THE LOADSTAR

LongRead

TECHNOLOGY & INNOVATION

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Inside

Logistics providers, as well as their clients, are in a bind: hardly a day goes by without some guru admonishing them that technology is sweeping through the industry, irrevocably changing it, and that those who fail to keep up will go the way of the dinosaurs

Discounting the element of hype in these sermons, forwarders are aware that the industry, as well as customer expectations, is changing and that technology is both a disruptive factor and part of the solution in this process.

"I think a tipping point is near in a very old industry, largely due to the current generation of managers being raised on technology," says Biju Kewalram, chief information officer at Agility. "They don't know a world without Google. It takes management and leadership, as technology by itself does not drive transformation."

Far from being static or averse to change, the logistics sector has spawned a host of ventures aimed at transformation: forwarders are establishing digital portals that automate the entire shipment process; shipping lines have started technology-focused venture capital funds; some players are mining social media data for predictive analytics that aim to transform their business model into a proactive mode; and warehouses are deploying robots that incorporate artificial intelligence, to name but a few.

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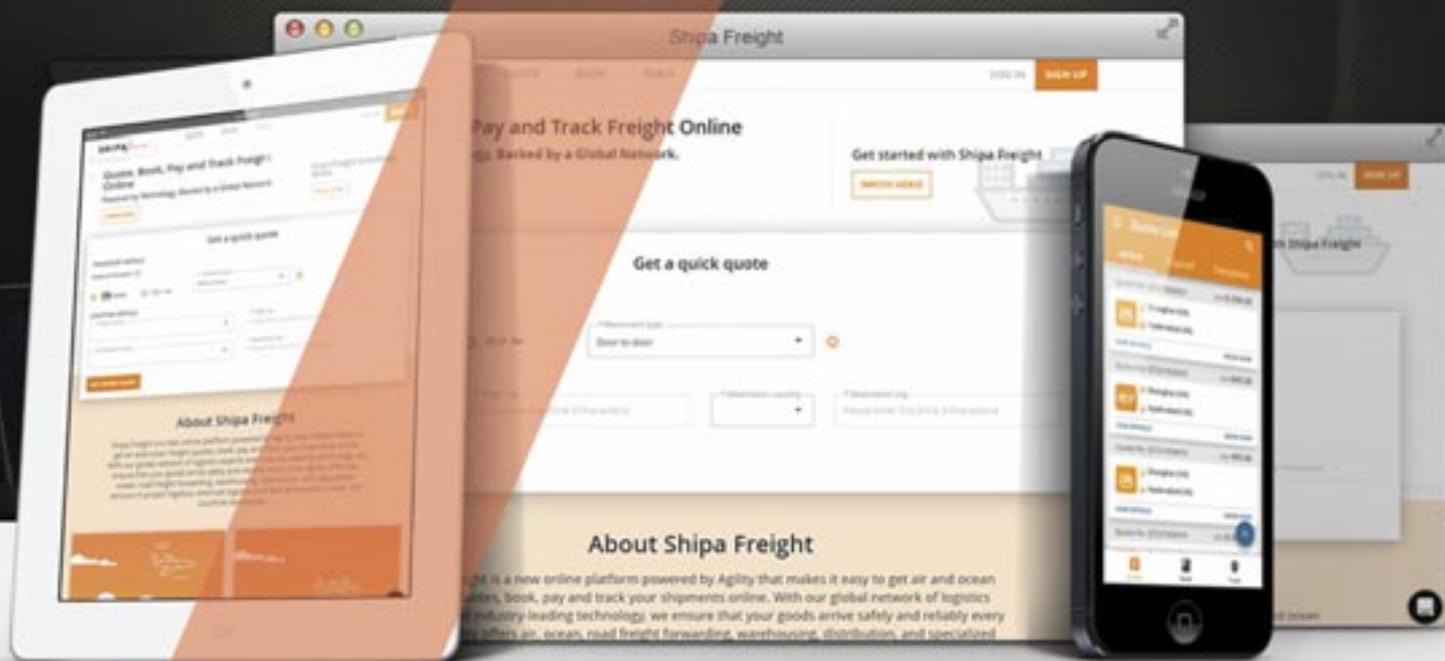
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For the individual logistics firm, the very breadth of this activity is a dilemma. Few have the resources to deal with all of these elements, so they are forced to determine which strands to pursue and which to set aside. For most, digitisation is the most likely initial target – customers increasingly expect this, it promises benefits sooner than artificial intelligence or drones and it is the basis for a number of other avenues, such as data analytics.

