PHARMA AERO

WE CONNECT PHARMA

Pharma.Aero Bedrijvenzone Machelen Cargo 706B, 1830 Machelen

WHITEPAPER

DIGI2.0: THE GLOBAL PHARMA TRACKER PROTOTYPE

How temperature-controlled pharma supply chain can benefit from collaborative data sharing to increase supply chain visibility and quality

DECEMBER 2019

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1. Reliable end-to-end air transportation is essential in pharmaceutical supply chains

Role of Pharma.Aero in supply chain optimization

The objective of Pharma.Aero is to achieve excellence in reliable end-to-end air transportation for pharma shippers, by fostering collaboration between CEIV certified airport communities dedicated in developing and pioneering when it comes to handling, storage and air transportation of pharmaceuticals.

Pharma.Aero's goal is to create more transparency and to improve performance of the supply chain for temperature-controlled pharma shipments. The ability to collect, unify and leverage data across the multiple participants in a pharma supply chain is instrumental in achieving the Pharma.Aero mission.

Problem description

The annual losses due to temperature excursions in transporting pharmaceutical (pharma) products is estimated to range between USD2.5 and USD12.5 billion[1]. To minimize and prevent such excursions, shippers are demanding higher trackability and traceability, as well as greater visibility by being able to know where and when excursions occurred.

Currently, the pharma industry uses both passive and active loggers to identify temperature excursions. However, additional relevant data (e.g. duration on tarmac or in warehouse, temperature of cold room, handover of responsibility from one party to another, etc.) are recorded and monitored in silos by individual supply chain players. Such data, which allows ease of root causes identification, is typically not shared across the supply chain. Moreover, supply chain players use different systems and the data is stored in different formats.

The development of a neutral logistics data-sharing platform is an essential collaborative tool to increase visibility and traceability throughout the supply chain.

Having a common data platform where coherent and uniform data (from real shipments) are shared would not only increase the visibility and traceability throughout the supply chain, but also be a tool to obtain greater insights on the reliability and performance of a transportation lane, as well as to identify and effectively address potential gaps within the supply chain. Such a platform would lead to fewer damaged or lost shipments and increase availability of pharma products in the market at the right time in the right place.

Data-sharing creates network visibility

The implementation of a Global Pharma Tracker (GPT) prototype – a platform that incorporated end-to-end data from real live shipments on a prototype lane, demonstrated that the technology is available today that allows users to visualise the door-to-door performance of the entire pharma air cargo supply chain and at the same time, control data accessibility based on the agreed data- sharing and governance framework.

Through this whitepaper we aim to share the lessons learnt, challenges and key attention areas to achieve full transparency and visibility on the air pharma supply chain network. Key findings are summarised below:

- Technology is not the bottleneck
- Business onboarding takes time
- Data sharing is key to increase visibility
- Data sharing requires a governance framework to assure data protection and data security
- A change in mindset that more transparency could lead to additional liability exposure.
- Building a global GPT network will require a gradual approach

2. Translating Digitisation concept to a live prototype

Pharma.Aero initiated **Digi 1.0: Certification of Pharmaceuticals Air Trade Lanes through Digitisation**[2] in 2018. Digi 1.0 concluded that building a common digital data-sharing platform that integrates data from different and multiple sources is critical to achieve greater transparency to the pharma supply chain stakeholders. The project resulted in a demo model validating our hypothesis that the relevant data collected from various stakeholders can be aggregated to provide greater visibility and enhance the reliability of end-to-end air transportation, and ultimately to enable the establishment of certified trade lanes.

Subsequent to Digi 1.0, **Digi 2.0**: **The Global Pharma Tracker Prototype** aims to develop the Proof of Concept into a Prototype – the Global Pharma Tracker (GPT) by incorporating data from real shipments for a selected trade lane and expanding the platform capabilities. Together with the Pharma.Aero project members[3], real data from 2 batches of 22 pharma shipments on the Brussels- Singapore-Sydney prototype trade lane were integrated into the GPT platform. This implementation focused on live data sources and validated the value of integration and visualization with various stakeholders of the air cargo supply chain. The platform allows users to visualise the door-to-door performance of the entire pharma supply chain and at the same time, control visibility of data based on the agreed data-sharing and governance framework.

