Edition 1 – Released 6 December 2023

Guidance on **Perishable Loss Reduction** in Air Cargo

Contents

Introduction

Perishable products are often transported by air to ensure their rapid delivery, reducing transit time and minimizing the risk of spoilage, maintaining product quality, and meeting consumer demand for fresh goods. This efficient means of transport also enables access to distant markets, facilitating trade and enhancing its efficiency. This is vital for industries like agriculture, pharmaceuticals, and food, where the fast and reliable nature of air transportation plays a crucial role in preserving the quality and value of perishable goods.

In the fast-paced realm of air cargo transportation, ensuring the safe and timely delivery of perishables goods is a paramount challenge. Addressing the intricate needs of these goods demands a comprehensive understanding of the common causes of loss. Chief among these challenges are damages to the products, resulting from improper handling or inadequate packaging, which can swiftly compromise the quality and market value of perishable items. Delays, caused by several factors such as logistical hiccups or unforeseen weather conditions, further exacerbate the vulnerability of these time-sensitive goods. Additionally, transit-related issues, encompassing regulatory hurdles or miscommunication between stakeholders, pose significant risks to the integrity of perishable cargo.

Globally, one-third of the world's annual food production results in loss. It causes immense economic, social, and environmental impacts. The FAO estimates $940 billion in yearly losses, with 17% wasted during consumption and 14% lost in distribution. Developing nations suffer more due to poor infrastructure and limited investment in food systems. The UN's SDGs, particularly SDG 12 (sustainable consumption) and SDG 2 (ending hunger), with a specific focus on Target 12.3 aiming to halve global food waste by 2030 and reduce loss, offer a roadmap to combat these issues through targeted interventions and initiatives by 2030.

This guidance aims to illuminate the key strategies and best practices essential for mitigating these challenges, fostering a robust framework for reducing perishable losses in air cargo and ensuring the seamless flow of goods in the global market.

Perishable % Change

Data Month	Chargeable Weight - Market - YOY%
Jan	2.1%
Feb	1.9%
Mar	4.2%
Apr	-4.7%
May	9.5%
Jun	10.5%
Jul	9.4%
Aug	6.6%
Sep	5.3%
Oct	8.4%
TOTAL	**5.2%**

Top Regional Flows for Perishables

Origin CargoIS Region	Destination CargoIS Region
Africa	Europe
Europe	Asia Pacific
Central and South America	Europe
Europe	Middle East & South Asia
Africa	Middle East & South Asia

% Share of Top 3 Perishable Types

Commodity Item-Level	% of Total Perishable Weight 2023	% of Total Perishable Weight 2023
Fish	22.0%	21.5%
Flower	17.3%	17.9%
Fruit and Vegetables	28.9%	27.5%

Perishable % Change per Export Region

Origin Region	YOY%
Africa	8.9%
Asia Pacific	12.1%
Central and South America	7.6%
Europe	-0.6%
Middle East & South Asia	22.8%
North America	-19.2%
TOTAL	**5.2%**

Source: IATA CargoIS data (period YOY Jan-Oct 2023 vs 2022 and based on chargeable weight)

Regulatory Framework

The IATA Perishable Cargo Regulations (PCR) outline guidelines and regulations for the handling, packaging and transportation of perishable goods by air. The Regulations cover key aspects such as temperature control, packaging requirements, handling procedures, and refer to legislation and government agencies that need to be referenced for international and country specific regulations and standards. Certain responsibilities are specific to shippers and operators, who must adhere to applicable regulations at every stage of the journey – origin, transit, and destination. The shipper, originating the consignment, holds the onus of meticulously packaging, labelling, and documenting the cargo in strict accordance with both international and destination-specific standards. The operator, responsible for the physical transportation, bears the weight of guaranteeing that the chosen mode of transit aligns with regulatory requirements. At destination, both parties must seamlessly navigate import regulations, ensuring a smooth transfer of responsibility from one stage to the next. This joint commitment between the shipper and operator is instrumental in safeguarding food safety and upholding the standards that govern the global food supply chain.

As industry regulations evolve regularly, it is advisable to refer directly to the latest edition of the IATA PCR which is released on an annual basis effective 1 January.