And they are grappling with the question of how far the transformation should go. Few would go as far as Hernan Rincon, CEO of Avianca, who declares that he wants his airline to be "a digital company that flies planes".

This *Loadstar LongRead* looks at companies in this industry that are exploring or implementing new technology solutions, or are pursuing innovation to transform their business, their expectations and experiences.

Digital DNA
In April, Agility introduced the first fully integrated online service platform for door-to-door shipments around the world. Designed as a multimodal self-service platform, Shipa Freight allows users to obtain rate quotes, find compliance information, make bookings, upload documents, pay for and track their cargo.

The platform targets primarily small and mid-sized shippers, offering them options that have not been widely available for SME firms, notes Toby Edwards, CEO of Shipa Freight.

Becoming a 'technology' or 'digital' company that operates in a certain sector like logistics is a buzzword, but the trend behind it is transforming the industry

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"We wanted to develop a technology-driven interface that could work with all customers, in particular smaller firms," he said.

It is a game changer, allowing customers to tap into a network that spans 100 countries from a single

point online, adds Kewalram.

Shipa Freight is a part of Agility's overarching process of digital transformation that changes the company as well as its interaction with its clientele.

"We become more of a technology company that does logistics, that is embedding digital capabilities into its DNA," reflects Edwards.

Becoming a 'technology' or 'digital' company that operates in a certain sector like logistics is a buzzword, but the trend behind it is transforming the industry, he says. "If you don't embrace it, you face the risk of being left behind."

This drive goes both into Agility's external customer-facing aspects and internal processes. "We look to drive it down into every segment of our business," Edwards says.

Digital capabilities depend on the availability and the quality of the data that are fed into the system.

"Securing data from carriers is a challenge in the industry overall," says Kewalram, adding that this is not unique to developing customer-facing digital interfaces and platforms.

"We've had to solve that problem for ourselves in our core business anyway."

Digitisation of customer-facing elements can lay foundations for further technology-based innovation, such as the use of blockchain. In February, Agility joined Maersk and IBM in their quest to develop a blockchain solution to manage and track container shipments.

It agreed to identify events associated with individual shipments and to share and receive information about them via blockchain technology developed by the pair. The objective is to reduce costs and increase shipping efficiency.

This project has now moved into the pilot stage. While it is too early for significant conclusions, Kewalram advises people to approach the issue with an agile mindset. "Don't look for a pre-determined roadmap," he cautions.

The forwarder has also trained its sights on the Internet of Things (IoT). It has formed a partnership with IoT solutions provider UnaBiz to advance the digitisation of event logistics and the development of enhanced tracking options.

Unsurprisingly, data science is another focus. "We are looking at both

our ability to participate in integrated customer supply chains and also customer service and pricing solutions," Kewalram says.

Bills of lading on blockchain
Blockchain technology for the ocean shipping sector took a step closer to commercial reality in April when CargoX conducted simultaneous live demonstrations of its smart bill of lading solution to audiences at industry events in Paris and Slovenia.

The technology provider has developed an exchange protocol to handle the transfer of ownership of bills of lading generated within the network and a decentralised application that enables licensed users to issue smart contracts – computer programmes that run on the blockchain with source code that is universally readable.

'Besides eliminating the spectre of a lost or stolen contract, a blockchain-based bill of lading promises significant savings'

Stefan Kukman, founder and CEO of CargoX

These smart contracts define all the types of data that are stored in the bill of lading (all involved parties, bill of lading number and pointers to private encrypted data that can only be viewed by the involved parties).

They also define rules for the change of ownership of bills of lading (typically from issuer to shipper, from shipper to consignee and from consignee to release agent). Whenever a bill of lading is about to change ownership, a transaction is made to the blockchain

where it is evaluated against the smart contract.

