Agility
A New Logistics Leader

Tradelanes

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TECH WAVE
Faster, better, now!
Internet of Things
Digital disruption
Autonomous ships

Faster, better, now!

An expert view of the technology landscape and advances that supply chain and logistics managers need to be thinking about. Agility's VP of Operational Transformation walks you through the options and choices before you.

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Also in this issue

Digital disruption

Agility CEO Tarek Sultan shares his view of innovation in the logistics industry and explains how embracing disruption is enabling Agility to stay ahead of the game.

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The Internet of Things and beyond

RFID, robotics, drones, autonomous vehicles, Web2.0, Blockchain, machine learning …….. a look at the technology remaking the global supply chain.

Page 9

Autonomous, crewless ships. Not if, but when.

Rolls-Royce Innovation Marine is leading a group of thinkers and developers who promise to make autonomous ships a reality. In 25 years crewless "drone" ships will carry a large percentage of ocean cargo.

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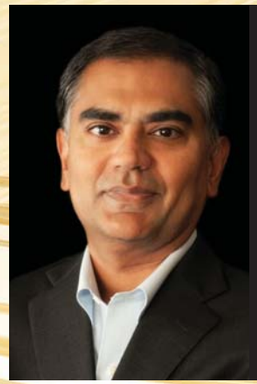
Tech wave

SUPPLY CHAIN LEADERS FORCED TO GET SMART

Faster, better, now!



Biju Kewalram is Agility GIL's Vice President for Operational Transformation. He has worked in the logistics industry in the United States and Australia for nearly three decades. He helps Agility teams and customers understand, adopt and implement technology intended to boost productivity, cut costs and improve service. Tradelanes asked him to survey the technology landscape and highlight advances that supply chain and logistics managers need to think about.

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Remember when supply chain executives let the IT people worry about technology and digital trends? It wasn't all that long ago that managing the supply chain meant procurement, inventory management and cost reduction. It also meant leaving technology to the specialists.

Today, it's vital to:

- Anticipate and respond to a world of continuously changing demands
- Deliver faster than ever to satisfy a new consumer generation's desire for instant gratification
- Keep reducing inventory levels and delivery costs

"Supply chain management requires demand forecasting and network optimization, as well as traditional freight, procurement and inventory management," says Essa Al-Saleh, CEO of Agility GIL, Agility's commercial logistics business. "Given the shifting landscape, it's important to have a logistics partner with a strong digital orientation."

The good news is that a wave of radical innovation is making it possible to respond to the clamor for "faster, better and now!"

It's understandable that supply chain managers feel overwhelmed. The pace in this area is accelerating, making it harder to keep abreast and leaving little time for front-line executives to evaluate and test new innovations. ▶

Bloomberg Businessweek

Bloomberg Businessweek devoted a double issue to "code" reasoning the case that business executives who don't learn the intricacies of computer code risk making themselves outdated.

McKinsey&Company

McKinsey predicted that the Internet of Things – the creation of a network of continually connected manufactured devices – would a have an economic impact of $3.9 trillion to $11.1 trillion by 2025.

amazon

Amazon announced it will have the capacity to deliver "tens of thousands" of products purchased online to consumers' homes within one hour.

Consider

Your world keeps getting faster. How do you create a snapshot of the underlying technologies and trends reshaping today's supply chains? How do you create a checklist so that you can recognize when disruption is occuring or giving your competitor an edge?

We've done that for you with this Survey of Digital Trends.

Let's start with a comprehensive list of the technologies that Agility is tracking – technologies you should be watching because of their potential to change the supply chain and logistics.

Like others, Agility is aggressively evaluating digital trends. As one of the world's top logistics providers, we've had hundreds of conversations with our customers about their logistics needs. Here is what they tell us is on their minds:

- **Transparency & visibility** – including tracking and event management
- **Flexibility** – adapting to changing requirements on short notice, including changing mode of transport, dictated by changing customer demand
- **Lower inventory management costs** – keeping inventory levels low (e.g. manufacture-to-order rather than manufacture-to-stock) and warehouse costs minimized
- **Lower supply chain risk** – being able to respond to disruptions like strikes and natural disasters, avoiding ▶

ASPECT OF SUPPLY CHAIN / LOGISTICS (IMPACT AREA)	TECHNOLOGY DEVELOPMENT TRACKED OR USED BY AGILITY
Physical Product	Internet of Things RFID Nanotech Sensors
Manufacturing	Additive manufacturing (3D Printing)
Inventory Management	Robotics
Transportation	Drones Autonomous vehicles GPS & Geolocation
Partner Integration	Web 2.0 (including Cloud Computing, SaaS & Mobile) Web services (incl. EDI) Blockchain Big Data / Data Analytics Machine learning Paperless (Paper to Digital) IT Operations – Agile & DevOps

A geographic footprint that matches your supply chain allows your logistics partner to offer standardized processes and standardized implementation of technology.

Big Questions

- Is your logistics provider able to scale the use of digital technology wherever you need to operate?
- Does your logistics partner enable partner integration and offer a mix-and-match of self-service and connected systems?
- Is your logistics partner able to offer multi-modal support for integrated systems?

stock-out situations and avoiding obsolete inventories

- **Predictability** – having freight and inventory move through the network as planned
- **Higher service quality** – continual improvement of product and information delivery
- **Lower overheads** – reduced administration costs through efficiency and streamlined processes
- **Simplicity** – elimination of complex processes
- **Lower transportation costs** – through choice and flexibility
- **Omni-channel distribution** – ability to deliver into brick-and-mortar and e-commerce supply chains uniformly
- **Self-service & integration** – connecting systems for electronic interchange and ability to pull information as needed

Your world keeps getting faster. How do you create a snapshot of the underlying technologies and trends reshaping today's supply chains?

To see where innovation intersects with customer concerns, we've mapped them like this in the chart below. Each of these innovations is discussed on the following pages.

