



Delivered.

THE GLOBAL LOGISTICS MAGAZINE

ISSUE 05/2016

BUSINESS

THE SHAPE OF THINGS TO COME

Find out if 3D printing is a game-changer

SOLUTIONS

CULTURE CLUB

Discover how a little local knowledge can be good for business

VIEWPOINTS

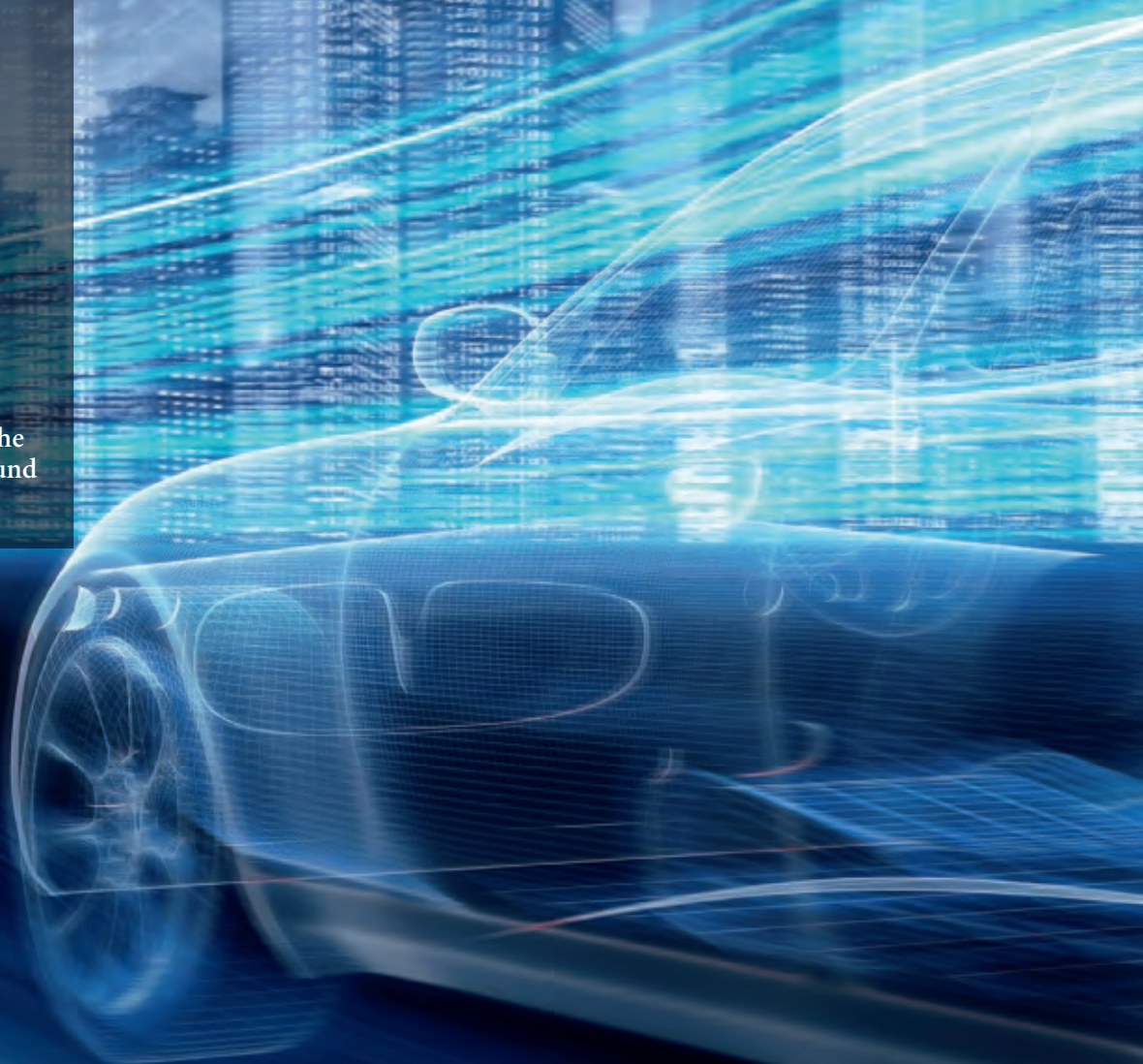
WORKING IN A WARZONE

DHL's Syria team delivers the goods as fighting rages around

FOCUS

DRIVING INTO THE FUTURE

Why consumer power is making the car industry to shift gear





DEAR READER,

Is your car a mere convenience, or something you love for its power and performance, the more high tech the better? Do you actually own a car, do car sharing or use chauffeured transport to get you where you need to be?

For the automotive industry, segmentation is now the order of the day, as consumer attitudes to cars and driving are increasingly diversified. Our **Focus** article **"Wired for the road ahead"** explores this changing landscape in which carmakers have to adapt to the complexity of ever more fractured markets and the rise of technology components in vehicles, and where smart supply chain planning matters more than ever.

For Jean-François Salles, Supply Chain Global Director, Outbound and Production Control, Renault-Nissan Alliance, the supply chain also plays a critical part in delivering his company's focus on innovation and people-centricity, as he explains in our **Executive View**.

A few years ago, 3D printing was heralded as one of the must-watch trends and some experts said a 3D revolution was upon us. **"3D printing: a new dimension"** explores where the technology is today and looks at its potential for disruption.

Finally, don't miss **"Business as Unusual"**, where Khulud Halaby, Managing Director, DHL Express Syria, presents an insightful first-hand account of what it is like to live and work in a country that has been ravaged by over five years of a devastating civil war.

Enjoy your read!
Sincerely,

Bill Meahl
Chief Commercial Officer, DHL

Cover: nadia/Getty Images, contents: DHL, Tolgat/Getty Images, picture alliance/AP Photo, PR



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PUBLISHED BY DEUTSCHE POST AG

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Commercial Register No.
Registration court Bonn
HRB 6792

Turnover Tax ID No.
DE 169838187

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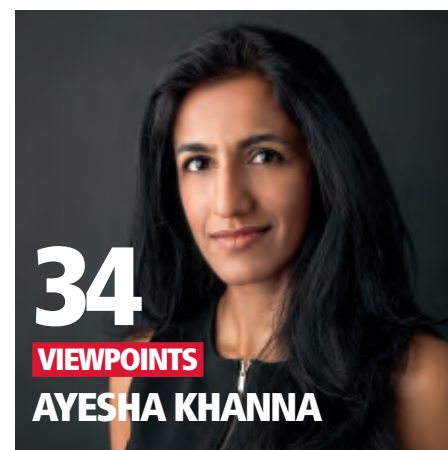
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Paper
This magazine is made from 100% recycled paper.

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



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www.delivered.dhl.com





STATE-OF-THE-ART SORTING

October saw the opening of the new state-of-the-art sorting center at the DHL Express European hub in Leipzig, Germany. The €230 million (\$253 million) facility is equipped with innovative conveyor technology that allows heavier and bulkier shipments to be moved around the hub on trays, tracks and lifts. This means packages with a weight of up to 170 kilograms can now be handled on a fully automated basis at Europe's most modern shipment sorting facility. This investment has also boosted processing capac-

ity at the site by about 50 percent to 150,000 shipments per hour. Frank Appel, Chief Executive, Deutsche Post DHL Group, said: "The successful launch of our expanded hub and the new sorting facility is a further step that reinforces the importance of Leipzig as our main European express hub."

DHL Express has invested a total of €655 million (\$722 million) in the Leipzig facility, which now covers an area of approximately 87,000 square meters.

STAYING THE COURSE

The FIA World Endurance Championship (WEC) comprises nine endurance races of at least six hours' duration on circuits around the world – one of which is the famous 24-hour Le Mans race. But there's another marathon effort involved too: DHL is the official logistics partner of the WEC and has the task of shipping all the teams' motorsports materials and equipment to the various events. This includes 32 race cars, three safety cars, 10,000 tires and a staggering 198,000 liters of fuel.



 bit.ly/dhl-wec

DELICATE DELIVERIES

Spanish porcelain maker Lladró's exquisite figurines have been collectors' items since the eponymous brothers Juan, José and Vicente began producing them 63 years ago in Valencia. The statues are now sold by 10,000 retailers as well as 80 of Lladró's own boutiques worldwide. Many are bought in Spain itself by visiting tourists and Lladró customers already use a special DHL service to send these delicate and expensive purchases home, with all duties and taxes paid in advance. Now Lladró and DHL are planning to extend this service to some of the firm's other big markets in the U.S., Japan, China, Australia, Singapore, Hong Kong, Korea and Russia.



 www.lladro.com

TROLLEY DASH

Now shopping trolleys really will have a mind of their own: U.S. retail giant Walmart is planning to take the strain out of the weekly supermarket run by having self-driving trolleys in its stores. According to a patent granted by the U.S. government, smartphone-controlled detachable motors will be able to fetch trolleys for shoppers and even round up those abandoned in the car park.



IN THE LOOP

In January this year, a 30-strong team from Delft University of Technology in the Netherlands won a coveted place in the finals of tech magnate Elon Musk's competition to design a Hyperloop system – passenger and cargo pods that will levitate through pneumatic tubes at speeds of 1,200 kilometers per hour (745 miles per hour). But with its success, the Delft team provided its logistics partner DHL with a transportation challenge too: getting the prototype safely to the test track at Musk's SpaceX headquarters in California. A DHL freighter transported the capsule to the U.S. safely encased in a specially designed flight case. "We welcomed the opportunity to bring our capabilities, knowledge and global network to bear in support of the TU Delft team as they built a viable Hyperloop prototype. We hope that DHL has inspired them with our own logistics performance today and that we have made a contribution to their future success in the SpaceX Hyperloop Pod Competition," said Ken Allen, CEO, DHL Express.

 www.delfthyperloop.nl



The percentage of a passenger car that can be recycled. In Europe, nearly eight million vehicles are recycled every year – in fact, 25 percent of the steel in your new car is probably recycled



CHART SUCCESS

Deutsche Post DHL Group has climbed the ranks of the prestigious European and World Dow Jones Sustainability Indexes (DJSI). The Group is now in the 93rd percentile of the transportation sector, building on the strong results it achieved in 2015. The DJSIs, launched in 1999, rate the sustainability performance of the top 2,500 companies in Dow Jones's global total stock market index.

For an in-depth article on the sustainability indexes, see the next issue of *Delivered*.

THE STORY

PROTECTING THE CHILDREN OF CONFLICT

As conflicts such as the one tearing apart Syria continue to rage around the world, the most powerless victims are often children. Millions are separated from their biological families, be it through wars, domestic crises or outbreaks of disease. SOS Children's Villages is a non-governmental organization that has been protecting the interests and rights of children since 1949. It provides family-based care for about 50,000 children and 15,000 young adults in more than 500 "villages" in 140 countries worldwide. Typically, these are made up of between 10 and 40 dwellings, each with about 10 children who have been placed with a new SOS "mother." That should be the happy ending to the story, but not always. As many of the villages are in the developing world, they can still be at risk from natural or man-made disasters. How best then to mitigate those threats? Well, SOS Children's Villages has signed an agreement to use Resilience360, DHL's risk management solution that helps companies by mapping their infrastructure and identifying risk hotspots. Resilience360 keeps track of man-made and natural disasters, feeding vital information to teams on the ground and enabling fast reactions when trouble strikes. In the case of SOS Children's Villages, its Emergency Response Coordination Team will use the information to monitor and manage threats to the young people it cares for and the NGO's employees.

 www.sos-childrensvillages.org

 www.dhl.com/resilience





UK MAIL BUYOUT TO STRENGTHEN DHL'S EUROPEAN FOOTHOLD

DHL is expanding its international network with the planned acquisition of UK Mail Group Plc. Founded in 1971, UK Mail is one of Britain's largest integrated post and parcel delivery services, with more than 50 sites nationwide, including an automated

hub near Coventry that can process up to 20,000 parcels an hour. The planned purchase of UK Mail will strengthen the European market position of DHL Parcel, which has expanded over the past two years to cover 18 countries.