The full contracts are stored using encrypted decentralised storage. The CargoX solution uses Ethereum, an open source, blockchain-based distributed computing platform and operating system.

Each user has a unique Ethereum address, which is similar to a public-private key certificate, explains Stefan Kukman, founder and CEO of CargoX . Every interaction between a user and a smart contract is based on this digital authentication mechanism.

Customer registration is free and open to all parties, while participating carriers are approved by the technology provider and licensed to issue blockchain bills of lading. CargoX is also issuing crypto-currency tokens, which are required to access the system and for payment in the network.

Besides eliminating the spectre of a lost or stolen contract, a blockchain-based bill of lading promises significant savings, Kukman claims, as there is no need to courier paper documents from issuer to shipper, to consignee to release agent. It also cuts down the time required for these movements, which typically take five to 10 days, he states.

For CargoX the bill of lading is the starter for its venture into blockchain solutions for logistics. The company is looking to develop a smart letter of credit so money transfers in shipping can be handled by the same infrastructure as the smart bill of lading contracts.

Kukman has no intention of branching out into other modes of transport, but others are eager to move in these areas. Fred Smith, founder and CEO of FedEx, described blockchain as "the next frontier that's going to completely change worldwide supply chains".

The integrator has been working with the Blockchain in Transportation Alliance, an organisation dedicated to the development of the blockchain for the cargo industry. Other members include UPS, SAP, JD Logistics, Schneider, BNSF Railway and Descartes.

Robotics and warehouse productivity
To achieve heightened productivity for order preparation and pallet building in a warehouse serving agri-food giant Mars, earlier this year XPO installed a robot that can handle 50,000-60,000 packages in a day. Its articulated arm can pack as many as five stacks of packages at one time to assemble pallets with multiple product codes.

Robots are playing a growing role in XPO's operation. Many new warehouse facilities that come onstream use robotics as well as the company's proprietary software. The rise of e-commerce has accelerated the deployment of robotics, since replenishing pieces as opposed to cases and pallets calls for increased automation, says CIO Mario Harik.

For the most part they are used for sorting, pick & pack activities and building of pallets, but robots are also deployed for security. Last October XPO fielded a unit equipped with 360-degree, high definition, low light cameras, thermal imaging sensors to detect fires or loitering cars, people detection and licence plate detections features, and alarms to deter potential criminals.

Drones are used in the warehouse for inventory management functions like stock taking.

The proliferation of robots is fuelled by the fact that they are becoming smarter and cheaper, notes Harik. Increasingly they incorporate learning and analysis capabilities, and they are also more autonomous, he points out.

Some observers see robots drive a technology revolution in logistics. Traditional models used in manufacturing lacked the versatility needed for logistics, but the arrival of a new generation of units equipped with artificial intelligence, sensor and vision technology is opening new horizons, they argue.

For all their growing autonomy, robots have to be integrated into the overarching warehouse IT architecture. In March XPO installed a new warehouse management platform to whittle down the time required to deploy and integrate automation and robotics. The system is cloud-based to allow software updates in real time, enhance apps and other programmes rapidly and support mobile devices.

For XPO advanced automation and robotics is one of four key areas of technology development, alongside visibility and tracking, the digital marketplace, and data science and analytics, says Harik.

The company employs a large technology & innovation department to develop solutions in-house, rather than use third-party ones, for the sake of better control. It spends in excess of $450m a year on technology.

Mapping the course

At its annual general meeting last year the International Air Transport Association (IATA) adopted a resolution to accelerate the modernisation and transformation of the air cargo industry.

This calls for a customer-centric approach and highlights the need for progress in the digitisation of the supply chain, the adoption of modern and harmonised standards, the use of technology based on intelligent systems – and urges the industry to harness the power of data.

Celine Hourcade, head of IATA's Cargo Transformation programme, emphasises the need for improved connectivity and for data standards. Delivering standards is a core business for IATA, but it is one element in a host of initiatives to foster innovation – in processes and practices as well as in technology.

The airline body's 2017 innovation award went to a Kenya-based company for its traffic management concept for Africa for unmanned aircraft systems.

