

DIGITIZATION AND BIG DATA'S IMPACT ON THE PHARMA SUPPLY CHAIN

Pharma and biotech organisations are beginning to implement some of the market's newest technologies to enhance how they make decisions and predict outcomes in the supply chain. These include the likes of big data, machine learning and automation tools. Ahead of the Global Forum Canada, Pharma Logistics IQ takes a look at digitization and big data's impact on the pharma supply chain.

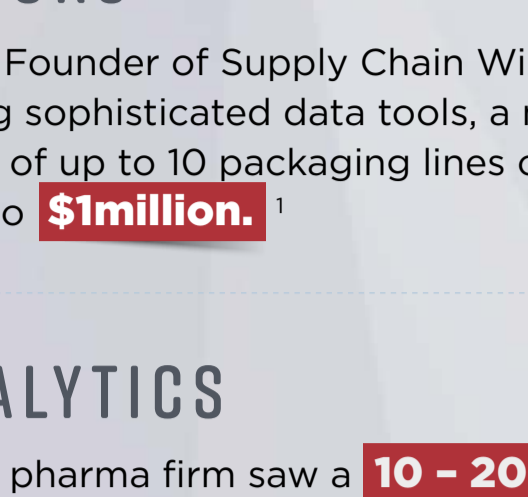
TODAY

26.25% of logistics companies currently use **machine to machine (M2M)** technology and just over **45%** of them are planning to use them in the future.⁷

The five years to 2009 witnessed a **15% increase** in pharma packaging equipment effectiveness.⁶

90% of the globe's GDP is under some form of serialisation/track and trace regulatory framework.¹

3D PRINTING



2015

The World's first 3d printed drug product gained FDA approval - Aprelia Pharmaceuticals' SPRITAM.

IOT SENSORS

Evren Ozkaya, Founder of Supply Chain Wizard estimates that from using sophisticated data tools, a medium sized packaging site of up to **10** packaging lines could reap annual savings of up to **\$1million**.¹



DATA ANALYTICS

One pharma firm saw a **10 - 20%** reduction in labour costs after applying a data-led digital decision making technology to solve a packaging line scheduling issue. Savings were seen because the data gave visibility to shrink unnecessary overtime.¹

MACHINE LEARNING:

Merck KGaA is planting sensors into its supply chain to track distribution practices for every SKU to optimise time to market. Machine learning technologies are then used to assist with tracking and planning for certain types of products.⁸



AUTOMATED DRONES



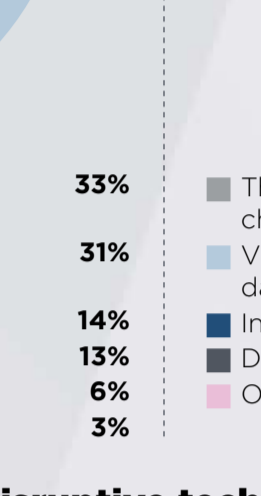
Quiqui Drone Delivery

delivers medications to patients in San Francisco's Mission District by drone. Most orders can be completed in less than **15 minutes**.

TOMORROW

BY 2020

Pharma Cold-chain logistics spend is predicted to exceed **\$16 BILLION**³



PWC forecasts that pharma companies will customise supply chains to suit the product types being transported - data will play a key role in enabling this vision.⁶

KEY TRENDS TO CAPITALISE ON IN THE NEXT FEW YEARS:

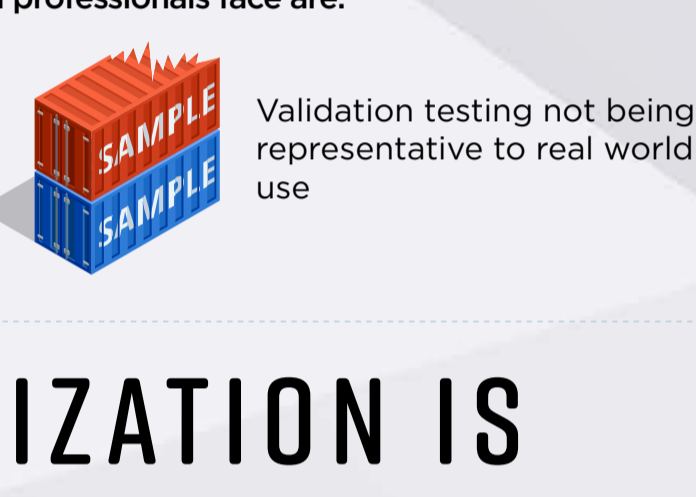
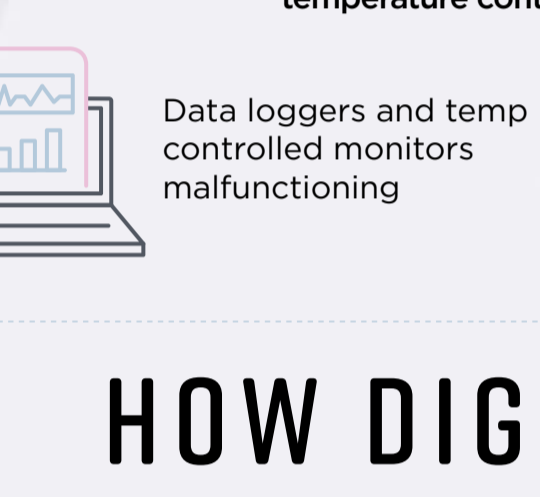
Pharma Logistics