THE BUS NOW PASSING OVERHEAD...

China has developed the Transit Elevated Bus (TEB), which straddles two lanes of traffic, allowing cars to pass underneath – but crucially, also enables the bus to keep going if there's a hold-up on the road below. Eventually four TEB cars joined together will be able to carry up to 1,200 passengers at a fairly zippy 40 miles per hour (60 kilometers per hour). The TEB will be electrically powered and will replace 40 traditional buses – meaning less traffic on the roads into the bargain. Unveiled on a 300-meter test track, the 22-meter-long, 7.8-meter-wide and 4.8-meter-high prototype is expected to be commercially available within 18 months.



bit.ly/elevated-bus

LIVING RESPONSIBILITY



CARBON-FREE STREETSCOOTER GOES LARGE

DHL's distinctive yellow StreetScooter electric vehicles are already a familiar sight on the roads in Germany delivering post and parcels, and now they're getting a big brother. At September's IAA commercial vehicles trade fair in Hanover, StreetScooter unveiled the Work L model, which has double the loading capacity of its smaller sibling, the Work. Its eight cubic meters of space mean the Work L can carry as many as 150 parcels, with a maximum load of 1,000 kilograms. It has a stronger engine and an improved lithium-ion battery, giving it a range of 100 kilometers. Originally developed in an open-source collaboration between more than 50 automotive parts suppliers, technology firms and software developers, StreetScooter is also planning further upgrades, including a media system and keyless entry, and there's even a version which has an electro-hydraulic three-way dumper in place of the box body.



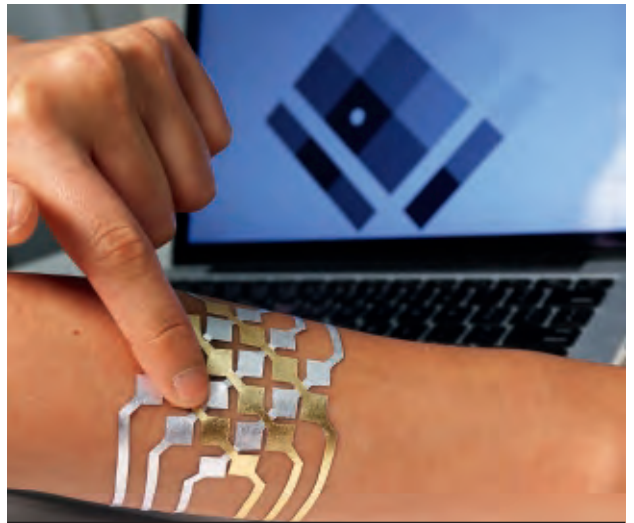
www.streetscooter.eu

TECH BEAUTY IS SKIN-DEEP

Smart watches, fitness trackers, augmented reality glasses... where can wearable technology go next? Well, have you ever considered that body art could be functional as well as decorative? In partnership with Microsoft Research, a team at MIT Media Lab has been developing a metallic temporary tattoo that could be used for everything from controlling smart devices, displaying information or sharing data wirelessly. The product, DuoSkin, uses copper-based imitation gold leaf, which is cheap, skin-friendly and robust, to create customized and functional devices for wearing directly on the skin. The technology is designed to be relatively easy to apply too – eye-catching circuit patterns can be designed using desktop graphics software and physically created with simple craft shop vinyl cutters and temporary tattoo paper. Getting a tattoo might finally be a smart idea.



bit.ly/duoskin-tattoo



MISSION POSSIBLE...

Time, sometimes, really is of the essence. Whether it's urgent spare parts, medical supplies or a new product launch, some deliveries will always be mission critical. To meet this growing demand, DHL Global Forwarding has launched a new air freight service by the name of DHL SameDay Speedline to enhance its SameDay product portfolio.

SameDay Speedline is a cost-effective way of handling emergency shipments. Operating all day, every day, and offering quotations within 60 minutes, collection within 120 minutes and a "best flight out" service, the SameDay Speedline contact center will monitor shipments from origin to destination, providing customers with "milestone" updates of their consignment's progress.

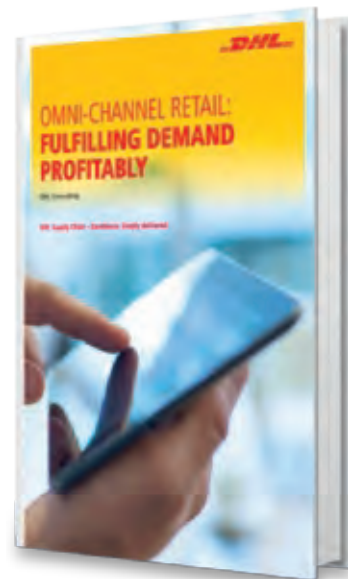
With Regional Contact Centers in the U.S., Singapore and Ireland and a global network of more than 50 stations, DHL SameDay Speedline provides an immediate response to customers' needs and continuity of their supply chain all year round.



bit.ly/dhl-speedline

IS YOUR OMNICHANNEL SUPPLY CHAIN PROFITABLE?

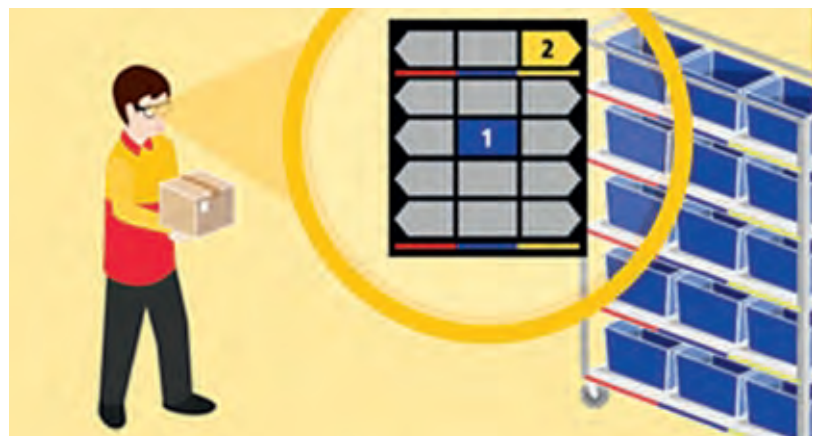
Can you make omnichannel retail pay? Many retailers are losing money on e-commerce and, faced with evermore demanding shoppers, retail supply chains are being challenged to transform their existing models, which were designed for so-called "bricks-and-mortar" networks. A DHL white paper, developed by DHL Consulting in collaboration with DHL Supply Chain UK & Ireland Retail, examines this problem. Find out what conclusions it draws and download the paper at:



bit.ly/dhl-omni-channel-retail

SMART WAY TO PICK

Analysts predict the augmented reality market will grow to \$150 billion over the next four years, and DHL Supply Chain is at the forefront of this innovative technology. A successful pilot scheme in the Netherlands used smart glasses to allow pickers to visualize where each picked item needed to be placed on a trolley. This allowed faster picking with fewer errors, and proved so successful that DHL and partners Google, Vuzix and Ubimax are now rolling out the technology globally in the U.S., mainland Europe and the U.K. Markus Voss, Chief Information Officer, DHL Supply Chain, said: "We believe this program is a game-changer in how we run our supply chain operations."



WIRED FOR THE ROAD AHEAD

Consumer attitudes to the automobile are evolving. That could drive fundamental changes in the way cars are designed, bought and used.



Since its invention 130 years ago, the mythology of the car has been one of freedom and independence, power and status. It is a story that the industry has worked tirelessly to promote. In TV commercials the latest models are shown sweeping along deserted cliff-top roads, exhilarating their occupants as they carry them swiftly and safely from one glamorous adventure to the next.

For most of us, the reality is not like the myth. Most cars spend 95 percent of the time sitting unused in garages and parking lots or on driveways and roadsides. They spend a lot of the rest stuck in traffic. In 2014, for example, urban drivers in the U.S. spent 6.9 billion wasted hours in their cars due to the effects of traffic congestion – around 42 hours per commuter. Cars have an image problem, too. Exhaust pipes emit carbon dioxide and other harmful by-products, sometimes in far greater quantities than consumers and regulators expect.

The automotive industry has responded to many of these criticisms. Downsized engines and hybrid powertrains are steadily chipping away at fleet-wide emissions. Lightweight materials are helping too. In the U.S., Ford's decision to switch from steel to aluminum in the construction of its F150 pickup truck has been rewarded with record sales. And there are plenty of parts of the world where access to a vehicle is providing real – and potentially life-changing – new freedoms to millions of people. While sales in key emerging regions like China, India and Latin America have been bumpy in recent years, the long-term trend is strongly upwards.

Carmakers are facing another challenge, however. Wherever they are in the world, the vast majority of their customers see vehicles not as an escape from their everyday lives but as an integral part of it. Increasingly, they are demanding products that fit into their lives in better – and sometimes radically different – ways.

The connected driver

Perhaps the most obvious manifestation of that change among wealthier customers is the desire for improved connectivity. Consumers – especially younger consumers – are used to ubiquitous internet connections in other parts of their lives. They increasingly rely on cloud-based technology to organize their work, conduct their social relationships and provide them with entertainment. They don't want those connections to stop when the car door slams.

Increasingly, they don't have to. Carmakers are working with technology companies to make existing services

available in a format that is suitable for use on the move. For example, Mercedes-Benz has announced a collaboration with Microsoft to make data such as contact addresses and calendar appointments seamlessly available in the vehicle. Connectivity offers plenty of benefits for the carmakers themselves, allowing them to monitor vehicle performance and reliability, deliver software fixes and upgrades remotely and offer a host of online services, from navigation tools to entertainment systems.

Technology analyst Gartner predicts that automotive “infotainment” technologies will become the second largest consumer application of internet-of-things technologies, after personal health and fitness tracking. Wireless network technologies are rapidly trickling down from high-end luxury vehicles to the mass market, and Gartner estimates that one in five vehicles will possess such technologies by 2020 – more than 250 million vehicles in total. By then, the market for the connected car sector is forecast to grow more than fourfold, from \$37.5 billion in 2015 to \$151.8 billion.

250
MILLION

The number of vehicles globally that will have wireless technologies by 2020

The ultimate self-driving machine

Easier online access obviously benefits drivers when they are stuck in traffic jams. And well-designed user interfaces should also increase safety by providing a less distracting way to access information in a moving vehicle. But this evolution could just be one step in a more fundamental move away from the historical focus on the driving experience.

Automation has been quietly creeping into cars since the mid-1990s, with the introduction of adaptive cruise control technologies that use radar or laser sensors to warn the driver, control the throttle or apply the brakes to maintain a safe distance from the vehicle in front. Today



GOOD CONNECTION:

Technology – like BMW's remote app for the Samsung Gear S – provides advanced connectivity.



SHARE OPTION:

App-enabled ride-sharing services, such as Lyft, are becoming increasingly popular.

many drivers have the opportunity to switch on devices that can control the vehicle over its full speed range and provide steering inputs too, reducing the driver burden in a range of situations including highway driving, traffic jams and parking maneuvers. Collision avoidance systems can automatically execute an emergency stop when a crash looks likely.

The next step is the elimination of driving tasks altogether. High-profile experimentation by a new generation of technology companies – notably Google – has spurred mainstream carmakers to accelerate, or publicize, their own research into vehicles capable of fully autonomous operation. Today, there is broad consensus among manufacturers that the first totally self-driving cars will be ready for sale in around 2020, although it may be another decade before the technology becomes widespread. Market research group IHS expects global sales of autonomous vehicles to reach 600,000 by 2025, and to continue to grow at a compounded annual rate of 43 percent for the following decade.