Agility's Al-Saleh says it's important to remember that effective use of technology is not achieved in isolation: supply chains are chains of trading partners. And typically, 3PL providers and logistics specialists are better able to deliver on the promise of technology if they have the second necessary aspect in place to offer leverage: a strong, effective network of their own offices.

A geographical footprint that matches your supply chain allows your logistics partner to offer standardized processes and standardized implementation of technology. Both, Al-Saleh says, are essential to your ability to leverage technology investments.

Innovation intersects with customer concerns

	Transparency and visibility	Flexibility	Lower inventory management costs	Lower supply chain risk	Predictability	Higher service quality	Lower overheads (admin costs)	Simplicity	Lower transport costs	Omni-channel distribution	Self-service & Integration
Internet of Things	●	●	●	●	●		●	●		●	
RFID	●	●	●	●	●		●	●		●	
Sensors	●	●	●	●	●		●	●		●	
Robotics			●			●					
Drones									●		
Autonomous vehicles									●		
GPS & Geo-location	●								●		
Web 2.0 (incl. Cloud, SaaS and Mobile)	●	●		●	●	●	●				●
Web services (incl EDI)	●			●	●	●					●
Blockchain				●							●
Big Data		●		●	●	●					
Machine learning	●	●		●	●						
Paperless							●	●			●
IT Ops – Agile											●

A world of automated logistics

Widespread testing of drones in urban settings has led to a focus on the tricky 'final mile' piece of delivery. But the greatest potential for autonomous transport is on long-haul routes. Autonomous, crewless ships – as visualized here by Rolls Royce – will join drones, long-haul aircraft and driver-less trucks in moving the world's commerce.

Rolls Royce has been researching and developing vessel systems for several years. And this year, aircraft developer Airbus announced plans to develop an autonomous flying vehicle platform for cargo transport. Planes without humans aboard don't need expensive, and heavy, life-support systems to keep cabins pressurized.

Uber's offshoot, Otto, made its first delivery by self-driving truck in October, a consignment of 50,000 cans of beers on a 120-mile route through Colorado. Earlier in 2016, six of Europe's leading truck makers ran "truck platoons" to Rotterdam port from as far way as Sweden and southern Germany. Not strictly a driverless operation, a truck "platoon" has a manned vehicle in the lead followed by two or three vehicles connected via wireless. DAF, Daimler, Iveco, MAN, Scania and Volvo are all developing this technology. The advantage of truck platooning is consistent speed, which will help traffic flow on heavily congested roads in Europe.

Most accidents whether in the air, on the road or at sea, are caused by human error, so over time autonomous transport is expected to significantly reduce accidents as well as operating costs.

On page 24 we look at developments in autonomous shipping, which one day will be delivering into fully automated ports, from where containers are delivered inland by driverless trucks and consignments delivered from ICDs to customer by drone.

The Internet of Things

The Internet of Things refers to the ability of each individual manufactured item to be part of a network.

The key to understanding the Internet of Things (IoT) is, first, to realize that every manufactured object can have its own internet identifying number (IP address). Second, each of your items or SKUs (Stock Keeping Unit) can communicate with the network.

When you combine a unique identifier with the ability to communicate, you've got a network in which each item can be constantly broadcasting its presence. The result is that you've substantially increased the transparency and visibility of inventory within your supply chain.

Today, objects from lightbulbs to thermostats come with *embedded systems*, unique identifiers and the ability to connect to Wi-Fi networks so that they act as parts of the network and can be continuously visible and trackable. This also increases the number of trackable events within the logistics/supply chain process.

This enhanced visibility in turn increases the flexibility of the supply chain because you have no need to wait for

By eliminating the need to perform manual inventory counts, you reduce the cost of managing the inventory and the costs in the warehouse.

inventory to be checked in at a point in the distribution supply chain. Its location is always known.

By eliminating the need to perform manual inventory counts, you reduce the cost of managing the inventory and the costs in the warehouse. The number of process steps in managing the inventory is also reduced, making for a simpler network.

The Internet of Things continues to grow exponentially and, according to *Business Insider*, is expected to expand from 10 billion devices in 2015 to 34 billion devices in 2020. ▶

RFID

(Radio Frequency Identification)

RFID technology has been available for a long time, but it is only now starting to gain significant traction in more sophisticated adaptations.

At its heart, RFID consists of a "tag" that is inserted into a manufactured item. It can be placed or sewn in. Each RFID tag comes with a chip and an antenna, capable of being programmed with basic stock-keeping data and able to broadcast that data to a reader.

It is wrong to think of this technology as a new technology. Booksellers, among others, have been using RFID tags to prevent theft for decades.

To understand why it has taken so long for RFID to become more widely adopted, it is best to think of the technology as an ecosystem.

In order for this ecosystem to work, it needs:

- RFID tags embedded in each SKU or item
- A standard way, or language, to manage the database and describe the product so that all inventory management systems can interpret the data the same way
- Scanners and readers at points in the network or supply chain where the presence of the SKU needs to be inventoried

It's easy to see why contactless scanning of an entire warehouse, of RFID-tagged products could reduce costs.

The cost of the tag has been a barrier to adoption. As the cost of garments and other manufactured items decreases, the relative cost of the embedded tag has also had to decline. Otherwise, the tracking technology is a disproportionate share of the cost of the item and the manufacturing process.

RFID's role in the supply chain holds great promise because tag costs are declining, large manufacturers and retailers are mandating their use.

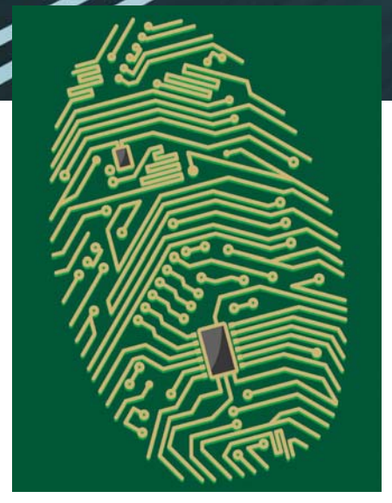
As the ecosystem expands, it is easy to see why contactless scanning of an entire warehouse filled with RFID-tagged merchandise could reduce inventory management costs. Continuous inventory management at multiple points in a supply chain also enhances visibility and increases the track-ability of products.