Temperature Monitoring In Pharma



What will be the most disruptive technology for the temperature controlled supply chain over the next 10 years?



THERE IS STILL A LONG ROAD AHEAD...

CHALLENGES

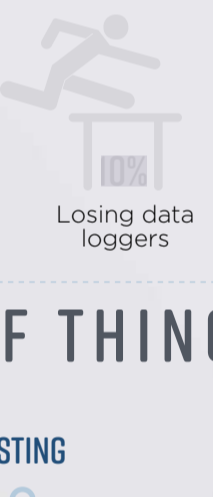
In recent research, most pharma companies said they struggle to get supply chain data quickly from distributors with the majority having to wait **1 - 3 business days** to receive data.⁶

2%: The amount of respondents in a recent survey who said their supply chains are the focus of their forward-looking digital strategies.²

Recent research from Pharma Logistics IQ discovered that the dominant challenges temperature controlled professionals face are:



Data loggers and temp controlled monitors malfunctioning



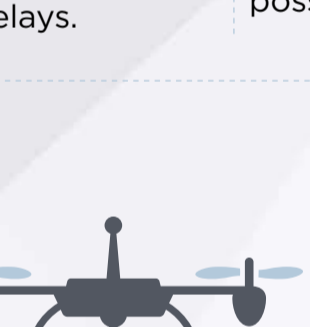
Validation testing not being representative to real world use

HOW DIGITIZATION IS IMPACTING THE SUPPLY CHAIN PROFESSIONAL

DATA

Pharma Logistics IQ asked a base of temperature controlled logistics professionals about how important data is to their role.

HOW IMPORTANT IS DATA FOR THE FUTURE OF YOUR FIRM'S PROGRESSION?



WHAT ARE YOUR MAIN DATA CHALLENGES?



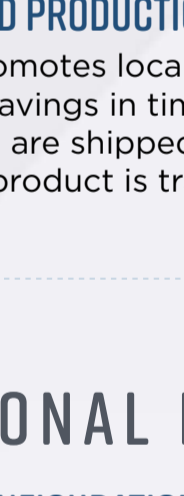
THE INTERNET OF THINGS (IOT)

VISIBILITY



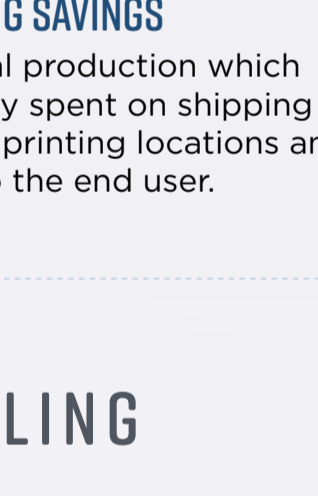
IOT technologies empower stakeholders to share data with colleagues around the world in a safe and economical manner. Supply chain professionals are able to examine data to react to situations quickly and prevent delays.

FORECASTING



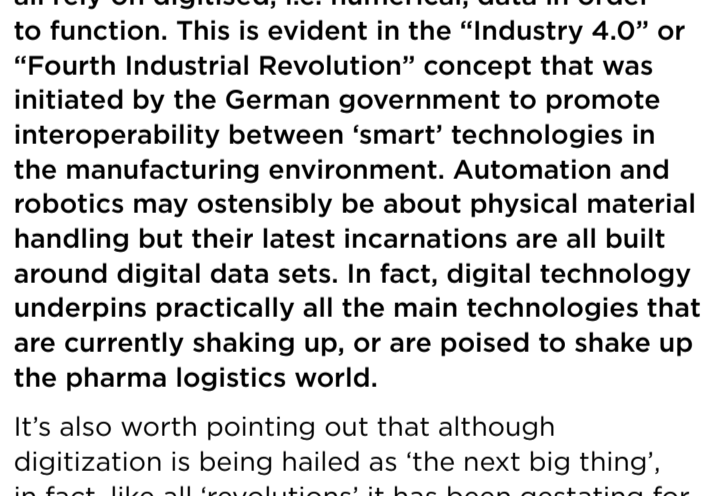
By integrating the manufacturing and distribution departments with IOT devices, logistics professionals are equipped to forecast accurately and pick up savings where possible.⁶

