own culture, which is much more interested in the "Googles" or "Facebooks" than in a logistics company.

WHAT'S THE STORY, MR. WOLFS? WEATHERING THE STORMS



Reiner Wolfs, Managing Director for DHL Express in the Caribbean, talks about the resilience of his team, who stood strong despite the devastation caused by Hurricanes Irma and Maria.

hen Hurricane Irma – the most powerful Atlantic storm in 10 years – hit the Caribbean at Category 5 this September, the effect was devastating for many of the Leeward Islands, such as Dominica, the British Virgin Islands (BVI) and St. Maarten. Not one area on the islands escaped unscathed. Then, around two weeks later, Hurricane Maria arrived and caaused further wreckage – to the islands – and an estimated \$90 billion worth of damage to Puerto Rico.

DHL Express has small teams operating in both St. Maarten and the BVI - 15 people and 11 people respectively - and I would say 85 percent of them have either lost their homes completely or their homes have been so badly damaged that they are currently uninhabitable. Our local general manager left me a voicemail just as Irma hit and it's chilling to hear. The hurricane blew the roof off the apartment she was staying in. Like many others on these islands, she's now had to move in with family members whose home has survived. Where possible, children have been sent away to relatives or friends in unaffected locations so that everyone can concentrate on rebuilding. In Puerto Rico, more than 10,000 people had to move to shelters. How long will rebuilding take? That's a tough question and I wouldn't like to put a timescale on it, but tourism is very important to these islands. In St. Maarten, the cleanup efforts were visible hours after Irma, with trucks operating 24/7 to clear debris from the roads. The BVI also made an incredible effort with cleanup and getting basic services up and running, and from November the sailing community is welcome back as "volunteer tourists." Things are moving slower in Puerto Rico, which is also a much larger island. Maria has left the island without electricity and, weeks after the storm, less than half of the population had access to clean drinking water.

In the immediate aftermath of Irma, communications were badly affected, no flights were able to land in St. Maarten or the BVI, our offices were closed, and there were no places for customers to pick up or deliver shipments. When we drove around in a DHL van, the first thing people asked us was: "When will you guys be open again?"

The answer we gave them was "as soon as possible." The first thing we did was carry out an assessment of our team to make sure everyone was accounted for. After their safety was assured, our job was to get relief goods into the islands – and, for that, we needed aircraft, which luckily started running fairly soon after Irma had passed. Lastly, we had to get our day-to-day delivery operations back up and running. I'm pleased to say that, just days after Irma struck, our office in St. Maarten was open, couriers were available, and pickup and delivery trucks were fueled and ready to go.

The quick and efficient support we received from the DHL global network in terms of sending relief goods was heartwarming. I've also been so impressed with the resilience of our team in such terrible conditions. I was talking to Ivan, one of our employees, and he said that when the hurricane had passed, the first thing he did was go to his closet and look for his DHL uniform because he wanted to get back to work as soon as possible. His closet had been blown away – but there he was, reporting for duty. Their "can-do" attitude has been inspiring. ■ *As told to Tony Greenway*

DONATE: www.support.unicef.org/donate/hurricane-irma



590 The cost of damage caused by the hurricane in Puerto Rico



by the hurricane in Puerto Rico

Deutsche Post DHL Group's global headquarters in Bonn, Germany, found itself literally at the center of COP 23, the U.N.'s annual climate change conference, hosted by city of Bonn on behalf of the government of Fiji. Some 20,000 delegates discussed critical matters relating to climate change and the implementation of the Paris Agreement (COP 21) at venues adjacent to DPDHL's iconic Post Tower, while others, such as the International Renewable Energy Agency (IRENA) chose the Post Tower as the venue for their gatherings. DPDHL participated with its own Mission2050 showcase, supporting the COP operations as official partner and presenting the Group's strategy for zero carbon emissions by 2050.



AND INCOME.



ON TARGET FOR ZERO

To drive the logistics industry toward a sustainable future, we are aiming for zero emissions by 2050. We want to achieve this for and together with our customers.

dpdhl.com/cop23

Official partner of





MISSION 2050 ZERO EMISSIONS GOGREEN

Deutsche Post DHL Group