Sensors

Sensors are embedded components that help track the "state" of objects in the flow of the supply chain.

Today's sensors help measure and preserve any changes in state of inventory – temperature, for instance – sending alerts when an SKU ventures outside tolerance parameters.

State-aware sensors that change displays can be used to track whether or not a packaging container has been opened and whether or not the inventory has experienced temperature, humidity or other environmental factors that are outside certain ranges.



The use of sensors can help either with real-time tracing of such changes or for a permanent record of the impact being created by changes. The inventory owner gets visible evidence of integrity.

Sensors are of particular use in cold chain logistics, typically for high-value pharma and life sciences products, or for other fragile and perishable goods. These are goods for which ordinary visible inspection might not reveal that an unacceptable event occurred in the shipment or in the progression of the inventory through the supply chain.

Use of sensors can cut inventory costs and increases reliability of supply chains, reducing supply chain risk at eventual point of consumption. ▶

The most likely place in the supply chain for this technology is likely to be in the last mile or final leg of delivery.

Robotics

The use of machines to manufacture products has long been a feature in automotive manufacturing and other high-value production chains.

Sophisticated manufacturers in Japan, Germany and the United States have been using robots in production for years. Now though, the cost of developing and installing industrial robots is dropping significantly, so manufacturers in developing countries such as China and India are aggressively adopting robotic production.

In addition, the proliferation of cameras, processors and other underlying technology means that smaller, more mobile robots can now be deployed in warehouses and used for very specific purposes: picking specific SKUs and bringing them to a packing station. With the growth of companies like Kiva (now Amazon Robotics), there has been wider adoption and scale availability of robots in this segment.

At the same time, it's important to note that robotic systems in distribution centers are now able to pick and palletize stock, making it possible for DCs to prepare and ship "store ready" pallets that are specifically built with inventory required by a specific store. That reduces warehousing and inventory costs – not just at the DC but also within the store.

Robotics can improve warehouse and supply chain efficiency and dramatically lower costs.

Drones

You're aware of the small unmanned aerial devices that are self-powered, guided remotely or self-guided, and capable of carrying and delivering small(ish) payloads over relatively short distances.

You can tell that a technology has achieved mainstream recognition when a government body regulates it. In June of this year, the US Department of Transportation and Federal Aviation Administration announced regulations for the licensing of Small Unmanned Aircraft Systems, known to teenagers and YouTubers everywhere as drones.

Implied in the growth of this technology is a significant – but still distant – disruption of the last-mile delivery model. Drones have limited range. Their most immediate promise is in delivering small packages from a relatively close inventory storage facility to a customer's place of consumption.

Currently, drone technology is limited by:

- Adoption and regulation – chaos to be prevented by regulated use of a spectrum
- Shorter range
- Lifting capacity or size of package

The most likely place in the supply chain for this technology is in the last mile or final leg of delivery. Amazon and others are experimenting with it.

Clearly, the most significant impact in the medium to long term will probably be to lower the cost of transportation in the last mile.

Autonomous Vehicles

Like all disruptive technologies, self-driving cars and trucks appear to have arrived on the scene all of a sudden.

Volvo and other companies are conducting trials with self-driving trucks while auto manufacturers such as Ford, Tesla and Audi are developing cars that operate by computer with no human driver needed.

The reality is that development of self-driving and self-navigating vehicles has been under development for a long time – Google's self-driving cars have driven over two million miles in four cities. Progress is underpinned by the simultaneous arrival of advancements in the underlying component systems: ▶

In the world of logistics, the ability to track the location of freight is clearly valuable: you are increasing visibility.

A Global Positioning System (GPS) is a space-based radio navigation system made up of multiple satellites that transmit timing and geographical location information.

cameras, GPS and the ability to interface with cellular towers, amongst others.

Currently, the wide-spread deployment and availability is constrained by the need to develop legal and insurance frameworks. Who is responsible in the event of an accident? Another issue is the ability for the vehicle to communicate with sensors and guidance equipment embedded in the roadways. This requires statutory and government involvement, as well as financing and construction.

The most likely impact of this technology innovation is in the reduced cost of the road transportation leg of the supply chain. Those savings are achieved by removing the human driver.

To some extent, predictability of the supply chain is also enhanced by this development.

For more about autonomous shipping and how Rolls-Royce Innovation Marine is responding to the challenge see page 24.

GPS & GIS

These are two different but inter-related technologies that are sometimes confused with one another or thought to be the same thing.

A Global Positioning System (GPS) is a space-based radio navigation system made up of multiple satellites that transmit timing and geographical location information. Ground receivers such as the navigation system in your car use signals from multiple satellites – typically three for latitude and longitude, and four to add altitude – in order to develop a precise location of the receiving unit. Like many major technology advancements, the system had its basis in military needs and today supports commercial positioning and a more precise, government positioning option.

Geographical Information System (GIS) is software/database technology that uses the data from GPS. Different GISs are set up for different purposes. They provide the databases showing what exists in the surrounding area. An interface to the GIS allows the use of that database. The database of "what is around you" is derived from a GIS or mapping database while a GPS tells you "where you are in relation to what is around you". The two work together to provide location specific technology uses.

In the world of logistics, the ability to track the location of freight is clearly valuable: you are increasing visibility. Expect the continuing proliferation of devices that allow real-time tracking of assets in motion – for example, container seals. A GPS-enabled container seal has the advantage of being able to identify where the container is at all times. When combined with GIS, a history of the movements of that seal can be visually inspected. In this way, these multiple but related technologies combine to resolve complex logistics problems.

The use of GPS/GIS-enabled devices also provides an ability to ensure that anytime a container leaves a space designated by a range of latitude / longitude, alarms are generated (or at least tracked and saved for later access). This increases security and lowers costs arising from loss.

Similarly, higher visibility reduces the need to reposition freight as often, reducing associated transportation costs.