	DIGI 1.0	DIGI 2.0
	PROOF OF CONCEPT	**PROTOTYPE**
Data used	**Dummy shipments** based on **realistic data samples**.	Live data from **2 batches** of in total **22 real shipments**. Data was provided by multiple live **systems from each stakeholder**, integrated by using a set of adapters.[3]
Scope	**Airport-to-airport**	**End-to-end**: Shipper to Consignee
Business logic	**Limited**: focused on reproducing the Cargo iQ milestones in a linear timeline and ingesting quality data	**Extended**: focused on building the enhanced data stream of the entire cold chain process and cargo flow processes. Tying together the MAWB to HAWB to shipment batch number and even down to the specific Purchase Order (PO) number to provide interpretation context.
Data exploitation	Basic visualization	Additional functionality to enhance platform capabilities enabling preventive and prescriptive actions by actors of the supply chain.

Table 1: Digi 1.0 and Digi 2.0 project scope

3. Digi 2.0 project

Digi 2.0 was divided into 4 work packages, each focused on a specific working area. The work packages were executed in parallel.

- **Work Package 1 – Technical implementation:** Configuration of Nallian's data-sharing platform to integrate various types of data sources, defining the output required of the GPT platform and configuring processing logic of the GPT.
- **Work Package 2 - Pilot onboarding:** This phase was split into 2 parts: first the business onboarding part, which focused on securing the buy-in from individual pilot group members to provide the necessary data, and second the technical onboarding portion, which involved in establishing the ability to automatically retrieve real live data from the participants' IT systems and integrate it into the GPT prototype.
- **Work Package 3 – Business Value drivers:** Mapping the business value of the GPT for various stakeholders – pharma shippers, freight forwarders, airlines, ground handlers, airports, etc.
- **Work Package 4 – System Validation:** Complying with the data collection and governance requirements as stipulated by the Good Distribution Practice and Computerized System Validation guidelines.

The first step in the project was to identify the prototype air trade lanes for Digi 2.0. The prototype air trade lane would need to feature members of Pharma.Aero at each node of the supply chain. After alignment between all potential participants in the project, the BRU – SIN – SYD air trade lane was identified as the prototype lane.

Subsequent to the lane identification, a technical protocol was established. This protocol included mapping of the process flows, identification of all the supply chain actors involved, registering flight schedules, and setting out data to be captured by the different actors. *Figure 1* identified the required data-elements.

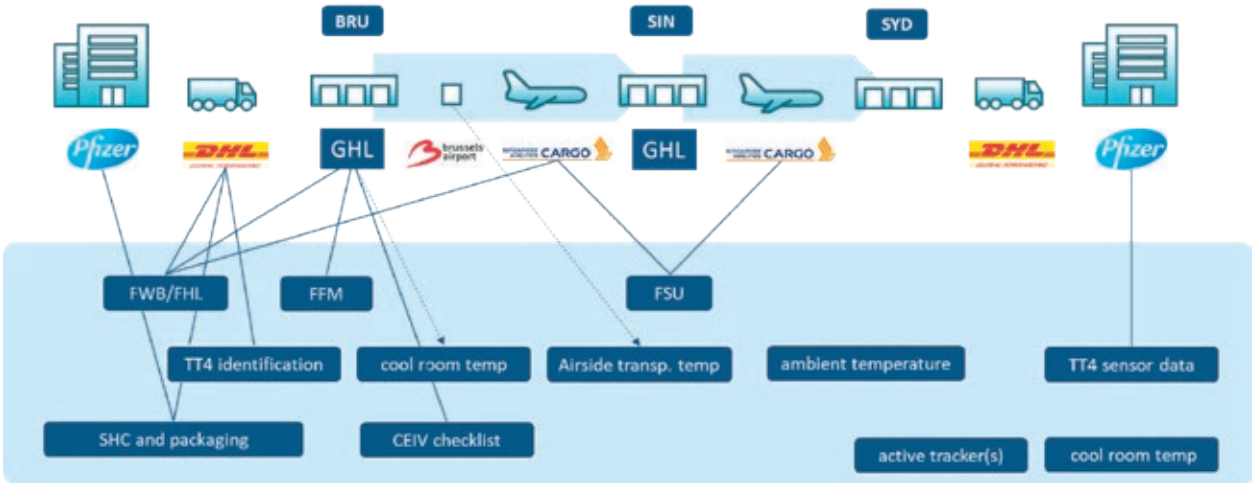

Figure 1: Potential data sources and types of data available

Figure 2: Role of individual parties as data providers to GPT and the types of data output