IATA has published Recommended Practice (RP) 1693 Device Approval for Air Cargo to facilitate device usage in the industry. This RP1693 covers the requirements of both EASA (European Aviation Safety Agency) and FAA (Federal Aviation Administration, USA) for the use of cargo-tracking devices, data loggers, and electronic tags attached to or included in airfreight. This RP describes the evaluation process and includes an approval request form for the use of device onboard aircraft for air cargo to provide a list of minimum information and supporting documents to be provided by device manufacturers when requesting evaluation.

IATA has also developed a set of standards and guidance documents in the areas of track and trace and digitalization to enable and ease the use of devices for cargo interactions and data sharing: Recommended Practice (RP) 1692 IoT (Internet of Things) Data Sharing in Air Cargo and the ONE Record data exchange standard. RP1692 describes the data elements, the definitions, and the units of measurement to be used when sharing data and the integration of the data elements into the ONE Record. ONE Record is a standard for data sharing and creates a single record view of the shipment. This ONE Record standard defines a common data model for the data shared via standardized and secured web API (Application Programming Interface). The vision for ONE Record is to establish an end-to-end digital logistics and transport supply chain where data is easily and transparently exchanged in a digital ecosystem of air cargo stakeholders, communities, and data platforms.
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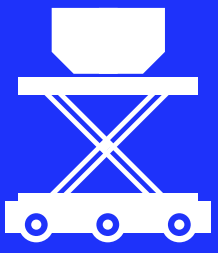
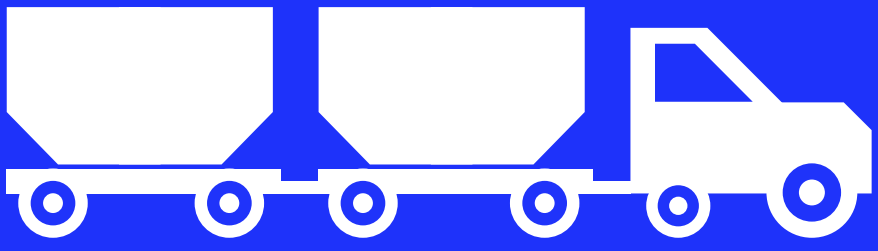




1. Damage Prevention

The integrity of perishable goods heavily relies on appropriate packaging, consistent temperature control and meticulous handling. Inappropriate packaging may lead to vulnerabilities, leaving items susceptible to impact, compression, or moisture during transportation. Temperature deviations, caused by inadequate temperature-controlled storage or fluctuating environmental conditions, can swiftly compromise the freshness and quality of perishables. Moreover, the absence of proper handling techniques exacerbates these issues, increasing the risk of damage. Mishandling, whether through rough loading/unloading procedures or improper stacking, as an example, can result in crushing, bruising, or spoilage of delicate perishable goods. These interconnected factors underscore the critical need for stringent protocols and awareness among transportation personnel, ensuring the safe handling and transport of perishable items through the air cargo supply chain.

Airline Example (Europe)

Estimated value of perishables loss:

USD 5.4 million

Claims paid:

USD 700,000

Perishable claims vs other:

26%

Claims classified as damaged:

70%

1.1 Packaging strategies to minimize physical damage

Appropriate packaging is essential to safeguard perishable goods during air transport. Customizing packaging based on the specific requirements for different perishables items, considering their size, shape, and susceptibility to damage, ensures tailored protection and minimizes physical damage during transport. Once commodity-specific needs are assessed, it is easier to determine which appropriate materials may be required to ensure their quality and shelf-life. Sturdy, impact-resistant materials such as cardboard or plastic crates are such examples. These materials provide a protective barrier against external pressure and minimize the risk of crushing during handling. Additionally, employing shock-absorbing materials like foam inserts or bubble wrap within the packaging can cushion delicate items, reducing the impact of bumps or jolts throughout the journey.

Furthermore, using proper insulation materials helps to regulate temperature. Thermal liners or insulated wraps can create a temperature-controlled environment within the packaging, preventing temperature fluctuations which can result in spoilage. Sealable plastic bags or airtight containers are also valuable to prevent moisture infiltration, especially for fruits, vegetables, or other moisture-sensitive items.

EXAMPLES OF SPECIFIC PACKAGING REQUIREMENTS

Insulation: Packaging should provide thermal insulation to regulate temperature and protect against temperature fluctuations, especially for products sensitive to heat or cold.

Ventilation: Some perishables, like fresh produce, benefit from proper ventilation to prevent ethylene buildup and maintain optimal freshness.