However, current GPS technology has inherent technical and security shortcomings. GPS signals are weak due to distance between satellites and terrestrial applications, making them vulnerable to jamming. A $10 jamming device powered by a car lighter could render a GPS-dependent port inoperable. Current GPS systems are controlled by countries, giving governments the ability to deliberately degrade signal quality and accuracy if they choose. Finally, GPS technology is ineffective in urban, indoor and other settings that multiply reflection of errant signals – places that include ports and warehouses. Hence, the need for GPS 2.0.

Web 2.0
(Incorporating Cloud Computing, SaaS and Mobile Apps)

Web 2.0 refers to the evolution of the Internet to allow for more participation and collaboration between internet users. It expands the definition of "the web" – used interchangeably by many people with "the Internet" – beyond a static place to find information. ▶

It changes the nature of the interaction from one-way communication by a "publisher" for a "consumer" of information, to a two-way interactive dialog with ongoing updating for a community of users.

Underpinning Web 2.0 has been the emergence of social media and the creation of web sites that allow interaction between internet users. Both factors have pushed the underlying technology of the web to evolve into newer programing models.

With the growth in interactive participation has come the opportunity for disruptive business models that involve crowdsourcing, or the ability to outsource to a large number of people simultaneously. The so-called "gig economy" – the ability for non-traditional players such as Uber and AirBnB to enter and compete in established industries – is another outgrowth.

Closely tied to the disruption made possible by Web 2.0 are some underlying trends:

- **Cloud computing** – the ability to access a software application over a browser rather than having to install the software on your own computer (think Google Docs)
- The **Software as a Service** (SaaS) business model – the ability of companies to make the use of their software available for a periodic fee per user. This makes software costs for a business variable in nature, rather than fixed, capital investments
- **Mobile computing and smartphones** – devices with a software application or app ecosystem so that the interaction can occur over a choice of Wi-Fi and cellular, making access to the information more or less ubiquitous. Supply chain executives can monitor worldwide developments that affect their businesses – say flooding in a critical supply center location – allowing them to respond quickly to minimize risk and avoid losses

Web 2.0 makes it easier for supply chain executives to have continuous visibility, regardless of location of goods or time of day. At the same time, use of social media such as Instagram expands the number of sales channels for a company's product.

Web Services (including EDI)

One of the best ways to eliminate inventory bottlenecks that require clearance or the stock-outs caused by improper demand forecasting is to better connect the participants in the supply chain.

As integration increases, supply chain participants are able to quickly increase or decrease their order levels based on upstream and downstream visibility. That prevents the creation of obsolete stock or unsatisfied demand that goes off in search of substitutes.

There are two ways to increase integration and communication. One is unstructured human-to-human communication, such as emails. The other is structured integration that is system-to-system. Systems and applications that are programed to take action by, for example placing or cancelling orders, rely on system-to-system communication, which in turn calls for structured data to pass between systems.

Electronic Data Interchange, or EDI, is a long-established method of conducting system-to-system communication. Typically, it involves two trading partners adopting one of many published standards and implementing a protocol to have their computer programs talk to each other, without needing to both be using the same programs and applications.

Web services is a more modern implementation of the same system-to-system principle, except that it is based on internet protocols and standards. Web services typically consist of one web-based application, say a tracking system that needs to get the latest carrier schedule, sending a message using coded internet protocols to another web-based system. In response, it gets the information back in the same coded internet protocol.

In logistics, there is a large body of communication that takes place via EDI. In all likelihood, that will remain the case and perhaps even be expanded. Adding a new trading partner to an existing EDI implementation represents a fractional, incremental cost and provides scalable integration. However, where web services are available, it makes sense for new trading partner relationships to be implemented using web services.

Over the next few years, most organizations will continue to implement and maintain both forms of structured communication and integration. There is generally less sizzle associated with these technologies but they still play a strong, integrative role in smoothing supply chains.

Blockchain

Blockchain technology is often confused with or used interchangeably with Bitcoin. In fact, Bitcoin, the digital payment "currency" is an application that is based on underlying Blockchain technology.

Blockchain technology relies on five key components that give it the strength to form a platform for applications that require a high degree of trust, such as finance:

- A historical transaction-tracking **database** (also called a "ledger"), which is stored on thousands of distributed computers, thereby avoiding a single point of weakness
- **Peer-peer transactions** that eliminate a middle man (most certification authorities and financial institutions are middle men)
- **Constant synchronization** – say every 10 minutes – across the distributed network
- Heavy use of **cryptography** for security
- **Public inspection** of the records to ensure integrity

Every computer on the distributed network stores transactions in a "block" and these blocks are synchronized in a "chain" across the computers on the network.

The term itself comes from the fact that every computer on the distributed network stores transactions in a "block" and these blocks are synchronized in a "chain" across the computers on the network.

The net effect is that making an unauthorized change to the data on any one computer puts it out of synch with the synchronized blocks on the other computers. Further, due to the constant synchronization, it becomes impossible to alter the historical record.

The result is a highly secure way of proving trust in transactions. It is foreseeable that Blockchain (or Bitcoin) technology could be used on a large scale to make financial payments and to keep real estate records, online ID verification and even voting records. Currently, stock exchanges such as NASDAQ and the Australian ASX are experimenting with Blockchain for securities transactions; and countries such as Estonia are working with governance programs ranging from identity cards to marriage certificates.

Wide adoption is slowed down by the speed of the system and risks associated with early adoption; however, the next decade should see continuation of the excitement ▶

generated by Blockchain and wider adoption.

In the logistics world, the most immediate application includes self-settling invoices, payments systems and ultimately verifiable devices in the Internet of Things. Further, the use of Bitcoin can make previously inaccessible applications, like online payment for freight forwarding transactions on a website, a distinct possibility.

Big Data

Everything we do online or on our smartphones generates data. Additionally, Software as a Service (SaaS) and cloud computing are getting more ubiquitous.

ERP systems are becoming more widely available to businesses of all scales and sizes, and these businesses are using web-based technologies to deepen integration of their supply chains.