GPT covers all data which is considered relevant for optimal handling of the shipment, in order to provide a comprehensive single-version-of-the-truth for all parties:

Definition of shipments at the lowest level of detail and their aggregation into logistics units of transport (such as house/air waybill, consignment, container etc.), including packaging and temperature / protection ranges

- Logistics events and activities across the end-to-end supply chain, identifying at each moment who is currently in control of the shipment
- Temperature (product, transport/storage and ambient)
- Other relevant sensor data (e.g. humidity, location)
- Quality data such as CEIV checklists, pictures, damage reports etc.
- Other documents related to the shipment (e.g. invoice, packing list, certificate of analysis etc.)

Depending on the data source and capabilities of in-house systems of the participant, several types of data exchanges could be used:

- For some cases, data exchange was straight-forward as companies use standardized data exchange formats such as Cargo-IMP messages and Cargo-XML; or
- Dedicated API integration with stakeholders' IT systems to allow easy integration of the data.

GPT platform

By integrating all relevant data sources into a single data model, GPT offers an **enhanced data stream** which can be leveraged in different ways:

- By integrating the data stream in participant's own operational monitoring / control tower solutions
- By sharing this data with partners who can benefit from the increased visibility to provide a better quality of service
- By offering real-time insight into shipment properties, status and conditions using GPT Explorer.

The combination of shipment properties, logistics milestones and sensor data provided a rich context which facilitates decision making by both the shipper and its logistics partners. Notifications and corrective actions integrated in the SOP between all parties enable preventive or corrective measures to be taken to prevent potential temperature excursions or minimize impact of temperature excursions, thereby ensuring that the shipments are not compromised.

Figure 3: Visualisation of shipment and sub-shipment data

Over time when enhanced with business intelligence tools and machine learning, the platform could lead to a more fine-grained predictive and prescriptive decision-making on a trade lane.

Figure 4 shows how GPT can be divided into 3 releases, going from a first step where simplified excursion analysis is facilitated through increased visibility when an excursion has occurred. Based on this information, further process alignment and SOP alignment can be steered between individual participants in the process. This will lead to the availability of real-time information and linking the required actions in a second release. As soon as large sets of historical data will be available, historical performance analysis can support predictive capabilities.

This allows for lanes qualification and certification, adding to a high-quality network of pharma corridors.