Absorbent Sheets: For products with liquid content, absorbent sheets help manage spills and leaks, maintaining the integrity of the package.

1.2 Handling guidelines to reduce the risk of damage

Labeling packages with clear instructions, including fragile or perishable labels, alerts handlers to the sensitivity of the contents prompting proper handling and any necessary precautions to be taken. Proper documentation in general is essential to track the handling process. Perishable shipments should be labeled with the IATA perishable label, which was created to provide a standardized and recognized way of communicating essential information about goods and enhancing visibility, appropriate handling and compliance with international guidelines and regulations.

To further minimize the risk of damage to perishable goods during transport, adherence to handling procedures and requirements is essential. Personnel involved in the handling process should receive proper training to understand the specific needs of perishable commodities. This training should encompass techniques for careful loading, unloading, and stacking of goods, emphasizing gentle handling to prevent bruising and crushing.

Additionally, implementing a robust inspection system is vital. Regular checks should be conducted to identify any packaging defects, temperature inconsistencies, or signs of damage. Goods should be inspected before and after loading onto the aircraft to ensure they are in optimal condition for travel.

Maintaining a controlled environment is another key requirement. Storage areas and transportation vehicles should be equipped with temperature and humidity control systems, ensuring that perishable items are kept within the specified temperature range throughout the journey. Monitoring devices, such as data loggers, can be utilized to track temperature variations in real-time, allowing for immediate corrective actions if deviations occur.

Collaboration between all parties involved, including suppliers, transporters, and receivers, is vital. Clear communication channels should be established to convey specific handling instructions and address any concerns promptly. By following these handling procedures and requirements diligently, the risk of damage to perishable good during air transport can be significantly reduced.

1.3 Implementing real-time tracking and monitoring solutions

In line with the increasing priority of sustainable supply chain operations, the efficient transportation of perishable goods is more crucial than ever. The most frequent factors contributing to damage during transportation and storage are connected to temperature deviations and humidity requirements. Perishable loss can result in significant economic and environmental consequences. The integration of technology and enhanced collaboration among transport chain stakeholders enables pathways to transport perishables in a more sustainable manner and minimize loss.

One fundamental aspect of damage prevention for perishable goods is the precise control of location, temperature, and humidity throughout the entire duration of transport.

The introduction of cargo devices and Global Positioning System (GPS) technologies has made real-time tracking and monitoring a reality. These solutions offer continuous insights into the location, temperature, and humidity of goods during transit. Let any deviation from the required conditions occur, immediate alerts are triggered for corrective actions. The use of devices and sensors can be employed in three distinct locations: attaching devices to shipments to monitor their condition, using sensors in warehouses to screen environmental conditions and within the aircraft to capture information on the conditions of both the shipment and the cargo hold.

By attaching tracking and monitoring devices to the shipment, instantaneous information is available about temperature and humidity of sensitive shipments throughout the whole transport chain journey, including real - time environmental conditions and alerts for temperature or humidity deviations.

In addition, use of sensors for monitoring conditions shall be extended to capture information about the environment within the facilities, as shipments are moved through the warehouse. This can provide additional insights about the conditions that may affect the shipment and support avoidance of potential damage.

Ideally, the conditions tracked and monitored during transport of the shipment shall also be captured while the goods are in flight. The revolution in connectivity has reached the field of aircraft manufacturing as well, in the form of the connected aircraft and major airplane manufacturers are working with different players of the transport chain to define new innovative aircraft features that would further enhance stakeholder communication and improve productivity of the transport ecosystem.

2. Mitigating Delays

2.1 Efficient loading and unloading practices

Adhering to required handling practices contributes to reducing damages, but also has a significant impact on mitigating delays. Certain commodities may have specific loading needs, such as stacking requirements which should be observed. Stacking requirements include (but not limited to) placing large or heavy pieces on the bottom, load light, fragile and perishable pieces on top, ensuring segregation of cargo loaded into suitable ULDs (Unit Load Device) according to loading instructions, and always following the instructions of orientation label. The appropriate sequence of procedures should be followed, and the commodities loaded as per the load plan to save precious time and prevent potential damages. Any discrepancies can result in delays and shipments may be offloaded at the last minute.