All of these trends generate lots of data that require ever-bigger databases, which is where the term "big data" originally comes from. They also require newer ways of thinking to cope with and manage the explosion in data volume.

By one account, our accumulated data will have grown from 4.4 zettabytes at the end of 2015 to nearly 44 zettabytes by 2020. That is equivalent to 44 trillion gigabytes. It means we will be adding 1.7 megabytes of new information every second for every human being.

The proliferation of data is both a problem and an opportunity. There are two obvious questions it raises:

- How do we manage this data explosion? That's a technology answer that involves the use of specialized databases like Hadoop and the evolution of skills sets and professions like "data scientist"
- What do we do with the data? That's something that explains the growth in the fields of data science and predictive data analysis

Currently, data science and predictive data analysis are growing as a discipline. Universities and other educational institutions are coming to grips with the value of the algorithm in business and as organizations learn to manage and go beyond the "business intelligence" wave of the last decade.

Logistics and supply chain planning is an area particularly amenable to the application of Big Data methodologies. Predictive analysis and data modeling are helping with development of algorithms that maximize demand forecasting, inventory balancing and route optimization.

Additionally, supply chain organizations are able to leverage Big Data to create better service opportunities. This could range from generating customized discount offers for each retail shopper to making "on-the-fly" recommendations from prior history for what else the consumer might find of interest.

Machine Learning

Machine learning is a newly popularized term in the supply chain world, one closely linked to the Big Data trend.

The term refers to the concept of a computer learning to make sense of patterns from data analysis without necessarily being programed to do so. Machine learning is focused on the algorithm, rather than the data itself. The focus is to generate those algorithms that can both learn from and then turn around and make predictions based on the data.

Logistics and supply chain problems are especially amenable to solving through machine learning, particularly as the size of the data sets grow. Network optimization, demand forecasting and supply planning are all problems that can use large data sets to reduce risk in the supply chain.

Paperless Technologies

Paperless technologies continue to evolve, even if they have become pushed aside by sexier technologies such as drones and machine learning.

The incorporation of paperless technologies continues to help logistics providers and their customers re-engineer process flows, reducing process friction through streamlined administration. The benefits are felt through the entire supply chain as document repositories can be shared with trading partners and customers.

The pace of growth has been exponential, supported by three main underlying trends:

- Advent of scanning technologies to the desktop
- Continuously dropping costs of data storage
- Cloud and web-based access to stored images

The resulting paperless environment from electronic document management systems is making it easier to provide self-service opportunities to customers and trading partners in the supply chain.

IT Ops –Agile

Clearly, the array of new technologies on the horizon demonstrates that the pace of change and adoption is quickening.

First, the arrival of new technology is itself driving demand for even more advanced innovation and applications. Second, developers and implementers are under incredible pressure to deliver the benefits of technology sooner.

One result has been a change in organizational behavior. Companies are adopting new ways of working in order to speed up systems development and technology implementation. Since the turn of the century, information technology has seen an increasing reliance on "lighter development methods" called Agile methods. While some of these methods have been around longer, it's clear that nearly everyone is using them in some form.

Agile calls for cross-functional collaboration between the day-to-day business and the technologists, working together in the simultaneous development of new applications. Agile methodology emphasizes speed to market and an iterative approach to technology development, particularly software development.

A number of Agile approaches are available for organizations to use. Each places an emphasis on collaboration and short bursts of iterations to reduce risk, particularly in high-cost technology development and deployment fields.

Agile calls for cross-functional collaboration between the day-to-day business and the technologists, working together in the simultaneous development of new applications.

Viewpoint

DIGITAL DISRUPTION IN LOGISTICS

Agility CEO Tarek Sultan recently spoke to Tradelanes *and shared his thoughts on innovation underway in the logistics industry.*

Digital disruption in the logistics industry is happening in ways big and small. For a mature company in a mature industry like ours, this can be either terrifying or exhilarating.

Personally, I am excited about the potential to close known gaps with our customers, drive efficiencies, deepen access to services, and open entirely new markets with new ways of doing business. Our approach at Agility is two-fold. First, disrupt ourselves from within, and simultaneously, invest in the disrupters.

The Certainty of Disruption

Change in our industry is inevitable. Here's a quick example. Even if you only spend $10 on an e-commerce platform like

Amazon, you get a digital experience that works simply, easily and well. You can buy your product, track its progress enroute, and manage returns or concerns, all on a single platform. However, when it comes to freight forwarding, shippers can spend anywhere from hundreds of thousands to millions of dollars on freight and still have to write emails, make calls, fill out paperwork, and very often, still ▶

not know with precision where their goods are at any point in time. It doesn't add up.

It's neither coincidental nor surprising that venture capitalists have quadrupled investments in freight forwarding start-ups in the last couple of years, according to the *Wall Street Journal*. Venture capital funding for freight forwarding companies exceeded $1 billion in 2015, more than double the amount invested in the five prior years. Put simply: the industry is ripe for change.

Disrupting Ourselves

While a number of logistics start-ups are trying to reshape how freight is booked and managed, they face the challenge of not having the logistics infrastructure to execute consistently across different markets. That's where a company like Agility has an inherent advantage. We're betting that we will gain a unique lead in the marketplace if we can develop an intuitive, online customer experience supported by a proven ability to deliver across the globe.

We are paying particular attention to the massive spike in smart phone penetration and growing comfort with e-commerce in emerging markets. We believe that our customers, especially in the small and medium enterprize segment, will increasingly demand self-service capability and increased functionality online. For bigger customers with more complex shipments, the ability to manage supply chains more effectively online is already a key competitive advantage.

Agility has invested in a development center in India to build platforms and tools that are cutting edge in our industry. Agility Connects is one example: a powerful customer platform that allows customers to book shipments, manage orders, documents, exceptions, inventory, vendors online, and to customize reports that improve shipping efficiency. Our commitment to developing a global operating platform that drastically simplifies and standardizes our business is another.