That remains an ambitious target. Experimental self-driving cars have an admirable safety record, but the fact that the occasional accidents that have occurred make headline news around the world is an indicator of public concern over the issue. Many observers believe the transition will be a gradual evolution rather than a “big bang.” Forecasts by Exane BNP Paribas, for example, suggest that “fully automated” vehicles will account for only 15 percent of the overall autonomous vehicle market by 2035, with the majority of cars still relying

0.6
MILLION

The expected global sales of autonomous vehicles by 2025

on human inputs in some situations. There is disagreement between industry participants about the safest way to handle the division of responsibility between humans and computers, however. The most advanced semiautonomous systems on the market today still need an alert driver ready to take over control in an emergency. That may be a difficult thing to rely on if the driver is reading emails, communicating on social media, or even sleeping.

That's not my car

Alongside these technological changes, other approaches to mobility are threatening to do away with another age-old concept: individual car ownership. If you think of a car only as a way to get from A to B, ideally while still allowing you to get on with other things, the expense and inconvenience of owning a vehicle for the other 96 percent of the time has little appeal. That's especially likely to be true in dense urban areas, where finding a secure place to park can be expensive and inconvenient. That logic is driving a host of new business models that attempt to offer mobility as a service rather than a product.

The highest-profile entrant into this market is U.S. technology company Uber, which now operates its app-enabled ride-hailing service in more than 500 cities



worldwide. Uber's growth has been startling. It carried its billionth passenger in December 2015, just five years after the company was founded. It is still struggling to turn growth into profit, however, has clashed with regulators and the traditional taxi industry in many markets, and it recently admitted defeat in its costly attempt to outcompete rivals in China. But the company's success has certainly focused attention on the potential of the "sharing economy" model in personal transportation, as has growth in other sharing models, such as city-center car clubs or peer-to-peer ride sharing networks.

On a collision course

In the coming years it seems clear that these trends – increased connectivity, automation and new mobility models – are set to interact in varied and intriguing ways. Shared-use models are an obvious opportunity for fully autonomous vehicles, for example. U.S.-based nuTonomy has been conducting a pilot project in Singapore since April 2016 offering taxi services to members of the public in a fleet of adapted Renault and Mitsubishi electric vehicles. It's not inconceivable that future autonomous cars could earn money for their owners by offering taxi services when not required by their owners.

With so many possibilities and so much to play for, carmakers, suppliers, established technology companies and new startups are engaged in a frenzy of acquisitions, alliances and deal-making as they jostle for position during the early stages of what may be a long and

grueling race. A few examples: carmaker General Motors has taken a \$500 million stake in ride-sharing company Lyft, with a plan to develop shared-used applications for autonomous vehicles. VW has made a \$300 million investment in New York-based Gett, with similar stated aims. Uber has acquired Otto, a U.S. startup developing self-driving trucks, and has entered into a partnership with Toyota which, among other things, offers Toyota vehicles to Uber drivers on favorable lease terms.

And it isn't just current automotive players who are entering the new mobility space. Technology giant Apple is investing \$1 billion in Didi Chuxing, the Chinese ride-hailing service that has also taken over Uber's operations in China. And Chinese internet technology company Baidu has been granted a license to test autonomous vehicles in California, part of a program that aims to develop a fully autonomous mass market vehicle by 2020.

So what does all this feverish activity mean for the business of actually building cars? Paradoxically, the answer may be "more of the same." Carmakers have become used to rising complexity as their markets fragment into a greater variety of niches and as the technology content of their products continues to rise.

While the potential long-term shift to the large-scale use of electric propulsion will create its own special challenges (see next article), autonomous vehicles or special products developed for shared-use applications just add additional elements to that complexity mix. Even a quite dramatic move away from individual car ownership may

COOL CONTROLS:

Well-designed user interfaces – such as this arc-shaped car dashboard from the Royal Technologies Corporation – enhance the driving experience.

**\$1
BILLION**

The amount Apple is investing in Didi Chuxing, the Chinese ride-hailing service

not require a tectonic shift in the structure of the industry. As Detlev Mohr, an automotive sector specialist with McKinsey & Company explained in an online interview earlier this year, cars used in ride-sharing applications tend to travel much further every year, meaning they wear out faster: “If you calculate it through with realistic use cases, the number of cars you sell is probably pretty much the same, but the lifecycle is much shorter.”

It’s a point echoed by Fathi Tlatli, President of DHL’s Global Automotive Sector. “Some consumers are still going to want power and performance, even if only for the weekend, and there are many parts of the world where car ownership levels are still less than 100 per thousand people, compared to 800 per thousand in the U.S.,” he says.

“For carmakers, the name of the game will be segmentation. They will need the right platforms to allow them to develop a diverse range of products for different consumers and use cases, and they’ll need the manufacturing and supply chains to deliver high-quality vehicles to all those different customers.” ■ *Jonathan Ward*



BODY BUILDING:
Cars such as the all-aluminium Audi R8 are altering the logistics landscape.



AIR FREIGHT:
Lightweight materials are altering the supply chain, allowing parts to be shipped by air.



1. Is connectivity reshaping the automotive sector?

In some sectors, yes, cars are beginning to be seen as technology on wheels, but it is essential to take a segmented view of consumer trends like these. Connectivity is really important to younger customers, and its importance varies by region. More than 50 percent of customers in China say they would switch to a different brand of vehicle to gain access to enhanced connectivity, but the figure is much lower in Europe.

2. What do you see as the main opportunities arising from internet-connected vehicles?

Consumers are looking for greater convenience, and connectivity enables a whole host of new services. Just one example is our own work at DHL to enable packages to be delivered straight to the trunk of a customer’s vehicle, wherever it is parked. Connectivity is also making car ownership more convenient. For example, automakers can offer extra features and upgrades as simple plug-in modules, or even deliver software wirelessly over the air with no need for the customer to visit their dealer.

3. Does that mean physical logistics will play less of a role in the future automotive supply chain?

Far from it. The demand for convenience means customers don’t want to wait for a new vehicle or a replacement part when one is required, which only increases the pressure on carmakers to get their logistics right. Other technology changes are altering the logistics landscape in a whole variety of ways, from the special considerations needed when shipping the lithium batteries used in hybrid and electric vehicle powertrains to the growing use of lightweight materials like fiber-reinforced composites, which can make it more cost-effective to ship parts or even entire vehicles by air. Connectivity features are enabled by high-tech components that weren’t traditionally encountered in automotive supply chains. These components have different characteristics compared to metal parts – they are usually lighter and of higher value. The increasing amount of these components entering the supply chain might lead automotive logistics professionals to rethink their inventory management as well as their transport strategies, among other things.

JEAN-FRANÇOIS SALLES:
Supply Chain Global
Director, Outbound and
Production Control,
Renault-Nissan Alliance.

INNOVATION IS KEY DRIVER FOR RENAULT-NISSAN

The 17-year-old partnership between Renault of France and Nissan of Japan is still yielding new benefits, and the Alliance views the supply chain as a backbone of its business.

Strategic collaborations don't get much more global than the Renault-Nissan Alliance. The two carmakers established their formal relationship in 1999 and over the intervening years they have progressively strengthened and deepened their connections in an ongoing quest to increase efficiency and boost revenues.

While the companies remain separate businesses, by 2014 this effort had led to the formal convergence of four key functions: engineering, manufacturing & supply chain management, purchasing and human resources. In 2015, the Alliance sold 8.5 million vehicles across its eight different brands, making it the world's fourth largest car manufacturing group, with around 10 percent of the global vehicle market.

Today, the Alliance operates a cross-production strategy, building vehicles from both brands on the same production lines in several plants around the world. It has also developed a system of modular vehicle architectures, known as the Common Module Family (CMF), which allows a wider range of cars to be built from a smaller pool of parts. It expects 70 percent of its vehicles to use this approach by 2020.

From the outset, the Alliance has seen the supply chain as a key area of opportunity for synergies, and it was the second function to undergo the convergence process, after purchasing. Today, the converged supply chain covers 106 production sites worldwide and 23 logistics platforms located in 17 countries. It supplies finished vehicles to customers in nearly 200 countries.

Location

The benefits of convergence come from two main areas, explains Jean-François Salles, Supply Chain Global Director, Renault-Nissan Alliance, "First we can save money in our transport flows, and second we can better support our shared manufacturing operations."

So far, the approach has more than delivered on its promise. All the way through the integration process, the supply chain function has beaten its targets for savings and synergies, says Salles. While there is still



work to do, he emphasizes that the Alliance doesn't view convergence as an end in itself. "There needs to be a real benefit from the process. Where it makes sense to do things in two different ways, that's what we do."

Today, the common supply chain function is organized in two parts: an Inbound section, which handles supply chain design for new projects, inland and overseas parts consolidation and transport; and an Outbound one, which manages sequencing for production, capacity planning and control of parts, and the onward delivery of vehicles to dealers around the world.

It is a structure designed to keep the organization focused on its end customer, says Salles, who is responsible for Outbound and Production Control. "Our objective is to answer customer demand in the shortest possible time. To do that, we need very close links with the sales and marketing function, which we achieve through our forecasting and sales and operations planning processes, and with our factories to ensure they have the parts they need." The supply chain, he says is "a backbone of the company in terms of coordination between manufacturing and sales."

Customer-centric

Becoming ever more customer-centric is a key driver in the Alliance's ongoing efforts to improve supply, says Salles. "Our customers want quality, the right performance features and on-time delivery. The supply chain is critical in achieving the last of those objectives." But

**8.5
MILLION**

The number of cars sold worldwide by the Renault-Nissan Alliance in 2015

the supply chain function also has other objectives, he adds, in particular “to be truly people-centric and focus on innovation.”

The focus on its internal people is critical, notes Salles, due to the scale and diversity of the group’s operations. “We have lots of plants and lots of consolidation centers. We operate in so many countries using diverse resources and teams. It’s vital for us that all those teams can work together as one.”

And what about innovation? It is here, Salles suggests, that supply chain and logistics functions across the sector are on the cusp of some truly significant changes. The whole automotive industry, he says, has built its supply chain capabilities on technology that has its roots in the 1970s and 1980s.

“For a long time, our industry was a leader in supply chain management, but a lot has changed in recent years.” Some of that change has been driven by the logistics industry itself, he notes, while other innovation has come from new approaches taken by other sectors. “The time has come for us to review our processes, too.”

That review is under way right now, and it is likely to affect every aspect of the Alliance’s supply chain capabilities. “We are implementing the next generation of tools across our core activities, including our transportation management system, warehouse management system and manufacturing resource planning,” says Salles. Some of those changes have already taken place, he explains, while others are still ongoing.

Smart solutions

Innovation in the Renault-Nissan supply chain isn’t just about big IT systems, however. Salles emphasizes that there are plenty of “light, smart solutions” with the po-

“We operate in so many countries using diverse resources and teams.”

Jean-François Salles, Supply Chain Global Director, Outbound and Production Control, Renault-Nissan Alliance

tential to deliver real value, citing new track-and-trace technologies and the use of automation and augmented reality in warehouse operations as examples.

The biggest opportunities, however, are most likely to be found in changes to the way the organization uses data. “We generate and receive a huge amount of data every day, on parts, suppliers, costs and material flows. Finding better ways to exploit that data will unlock massive improvement opportunities.”

Achieving that goal will require the Alliance to acquire and develop new tools in a broad range of areas, says Salles, from data analytics to risk management. It will also need to ensure it has enough people with the right talents and skills to use them.

