

# Boundless potential, just around the bend

With the internet of things (IoT) increasingly shaping logistics behaviour, Richard Wood, director of connected digital technologies at **Softbox Systems**, looks at how its impact is protecting businesses, moulding the future and saving lives.

**T**o ascertain the level of influence that the internet of things (IoT) is having on the pharmaceutical supply chain, you don't have to look much further than the coverage it currently enjoys. Narratives are plentiful. But no less prominent, it would seem, are the rates of adoption.

Bain predicts the IoT market will grow to \$520 billion by 2021, more than double the \$235 billion spent in 2017. In vertical terms, Statista puts transport and logistics at the top of the industrial investment tree, with a \$40 billion outlay forecast for IoT next year. Where the supply chain is concerned, its capabilities are such that an inexorable march into the fold appears just a matter of course.

## **The new safety net: an online lifeline for product integrity**

The nature and scale of the pharmaceutical industry's global expansion has changed logistics dynamics. New markets and compliance, transportation delays, the ascent of biologics, packaging, product excursions, technology, theft and human error are all challenges needing resolution. Transparency across a new super-connected supply chain, says a Council of Supply Chain Logistics report, can deal with much of this complexity, as well as the scale and distances involved. IoT, it would appear, offers a potential lifeline to product integrity and company bottom lines.

Temperature control packaging (TCP) and logistics companies have already recognised visibility and traceability as top priorities. As new strategies and ways to ensure product safety hit the radar, a new generation of monitoring practices has emerged. The most significant centres around near real-

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time temperature and location monitoring. Yet while these advancements have been crucial, at one end of the cold chain spectrum they have been critical.

## **Partnerships that save lives: survive through it, together**

One of the most important developments for the substantiation of IoT technology first emerged in the aftermath of Hurricane Maria, a natural disaster that devastated Puerto Rico in 2017. As the supply chain collapsed in the country, people with serious conditions were unable to gain access to their daily medication. Week on week, the death toll multiplied. One diabetic relative of an employee who worked for a pharmaceutical giant was among the casualties and this pushed the company into action.

Partnerships were formed that married IoT technology with TCP systems. And just two years on they were flying – quite literally; a third element, drone technology, had become part of the solution.

## **A phenomenon gains its wings: introduction of drone technology**

At the time, commercial drone development was way beyond its teething stage. There were vertical take-off and landing versions available that were useful over short distances, as well as fixed wing models, with catapult launching systems that could potentially reach areas 50 miles away.

Lightweight and powerful, these drones were already being equipped with cameras. But could they carry anything heavier, such as temperature-sensitive cargo? Back in 2008, Softbox Systems had first optimised containers for aircraft unit load devices. So why couldn't shippers be optimised for drones?

Research commenced on cargo drone – new lightweight TCP was developed; an adaptor plate was conceived for secure attachment; package temperatures were tested in labs with thermal simulation tools; and data connectivity and transmission was embedded. In just six weeks, rapid development prototyping had taken place, with cooperative work going on between relevant teams across different continents. In a final proof of concept, test flights were conducted in remote areas of Puerto Rico that had been hit hardest by Hurricane Maria.

## **The advantages of transparency: accuracy through openness**

The emergence of this cooperative piece of innovation means biologics and other life-saving medical supplies can be housed safely inside a temperature control shipper and transported by air to any remote or devastated area on earth. But it's also the mechanics behind this innovation that are opening doors to the future.

To maintain the safety and quality of the medicines, the Skypod temperature control shipper, as it's known, includes a Smartbox device powered by IoT technology. It gathers near-real-time data including location, and shipper temperatures, external and internal. A temperature-monitoring tag is paired via Bluetooth enabling data to be sent to a SIM card gateway. Once transmitted to



The future of the industry will rely heavily on the proper integration of interconnectivity and the patience required to allow the technology to grow.

the cloud, authorised parties can view the data collected on a web and mobile app dashboard. These sense-and-respond feedback mechanisms can be expanded to encompass humidity, air pressure, light and shocks.

This technology brings enhanced transparency, accuracy and responsiveness to the whole delivery cycle. Not to mention a good deal of comfort to all those involved.

### **Never break the chain: an exercise in preservation**

With data being the entity that swirls around this core technology, all those with a vested interest will need to embrace cybersecurity as a safeguard against potential perpetrators.

Dashboard apps, like those built for Skypod, are configured to flash alerts, whether on breaches of temperature ranges, defined geofencing parameters, or light exposure data that signals any tampering during transportation. These can prompt appropriate action.

Serialisation – the practise of assigning unique, traceable numbers to individual saleable units – is leading the charge against counterfeiting, diversion and theft. Progressive track-and-trace systems are forming another safeguard.

Advances in cryptography, where combinations of private and public keys protect data, are also building a robust security layer.

Similarly, with the rise of blockchain technology, first given the light of day by bitcoin, an open ledger stores blocks of data and preserves them in their original format with the entire decentralised user network shielding them from amendment, tampering or destruction.

In next-generation supply chain management, data preservation and product preservation will be one and the same, with an unbroken chain being the difference between usable and spoiled vaccines.

### **A proactive future: look forward now for structured plans**

As IoT breaks into packaging logistics, a strong body of evidence is gathering in its favour. Drones armed with smart shippers are already proving invaluable in Vanuatu; vaccines for immunisation are being transported there by air. It therefore follows that countries like Indonesia, with 18,000 islands in its archipelago, could be prime beneficiaries. But uses are poised to go beyond emergency solutions, as they weave their way into mainstream digital strategy for worldwide supply

chain operations. To date, solutions like data loggers have made information on shipments available, but only post-transit. Should a problem be identified, it can often take two to three weeks for assessments to be completed, before a shipment is released. With IoT allowing real-time assessments, the potential savings in time and costs are clear.

### **Carefully does it: technology that requires room to grow**

However, these technological advances have further to go, and the ‘where next?’ is happening right now. Predictive analytics powered by artificial intelligence is helping the supply chain become increasingly proactive.

With the capacity to leverage multiple data assimilations, smart algorithms can detect patterns and make informed, accurate predictions. Weather forecasts can highlight risks before they are encountered, affording pallet preparation and advanced warehousing management. Transportation availability can be known ahead of time, allowing for more accurate future scheduling. Driving routes can be optimised to negotiate traffic. Drones or ships, for example, could sense their immediate environments, preventing delays. Orders can be anticipated.

### **Laggards to leaders: a valuable investment**

According to the 2018 *Forbes* report, “IoT marches into the enterprise, transformation follows quickly,” companies that have embraced the IoT space are seven times more likely to see high growth rates, as productivity takes hold and new lines of business kick in. Additionally, more than three quarters of these companies have seen it as a precursor to increased revenue or profitability.

All the current indicators would suggest that the value of IoT to any company involved in the supply chain will be significant. This is one area where laggards might consider rallying to become leaders. ☒

### **For further information**

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