Hourcade is sanguine on drones, pointing to a broad array of applications – from delivering parcels

and small urgent shipments to large units carrying heavy cargo. Notwithstanding all the trials now in progress and hectic work on the regulatory side, she reckons it will be another two or three years of development before drones begin to play a serious role in the industry, with larger units further down the road.

Data is the focal point of IATA's modernisation drive, as everything hinges on digitised information to collect, use and share

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The use of artificial intelligence is high on airlines' agenda at this point, albeit primarily with regard to flight operations. Hourcade stresses that a prerequisite for this is to have everything in a digital format.

Data is the focal point of IATA's modernisation drive, as everything

hinges on digitised information to collect, use and share. While access to data is critical, it has to be balanced with measures to protect the integrity as well as the ownership of data, Hourcade notes.

IATA has championed a number of industry initiatives in this direction, most prominently the e-freight drive. As business is or will be shifting from peer-to-peer messaging to smart data sharing, IATA has launched the ONE Record initiative that builds on top of the e-freight infrastructure and envisages an end-to-end digital supply chain where data is easily and transparently exchanged in a digital ecosystem.

Key elements in this are going to be data standards, connectivity (making data accessible through common protocols and application programme interfaces), and the creation of virtual single shipment records that combine all relevant data without duplication and with clear ownership.

"ONE Record is not an airline project, it is an industry project," Hourcade stresses.

While data are increasingly being

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Hosted by IATA, the Cargo Events provide a unique platform for air cargo supply chain professionals to address the latest industry challenges and opportunities regarding cargo claims, security, technology and pharmaceuticals. Taking place between 9-11 October 2018 in Bangkok, Thailand attendees will have the opportunity to expand their knowledge through exclusive access to industry intelligence, learn about the latest air cargo developments and participate in valuable networking opportunities.

AirPharma Conference
9 - 10 October 2018
www.iata.org/airpharma

The IATA Air Pharma Conference provides attendees with an opportunity for experts from the Pharma Industry to come together in order to discuss and apply fundamental principles of supply chain excellence that address customers' needs.

DronesLAB
9 - 10 October 2018
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Drone technology provides a range of opportunities to increase efficiencies across the aviation industry: opening new routes, decreasing costs, increasing revenues and serving new markets on the cargo side; greater efficiencies, reliability for less costs on the operations side.

Cargo Security & Facilitation Forum
9 - 10 October 2018
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IATA

shared rather than transmitted, the journey there is a one-way street, she remarks.

"You are not going back to paper once you've started going digital," she says.

Powered by AI

Artificial intelligence (AI) and the logistics industry produce a curious paradox. AI has become ubiquitous in recent years, notably in consumer markets, and the technology and banking sectors. Logistics firms, sitting in a chain that requires flow of data between the various parties, are uniquely positioned to benefit from the use of AI. However, adoption rates so far are rather low.

A joint report tabled by DHL and IBM on AI in logistics estimates that only 10% of current systems, data and interactions include elements of AI.

The research concludes that AI is still in its infancy in logistics, but the study's authors have no doubt that this will change.

"Logistics companies can optimise network orchestration to degrees of efficiency that cannot be achieved with human thinking alone," they concluded.

Ben Gesing, project manager, DHL Trends Research and one of the authors, noted that the use of AI can lead not only to new operational efficiencies but can also help create new business models. He reckons that it will have a profound impact on the industry.

AI brings about a fundamental shift from a reactive to a proactive operating model, thanks to the use of predictive analytics. In a white paper released last year DHL argues that "no longer can companies run their businesses by looking through the rearview mirror – they must now look ahead and use the supply chain data available to them to foretell the future".

AI also elevates the depth of forecasts, resulting in a significantly higher degree of certainty. DHL is already using these elements in its operations. It has developed a machine learning-based tool to predict transit time delays in airfreight. This uses 58 different parameters of internal data to predict delays up to a week in advance.