2.2 Identifying bottlenecks causing delays in the supply chain

Identifying bottlenecks in the air cargo supply chain for perishable transport involves analyzing various stages of the process. Common methods include tracking shipment data, conducting time-motion studies, and collaborating with stakeholders. Known bottlenecks in perishable transport can include inadequate storage facilities, limited transportation options, inefficient handling processes, regulatory hurdles, and unpredictable weather conditions.

2.3 Optimizing routing and scheduling for timely deliveries

Several strategies can be implemented, such as:

1. **Real-time tracking**: implementing advanced tracking systems to monitor shipments in real-time. This allows for immediate responses to any delays or issues that may arise in transport.

2. **Data analysis**: Analyzing historical data to identify the most efficient routes and scheduling patterns. Machine learning algorithms can help predict potential delays and optimize routes based on several factors, such as weather conditions and flight traffic.

3. **Collaborative planning**: Collaborating closely with the rest of the supply chain, particularly producers, suppliers, and transportation partners to align schedules. This ensures smooth coordination between different stakeholders involved in the supply chain.

4. **Dedicated perishable cargo handling**: Airlines should have dedicated facilities and specialized staff for handling perishable goods. These facilities should be equipped with proper temperature and humidity control to maintain the quality of the commodities.

5. **Priority boarding and unloading**: Providing priority boarding and unloading for flights carrying perishable commodities minimizes the time perishable goods spend on the ramp, reducing the risk of spoilage.

6. **Alternative routes**: Having contingency plans and alternative routes in place in case of unexpected events like adverse weather conditions or airspace closures. Being able to quickly switch to an alternative route can prevent significant delays.

7. **Regulatory compliance**: Staying up to date with regulations and compliance requirements related to perishables goods transportation is essential, particularly regarding required documentation. Adhering to these regulations ensures smooth customs clearance and avoids unnecessary delays.

8. **Collaboration with logistics partners**: Working closely with logistics partners and third-party providers to optimize the entire supply is key. Efficient coordination between airlines' ground transportation, and storage facilities is essential for timely deliveries.

9. **Continuous improvement**: Regularly review performance metrics and customer feedback to identify areas of improvement and refine the routing and scheduling processes continuously.

By integrating these strategies and technologies, airlines can optimize their routing and scheduling processes, ensuring timely delivery of perishable commodities while maintaining their quality and freshness.

Airline Example (North America)

Estimated value of perishables loss:

USD 700,000

Claims paid:

USD 80,000

Perishable claims vs other:

40%

Claims classified as damaged:

73%

Claims classified as loss:

22%

3. Enhancing Transit Operations

It is imperative to thoroughly review the export regulations of the originating country, transit rules for the country of transit, and import regulations of the destination country when making a booking. Airlines face multiple embargoes due to several factors like country restrictions, customs limitations, aircraft constraints, and ground handling agent restrictions, among others. These embargoes, whether temporary or permanent, can significantly impact outbound, inbound or transit movements.

The forwarder initiates comprehensive planning to fulfil the shipper's commitments. This includes selecting appropriate carriers, considering transit times, and meeting specific shipper requirements. The entire journey must be reserved and confirmed before the cargo is accepted for carriage. This confirmation should adhere to standard deadlines at departure stations and ensure sufficient transit time at transit stations. Special cargo requirements, such as the availability of storage facilities at the final destination, must be verified through station information. For interline shipments, confirmation from transit stations and connecting carriers is essential.

