Tangible Technology

Every pharmaceutical company has a unique way of approaching the various types of integrity solutions on the market, but which way is best?

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Over the past five years, the pharmaceutical logistics industry has seen a seismic shift towards embracing new technologies and preparing for the next industrial revolution.

The increasing number of healthcare products that are time- and temperature-sensitive, coupled with a growing awareness of risk within the supply chain, has driven shippers to focus on managing the quality and compliance of product distribution. To manage risk, there needs to be transparent information on how products move throughout the world, the touchpoints by multiple stakeholders, and external environments the shipment encounters.

Much of this information has been challenging to obtain. Temperature monitoring has been the go-to technology over the past 20 years to gain insight, yet it has its limitations. Knowing a shipment has exceeded its temperature parameters is one thing, but there needs to be a robust solution that can take corrective action in real time for the products to be saved. There are some common pain points as the industry moves in this direction. Additionally, with all

the various technologies available, most come with a platform. It can be time-consuming to access these fragmented systems, and the data offered do not automatically correlate, so further analysis is required. Most have a niche focus, either security and location of freight or temperature and condition of freight. The idea behind risk mitigation is that prevention is better than a cure. This is the gap in the market that supply chain integrity solutions are aiming to fulfil, offering to shed light on the blind spots and increase efficiencies and compliance. However, as more solutions pour into this marketplace, promising added value such as end-to-end visibility and supply chain optimisation, what does this mean and are all solutions created equal?

Buyer Types: Embracing Technology

The DIY-ers
Historically, the cost of developing fit-for-purpose Internet of Things (IoT) solutions has been a business obstacle. Many companies have invested millions of dollars and a lot of time into projects, ultimately resulting in a sub-standard solution as technology advances. The words 'blockchain', 'visibility', and 'data'

have become overused in an industry that is still using paper-based documentation processes and has only just implemented GDP. However, for the most part, the tangible benefits of these potential changes have not come to fruition.

Early Adopters
Some early adopters have been left disappointed as companies jumped on the bandwagon and boasted claims that they did not have the maturity of concept to deliver. Others benefitted from being able to shape the solutions to their requirements.

Wait and See
The silent observer waits and learns from others' mistakes. As these mistakes can be costly and have multiple impacts on business flow, the silent observer waits until his or her contemporaries or competitors have successfully implemented a solution and are experiencing benefits. It is only then that they will take the plunge.

Which Buyer Type Is Best?
The advantage of the 'wait and see' strategy is getting others to demonstrate proof of concept while not risking budget. The disadvantage of this group is that visibility and

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product integrity mean different things to different companies. The DIY-ers often have a long and expensive development period that consumes resources and budget, and by the time the solution is implemented and ready to go, technology has moved on, and it is no longer fit for use. Often, the early adopter is the winner as they help shape the new technology. The result is a system that they have moulded to their requirements.

What Tech Is Out There?

As technology is moving so quickly, let's pause and see what types of technology are available and what solutions they offer:

The Digital Cloud and IoT
The term 'IoT' is a buzzword, with many organisations using it at every opportunity. Put simply, it refers to the millions of physical devices around the globe that are all now connected to the internet. As an example, in our industry, a driverless truck could be seen as an IoT device, whereby the truck (the device) is connected to the internet to allow it to be controlled remotely.

This leads us to the digital cloud. The cloud often refers to the internet, which is really a data centre full of servers connected to the internet performing a service. It refers to sharing resources, software, and information through a network.

GPS Devices
A stalwart of the security and logistics industry, the GPS device has long been the number one device when it comes to real-time visibility. Providing accurate positioning data, first developed by the US military in the 1980s, the device is flexible, easy to use, and very cost-effective. Along

with most modern-day devices (cell phones, PCs, etc.), the GPS device has reduced significantly in size. Modern-day covert GPS tracking devices can be as small as a USB stick.

Temperature Monitoring, Shock, Humidity, and Light Devices
The increase in temperature-sensitive shipments and the requirement to adhere to the global GDP guidelines means that the use of a temperature-monitoring device is a prerequisite for many pharma shipments. Many types of devices are available from single to multi-use, measuring temperature, shock, humidity, and light data.

The pharma industry has long worked with devices that only provide retrospective data, i.e., data are only downloadable once the shipment has been received by the consignee, typically via a USB connection and proprietary software. The increasing trend is the use of real-time temperature devices, allowing the shipper or forwarder to have direct involvement if a shipment deviates from the defined temperature ranges.

Cargo Security Seals, Tamper Seals, and Door Alarms
With the introduction of government-sponsored security programmes such as Authorised Economic Operators and the Customs-Trade Partnership against Terrorism, we have seen the emphasis placed on the shipper to secure their supply chain. To ensure that the chain of custody is not broken, container security seals provide evidence that a shipment has not been tampered with while in transit. In this area, we see the use of standard ISO 17712 container seals to the latest technology, which provides real-time data from the container seal if the seal is broken.

Vehicle Tractor/Trailer Telemetry
Truck or trailer telematics is based on the idea of gathering, storing, and transmitting information about the vehicle for tracking purposes. This information can be used to analyse vehicle performance, vehicle conditions, driver performance, and more. This data is relayed from sensors on key mechanical components of trucks and trailers back to drivers and fleet managers at the base using satellite/GPS technology (1).