Partnering with the Disrupters

Digital disruption is not just about improving the business we have today. It's also about anticipating new ways of doing business. On this front, Agility has created a new technology venture to invest in disruptive technology related to logistics.

The idea is to look outside our company at new business models that we feel that we can either adopt internally or promote through our business. For example, we have invested in CargoX, a platform that is looking to revolutionize how road freight is booked in complex

CAPTURING THE ENERGY FROM BRAKING

Hyliion set out to bring the advantages of hybrid energy to tractor-trailers. Its add-on system hybridizes the tractor-trailer by installing an intelligent electric drive axle on the trailer. The system uses regenerative braking to capture and save power when the driver is braking, then to reuse that energy to provide power when the truck is driving up hills.

30% fuel reduction*

$1,300 monthly fuel saving*

30-60min installation time

* average depends on topography, fuel economy of trailer.

markets like Brazil. We are eager to see CargoX at work in Brazil. Undoubtedly, there will be interest among customers, shippers, transport suppliers, regulators and other parties in other countries.

We have looked at investment opportunities brought to us by venture capital firms. One of the technologies that is intriguing is a hybrid technology for the trucking industry that reduces fuel consumption and corresponding emissions by a staggering 30 percent. These savings are achieved by recycling otherwise wasted kinetic energy and doing it through a simple, 30-minute trailer retrofit. The technology has the potential to disrupt multiple industries, from supply to oil-and-gas and beyond. Imagine for a moment the impact of a near-term 30 percent reduction in diesel consumption for trucks.

CargoX: Connecting Truckers and Shippers

CargoX, a Brazilian startup, has been described as "Uber for trucks." The analogy might have been inevitable, since Uber co-founder Oscar Salazar is one of CargoX's investors. He sees the fragmentation in the Brazilian trucking market as a major opportunity.

"They don't have the tools to talk to each other," Salazar says. "There's a huge information asymmetry playing an important role there. If you show me a market with information asymmetry, I'm going to show you a $1 billion opportunity."

CargoX works to connect businesses that need to ship freight with truckers who have excess capacity. Brazil reportedly has an excess of between 300,000 and 350,000 vehicles, with trucks running empty 40 percent of the time. So the goal is to reduce the number of empty trucks on the highway, increasing revenue for truckers and reducing costs for freight owners.

The startup has now raised a total of $14 million. The funding was led by Goldman Sachs, with participation from investors including Valor Capital Group, Agility Logistics, Lumia Capital, former DHL Express US CEO Hans Hickler and Salazar – who said that ultimately, the CargoX model could work in other countries. He also suggests that the company will remain valuable if trucking moves to a more autonomous/self-driving model.

From an article by Anthony Ha in Techcrunch.com

While we believe that this technology will succeed in its own right, we also believe that we can accelerate value creation by using the technology in our own fleets and promoting the technology with customers around the world. This philosophy of finding multiple points of leverage is at the heart of our tech strategy.

Disruption without Distraction

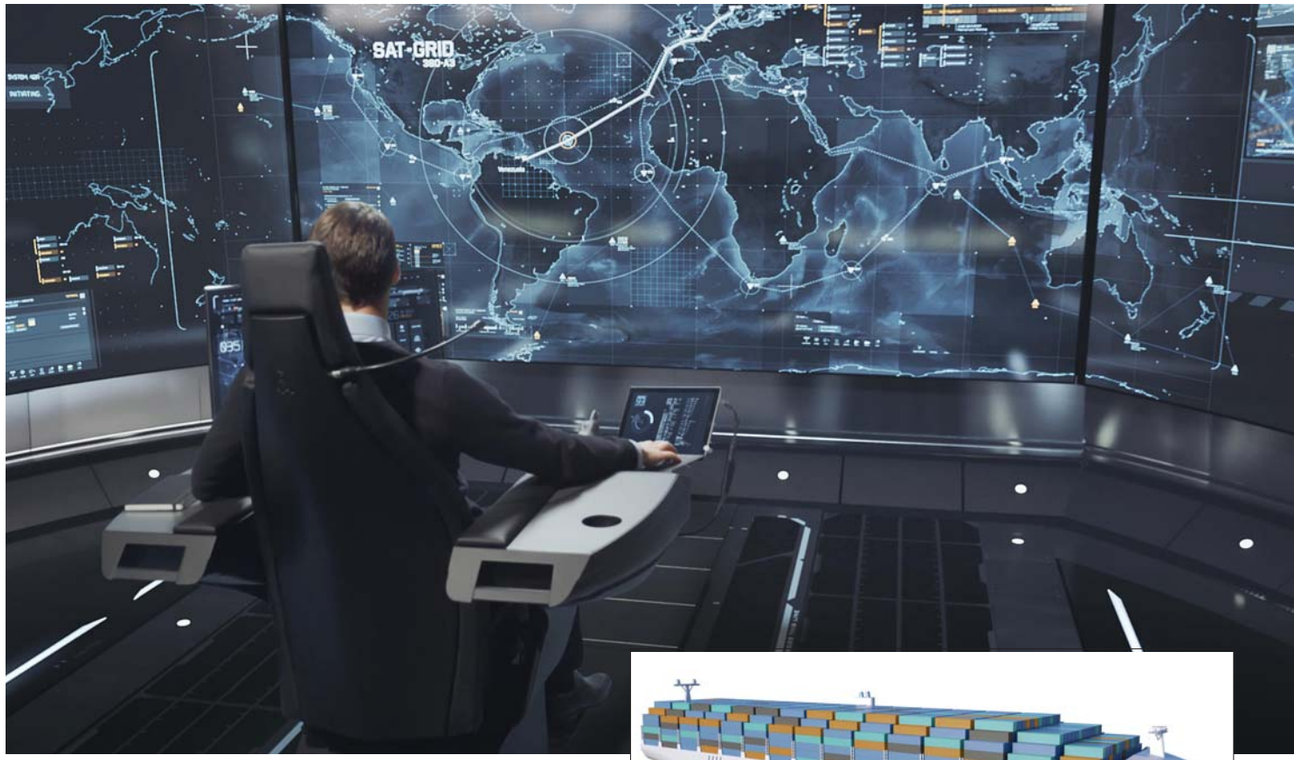
The challenge of being a big company is not distracting the core business, even as we invest in the technologies that may change it forever. There are many cautionary tales of logistics titans in our industry that spent hundreds of millions of dollars on transforming their technology platforms and ultimately failed.