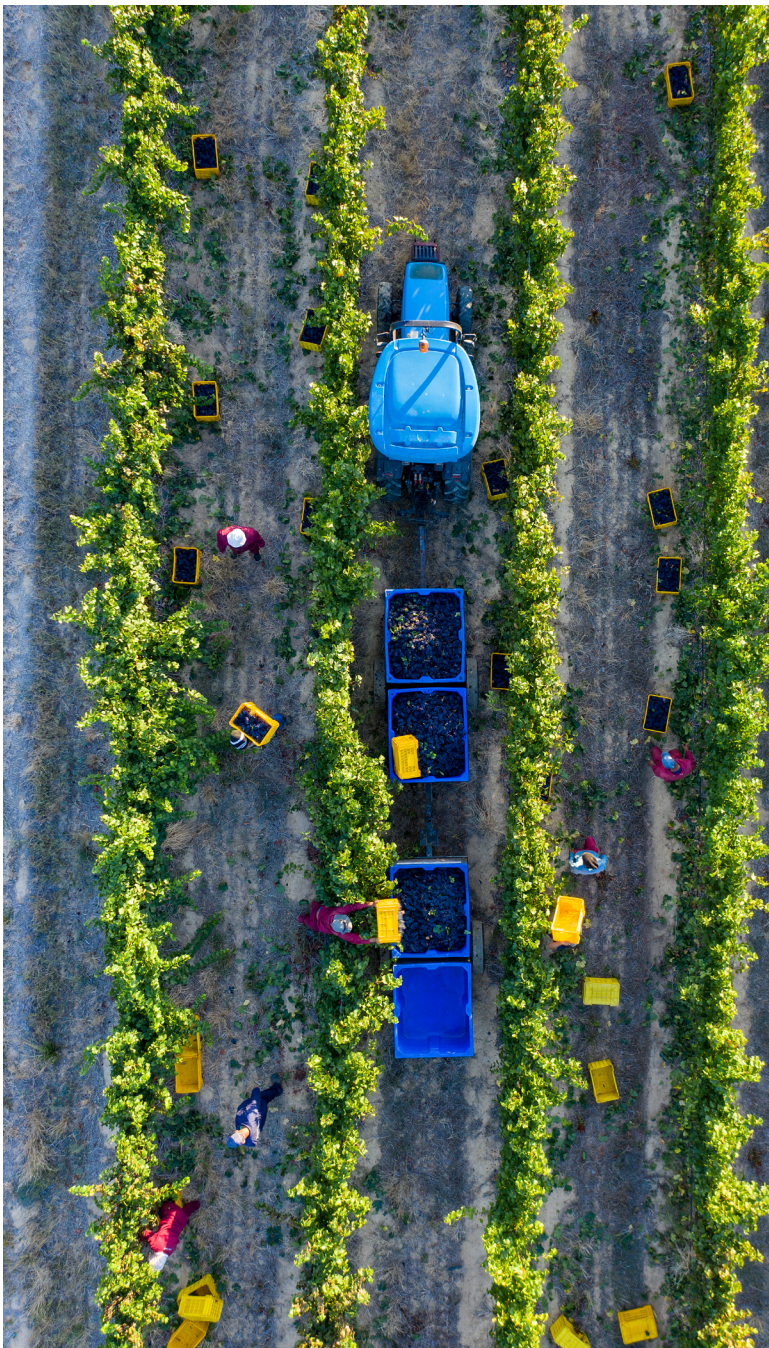
The carrier will confirm the requested capacity based on planned flights or within the requested transit time for non-flight specific products by sending a booking confirmation (BKD). It is crucial to complete the consignee field of the electronic air waybill accurately. Insufficient or inaccurate information in this field may lead to non-acceptance of the shipment at the origin, longer transit times, or delays in delivery at the final destination.

3.1 Role of technology in improving transit conditions

A variety of systems and platforms are used to simplify and enhance the transit process, beyond those regularly used for shipment tracking. For instance, cloud-based platforms store and process vast amounts of data related to perishable shipments. This data can be accessed by various stakeholders, allowing for seamless collaboration and decision-making.

Airline and logistics providers also frequently offer mobile applications which allow customers to track their shipments in real-time. These apps provide timely updates, enhancing customer satisfaction and allowing them to plan accordingly based on the perishables' status.

Predictive analytics, algorithms forecast demand, transit times, and potential delays. By analyzing these predictions, airlines can optimize routes, scheduling, and inventory levels, ensuring perishables are transported efficiently. By implementing such technologies, airlines can improve transit conditions and enhance visibility, control, and coordination, leading to more reliable and efficient transportation of perishable goods.



3.2 Collaboration between supply chain stakeholders

Regarding the use of tracking and monitoring devices, data capture is only the start of ensuring damage prevention. Capturing data does not result in the desired outcome without sharing the information safely and efficiently. Currently, even if shipment information is captured, it stays with the shipper instead of being transmitted to the relevant parties in the supply chain. To best use the collected shipment information for loss prevention, structured collaboration of the stakeholders - including shippers, carriers, and other players - is a prerequisite. Technology facilitates this collaboration by enabling data sharing and real-time communication to ensure that each relevant stakeholder in the transport chain has access to up-to-date information and can use data to make informed decisions to prevent damage.