Salles is convinced that the benefits will be worth the effort. “Our flows are so large that it is impossible to spot every source of waste or opportunity for improvement. We have already seen how advanced analytics can reveal valuable information in data that was sitting right under our feet. I know that the more we make use of digital technologies, the more benefits we’ll gain and the more opportunities we’ll find.” ■ *Jonathan Ward*



www.group.renault.com



SMOOTH OPERATIONS:

The collaboration between Renault and Nissan in key areas has delivered real value.



CHARGING AHEAD:
Electric cars are developing fast.

CAR TECH REVS UP

Over the long term, shifting automotive technology will have far-reaching repercussions for infrastructure and supply chains.

Discussions about the future of the automotive sector inevitably tend to focus on changes to the car itself. But as today's emerging technologies and new business models scale up, they will begin to reshape many other things, from the way we use energy and raw materials to the design of our cities and towns.

Take the adoption of electric powertrains for example. While carmakers continue to experiment with other alternative fuels – notably hydrogen – in the quest to reduce automotive carbon emissions, electric cars have beaten them to mass production. Including plug-in hybrids, there were more than 1.26 million electric vehicles (EVs) on the world's roads by the end of 2015, up from just a few hundred in 2005.

Recent growth may have been high in percentage terms, but electric vehicles – especially pure EVs – are still a minute fraction of the overall vehicle market. EV sales to date have relied heavily on government incentive schemes – from lower taxes to direct cash payments to buyers. Overcoming customer reluctance is a high-stakes game for the industry and regulators alike:

**1.26
MILLION**

The number of electric vehicles set to be on the world's roads by 2015

if international agreements to limit transport-related carbon emissions are to be met, that figure will need to increase 100-fold by 2030.

Battery issues

Manufacturing, operating and supporting electric vehicles on that scale will create plenty of challenges. First, there are the batteries. The best current battery technologies are based on lithium – the battery in a small electric vehicle such as the Nissan Leaf contains around 4 kilograms of lithium, for example, and a vehicle may need several batteries over its working life. Batteries already account for around 40 percent of global lithium consumption, and large-scale use in EVs is greatly increasing demand for the metal, leading to sharp price hikes and fears that supplies of the material could become exhausted. Those fears seem overblown. Lithium is highly recyclable and abundant in seawater and salt lakes. Its availability is limited largely by the capacity of the plants required to extract and process it. Encouraged by rising demand, lithium producers are ramping up their output. Philadelphia-based FMC, one of the world's major producers, has announced plans to double its production to 8,000 tons in 2017, for example.

Other supply constraints and logistical issues also need to be overcome. Manufacturing batteries is difficult, and quality is safety critical. Electronics giant Samsung had to cease production of its Galaxy Note 7 smartphones in October after numerous cases of their lithium batteries catching fire, and problems with lithium batteries led to Boeing's entire fleet of advanced 787 aircraft being grounded briefly in 2013. EVs need other special materials too, including so-called rare earth

metals used in their electronic components and motor magnets. Competition for these resources is likely to be fierce in the coming years.

Then there's the need for charging points – lots of them. Estimates of the number of charging points required to support the large-scale adoption of EVs vary from just under one to as many as 2.5 per vehicle. This demand will have to be met by a mixture of private installations in the homes and workplaces of vehicle users and public infrastructure. Forecaster Navigant Research estimates that the annual global demand for new charging stations will reach 2.5 million by 2025, almost six times its present level. Significant investments



ON THE LINE:
Lithium batteries waiting to be installed at Peugeot-Citroen's Sochaux factory in France.

in charging infrastructure are underway, but progress has been hampered by a lack of compatibility between the different standards adopted by manufacturers, and some networks have also faced reliability issues.

Electric powertrain batteries are huge, and can weigh up to 400 kilograms. They cannot be handled in the same way as traditional automotive parts, and special equipment is often required to move them around warehouses. In addition, as with many other electronic components, they may need to be kept within a specific temperature range. Special care will have to be taken with storage and transportation due to the potential fire risk, and used batteries will also need collecting for mandatory recycling.

Energy generation

Keeping millions of EVs topped up will also have implications for electricity generation and distribution infrastructure. Beyond the need to generate sufficient clean electricity to reduce global carbon emissions, large-scale EV use may also lead to peaks in demand that exceed the capacity of local and regional electric-

ity grids. While extra capacity is likely to be required, researchers are also looking at the potential to use smart grid technologies to smooth demand. A team at Sichuan University in China, for example, has proposed a system that shares the available energy based on the expected departure times and commuting distances of users, to maximize the chance everyone will wake up to a car sufficiently charged to get them to work.

EVs won't just be a burden on electricity grids – there could also be a benefit. Charging an electric car is a great way to use cheap electricity available during periods of low demand, such as overnight, or when strong winds and bright sunshine lead to excess power from renewable sources. And smart grid systems can allow cars to send some energy back to the grid, helping to smooth demand peaks elsewhere. As it ramps up battery production, EV maker Tesla has started selling dedicated domestic energy storage systems using its EV batteries, and Nissan is developing a similar system to give an extra lease of life to part-worn batteries removed from its vehicles. Some batteries need to be regularly recharged if stored for long periods, or they lose their capacity. In Germany, Daimler has announced plans to create a 15-megawatt-hour grid-connected energy storage system using new batteries destined for its existing fleet. Similar warehouse solutions will need to be developed for other carmakers.

Clearing the streets

If large-scale use of electric vehicles is set to place significant new demands on infrastructure, two other key automotive trends – autonomous driving and the growth of shared-use vehicles – could fundamentally transform the urban environment. To find out what might happen, researchers at the International Transport Forum built a model of a hypothetical urban transport system for the city of Lisbon, replacing private cars with various combinations of shared, autonomous vehicles and high-capacity public transportation.

Their report creates some intriguing possibilities. While the simulations suggested that the number of vehicle miles driven would rise, partly as a result of the need for vehicles to reposition themselves from one user to another, they also found the system could reduce the total number of cars required to meet the city's transport needs by 90 percent, and cut peak hour congestion by almost two-thirds. The approach would completely eliminate on-street parking, freeing up as much as 20 percent of the available road space for other uses, and allow 80 percent of the current off-street parking space to be used for other purposes.

It's a vision of city life that would appeal to many, but the researchers warn the transition would be hard to manage – the version of the model that retained private cars for 50 percent of journeys caused vehicle travel to increase by up to 90 percent. ■ Jonathan Ward

BUSINESS

THE LATEST DELIVERY BATTLEFIELD – YOUR DOORSTEP

Last-mile delivery is critical for e-commerce success, and companies are rushing to come up with innovative solutions in the quest to win over the customer, right on the doorstep.

Manny Sears is running low on groceries – or, at least, that's what his fridge tells him via his voice-activated digital assistant, Jenna. But that's OK: the fridge already placed an online order with the supermarket, and Jenna says his delivery will arrive at the house at 2:50 p.m.

Manny's at work, but that's no problem, either. When the delivery robot arrives with his shopping it will make its way to the chilled secure box at the front of the house, access it via the cloud-based digital keypad and drop off the groceries.



This vision of the future of home delivery might be here sooner rather than we think. Smart technology and delivery are meeting on the consumer's doorstep, algorithms and predictive analytics are combining with connected devices, automation and smart homes. And in an environment where fast isn't fast enough, and customer loyalty can be fickle, companies are striving to innovate constantly with new gadgets and services.

Fast delivery

This battle for the doorstep is raging right now among e-commerce businesses who are vying to fulfill big demand for fast delivery as efficiently and cost-effectively as possible. The last mile is a space which is famously costly and complex, after all: software company Telogis estimates that it accounts for approximately 28 percent of the total cost of delivery.

The huge uptick in online sales is only making the challenge more acute. eMarketer estimates that global B2C e-commerce will reach \$2.3 trillion by 2017. To ensure return sales, customer expectation has to be met – and then exceeded. So it seems that the fight over the last mile is being driven by what consumers want, rather than simply intense competition from e-commerce companies all trying to out-do each other.

“Actually, it's a bit of both,” says Charles Brewer, CEO DHL e-Commerce. “Consumers do have much higher expectations today. They live in a real-time environment where they want things faster, with more visibility, more predictability, more choice and a great deal more convenience than they ever did in the past. E-tailers, meanwhile, recognize that it's a critical part of a customer's journey and see fulfillment and last-mile delivery as a differentiator and a driver of loyalty – and they're looking for partners with an innovative mindset and creative solutions who can help them deliver it.”

Click & collect can help protect margins as part of a multichannel distribution strategy; but, obviously, online retailers need a physical store to be able to provide this service. And anyway, there's no ignoring the fact, that for the time being, the majority of online customers still want items brought to their door – and for free, too.



Huge stakes

This needn't trouble e-tailers too much, who can make their money from

the last mile by building shipping costs into the price of the goods; but for logistics players, the stakes are huge. With failed deliveries adding more cost, success means being both flexible and generating a constant stream of mold-breaking delivery ideas.

Yet new delivery technologies can't be relied on to solve the problem alone, notes Matthias Winkenbach, director of the MIT Megacity Lab at the Center for Transportation and Logistics in the U.S., in a recent article for MIT Sloan Management Review. The way companies mine and model their data is even more important.

Information businesses already have on hand – such as data on vehicle movements and product sales – can be used to improve delivery services, he argues. Take GPS data from smartphones on vehicles. This carries “a treasure trove” of locational data – but “when combined with other sources – transactional data, census and geospatial data, and information on driver activities – it is possible to build highly detailed models of urban delivery operations. Such analytics can equip managers with last-mile insights both on the strategic and day-to-day decision-making levels.”

Harnessing data

In fact, new technology in this space could change the marketplace for good by giving small businesses the ability to harness modeling data for



“There is no disputing the fact that the consumer landscape has changed irreversibly and will continue to change at a far more rapid rate.”

Charles Brewer, CEO DHL e-Commerce

themselves. Take Bringg, which is developing its web and mobile platform to offer services such as driver tracking, dispatching, SMS alerts and estimated time of arrival (ETAs), and allowing small and medium-sized enterprises the chance to compete with the likes of big players such as Uber and Amazon.

Crowdsourced cargo delivery – as epitomized by same-day delivery firm Deliv, which Forbes calls “the Uber of the retail world” – is another potential advance for the last mile. Customers seem to like it too. In a 2015 study of 2,000 U.S. consumers by Acquity Group, roughly 75 percent said they would be open to receiving deliveries from third parties.

Although currently in trial mode, autonomous vehicles and robots are eventually set to make an impact on the last mile, and could improve accuracy, efficiency and cost. Indeed, according to a recent study by McKinsey & Company, nearly 80 percent of parcels will be delivered in an automated way by 2025. In the U.K., food ordering service Just Eat is to trial delivery robots in London this year, while DHL will be testing autonomous vehicles concepts that work alongside couriers at its annual innovation day.

Drone launchers

Up in the sky, drones have been undergoing testing for some time. Niels Agatz, associate professor of Transportation and Logistics at the Rotterdam School of Management, Erasmus University, is aiming for a new level. “I’m working on a concept that combines a truck with multiple drones,” he says. “Maybe autonomous delivery robots could be launched from the truck, too.”

Even urban planning is in the mix. Charles Bombardier, a mechanical engineer from Quebec, Canada, and Ashish Thulkar, an industrial designer from Bangalore, India, recently unveiled a concept for “drone-ready tower blocks.”

There are big challenges to overcome with autonomous delivery, admits Agatz. “There are flying restrictions and safety issues to take into consideration with drones; and currently urban areas are the most difficult places for autonomous vehicles to operate in. But I think self-driving vehicles and drones are something we will see happen in last-mile delivery in the future.”



located on the outskirts of the city, where space was more plentiful and land less expensive. But this practice is no longer flexible enough to meet the varying needs of many urban markets. A multitier system that adds another layer of

distribution facilities is required.”