Such forecasting possibilities do not end even at the ends of a supply chain. The DHL-IBM study cites the craze for Fidget Spinners, spinning toys that sold an estimated 50m units over a few months in 2017, which prompted a run on airfreight. By scrutinising YouTube videos and conversations on social media, AI can identify a quantitative rise
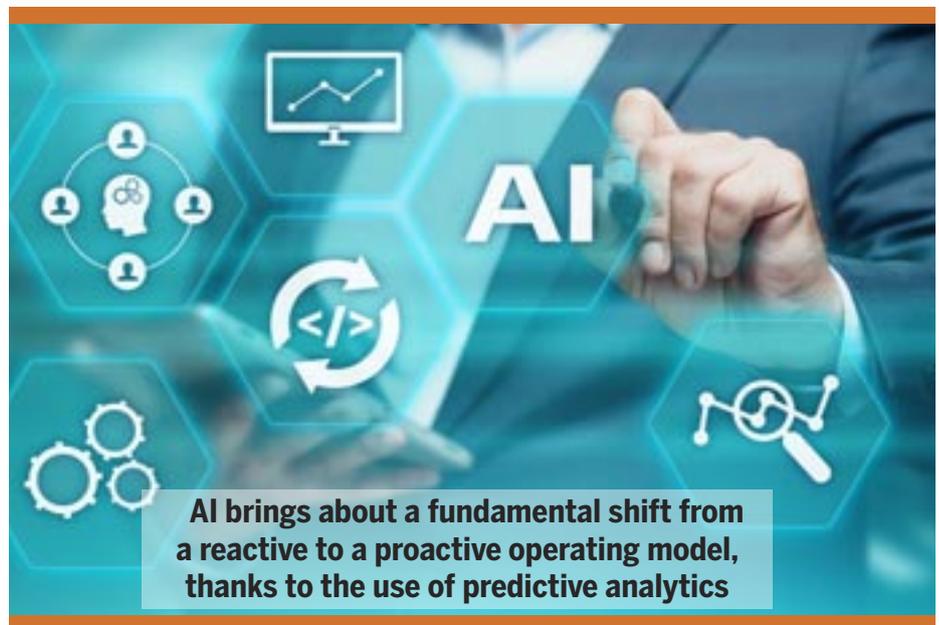
AI brings about a fundamental shift from a reactive to a proactive operating model, thanks to the use of predictive analytics

in interest in such a topic as well as the context of that interest from semantic understanding of unstructured text. This can be used for predicting which fads could boom.

Thanks to AI, a growing number of manual things will become autonomous, remarks Gesing. The repercussions will range from automation of back office functions to a greater uptake of automated vehicles, from drones in warehouses to truck platooning with synchronised acceleration, braking and steering of multiple trucks. In the warehouse, computer vision-based AI can measure shelf performance and track products. Using image recognition technology, it can recognise brands, logos and price tags and identify damage to shipments shelves.

AI also opens the door to a greater degree of personalisation in service through speech recognition technology, the study argues.

Inevitably, data quality is always an issue, Gesing notes. At the end of the day, it is a question of approximation. "You never get 100%. The question is: How good is good enough?" he remarks.

He adds that results will improve over time. "The worst day for any AI application is the first day. There is not enough data," he says.

Making a splash

Maersk is going to test perception and situational awareness technology in the extreme conditions of arctic container shipping.

The line will install computer vision, Light Detection and Ranging and perception software on one of its new 'Winter Palace' series vessels. The technology, provided by Boston-based

Sea Machines, uses artificial intelligence to digest a continuous stream of data from advanced sensors for situational awareness and to identify and track nearby objects.

Michael Johnson, founder and CEO of Sea Machines, sees a good fit for technology used for autonomous vehicles on land in the marine environment, pointing to the fact that much of the navigation of vessels is already driven by instruments and sensors.

News of the deal with Maersk has brought Sea Machines much interest from other shipping companies. Johnson had not expected this technology to gain much traction for a while yet.

"We would have thought that situational awareness was a couple of years away," he says.

So far, his company's focus had been primarily on an autonomous control and remote command system for works boats and other utility craft. The combination of sensors, common vessel-based instruments and proprietary algorithms enables these to move from one point to another independently while avoiding objects or collaborating with other vessels.

Johnson reckons that this segment of the industry will be in the lead in the adoption of autonomous steering technology – at least initially with a person in the loop. The system includes a remote user interface for command and control as well as data reception.

Trials for the autonomous control system started last October. Johnson expects to have it available as a commercial product in the third quarter of this year.