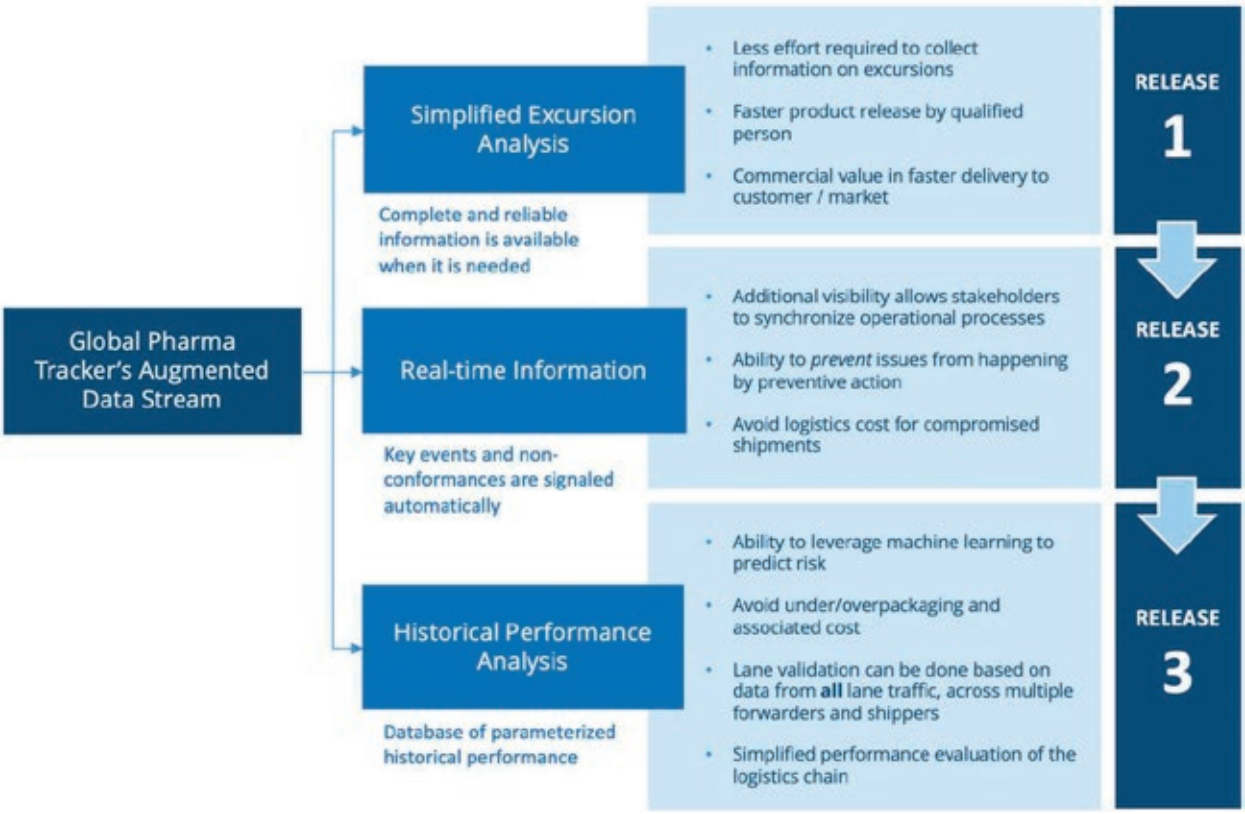

Figure 4: Progressive Business Benefits to be Realised

4. Data sharing and data security

Data sharing and data ownership

As part of the business onboarding process, a data-sharing matrix was established to detail the data ownership and data governance structure, outlining who to provide the data (the data owner) and who would have access to this data under specified conditions.

Data ownership, protection and security are key concerns for all organisations involved in the supply chain: data is an important (and often commercially sensitive) asset for every company, hence it is important to be able to control and share relevant data with only those specific organisations who are involved in a particular shipment. Data collected should also not be manipulated.

During the project, data-sharing and confidentiality agreements between each participant and the platform service provider have been put in place. These contractual agreements form the legal basis for confidentiality protection of shared data and facilitate the technical implementation of data sharing rules in the platform.

5. Business value drivers

GPT is steered by the business value drivers of each stakeholder, and addresses specific business needs for improved visibility and transparency on pharma shipments.

Pharma Shippers

Getting the pharma products to the patient on time to preserve or save lives is the top priority for shippers. Reduction of financial impact (value of lost shipments, resources spent on root cause analysis, etc.) is seen as a secondary business value driver for the pharma shippers.

Hence, shippers' principal value driver is the **ability to prevent excursions** or **respond in a timely manner**.

To achieve these value drivers following operational and technical needs are identified

- Simplify excursion analysis and reduce the cost associated with it;
- Increase the ability to intervene by providing (near-) real-time information on shipments; and
- Provide the ability to use historical performance as a predictive tool in avoiding excursions.

Airports

Airports are interested to develop niche cargo segments to diversify and grow their cargo base Pharma cargo is a specific cargo segment of interest to airports as it is a high yielding cargo and it helps to sustain flights in the airport. In addition, the ability to handle pharma shipments efficiently has become an implicit quality label for airports.

Also, it is in the interest of airports to improve the cargo handling capability within their airport community in order to maintain their competitiveness when compared to competing airports and other modes of transport.

Forwarders, airlines and ground handlers (GHA)

Forwarders are the party tasked by the shippers with the handling of pharma shipments. As such, the lack of visibility and the dependency on the partners in the airport-to-airport segments for granular data result in forwarders sharing similar business value drivers with shippers.