According to him, one such layer might be a fleet of mobile warehouses parked at strategic locations throughout the city. Another model begins with larger trucks designed for rapid offloading to smaller, more agile vehicles at transshipment points within the city.

Charles Brewer believes that getting the mix right is essential: “There is no disputing the fact that the consumer landscape has changed irreversibly and will continue to change at a far more rapid rate going forward.

For those of us at the forefront of this brave new world, my advice is to buckle up, enjoy the ride and push to put the smile in the last mile!”

■ Tony Greenway



BIRCHBOX, BARKBOX AND THE BILLION DOLLAR WUNDERKIND

Subscription box schemes are moving from niche products to potential money-spinners, and big brands now want a piece of the action.

One billion dollars – the price paid by Unilever for online razor and men's grooming company Dollar Shave Club this July – made news headlines, shining the spotlight on an industry that has become a growing phenomenon in the U.S. and beyond: subscription boxes.

Emerging as a trend in the U.S. around 2010 with Birchbox' launch of a monthly \$10 box of beauty samples, subscription box schemes grew fast, both in popularity and variety. While still a niche business, interest in boxes has skyrocketed – in the U.S. in particular. Hitwise, a division of e-commerce and consumer analytics company Connexity recorded some 24.1 million visits to a sample of key sites made

in January 2016 alone, representing a 3,000 percent increase in just three years.

Subscription box schemes now come in all shapes and sizes. While some deliver convenience at a great price, such as the Dollar Shave Club, many cater to



SITE	VISITS	DESCRIPTION
Birchbox	3.6 million	Monthly deliveries of personalized beauty, grooming and lifestyle samples, \$10 a month for women and \$20 a month for men.
Dollar Shave Club	3.6 million	Customers pay between \$3 and \$9 to receive a shipment of the razor blades of their choice monthly or every other month.
Loot Crate	3.1 million	Multiple types of crates for gamers, anime fans or dog owners. Each crate features a curated collection of goods for \$30 and up each month.
Blue Apron	2.8 million	Weekly delivery of the precise amounts of fresh ingredients required to make three home-cooked meals. Cost is \$60 for two people/\$70 for four.
Graze	1.7 million	Four individual snacks selected according to customer's taste are delivered weekly for \$12 per box.

Data collected in January 2016

Amounts in local currency unless otherwise stated. Source: Hitwise, a division of Connexity, and company websites.



www.connexity.com/au/hitwise

consumers' love for surprises, and successfully so. Site aggregator mysubscriptionaddiction.com lists no fewer than 900 schemes, and there is a box for all tastes and budgets – from sample boxes at less than \$10 to the \$25,000 a quarter Opulent jewellery box. Even man's best friend is stylishly catered for by Barkbox, which delivers choice dog treats each month.

Wunderkind

Dollar Shave Club, the subscription wunderkind, is arguably the most profitable and the simplest of them all – a monthly subscription scheme of disposable razors plus optional men's grooming products. Launched in 2011, it went viral with a witty online ad in 2012 and in 2016 was on course to generate revenue of some \$240 million. The company excels at digital direct-to-consumer sales and marketing which made it so appealing for a big brand such as Unilever, whose core strength lies in traditional retailer relationships.

Subscription boxes are a clear win for companies. Predictable demand and a controlled logistics flow, the ability, in most cases, to select the subscription contents, and opportunities to upsell to a loyal cus-



3,000 PERCENT

The increase in the number of visits to subscription-box sites recorded by Hitwise from 2013 to 2016

tomer base – what's not to like. No wonder, then, that the big brands now want to get in on the game.

Adidas, for example, has just launched Avenue A, a quarterly \$150 curated subscription scheme for females and Walmart, Target, Amazon, Starbucks and Sephora are among the big players that have created their own box schemes.

John Fetto, Senior Analyst at Hitwise, comments:

"While the subscription shopping category is still a niche market, with total monthly visits just a third of one percent of what the top retailers receive, these sites appeal to a critically important segment of consumers who are entering the prime of their earning and spending years, which should sustain continued growth in the category.

"Traditional retailers should – and some already are – take note of the success that startups in this industry have enjoyed, and determine if a subscription model would be a smart extension to their existing product line-up."

■ Michelle Bach



www.mysubscriptionaddiction.com

GETTING AHEAD:

Visitors to a trade fair view a 3D-printed medical model of the human body created by U.S. company Stratasys.



3D PRINTING: A NEW DIMENSION

Science fiction is fast becoming science fact, and none more so than 3D printing, which is now being adopted as a production process for everything from buildings to aircraft components.

It's like magic. Layer upon layer of heated plastic or metal is injected from the nozzle of a 3D printer onto a plate, where it builds up into a three-dimensional object. It makes for a wondrous sight to see a tool or a toy, a prosthetic limb or a spare part for a jet engine being produced before your eyes.

It's a process that has the potential to transform both industrial production and the supply chain. Products can be made at a fraction of the cost of manufacturing processes such as forging, molding and sculpting, as there is no need to build special equipment to create each new product.

Already, 3D printing, or additive manufacturing, has moved beyond the experimental stage, and is being used in a variety of applications where often the parts are complex to produce or require high levels of customization.

Game-changer

DHL has investigated the future of 3D printing in an in-depth study that looks at the implications and uses of the technology across sectors and the supply chain. The report – “3D Printing and the Future of Supply Chains” – concludes the technology will “undoubtedly be a game-changer in many industry segments” and will

lead to improved product quality and, in some cases, completely new types of products. It highlights a number of use cases where 3D printing could have a disruptive effect and implications for the future of supply chains. Companies could team up with logistics providers offering 3D printing in areas such as “spare parts on demand,” which would enable them to save substantial amounts on storage; end-of-runway services, to enable fast production of parts that need to be put into operation in the shortest possible timeframe, or product postponement services to increase customization options but at the same time reduce lead time to the customer.

The promise for 3D printing comes as new industrial applications of the technology are springing up all the time. The report says Airbus has already introduced 1,000 3D-printed parts to its A350 airliner model. Each part weighs just half as much as the one it replaces, significantly reducing the weight of the aircraft.

Airbus has heralded a breakthrough by producing a partition wall for its planes through 3D printing. This product is billed as the world’s largest 3D-printed airplane cabin component. The partition wall, which fits between the passenger seating area and the plane’s galley, has a bionic structure, mimicking the structure of organic cells and bones. The new design dispenses with the weight, materials and bulk of older versions of the partition and is 45 percent lighter than previous versions. It is also much stronger, supporting the jump seats used by cabin crews. When installed in the fleet of A320 planes, Airbus claims it will save up to 465,000 metric tons of CO₂ emissions each year.

Rocket parts

Meanwhile, U.S. space program NASA is experimenting with ways of printing rocket parts, and has manufac-

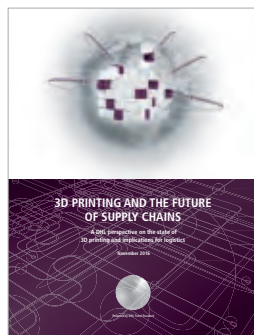
tured and tested 75 percent of the parts needed to build a 3D printed rocket engine. The turbo pumps, injectors and valves have been successfully tested together, suggesting it would be possible to build a 3D engine for landers, in-space propulsion, or the upper stages of the rocket engine. NASA has also manufactured 3D-printed objects on the International Space Station (see box).

General Electric (GE) has also made some big commitments to 3D printing. The industrial giant recently opened The Center For Additive Technology Advancement (CATA), producing 3D-printed parts such as fuel nozzles for jet engines. GE is investing \$40 million in the facility, which will develop industrial applications for 3D printing across its businesses.

BMW Group has integrated 10,000 3D-printed parts into production of the Rolls-Royce Phantom. The complex geometry of some of the parts required lent itself to 3D printing, and they could be manufactured significantly faster than with traditional methods without any loss of quality. BMW is now planning to roll out 3D printing technology across its production range.

Meanwhile, Dubai’s Museum of the Future project has unveiled what it calls the world’s first 3D printed office building. A 3D printer was used to create the building layer by layer, using cement. It took 17 days to print the 250 square meter building at a cost of some \$140,000. The printer used to make the building – including all interior furnishings and detailing – is 120 feet (36 meters) long, 40 feet (12 meters) wide and 20 feet (6 meters) high.

3D printing also has huge potential to help developing nations provide basic supplies to people living in remote areas. According to the DHL report,



The trend report will be available in December 2016. To download it, please visit:



www.dhl.com/3dprinting

LIFE SCIENCES AND HEALTHCARE

Great strides are being made with 3D printing in life sciences and healthcare. At the University of Melbourne, engineers and doctors have worked together to model and 3D print the heart arteries of patients. The models allow doctors to see the twists and blood flow in these vessels and accurately construct the most suitable heart stent, a mesh tube used to support narrow or weak arteries.

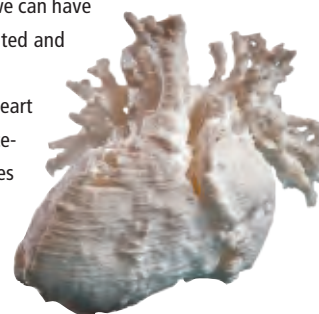
In collaboration with researchers at the University of Wollongong’s ARC Centre of Excellence in Electromaterials Science, the team is able to print a patient’s artery within a day.

Their aim is to improve the technology so they can print the artery while the patient is in surgery – and ultimately, to be able to 3D print a custom heart stent on the spot.

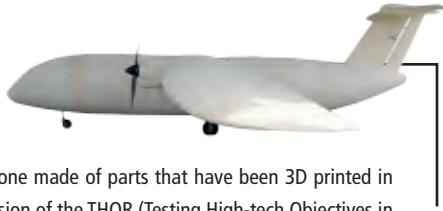
“No two arteries are shaped the same,” says Professor Peter Barlis, Honorary Principal Fellow at Melbourne Medical School and Melbourne School of Engineering.

“We’ve gone to our engineers and created 3D models looking at a million data points in the artery. We want to use models to predict the best type of stent for a patient. Once this process is streamlined, we can have a patient on the table and an artery 3D-printed and modeled to guide the procedure.”

Other medical teams have used 3D-printed heart models to prepare for complex surgical procedures – especially when operating on babies and young children.



AEROSPACE



Airbus has unveiled a drone made of parts that have been 3D printed in polyamide. The initial version of the THOR (Testing High-tech Objectives in Reality) aircraft weighs 21 kilograms, can fit in a four-meter by four-meter square and is powered by two 1.5-kilowatt electrically-driven propellers. Airbus says the time taken to produce the prototype was much shorter than with traditional methods – seven weeks to print the THOR aircraft's 60 structural segments, with one week for assembly and three days for finetuning. "The first version was to test whether the slogan 'Print me an airplane' can be converted into reality," says Detlev Konigorski of Airbus' Emerging Technologies & Concepts activity in Germany, who oversees the THOR project. "The first flight was simply about flying. Now, we want to generate basic data on things like altitude, speed and acceleration in a turn." Follow-on THOR versions are being assembled at the new Center of Applied Aeronautical Research in Hamburg. The second THOR version will have interchangeable wings, including concepts for a hexagonal wing with a support structure derived from a honeycomb design; a metallic aluminum wing; and a flexible wing made from carbon-fiber-reinforced plastics. "If a THOR aircraft takes off, and after 30 feet (9 meters) makes a nose-dive back to the ground, our attitude is, 'Good, let's sweep it off the runway and come up with a better idea'," says Konigorski. "In a few weeks, we can print a new aircraft!"

startup re:3D is donating a "Gigabot" to some of these communities to make clothing and other products on a day-to-day basis. Another firm, Field Ready, is collaborating with World Vision to establish an innovation lab in Nepal to produce 3D-printed supplies for relief camps – reducing aid agencies' logistics costs by 40-50 percent.