Agility has created a new technology venture to invest in disruptive technology related to logistics.

Internally, our approach has been measured change: engage widely, pilot at every step, and roll out in phases, fixing problems early and continuously. From our technology venture perspective, we ring-fence our investments from the business until it makes sense timing-wise, geography-wise or service-wise to link them together. In this way, we hope to reap the benefits of revolution with the relative ease of evolution.

Autonomous shipping

THE TECHNOLOGY EXISTS. NOW IT'S A MATTER OF SAFETY AND MARITIME LEGISLATION



Figures suggest that up to 44 percent of a ship's running costs are in the crew, so it's not hard to see why carriers would be exploring the feasibility of autonomous ships. With big savings possible, liner operators are looking closely at coastal shipping, short-sea operations, even on-demand shipping. The idea of crewless vessels plying the waters between coastal centers and delivering payloads by drone might not be too far in the future.

Autonomous shipping will be a reality even if current concerns surrounding legality, insurance and safety cloud the waters. Remotely-operated vessels are already operating beneath the sea and on the surface in oil-and-gas and defense sectors. Cargo vessels now sometimes run sections of long voyages on autopilot, making fully autonomous vessels a logical next step.

Safety & Regulation

The real leap is to figure out how they will be integrated into mainstream logistic operations across the oceans and how safe they will be in use.

"We will see a remote-controlled ship in commercial use by the end of the decade," Oskar Levander, Vice President of Rolls-Royce Innovation Marine, recently told the Autonomous Ship Technology Symposium in Amsterdam. "This is happening. It's not if, it's when. The technologies needed to make remote and autonomous ships a reality exist."

Rolls-Royce leads the Advanced Autonomous Waterborne Applications Initiative (AAWA), a project that includes universities, ship designers, equipment manufacturers, and classification societies. The goal is to explore the economic, social, legal, regulatory and technological factors needed to make autonomous ships a reality.

The legal questions raised by crewless ships are causing headaches for regulators and potential operators. To move ahead, maritime laws and regulations will have to be reconsidered and redrafted.

In addition to cutting costs, autonomous vessels will reduce the need for human interactions – and human error.

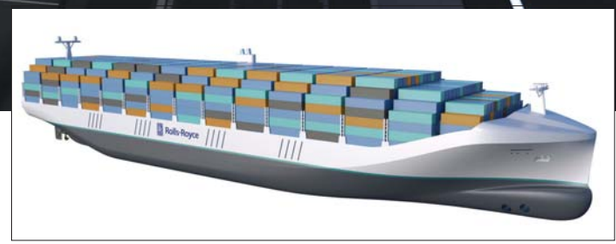
The hardware and electronics needed to operate unmanned vessels already exist and look similar to the technology behind driverless cars, trucks and other land-based autonomous vehicles. At sea, the idea is that once a vessel has a "picture" of the world around it, the environment is right for clear sailing. The bigger unknown is regulatory: how such ships are to operate within the boundaries of safety and maritime legislation. Industry experts say those concerns can be addressed by adjusting existing regulation rather than adding another layer of complexity with new rules.

In addition to cutting costs, autonomous vessels will reduce the need for human interactions – and human error. There will be more room aboard for cargo. Advocates tout more efficient schedules and the likelihood that, with no crew, there will be less waste and pollution. Complex maritime operations will be handled by onshore teams that aren't pre-occupied by the pressure of working aboard the vessel. They will be able to deal with operational issues free of distractions.

Not If, But When

Rolls-Royce says the first autonomous vessels will be on the seas by 2020.

In the next decade, the industry's emphasis will be creating strong communications systems capable of maintaining a constant flow of real-time information from ship to shore. Expensive satellite infrastructure capable of handling huge amounts of data will be required. Early adopters and users of autonomous vessels are likely to be coastal-based operations as developers work through obstacles they might confront farther out at sea: bad weather communications and the lack of satellite coverage in certain geographic black spots on the globe. Look for crewless ferries and autonomous ships running local cargo routes between production centers and large markets.



For now, the prospect of unmanned vessels remains a bit distant. But carriers and technologists aren't the only forces behind the push for autonomous shipping. Companies moving goods by sea want lower costs, quicker delivery and more flexibility. Retailers and other ocean shippers have come to demand faster deliveries. Manufacturers want to shorten wait times for raw materials.

Imagine

In 25 years, crewless "drone" ships will be a large percentage of cargo ocean traffic. Imagine a large drone container ship loaded with 25,000 containers arriving at the world's two great chokepoints – the Suez or Panama canals. The ships are too big at first, but have the ability to break into seven or eight smaller capsule sections and following each other nose-to-tail through the canal, then reform into a single vessel on the other side. What about an autonomous vessel sailing the Mediterranean with aerial drones lifting containers off at intervals for deposit in Naples, Marseille, Malaga or Algiers? Fanciful today, yet feasible in 20 years.

Logistics is changing with the Internet of Things (IoT). Connectability will result in demands for faster and more environmentally friendly movement of goods and raw materials. The autonomous ship could well be the start of a drive to make shipping smaller, faster and more locally concentrated.

New rules coming?

FIRST THERE WAS VGM. IS CTU AROUND THE CORNER?

Shippers struggling to cope with the July 1 container weight rule could face even tougher requirements if international authorities move to turn cargo loading-and-securing guidelines into global industry mandates.

The "light touch" period for enforcement of the International Maritime Organization's Verified Gross Mass (VGM) requirement concluded Oct. 1. The period ended without a much-feared disruption of global supply chains – but also without a clear picture of how well or poorly shippers are complying with the new requirement.