Overall, data standardization and data collaboration are essential trends that enable companies to streamline operations, enhance quality control, and ensure the safe and efficient transportation of time and temperature sensitive products. The use of tracking and monitoring devices and ONE Record provides the tools and framework to ensure collection and distribution of cohesive and seamless status data autonomously, this way ensuring the handling of shipment in the required environment, delivery by the requested time and notifications to responsible parties to prevent any potential occurrences; hence significantly contributing to reducing the risk of perishable goods spoilage and loss during transportation, enhanced end-to-end visibility and increased efficiency.

To ensure industry collaboration, stakeholders across the air cargo supply chain must move away from bilateral relationships and start to foster multilateral partnerships. This will ensure that all parties involved are aware and understand what is at stake, learn from each other, establish best practices, align priorities and processes as well as make better use of the information in the segment in which they are operating. The air cargo industry is playing a key role in facilitating this global challenge while instilling public trust and confidence that air transport provides a safe, reliable, and trusted force multiplier.

There are several scenarios that stakeholders in the supply chain are currently exploring and implementing. We encourage evaluations of possible scenarios be done taking into consideration the need for a risk-based approach during the process.

FOUR CONCRETE STEPS TO PREVENT PERISHABLE LOSS

Are you in compliance? Your organization and staff must be trained and up-to-date on all regulatory requirements at origin, in transit and at destination.

Ensure that the required equipment and infrastructure are available to effectively conduct perishable handling and transportation operations.

Engage with your community and the wider supply chain to share best practice and improve the performance and productivity of your organization.

Contribute to standard-setting activity to support the industry in aligning and moving forward with efficient practices.