Sales growth

Sales of consumer-grade printers priced at under \$5,000 from companies such as Ultimaker and Makerbot have grown rapidly. In 2015, some 258,000 were sold globally, up from 35,500 in 2012.

"Affordable desktop printers are expanding tremendously in sales and adoption, moving into places in industry and engineering in a bigger way than before," says Matt Griffin, Director of Community, North America, for 3D printer manufacturer Ultimaker.

He explains that, in the same way low-cost PCs are networked together, a similar process can be used with consumer-grade 3D printers to set up a small production line that makes all the components for a particular product.

"Each machine is like a unit of production, it will do whatever it is assigned with the materials



READY TO WEAR:
3D printers even made the accessories and shoes for these Paris catwalk models.



PRINTED OFFICE:

The world's first functional 3D-printed office at Dubai's Museum of the Future.

available to it," says Griffin. "You can deal with these magic [production] numbers between 100 and 1,000 products, where there isn't enough of them to make it worth setting up tooling for injection-molding or any other processes.

"That is actually very interesting when you can leverage this kind of system to produce something really quickly. You can respond to a need or a trend quickly, and get the entire object produced without necessarily needing to make a business case to produce 10,000."

In the short term, industrial-grade 3D printing – where printers can cost upwards of \$1 million – is likely to complement existing production and delivery techniques rather than directly replacing them. The challenge in the longer term is to improve the technology and make the printers faster and more agile, able to use multiple materials and capable of producing higher-quality items.

As these challenges are met, 3D printing is likely to lead to greater customization of goods and

SPACE ENGINEERING

The International Space Station's 3D printer completed the first phase of a NASA technology demonstration by printing a tool with a design file transmitted from the ground to the printer, using 104 layers of plastic. The tool was a ratchet wrench.

"For the printer's final test in this phase of operations, NASA wanted to validate the process for printing on demand, which will be critical on longer journeys to Mars," explains Niki Werkheiser, the space station 3D printer program manager at NASA's Marshall Space Flight Center in Huntsville, Alabama. "In less than a week, the ratchet was designed, approved by safety and other NASA reviewers, and the file was sent to space where the printer made the wrench in four hours."

The ratchet wrench will be returned to the ground for analysis and testing, along with other parts printed in space. The 11.4 by 3.3 centimeter wrench was designed by Noah Paul-Gin, an engineer at Made In Space Inc., a Californian company that NASA contracted to design, build and operate the printer.

localized production. There is no doubt that additive technology will develop and enhance manufacturing and logistics in the years to come. But just like the technology itself, the changes will unfold step by step. ■ *David Benady*

WORK SPACE:

International Space Station commander Butch Wilmore with a wrench that was 3D-printed on the ISS.





BREXIT: WHERE NOW FOR BUSINESS?

Businesses across Europe are still coming to terms with the prospect of the UK leaving the European Union. Amid the media frenzy, what does the future really hold, and how might it affect supply chains?

When the U.K. voted to leave the European Union on June 23, shockwaves reverberated around the world's financial markets. Stock markets tumbled overnight, the pound plummeted, the FTSE 100 Index of leading U.K. shares dropped off a cliff. It seemed that prophecies of financial Armageddon had come home to roost.

Fast-forward six months, and despite all the hot air, nothing much has happened. Stock markets have recovered and the FTSE 100 is trading at higher levels than before the referendum. The pound has fallen, but that only served to boost month-on-month exports by £800 million in July, as British goods became cheaper – although the cost of imported raw materials and consumer goods will rise.

New British Prime Minister Theresa May reaffirmed that she still intends to trigger Article 50, the process for leaving the EU, by the end of March 2017, despite the recent decision by the U.K. High Court that the referendum result must be ratified by parliament.

However, it may not be so easy. While MPs in the House of Commons, most of whom are pro-EU, have vowed to respect the referendum result, some may seize the chance to demand continued membership of the Single Market as the price for their vote. The legislation could also be held up in the House of Lords for up to a year. The government has appealed the verdict to the Supreme Court, and a decision was awaited at the time of going to press.

Only when Article 50 has been triggered will we really see how Brexit plays out during the two-year mandatory period in which everything is decided. There are so many

unknowns, such as trade agreements that Britain may have to negotiate, and customs procedures not only with the EU but Ireland, with which it shares a land border.

So should businesses be alarmed – and what can they do to prepare? In particular, how can they safeguard their supply chains from any possible downside?

“The good news, unlike many supply chain events – like a volcano disrupting air traffic or an earthquake destroying infrastructure – is that we have over two years’ notice of the change,” says Professor Richard Wilding, Chair of Supply Chain Strategy at Cranfield School of Management. “Do your scenario planning and understand how susceptible to impact your supply chain is – you may be pleasantly surprised.

“It’s a massive change and people need to plan for that, but equally this is a serious opportunity. I would argue that a lot of things that have been taking place in the last 15-20 years may not be the most efficient way of doing things, so it gives organizations the opportunities to really reflect on the right way of doing things.”

U.K. political debate is now focused on discussions as to whether there should be a “soft” Brexit – staying in the Single Market, or a “hard Brexit – leaving the Single Market. However, it is much more complex than that. Rather like an ice-cream parlor, there are four possible scenarios that could form the basis of the U.K.’s relationship with Europe post-Brexit, but each with a number of different flavors that could be added:

The Norwegian model: By joining the European Economic Area (EEA), like Norway and Iceland, the U.K. would still have access to the Single Market but be exempt from EU

control in some areas, such as external trade, agriculture and fisheries. However, it would be required to retain freedom of movement, and would still have to pay into the EU budget – the two biggest issues in the referendum campaign.

The Swiss model: Joining the European Free Trade Area (EFTA) but not the EEA would allow the U.K. to have partial access to the Single Market in return for smaller financial contributions. There is argument as to whether this would still require freedom of movement. The Swiss signed a free trade agreement with the EU in 1972 that did not include freedom of movement, only signing up to this later, so a precedent has been set. Furthermore, in a 2014 referendum, the Swiss voted to end freedom of movement – an issue yet to be resolved with the EU. However, Switzerland does not have a deal on financial services, which are vital to the U.K. economy.

EU-U.K. free trade agreement: Theresa May confirmed on October 2 that the U.K. will take back control of immigration and will not be subject to the jurisdiction of the European Court of Justice. Neither of these appear compatible with remaining in the Single Market – but this could change once the bargaining starts. The prime minister has said the U.K. will seek the best possible deal, including free trade in goods and services, but also wants to retain the “maximum possible access” to the Single Market. It has also been rumored the U.K. government may offer substantial payments into the EU budget to keep access to the Single Market for financial products and services.

Exit from Single Market: If a U.K.-EU trade deal cannot be reached within two years of Article 50 being triggered, then the U.K. would leave the Single Market and trade would simply continue under World Trade Organization (WTO) rules, designed to encourage non-discrimination among its members. The U.K. is an original member of GATT, which preceded the WTO, and its membership is not affected by Brexit. Most tariff rates have already been bound by most of its members, and contrary to some reports, punitive tariffs are not allowed except in exceptional circumstances – also governed by multiple WTO agreements. An example would be the current anti-dumping investigations into China’s steel exports by multiple WTO member states.

Supply chain implications

The issue of customs declarations, and its potential impact on the supply chain, is an area of key concern for businesses. However, both Norway and Switzerland were able to find solutions through bilateral negotiations, removing the need for customs clearance in trade with the EU in most cases. Professor Wilding says that, despite the lurid headlines, it’s certainly not all doom and gloom. “The vote to leave the European Union was a vote for border controls, customs clearances, more extensive passport checks and border crossings that will not only take longer than now, but which may be more uncertain and unpredictable than now,” adds Professor Wilding.

“However, the opportunity to streamline processes in these areas may result in more efficient and effective trade.

Technology platforms enabling automated prenotification of where goods are moving are already available, and they just need to be applied to the new processes we require.”

He says the key thing to prepare your business for change is to understand the structure of your supply chain. “Where are your first-tier suppliers located, where are your second-tier suppliers located, where are your core customers located? Once you’ve done that and you’ve got a network, some organizations are already starting to plot addresses of sectoral organizations on Google Maps – you get a picture up with lots of little pegs around the world, and then you can very quickly understand your exposure to various trade routes, you can see where people are moving things from, and so on.

Other tips include:

- Streamline your business and trade processes, leverage the digital revolution and take advantage of regulatory flexibility. Off-the-shelf software can help you with things such as projecting customs duties, licensing requirements and rules of origin.
- Make sure your people are aware of any changes in your business. There’s a lot of misinformation, so make sure you share the facts with them.
- Get the data together, really understand what the opportunities are and share those with higher levels within your business.

Phil Couchman, CEO, DHL Express UK, is also optimistic about the future. “Britain is a trading nation – there’s an entrepreneurial spirit here, it’s relatively easy to do business and start a business... we should take a positive attitude in how we approach the future.

“At the moment, there is of course lots of guesswork going on in terms of what Brexit will look like, but the overall mood here amongst our customers is one of resilience and continued desire to grow exports.

“That resilience is echoed right across our business. Our strength lies in our ability to help customers navigate complex customs processes and that’s something we’ll continue to do. As the direction of negotiations becomes clearer, customers will look to us for support and, with our expertise in global trade, we’ll be ready and prepared to offer just that.” ■ *Richard Reed*



UNITED KINGDOM

Population: 64,600,000

GDP: £1.83 trillion

World Economic Forum’s Global

Competitiveness Index:

10th place (out of 140 countries)

World Bank Group’s Ease of

Doing Business Index:

6th place (out of 189 countries)

DHL Global Connectedness Index:

8th place (out of 140 countries)