American Shipper reported that World Shipping Council data showed compliance for the VGM rule rose to about 95 percent. At the same time, the magazine noted deep skepticism among insurers and risk management specialists, who question whether declared VGMs are accurate and represent "the result of an actual weighing process."

The painful adoption of the VGM rule could foreshadow deeper pain if the three UN agencies that set standards for shipping turn their non-mandatory code for loading and securing of cargo into a mandatory requirement.

Trucks, Rail & Ocean

If mandated, the code – known as the Code of Practice for Packing of Cargo Transport Units, or CTU Code – "would be far more disruptive and have a much greater effect than the VGM rule," says Sue Terpilowski, Managing Director of Image Line, a UK-based maritime and logistics consultant. "The IMO and other authorities want to change shippers' behavior to improve safety and operational performance in the supply chain. The best way for the industry to avoid a costly, difficult mandate is to act now ourselves."

The CTU Code applies to the containers, truck trailers and rail cars used for ocean and land shipments.

Terpilowski says it's clear that not everybody is following the guidelines. "There are too many incidents that can be traced to poor packing, inadequate securing of cargo, overloading, and incorrect declaration of contents."

Estimates indicate 65 percent of cargo accidents result in loss or damage to the cargo and about a third stem from poor packing. The consequences for shippers, carriers and their insurance companies are significant.

Common Sense

The CTU Code is detailed and comprehensive, but it contains a number of common sense practices, advising shippers, consolidators, road and rail haulers, and other third-party packers to:

- Arrange for a safe working environment
- Check that the container, truck or rail car – and securing equipment – are in sound condition
- Select the most appropriate CTU type for the specific cargo
- Pack dangerous goods near the doors of the CTU where possible
- Not concentrate heavy cargo over small areas of the floor
- Not use securing or protection equipment that is incompatible with the cargo
- Affix required placards, marks and signs on the exterior of the CTU

"If everyone involved in supply chains adopts the principles in the code and embeds them in their procedures and way of behaving then the IMO will have no grounds to make it mandatory," Terpilowski says.

Africa

PHOTO CONTEST CAPTURES CHANGE OF A CONTINENT

Agility recently announced winners of its Africa 2016 Photo Competition, images that show how quickly Africa is modernizing, growing and even leading the way in new technology.

The annual contest, now in its second year, is a pan-Africa photography competition focusing on Africa's rapid modernization. This year's competition drew more than 2,500 photographs from professional and amateur photographers in 30 countries.

The winning images depict a fisherman in a canoe on Lake Victoria on his laptop, a solar farm in Rwanda powering 15,000 homes, and the skyline of Harare, Zimbabwe. ▶

■ *The winning photographs and the runners-ups were featured at a session at the United Nations General Assembly in New York.*

■ ***Technology category and Grand Prize winner:***
Stephen Simiyu, Kenya.
JUNA, UGANDA (Source of the Nile River). For more than 20 years, George Atika's fishing business on Lake Victoria has helped him provide his family with a comfortable life. Now they have joined the global digital world.

■ ***Cities category winner: Henry Oliver Hakulandaba, Zimbabwe.*** *The central business district of Harare, capital of Zimbabwe, just after rush hour.*

A cash prize of $2,000 was awarded for each competition category. The winners were Stephen Simiyu, a photographer from Nairobi, Kenya (Technology); Henry Oliver Hakulandaba, an environmental consultant and photographer from Harare (Cities); and Esdore Hakizimana, a machine operator from Kigali, Rwanda (Industry). Simiyu also won the Grand Prize of $2,000 for his photograph of a fisherman using a laptop in a canoe on Lake Victoria, Uganda.

The winning photographs and the runners-ups were featured at a session at the United Nations General Assembly in New York and were shown at the Thomson Reuters Africa Summit 2016 in Cape Town in October. They also were showcased in *Forbes Africa*, on CNBC Africa.

Simiyu, the Grand Prize winner, said he was trying to take a photograph that illustrated how much Africa is transforming: "I needed an image that could tell that story in one picture. The competition really made me think about Africa – there's nowhere like it."

Hakulandaba, winner in the Cities category, said non-Africans are continually surprised by the pace of change in Africa. "Whenever I exhibit images of Harare or any other African city, there is always someone who says they never thought Africa has such development," he said. "This competition is a platform to reach a wider audience about African development. It will help change perspectives of the continent's potential."

The winning images speak eloquently about the historic change underway in Africa and the opportunities for Africans, African businesses and the world," said Geoffrey White, CEO of Agility Africa. "As a company investing in the logistics infrastructure of the continent, we are proud to show the world powerful images that capture a more positive view of Africa and demonstrate the progress that has already been made, hopefully changing the perceptions of Africa in 2016."

The competition was judged by an independent panel that consisted of Sneha Shah, Managing Director, Thomson Reuters Africa; Bronwyn Nielsen, Editor-in-Chief, CNBC Africa; and Salim Amin, Chairman of CameraPix and co-founder of Africa24 Media.

■ ***Industry category winner: Esdore Hakizimana, Rwanda.*** *This 42 acre solar power farm 20 miles east of Kigali, Rwanda, has a capacity of 10 megawatts. The energy it produces powers nearly 15,000 homes. Operational since July 2014 it went from contract signing to producing in just 12 months.*

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About Agility

Agility brings efficiency to supply chains in some of the globe's most challenging environments, offering unmatched personal service, a global footprint and customized capabilities in developed and developing economies alike. Agility is one of the world's leading providers of integrated logistics. It is a publicly traded company with $4.3 billion in revenue and more than 22,000 employees in 500 offices across 100 countries.

Agility's core commercial business, Global Integrated Logistics (GIL), provides supply chain solutions to meet traditional and complex customer needs. GIL offers air, ocean and road freight forwarding, warehousing, distribution, and specialized services in project logistics, fairs and events, and chemicals. Agility's Infrastructure group of companies manages industrial real estate and offers logistics-related services, including e-government customs optimization and consulting, waste management and recycling, aviation and ground-handling services, support to governments and ministries of defense, remote infrastructure and life support.


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