ENHANCING EQUIPMENT AND EMPLOYEE MONITORING



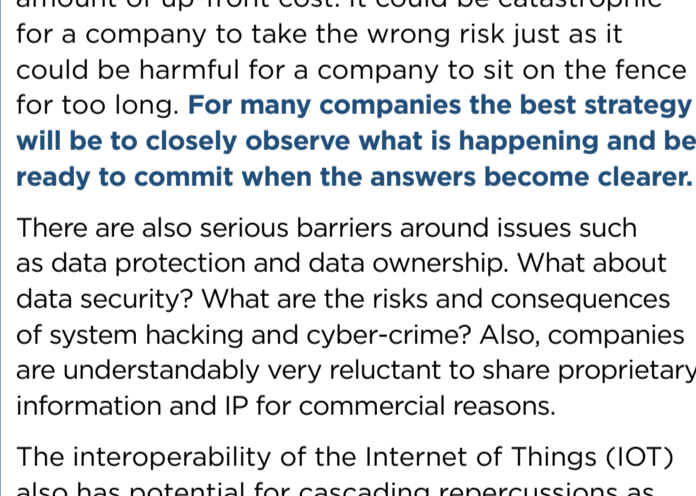
The internet of things can be utilised to better monitor the performance of equipment and logistics professionals.

DRONES



LAST MILE RELIEF

A network of drones could provide significant support to last mile logistics.⁷



RURAL DELIVERY

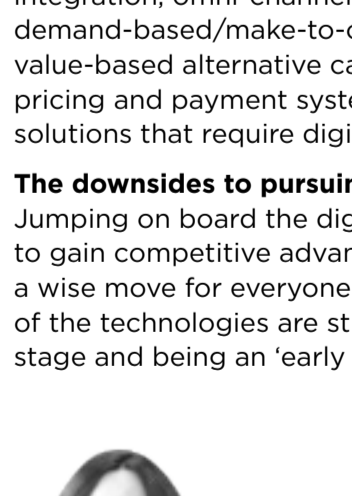
Remote locations with poor infrastructure could greatly benefit from drone delivery.⁷



3D PRINTING

DECENTRALISED PRODUCTION + SHIPPING SAVINGS

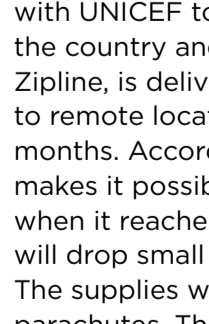
3d Printing promotes local and regional production which could unlock savings in time and money spent on shipping drug products. APIs are shipped to regional printing locations and then the final product is transported to the end user.



COMPUTATIONAL MODELLING

QUICKER RECONFIGURATIONS

Experts predict this technology will be used by pharma to design and validate manufacturing processes virtually with Quality by Design (QbD) principles.⁶ This will enable supply chain professionals to reconfigure lines for different products faster.



EXPERT ANALYSIS:

THE FOOTPRINT OF DIGITIZATION IN THE PHARMA INDUSTRY
ALAN KENNEDY OF TEAM-UP GLOBAL

The 'catch-all' term for an array of technologies that all rely on digitised, i.e. numerical, data in order to function. This is evident in the "Industry 4.0" or "Fourth Industrial Revolution" concept that was initiated by the German government to promote interoperability between 'smart' technologies in the manufacturing environment. Automation and robotics may ostensibly be about physical material handling but their latest incarnations are all built around digital data sets. In fact, digital technology underpins practically all the main technologies that are currently shaking up, or are poised to shake up the pharma logistics world.

It's also worth pointing out that although digitization is being hailed as 'the next big thing', in fact, like all 'revolutions' it has been gestating for decades and quietly being implemented for years, for example in the automated warehouse systems which have been slowly evolving for the past 70 years or so.

While they will may facilitate and accelerate decision-making, **big data and smart algorithms will only ever be part of the answer.** At the end of the day algorithms are ultimately written by humans and AI is still a long way from replicating the human nuancing, reasoning, interpretation, intuition, contextual awareness and other qualities of cognitive intelligence.

There are many new technologies based around digital that hold promise for pharma-logistics including:

- Cloud-based IT solutions
- Simulation and modelling technologies
- Robotics/AI
- Localised 3D printing
- Mobile apps
- Wearables
- Blockchain
- IOT
- Unmanned aerial/marine drones/vehicles
- Social media and context-related services

For example, one area of immediate application relates to the tracking and monitoring of products en-route to market. Embedded sensors right down to the individual product will give real-time location and safety information.

By harnessing, and often combining, the latest technologies, a lot of doors open up to hitherto intractable problems. Real-time track and trace temperature monitoring, end-to-end supply chain integration, omni-channel segmentation and supply, demand-based/make-to-order supply systems, value-based alternative care models and innovative pricing and payment systems are just some of the solutions that require digital technology to succeed.