SOLUTIONS

ON THE RIGHT TRACK

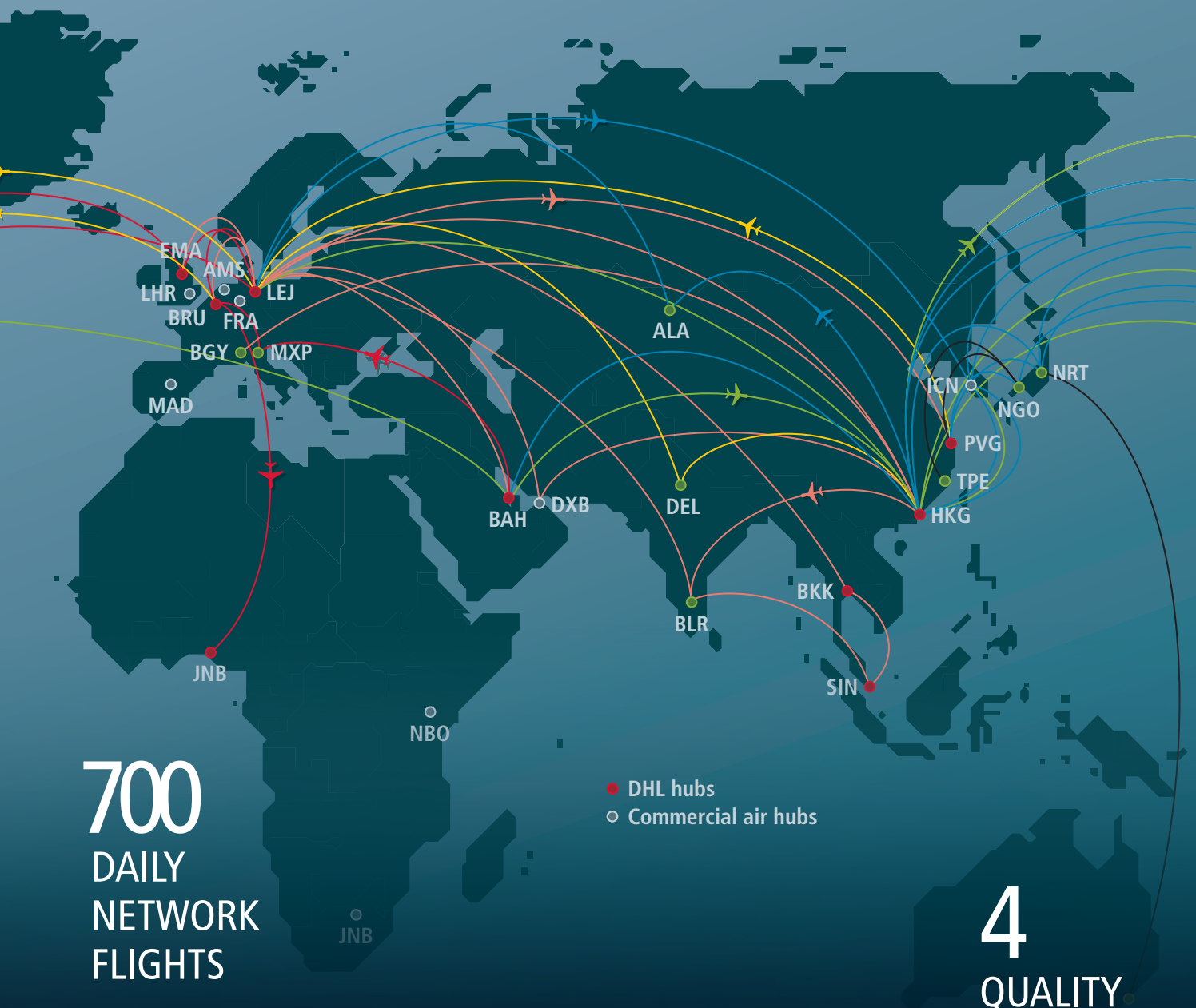
If you've ever wondered how DHL Express manages to move millions of packages around the world – and keep track of them all 24/7 – the answer lies in its Quality Shipment Monitoring System and four state-of-the-art Quality Control Centers (QCCs).

Located in Cincinnati, Leipzig, Singapore and the East Midlands, the QCCs monitor DHL shipments in the air and on the ground on a real-time basis. Using cutting-edge technology, around 244 million pieces are monitored annually from origin to destination via a global system of some 9 million daily checkpoints. With a fleet of 250 dedicated aircraft operating more than 700 network flights a day around the globe, plus additional capacity on some 2,000 flights on major airlines and a fleet of more than 30,000 vehicles, this door-to-door tracking allows for decisive action when necessary, working in conjunction with the operations teams, to ensure fast and secure delivery. ■



9
MILLION
DAILY
CHECKPOINTS







BRIDGING THE CULTURE GAP

In a globalized world, knowing your way around local cultures remains a key factor for business success.

A typical scenario in a global business: you're heading to a project meeting with colleagues in Mexico next week and preparing to pitch a major proposal to a prospective client in Japan next month, after which you'll be stopping over in Abu Dhabi to catch up with a business partner there.

And while you and your counterparts will be speaking the language of global business, the meetings, conversations and the flow of each project could nevertheless be very different in each geography.

Knowing your way around those local differences can be important, if not imperative, for a successful outcome. So, in the age of globalization, can you become an expert in every local culture? Most likely not. What you can do, however, is develop cross-cultural competence and gain understanding of some of the fundamental principles at play in the countries you do business in. This will enable relationships to be forged across cultures which can set the foundations for sustainable business success, no matter where in the world you do business.

Preparation is key. Barry Tomalin, a professional trainer and co-author of *The World's Business Cultures and How to Unlock Them*, uses the French word for school, *ECOLE*, as an acronym for a framework for approaching different cultures. E means managing your counterparts'

expectations. C is for communication, how they network and negotiate. Organization is next, how do your counterparts handle their time, e.g. punctuality, and how do their teams operate? How are they selected, who's going to lead and allocate work and deliver? L represents leadership, what is its style and how are decisions made? The final E is etiquette, ranging from how you greet people to dress code and gift-giving.

In meetings there are some major factors to consider, for example language. If English is spoken, keep language clear and free from jargon and abbreviations. Communication in Asian and Arabic countries tends to be a lot more subtle and indirect, so be aware – and ensure that at the end of the meeting everyone leaves the room with a clear understanding of what was discussed.

Distance also plays an important role. Denise Pirrotti Hummel, CEO of cross-cultural advisory firm Universal Consensus, says that while acceptable personal space in a business meeting in the U.S. is 2.5 feet, every culture has its own acceptable space proximity. Her advice is to look around when arriving at the airport and note how far apart people are standing; you can then proceed to your next meeting armed with information that will avoid instant discomfort and a potential disconnect that may jeopardize business with your international counterparts.

There are specific forms of greeting at the start of a meeting, such as presenting and appraising business cards in countries like Japan – but the time before a meeting with key decision makers is often just as crucial. When doing business in China, *guanxi* is the foremost principle to master. Chinese prefer doing business with people they trust – and more than mere networking, *guanxi* is the gradual building up of trust and respect through interaction built on obligations and favors, developed and maintained over time in order for business to flourish.

For cross-cultural mentor David Clive Price, the *guanxi* principle is at the heart of business culture in all





Asian countries; in fact, he believes it plays a crucial role when building business: “For the Western businessperson seeking to launch or expand business in Asia, how to build guanxi is not only important to your business. In many cases, it IS your business.” Price advises to initially go through a partner or intermediary who cannot only make a formal introduction and vouch for the reliability of your company, but is also someone who teaches you how the guanxi system works.

Due to a period of national isolation officially in effect from 1633 to 1866, Japan still has one of the most formal business cultures in the world. Two concepts are important to grasp.

The first is *Nemawashi*, a drive for consensus, which paves the way for a successful meeting with senior managers. Japanese decision makers value their employees’ input before entering into a relationship with a new business partner and even offices are often set up to make you walk past “regular” employees before seeing a senior executive. Open meeting areas are the norm – and having informal talks with stakeholders in these areas, or over tea, and gaining their trust and approval is a significant contribution to future deals.

The other important dynamic is *Horenso*, where both parties keep each other constantly updated in a quite detailed way, from the project draft to day-to-day operations. Any issue is reported and people are consulted in a much more collaborative way than is the norm in Western countries for example.

In the Arab world, people tend to engage in business with partners they know and like, therefore what may look like lengthy small talk can actually be a way to determine whether you are a suitable business partner. It is thus well

2.5 FEET


The acceptable personal space in a U.S. business meeting



worth investing time to engage with and get to know your counterparts. Time horizons are different, decisions can take a long time, and schedules and meetings can be shifted or delayed, so patience and flexibility are important assets to bring to the table. The concept of time also differs in many other cultures. While one would be expected to be precisely on time in most European countries, across Africa and Latin America time can occasionally be more of a guideline, and equally, decision making and planning horizons can differ widely.

For the globally connected executive it pays to invest in gaining cultural understanding and developing a high level of cross-cultural competency. Spending time to read up on the fundamentals of etiquette and doing business in the country, and mapping out a plan for approaching the right decision makers in the right way, can work very well. When dealing with complex cultures, getting some coaching or introductions from a local expert can make all the difference. Beyond this, simple gestures of respect and appreciation will be welcomed everywhere – such as making an effort to learn something about the country and knowing a greeting or some phrases in the local language; small tokens help to bridge the culture gap and can quite possibly open many a door. ■ *Michelle Bach*

For further information on developing cultural competencies:

-  www.universalconsensus.com
-  www.davidcliveprice.com
-  www.culture-training.com

VIEWPOINTS

A portrait of Ayesha Khanna, a woman with long, dark, wavy hair, wearing a black zip-up top. She is looking directly at the camera with a slight smile. The background is a dark, solid color.

DELIVERED. GETS SMART WITH...

AYESHA KHANNA

Technology and smart cities expert Ayesha Khanna talks about current tech trends – and where the internet of things, robotics and artificial intelligence and other innovations could take us in the future.

Entrepreneur Ayesha Khanna has always been fascinated and excited by transformative technological innovation. “I truly believe in the power of technology,” she says. “It makes us more productive. I love tech that is user-friendly and valuable because it reduces stress, creates business opportunities and brings joy to people.

“I’m particularly excited about the transformative power of technology for the emerging middle class in Asia.” For example, she says, now anyone with a smartphone can have access to personalized education, thanks to the range of free learning courses, classes and lectures available online.

Harvard and Columbia-educated Khanna – the author of several books about innovative tech – spent years on Wall Street working in financial technology. Now based in Singapore, she works as an innovation and technology expert, advising governments and companies on smart cities, future skills, fintech, and other emerging industries. Clients come to her for advice on out-of-the-box thinking and product design.

Tech has been good to Khanna, so she is keenly aware of using it to give something back to society. In 2014 she founded 21C GIRLS, a non-profit organization that delivers free coding classes to girls in Singapore, and in 2015 she launched an education hub called The Keys Global, which partners students with leading companies to apply skills in coding, robotics, 3D printing and other new technologies.

“Academia has traditionally been divorced from innovation,” she says. “But I think it’s incredibly important to expose students to industry at an age when they are interested, enthusiastic, open and idealistic.”

To wind down from thinking about tech, running her business and continuing her Corporate Social Responsibility (CSR) activities, she loves spending time with her husband and their two children. “As much as I enjoy tech, there are other aspects to my life that make things fun and interesting,” she says.

She’s also finishing off a PhD on smart city infrastructures. “So as you can imagine, I’m a big fan of Google and Google Scholar!” she adds. “I’m a fan of Uber, too. As a family we had a car for a long time but decided to go completely green and now use Uber and car-sharing. And I love virtual reality. I’ve tried various applications and I’m really excited to see what will happen next in that area. I think virtual reality, mixed reality and augmented reality will transform everything from entertainment to education to logistics.”

What tech innovation trends are currently exciting you?
Anything relating to smart cities. That means the internet of things, smart homes, plus innovations around mobility such

**16.6
PERCENT**

The predicted growth in smart cities per year between 2014 and 2019

**\$27.5
BILLION**

The predicted global income generated by smart technologies by 2023 – up from \$8.8 billion in 2014

as driverless cars and buses, and connected cars. Another exciting trend relates to artificial intelligence and the use of big data by large companies – and its application in education, too: Bill Gates, for example, has plans to change education with an artificial intelligence-driven “personalized learning” program. The Bill and Melinda Gates Foundation has invested more than \$240million in the initiative so far.

What about robotics?

Robotics will have a big impact on everything from supply chains to last-mile logistics to care homes. There’s no doubt we will see the growth of robot technology in policing, rescue and crisis operations, and security. Robots are also becoming more affordable so increasing numbers of small and medium-sized enterprises will be able to employ them. And with the aid of robotic exo-skeletons, people who are paralyzed or elderly will be able to lead better lives.

You mentioned your interest in Smart Cities. What are their benefits? And what would it be like to live in one?

I do live in one. Singapore is one of the world’s leading smart cities. At a very basic level, public services are very efficient. People tend to think of smart cities in terms of infrastructure technology, with sensors everywhere exchanging information. A criticism of smart cities is that in all the excitement of the technology, ‘the individual’ tends to be forgotten. However, Singapore has moved things to the next level with an initiative called Smart Nation. This aims to use tech-enabled solutions to harness the innovative spirit needed to grow the next-generation economy, and help its citizens, businesses and government co-create a better future. I really like its inclusivity and creativity and think more countries will adopt it.