4. Case Studies

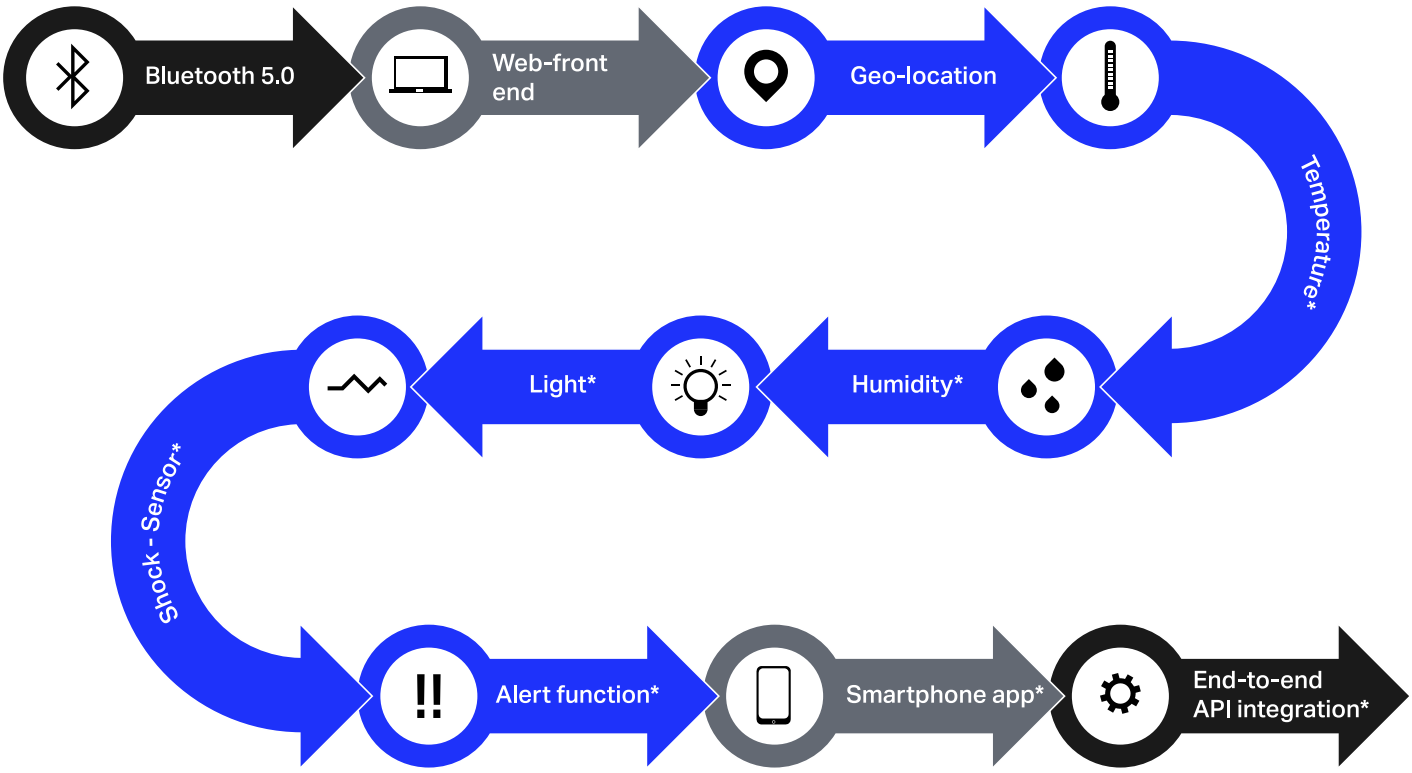
4.1 Unilode

To foster the digitalization of the air cargo industry, Unilode is building a global reader infrastructure in cooperation with its partners to provide a framework for the transport chain stakeholders to guarantee safe and efficient delivery of time and temperature sensitive shipments.

Unilode has a fleet of 160,000 ULDs, with 130,000 of them equipped with Bluetooth tags providing advanced tracking capabilities. The multi-sensor technology of Unilode's Bluetooth tags enables the monitoring of location, temperature, humidity, light and shock, helping to create end-to-end transparency for the air cargo transport chain and gain better control over sensitive shipments, such as perishables.

To support data collection from the tags that are installed within the ULDs, Unilode has also installed a network of 750 readers at key airports which provide visibility for approximately 90% of its entire ULD fleet. The fixed readers provided by Unilode are small, have a long-range Bluetooth antenna up to 400m radius, battery back-up for up to 30 days, humidity protection, built-in GPS and data transfer through GSM/LTE/5G Cellular networks.

These technologies support near real-time data collection (customizable up to 15 minute increments) during the entire transport chain, including even during flight (when readers are installed on the aircraft). The data captured from sensors provides a wide range of information including location, temperature, shock detection and light exposure, information that is essential to ensure smooth transport of perishable.



IATA Pipeline of Initiatives Supporting Standard Development, Sustainability, and Innovation in Perishables

STANDARDS & REGULATIONS

Perishable Cargo Regulations (PCR)
The Perishable Cargo Regulations manual is an essential reference guide for all parties involved in the packaging and handling of temperature-sensitive products.

Perishable Cargo Working Group (PCWG)
The air cargo industry is working to speed up its efforts to reduce perishable loss during storage, handling, and transportation, contribute to economic growth and achieving global access to perishables. To that end, the IATA Perishable Cargo Working Group is working to map the supply chain and analyze where plastic waste occurs today, identifying solutions and prioritizing them.

IATA Cargo Handling Manual (ICHM)
Describes industry best practices, aligned to the Industry Master Operating Plan and international regulations and standards, ICHM is the first complete set of standards covering the operational activities of all stakeholders in the supply chain.

TRAINING

Perishable Cargo Transportation
Gain the knowledge required to ship perishable goods safely and how to comply with the industry standards.

Perishable Cargo Logistics Management
Learn how to use IATA's Perishable Cargo Regulations (PCR), explore the HACCP methodology and learn how to use the IATA CEIV (Center of Excellence for Independent Validators) fresh audit checklist to implement it in your organization.

PROJECTS

ONE Record
A standard for data sharing and creating a single record view of the shipment. This standard defines a common data model for the data that is shared via standardized and secured web API.

Interactive Cargo
Developing the relevant standards and guidelines (piece-level tracking, real-time notification, and use of connected devices) to enable cargo to talk!

PRODUCTS & SERVICES

CEIV Fresh
Applying excellence in perishable logistics by ensuring standardized and efficient processes and operations throughout your company.

Smart Facility Operational Capacity Certfication (SFOC)
Creating transparency in cargo handling services and their quality, as well as enhancing handling capabilities to a consistently high standard across the industry.

ONE Source
The online industry platform for validated aviation capability and infrastructure information.

OTHER RESOURCES

Whitepaper: Perishables Logistics and Air Transport
How to Ship Perishable Goods by Air
How to Avoid the Loss of Perishable Goods When Shipping by Air
Sustainability Considerations for Perishable Cargo Transportation

Do you wish to contribute to the development of standards, training and sustainable practices in the areas of the perishable cargo handling and transportation? **Submit your interest to join the Perishable Cargo Working Group (PCWG)** by contacting the IATA Secretariat at **larper@iata.org**