Both **forwarders** and **airlines** are interested in pharma shipments as it is a high yielding cargo. Also, forwarders and airlines want to be the best in class and want to comply with the requirements of the pharma shippers to be the provider of choice for their pharma shipments. The ability to handle temperature-controlled shipments efficiently is seen as a competitive advantage.

Similarly, **ground handlers** (GHA) are key stakeholders in providing fine-grain visibility into shipment transport and storage conditions under their care. The ground handlers share the objective of forwarders and airlines and see the ability to correctly handle temperature-controlled shipments as a business differentiator.

We found strong alignment among all supply chain partners on the relevant business value drivers. Individual participants to the supply chain realised that the entire supply chain is only as strong as the weakest element, and visibility is key: shippers are interested in what happens with their shipment along the entire logistics journey, forwarders and airlines are interested in what happens with their shipment as soon as it arrives at the GHA.

6. Challenges and key attention areas

Technology is not the bottleneck

A fundamental lesson is that the technology to implement GPT is currently available and capable of supporting all requirements for such a data-sharing platform, we were able to quickly integrate data from carriers, forwarders, shippers and sensor data providers

Business onboarding takes time

While there is consensus among logistics partners on the need for increased logistics visibility, the process of obtaining alignment within a participant's organization takes considerable effort.

Making the case for a collaborative, data sharing-based approach requires a strong internal sponsor who can promote the solution and will inform and convince several organisational stakeholders. This will include a strong business case, explaining the data governance framework.

Data is key

Moving beyond the airport-to-airport segment, shippers and forwarders who require visibility at the purchase order or house waybill level will also need to provide shipment aggregation details. This needs to be combined with packaging details, temperature control requirements and sensor placement details. GPT can facilitate this by providing an integration playbook for shippers and forwarders and allowing master data to be set-up for the packaging standards, SOPs, lane definitions and so on.

A solid data-sharing and governance framework

The advance availability of a clear contractual structure which includes the data-sharing and governance framework will facilitate faster completion of the necessary legal process every pharmaceutical company and logistics partner will require in order to participate to GPT. Providing clarity on this aspect in the early stages of discussions with potential participants will likely result in faster onboarding.

The (perceived) conflict between transparency and liability

Many parties still express concern over the potential increase in exposure to claims, where more transparency could lead to additional claims.

It is likely that significant steps towards full transparency will need to be matched by a review of contractual liability standards. This requires an industry-wide open debate, which should better articulate the business benefits of logistics visibility for the logistics service providers and the shippers.

Building the GPT Network

A final lesson is that building a global visibility network will require a gradual approach. The initial backbone of the GPT network will be defined by shippers who will identify their most important lanes, as well as the forwarders, carriers, ground handlers and airports that participate in implementing visibility along those lanes. Every onboarded partner will have the opportunity to leverage GPT to offer an increased quality of service for all their customers.

7. Conclusion and next steps

The GPT was presented and demonstrated to the Pharma.Aero User Board and key departments in major pharmaceuticals shippers such as Pfizer, MSD and Johnson & Johnson, which acknowledged that the GPT is a value-adding tool to their supply chain management. Shipment data (e.g. milestones and activity duration, temperature events etc.) made available in a data warehouse format allows shippers to perform analysis. With AI and machine learning, more fine- grained predictive and prescriptive decision-making on a trade lane could be achieved.

Through the successful prototype and lessons learnt from Digi 1.0 and Digi 2.0, we have demonstrated that our original project objectives were met. Based on the project results, an Early Adopter Program (EAP) for operational use is defined as a next step.

[1] According to International Air Transportation Association (IATA).

[2] The Digi1.0 whitepaper can be requested at administration@pharma.aero

[3] Brussels Airport Company (BAC) and Changi Airport Group (CAG), together with DHL Global Forwarding, Singapore Airlines and Pfizer, played a key role in the selection of the prototype lane and identification of the key players on the lane. Nallian, was selected by Pharma.Aero as IT service provider.

[4] By adapters we mean all interface capabilities, including APIs and ingestion of standard Cargo iQ messages.

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