In the pharma supply chain, the use of tractor/trailer telemetry is important. Shipments that require temperature-controlled transportation information from these sources can enhance the data being provided by standalone temperature devices. Modern-day telemetric data can also provide real-time predictive maintenance information, thereby enabling key equipment to be replaced in a proactive, rather than a reactive, way.

Active/Hybrid Packaging
The temperature-controlled packaging space is also seeing its share of innovation and technological advancement. The use of temperature devices embedded into temperature-controlled packaging has been the *modus operandi* for pharma shipments. This, of course, provides accurate data on the temperature of the product while being transported through the logistics chain. We are seeing the increasing use of real-time temperature and positioning technology being deployed on temperature-controlled packaging systems. An excellent example here is Sonoco's PharmaPort 360.

Integrations with TMS and WMS
The integration of a warehouse management system (WMS) and a transportation management system (TMS) can significantly increase

operational efficiencies and customer service levels. Through the TMS/WMS integration, manufacturers and distributors can increase supply chain visibility across the warehouse and transport functions. The cost benefits with the integration significantly enhance the just-in-time model by allowing greater warehouse utilisations, reduced inventory holdings, and, ultimately, speed of product to market.

Driver Apps

It is estimated that 95% of truck drivers globally own a smartphone. This enables instant communication and use of apps. Supply chain integrity solutions have apps that allow drivers to capture key shipment information, bill of lading, proof of delivery, photographic evidence of the inside of the trailer, the condition of the freight, and complete compliance and quality checklists. Digital workflows aid the driver on processes, and information gets stored directly on the cloud, is accessible to operations, and reduces calls to the driver for information. GPS phone tracking is an additional data stream and triggers alerts for a tractor and trailer separation event if the app is part of a product integrity solution.

Drone Deliveries

The use of drone technology as a mode of transport for shipping pharmaceuticals has arrived. Recent announcements from UPS, in conjunction with AmerisourceBergen and CVS Pharmacy, to deliver pharmaceuticals directly to hospitals and patients is a game-changer. According to UPS, drone technology will be used in tandem with the traditional modes of transport. The cost benefits of drones could be substantial. Avoiding traffic delays, thereby reducing the carbon footprint, is the obvious one.

Another interesting development in this space is the partnership between Air Canada and Drone Delivery Canada. The agreement will mean that Air Canada Cargo will sell, market, and promote Drone Delivery Canada's services on agreed routes.

Blockchain Technology

Blockchain is perhaps the greatest advance in modern-day accounting/ledger technology, emerging in 2016/2017. Based on a peer-to-peer topology, blockchain is a distributed ledger technology that allows data to be stored globally on thousands of servers while letting anyone on the network see everyone else's entries in near real time. This makes it difficult for one user to gain control of, or game, the network (2). While the most prominent use of blockchain is in the cryptocurrency Bitcoin, the reality is that blockchain has many applications and can be used for any exchanges, agreements, contracts, tracking, and, of course, payment. Ultimately, blockchain can increase the efficiency and transparency of supply chains and positively impact everything from warehousing, to delivery, to payment. Some excellent examples of the use of blockchain are from the food industry, where it's imperative to have solid records to trace each product to its source. For example, Walmart uses blockchain to keep track of the pork it sources from China, and the blockchain records where each piece of meat came from, is processed, is stored, and its sell-by-date (3).

Bringing It All Together to Reduce Risk

A layered approach to product integrity and security is highly recommended, ensuring there is no single point of failure.

The most logical answer is a Software-as-a-Service (SaaS) platform that

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is device- and stream-agnostic and specifically designed for aggregating all available layers of data and overlaying with situational and contextual data into a single unified view. As technology evolves rapidly and hardware devices become smaller and more cost-efficient, shippers should look for a solution where they can take advantage of this. A SaaS solution where shippers own the data means they can leverage procurement benefits and be agile in their sourcing while retaining a standardised operation.

Start With Your ROI in Mind

Return on investment (ROI) is a vital principle of any business decision. Over the past 20 years, the supply chain and logistics industry has evolved, though the levels of technology adoption have been variable among service providers and shippers.

Global supply chains are under pressure to meet high-quality service demands, continually innovate, and offer cost savings and value. A digital supply chain can facilitate and enhance the just-in-time manufacturing principle. With the increased use of data and real-time visibility, shippers can apply 'lean techniques' when it comes to inventory management, resulting in improved business processes and risk reduction. Key considerations are to ensure you select an agile, flexible solution that can adapt to new advances in technology. Product integrity can have cross-company advantages sharing the concept between logistics, security, legal, procurement, and quality. Technology developed with the end user in mind, and used correctly, can revolutionise your operation and deliver a more robust supply chain to improve the quality of your products for your customers.

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Amy Shortman is a Chartered Fellow of The Institute of Transport and Logistics and has over 20 years' experience within pharma logistics. During this time, she has worked within operations and commercial roles and is passionate about creating supply chains that ensure product integrity is maintained throughout. In 2019, Amy joined the Senior Management Team at **Overhaul** as their Director of Product Marketing, enabling her to utilise her practical experience of supply chains with her passion for the future and Industry 4.0.