The downsides to pursuing digitization

Jumping on board the digitization train in order to gain competitive advantage is not necessarily a wise move for everyone. At least not yet. Some of the technologies are still at the developmental stage and being an 'early adopter' will not always

be a rewarding experience if you select the wrong option or path. Digitization invariably incurs a huge amount of up-front cost. It could be catastrophic for a company to take the wrong risk just as it could be harmful for a company to sit on the fence for too long. **For many companies the best strategy will be to closely observe what is happening and be ready to commit when the answers become clearer.**

There are also serious barriers around issues such as data protection and data ownership. What about data security? What are the risks and consequences of system hacking and cyber-crime? Also, companies are understandably very reluctant to share proprietary information and IP for commercial reasons.

The interoperability of the Internet of Things (IOT) also has potential for cascading repercussions as the industry advances to having every device collect data and interact with each other. What may be nothing more than a small localised vexation today, could easily mushroom into an exponentially greater problem in a more digitized, interconnected world.

How digitization is changing the role of the pharma supply chain professional

The type of person needed in the future will be very different. The skill sets needed in a digital world are very difficult from those in a conventional work environment. The problem is likely to be a dearth of suitable expertise unless the industry can make itself more attractive to bright young talent. This will create a huge demand for staff re-training, re-organisation and cultural change. In most cases the key to successful digitization will be to blend young digital mavericks with mature logistics specialists that understand the operational nuances of the sector. Focused experience plus youthful energy will always win out.

Also, the social (jobs market) implications of digitization are huge. For example, automation is going to replace a lot of handling staff while local 3D printing has the potential to substantially reduce the need for finished-goods transportation. For some, industry-wide digitization will be a lot harder to embrace than many expect.

Benefits of digitization for pharma logistics

Big data acquisition and analysis, together with 'evidence-based medicine' (EBM) and 'patient-centric care' have serious implications for driving:

- Faster, smarter, decision making
- Cost reductions
- Time reductions
- Product / solutions development and optimisation

Today's pharma supply chain is very inefficient by comparison to similar supply chains in other industries. Digital technologies will give the sector an opportunity to leapfrog into the 21st century. Smart algorithms, artificial intelligence and advanced robotics will free management from a lot of the tedious, repetitive drugery that characterises much of their workload at the moment.

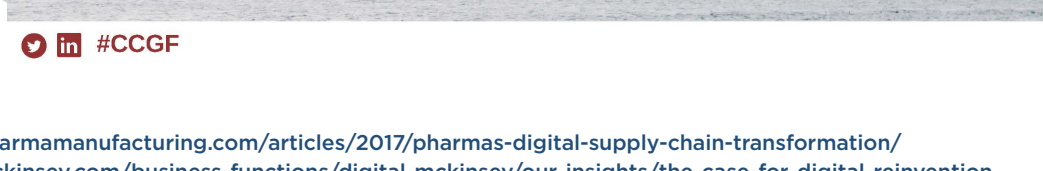
In Europe, DHL is running research tests that utilize drones to deliver drugs and other urgent supplies to a remote island in the North Sea. The island, Juist, is only accessible by a once daily ferry service and regular passenger flights. According to a press statement from a DHL Parcel spokesperson back in 2014, deliveries are secured and all types of drugs can be carried except those which are dependent on refrigeration, as a refrigeration unit may be too weighty for the 'parcelcopter' to carry.

Also in Europe, a very interesting product has been introduced by Flash Biologistic, a logistics provider that focuses on premium freight delivery services. Flash Biologistic's drone is one of the more unique in the market. **Each drone is equipped with biological isothermal packaging for temperature control and monitoring and travels on a predefined and programmed flight path directed by longitude and latitude coordinates.** Testing is expected to take place this year at the University Hospital Center of Bordeaux, a partner of Drones for Life which is a group of healthcare, technology and development experts trained to route and test drones safely and one in which Flash is a member.

Is drone delivery viable? According to various market research companies, the estimated market size of the commercial drone market was about \$609 million in 2014 and is expected to grow roughly to \$4.8 to \$6.4 billion by 2021. The market faces numerous challenges, most importantly how to share air space with larger airplanes as well as privacy and security concerns. **However, its benefits in delivering life-saving pharmaceuticals to remote areas cannot be denied and perhaps this is 'secret sauce' within supply chains.** But, like many other great innovations, its use will evolve and expand over time to perhaps delivering to the elderly and shut-ins to delivery within 'smart cities'. The possibilities are endless.



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RESOURCES

- <http://www.pharmamanufacturing.com/articles/2017/pharmas-digital-supply-chain-transformation/>
- <http://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/the-case-for-digital-reinvention>
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