Is there a danger that smart city technology – with its collected and connected data – could be used in an intrusive, ‘dystopian’ way?

It’s a danger to be aware of, certainly. A society should know about the ethical dilemmas associated with the use of such technology and a regulatory framework needs to be in place for the protection of citizens. But such problems can be overcome if we can figure out a way to meet these challenges together as a society.

Where could tech and innovation take us in the future?

Way, way ahead? Who knows? We could be living on other planets or space stations. And with genetic enhancement people could edit embryos to design the intelligence of their babies, which I think is exciting and terrifying at the same time. It would mean that people who don’t have access to those kinds of technologies would be at a disadvantage, and that’s what bothers me, because rich people would be thousands of times smarter than poor people. But I’m a cautious optimist. I believe that there are enough people out there who are thinking about what’s right for humanity – and that, whatever tech advancements come along, controls will be in place for our protection. ■ Tony Greenway

ASEAN remains a bright spot in the global economy for European businesses

European investors are increasing their exposure to Southeast Asia, and the second annual EU-ASEAN Business Sentiment Survey reaffirms the ASEAN region's position as a bright spot in the global economy and a focus for European investment in the year ahead.



AN ESSAY BY DONALD KANAK

Don Kanak is chairman of Eastspring Investments, the Asia investment division of Prudential plc, one of the region's leading retail asset managers. He is also chairman of Prudence Foundation, the community engagement arm of Prudential in Asia. In 2011-12, he chaired the World Economic Forum's Global Agenda Council on Insurance and Asset Management.

At a time when surveys in some other Asian markets show companies taking a more cautious approach, European businesses in ASEAN overwhelmingly expect their profits to grow and their operations to expand over the medium term. Almost three-fourths expect their ASEAN revenues to grow in importance relative to worldwide revenues over the next five years.

As a result, about two-thirds of respondent companies are planning to expand operations and increase employment in ASEAN over the next five years, which is good news for jobs and investment. This is consistent with our 2015 survey results, suggesting a steady trajectory of strengthening European presence in Southeast Asia. By contrast, only 47 percent of European businesses in China plan to expand, with flagging business sentiment attributed to overcapacity in the Chinese economy and an increasingly challenging regulatory environment.

Business optimism is driven by a number of factors. First, our respondents report confidence in the growth potential of ASEAN

markets, which is powered by large, youthful populations, strong consumer sentiment and skilled workforces. Indeed, with more than 600 million people in the ASEAN market, it has an exceptional growth rate and many opportunities going forward. Second, ASEAN member states are embracing external trade as a driver of growth and are demonstrating their commitment to enhancing economic ties among themselves and with the rest of the world.

European business is also encouraged by measures to strengthen and formalize trade ties between the EU and ASEAN member states. The recently concluded EU-Vietnam and EU-Singapore FTAs are seen as building blocks to an overarching region-to-region agreement, and will pave the way for bilateral negotiations with Malaysia, Indonesia, the Philippines and Thailand.

Looking forward, our survey findings show that European businesses in the region are enthusiastic about the prospect of an EU-ASEAN FTA. The EU is already ASEAN's largest source of foreign investment and its second largest trading partner, and a region-to-region FTA would be a powerful catalyst for an even closer, mutually beneficial economic relationship between our two

regions. It would also be the world's first region-to-region FTA, and a landmark achievement in international trade integration.

However, our results illustrate that much work remains to be done to ensure that all businesses – local, European, and international – can maximize the obvious growth potential of the ASEAN region.

While our respondents are optimistic, they also want to see deeper engagement between EU and ASEAN governments on trade and investment issues. Since the 2015 survey, there has been progress, but still more than half of European businesses say that the EU can be more engaged in supporting European businesses, and a similar number of respondents reported that they are only sometimes, rarely or even never consulted by ASEAN governments. As a result of this insufficient engagement between governments and the private sector, European businesses report a lack of awareness about how to leverage existing economic agreements and how their businesses can benefit. Looking at the ASEAN Economic Community (AEC), for example, half of European companies surveyed indicated that they were unsure how the AEC would impact their business.

With trade growth slowing in some of the world's largest economies, China coping with industrial overcapacity and the American economic debate showing increasing signs of an inward turn, governments and businesses in ASEAN have a unique opportunity to work together to plot a course towards sustainable and inclusive growth. Consistent, substantive dialogue between businesses and EU and ASEAN governments are essential to the successful con-

clusion and implementation of high-quality trade and investment agreements that will lift up both European and Southeast Asian economies and peoples.

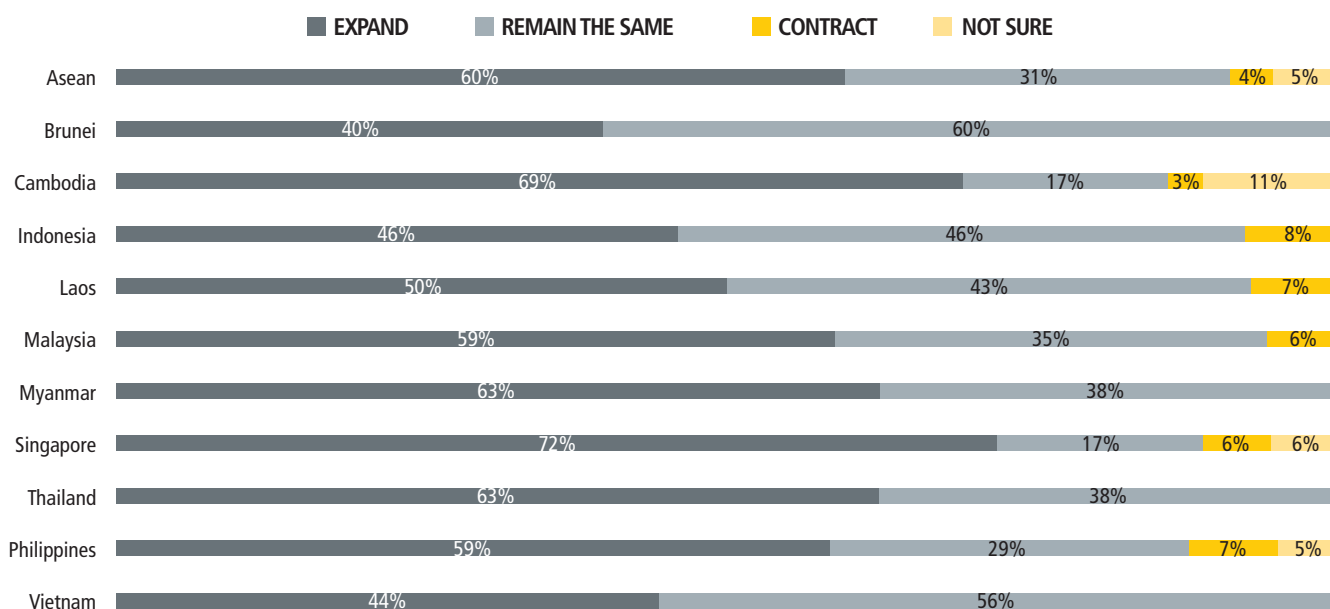
The key takeaway from this year's survey is clear: European business is fully committed to growing in ASEAN, and is ready and willing to play its part in helping to support regional integration and the economic development process. European companies have a long-term stake in the continuing success of ASEAN and its member states – almost half of the respondents in our 2016 survey have been in the region for 20 years or more and many of the EU-ASEAN Business Council's members have been operating in Southeast Asia for close to a century. The enduring ties between the EU and ASEAN can and will only grow stronger as we move forward into the next phase of our economic relationship. ■

¹ *The EU-ASEAN Business Council (EU-ABC) is the primary voice for European business within the ASEAN region. It is endorsed by the European Commission and recognized by the ASEAN Secretariat. Independent of both bodies, the Council has been established to help promote the interests of European businesses operating within ASEAN and to advocate for changes in policies and regulations which would help promote trade and investment between Europe and the ASEAN region. The EU-ABC's membership consists of large European multinational corporations and the nine European Chambers of Commerce from around Southeast Asia.*



Please visit www.eu-asean.eu for more details about the EU-ABC and download the full report at bit.ly/eu-asean-report

QUESTION: WHAT ARE YOUR PLANS FOR ASEAN OPERATIONS OVER THE NEXT FIVE YEARS?



WHAT'S THE STORY, MS. HALABY?

BUSINESS AS UNUSUAL



In war-battered Syria, Managing Director Khulud Halaby ensures that DHL Express Syria is available to serve its customers – and protect its employees.



War started in Syria in March 2011. In 2013 I started dividing my time between Damascus and Beirut in Lebanon, where I was able to guarantee the smooth transit of Syrian shipments via Beirut–Rafic Hariri International Airport. It's only about a two-hour drive between the cities along a very safe road.

On a 'normal-as-possible' working day in Syria, I travel between our country office in Damascus city and our 12 sites across Damascus state. I can't visit them all in one day because the streets are now blocked with massive traffic jams due to the large number of security checkpoints. A trip across town that used to take 15 minutes now takes one and a half hours. Occasionally, I visit the coastal cities of Latakia and Tartus.

Late in 2012 we relocated our operations from our new Syria Country Office near the airport to the city because snipers were shooting at vehicles, but now the roads are safe again. In this facility we have now 30,000 square meters of warehousing. Even though we have a generator for electricity there is still no internet connection, so we can't move back yet.

The situation in Damascus is not particularly dangerous, but there are occasional unpredictable explosions. Last spring in Tartus and Latakia – two cities on the Mediterranean coast, where we operate warehouses for international humanitarian aid organizations – 150 people were killed in five bombings in just one day.

At DHL Express Syria we have people from every religion. I'm proud to say that we have Muslims – Sunni, Shia, Alawite, Sufi; Christians – Roman Catholic, Orthodox, Protestant; Jewish Syrians; Kurds and Charkas all working together. This is one of the few Middle East countries where mosques and churches sit right next to each other, where Christian priests and Muslim sheikhs preach peace.

Most of the danger is in the north – near Aleppo and the North-East – where Islamic State (ISIS/DAESH) is in control of the oil fields, crippling the national economy. But the DHL Express office in Aleppo refuses to close, although there's no longer a lot of business there.

The most important thing for me is that over the past five years we have had no casualties among our DHL Express staff. Thank God! Our people are my eyes and my soul.

During the week, after closing the office I usually go home to relax or have dinner with friends. On Thursdays – when the weekend begins in the Middle East – we might even go dancing till 2:00 in the morning, if we feel like it. In safe regions of Syria, restaurants and bars are flourishing. What we have learned is that life goes on. At the beginning of the war we didn't go out, until we realized that we had the choice between being unhappy and sad all the time or enjoying ourselves as much as we can, because we can't change the situation. Should I die today, at least I'll die happy! ■ *As told to Rick Demarest*

FOOD AID: DHL operates food aid warehouses for major international humanitarian organizations in the Syrian cities of Latakia and Tartus on the Mediterranean coast.

500

Employees and other staff are on the payroll at DHL Express Syria

9

The number of different religious and ethnic groups – including Muslims, Christians and Jews – working together at DHL

3D

The wanton destruction by Islamic State of the ancient Roman city of Palmyra in Syria appalled the world. Now there are ambitious plans that could see the city rise from the ashes using 3D technology. Already a copy has been made of the Arch of Triumph – the entrance to the Temple of Bel – using thousands of 2D photographs to create a 3-D computer model, which robots in Italy used to carve an exact replica from Egyptian marble. At 20 feet (6 meter) tall the arch is two-thirds of the original's size. It will travel to cities around the world before finding a permanent home in Palmyra.



www.newpalmyra.org



FIA WEC

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33 entries around the globe
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250 TEU sea freight
200 Express and ad-hoc shipments
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CHAMPIONSHIP



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