He envisages a range of applications for this system, so Sea Machines is planning to develop it into a platform that can support different versions.

Taking the technology on board is not a straight plug-in; it involves integration work, he says.

The deployment of the situational awareness technology with Maersk will be a serious test for equipment, as the environment where the ship operates calls for sensors and instruments that can function reliably in extreme weather conditions. "Not a lot of sensor and instrument companies provide products for this," Johnson says.

Bridging the gap
Bridging the gap between product and cargo information, Amsterdam Airport Schiphol has devised a way to link flower shipment data to air waybill information in real time. This gives all authorised parties involved – from grower over logistics firms to consignee – instant access to information about a shipment in one place.

The initiative is one of a host of innovative ventures under the Smart Cargo Mainport Programme (SCMP), a broad industry initiative launched two years ago with support from the Dutch government that aims to develop innovative ways to improve cargo flows to and from Schiphol for years to come.

Teunis Steenbeek, who heads the programme, emphasises that it seeks to improve the cargo chain via Amsterdam, which means that its focus goes beyond the airport. Stakeholders work together in individual projects, which must have a generic purpose. Much of the initiative comes from 'front runners', but they can also draw on academic firepower. SCMP is backed by the University of Delft and the Hogeschool van Amsterdam, which provide vital assistance like developing a dashboard for performance measurement or a simulator model to play out different scenarios.

Projects fall under four major categories – paperless initiatives, the use of digital information, verticals (improving specific supply chains, as with the flower data project), and landside logistics, which build on the understanding that an airport is a hub in a cargo chain, so the focus is not on the airport itself, Steenbeek explains.

Since its inception in 2016 the SCMP has unleashed a string of initiatives,

which have yielded results like the establishment of a compliance checker, which verifies that all information on air waybills is correct and complete. This includes functionality to ensure that shipments do not violate international or national regulations and restrictions. Another project developed an algorithm that uses historical data to help handlers determine which receiving forwarder to contact for incoming shipments, as this information is not on the air waybill.

According to Steenbeek, the most substantial undertaking focuses on pick-up and delivery on the land side. "This will not be just a step forward, it will be a revolution," he declares.

To reduce waiting times and smooth

At Amsterdam Schiphol, the drive to improve the cargo chain means the focus goes beyond the airport itself

truck movements, an SCMP group is working on a trucking app so that a trucker can indicate his estimated arrival time to the handler and convey information about himself, his vehicle and the cargo on board. The handler in turn will be able to send instructions to the trucker.

Steenbeek regards this as a step towards the establishment of a control tower to monitor and control truck movements, which will be implemented step by step. Other key strategic objectives include the establishment of neutral trucking, which will be controlled and planned, to take care of local cargo. This is meant to replace a swarm of local trucks that often are far from fully loaded.

On the IT side the agenda calls for a move towards connected clouds. Steenbeek does not believe that in the future there will be one data hub that holds all the information. Data will reside in multiple clouds, so the ability to connect these clouds – in a secure manner – will be critical, he says.

Conclusion
A report on digitisation published by DHL in May finds that new technologies and solutions are developing at a fast pace and that companies are struggling to keep up. A survey of nearly 350 supply chain and operations professionals that served as the basis for the report found that 95% of the respondents are not fully capitalising on the potential benefits yet.

Most of the obstacles that the authors identified are not technological. For hardware technology applications, almost two-thirds of the respondents reported a resistance to change in their organisation, while 64% mentioned insufficient or prolonged return on investment as an impediment.

When it comes to information and analytics solutions, 78% pointed to organisational silos and legacy systems as roadblocks, and 70% felt hamstrung by a lack of specialised expertise.

The quest for better supply chain integration faces similar hurdles. "The problem is not with technology, it is with participants and the ability to adopt a partnership approach and sharing data," comments Agility's Kewalram.

When companies venture forward into new territory, it is often important to take an incremental and iterative approach, advises Gesing.

Several executives emphasise that technology is a tool, not an end in itself. "You do not choose a technology, you choose what challenges you want to address and decide what is the appropriate solution," Hourcade says.

"It's not IoT versus Big Data, but what is important for my business, my partners, my employees?" agrees Gesing.