White Paper

The Cargo Facility of the Future

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World air cargo traffic is forecast to increase dynamically, with the annual growth rate over 4% in the next 20 years. In that, air freight is projected to grow at a rate of 4.3% per annum while airmail will grow at an average rate of 2%.

20%
e-commerce annual growth

Air cargo market is and will be significantly stimulated by the boom of e-commerce, with its market size forecast to increase 20% per annum during the next five years, to about $5 trillion in 2021.

More special commodities, less letters, more parcels, more periods of high demand… illustrates a shift in the type and volume of goods handled through cargo facilities. **Transportation of letters decreased from 340 to 328 billion globally, whereas the number of postal parcels grew from 6.7 to 7.4 billion.**

Shippers, freight forwarders and logistics providers increasingly demand or expect excellence, simplicity, traceability, transparency and speed.

Regulations impacting air cargo will continue to increase, though ideally, they will be smart, balanced and data driven.

Air cargo will continue to evolve, cargo facilities must keep pace

Economic outlook, increasing customer expectations and changing regulations are redefining the handling, storage and distribution of goods transported by air which consequentially impacts cargo facilities. Changes are therefore needed in business models, architectural and process designs, deployed technologies and workforce skillsets.

Many facility operations will become automated by **2030**

Fully automated high-rack warehouses, automated and green vehicles navigating autonomously through the facility, employees equipped with tools, including Artificial Intelligence (AI) and Augmented Reality (AR), empowering them to be more efficient – the next generation of technology-enhanced cargo facilities will boost productivity, operational efficiencies and increase responsiveness to customers.
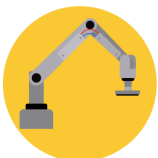
The cargo facility of the future will be safe and secure, green, automated, connected and smart. This will ensure the cargo facility of the future is fit for purpose in size, location and for the people who use it

Six technology trends revolutionizing air cargo facilities
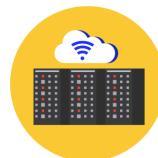

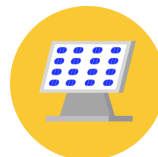**AUGMENTED REALITY AND WEARABLES**

ROBOTICS AND AUTOMATED SYSTEMS

IOT, CONNECTED CARGO AND DEVICES

DRONES AND AUTONOMOUS VEHICLES

BIG DATA / PREDICTIVE ARTIFICIAL INTELLIGENCE / DEEP LEARNING

GREEN, SUSTAINABLE, NET ZERO BUILDINGS

The Cargo Facility of the Future will be…

Safe and Secure

The cargo will be secured upstream with a combination of technology and data used to confirm security status throughout the process up to and within the facility. When necessary, extra controls will be flagged and planned accordingly.

Screening equipment onsite will be designed specifically for air cargo and integrated into the process, so that no additional steps or touch points are required.

Information gained from screening will be used to automatically validate available booking data and scanned shipment documentation to ensure conformity of the cargo.

Molecular screening will be capable of processing all commodities including lithium batteries, live animals and pharmaceuticals and will perform multiple actions such as security screening, commodity specific identification, safety checks in a fast and lean process. This will allow for the identification of drug integrity, potency as well as identification of live animal species but also the detection of prohibited materials such as illegal ivory artifacts at interfacing points in the supply chain.

Green

Environmental stewardship will be as important as safety and security. With the appropriate policies, strategies and shared best practices, cargo facilities will contribute to aviation's overall environmental impact reduction targets, such as carbon neutral growth by 2020 and halving net emissions by 2050 based on 2005 levels.

Emissions will be reduced via progressive fleet modernization, use of zero or low emission alternatives such as electric vehicles and solar panels, and operational efficiencies. Water and land use will be optimized, waste will be efficiently managed through the "reduce, reuse, recycle" waste hierarchy. Where possible, potable water use will be replaced with water from other sources including rain water from roofs and tarmac, treated waste water and recycled cooling water.

Green facilities will protect their owners from traditional energy price increases and carbon emission taxes/penalties, resulting in overall cost reductions.

Single-use plastics, such as shrink wraps, protective covers will be replaced with suitable alternatives whose total impact assessment lowers the footprint while maintaining efficiency.

Automated
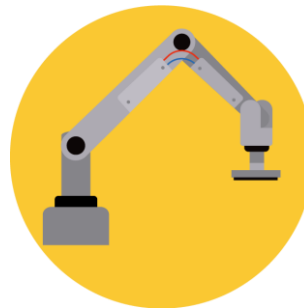
Automation will be taken to new heights with autonomous vehicles, robotic systems and drones, allowing operations to accomplish more each day. Productivity, precision and quality will be enhanced, process waste removed, and speed increased.

Autonomous material handling equipment will weigh, dim, take acceptance photos and automatically move the cargo to the next location. Drones will manage automated sorting and inventory management. Automated build-up and break-down of cargo will be performed by robotic systems.

Robots will also eliminate human tasks that are dangerous, repetitive or tedious, such as dealing with toxic spillage, handling over-sized or extremely fragile cargo.

Replacing the storage rack function (i.e. a buffer) with automated lift devices, or automated storage and retrieval (AS/RS) devices allows for the racks to be closer together, as well as frees up time for personnel to continue the tasks still being performed by humans.

Robots then work alongside the human, not just to help the robots learn the tasks, but also to supplement where the robot is less efficient and vice-versa. The added benefit is the ability to reduce the horizontal footprint thorough these efficiency gains. Augmented Reality will reduce errors, improve processing times, improve user/ worker

satisfaction and reduce training and ongoing competency assessment burdens.

Connected

Identifying, tracking, monitoring, interacting with everything, everyone and everywhere in the warehouse will be made possible by the use of mobile and connected devices, sensors and data loggers combined with the Internet of Things.

Sensors will capture and display transport and handling information as well as required electronic documentation. The status of assets, commodities, parcels, environmental conditions, locations and people will be monitored throughout the journey and made available in real-time to all required systems and handling staff via AR devices. Cargo will be interactive!

Smart

Data collected from sensors, electronic documents, screening methods or captured from oral discussions within the facility will be processed and consumed by AI-based systems, providing tools to empower human workers to be more efficient.

AI analysis results will then be fed back to warehouse management systems, voice-controlled assistants or smart glasses in order to optimize the facility operations and asset utilization overall for human comfort and energy efficiency.

"Internet of Cargo" in the facility will contribute to internal process optimization, better predictability of maintenance needs for the handling equipment and improvement of employees' health and safety; overall resulting in cost reductions.

With connected and smart facilities, customers will be more engaged, receive greater transparency on the services offered, benefit from complete traceability and will interact in real-time when necessary. This will ultimately help increase their overall satisfaction.

Deep learning could also be used to train a combined AI and AR system to recognize more complex scenarios or operations. A view of special loads to be shipped, for example, could suggest a securing approach to staff, with instructions, tests, and approved tolerances immediately pinpointed on the image.

IATA's role to drive innovation in operational efficiency

IATA is the trade association representing approximately 275 commercial airlines worldwide, accounting for more than 83% of total air traffic. IATA's mission is to represent, lead and serve the airline industry.

Air cargo represents more than 35% of global trade by value. When it comes to combined passenger and cargo airlines, the cargo business generates 9% of airline revenues on average, representing more than double the revenues from the first-class segment.

To support this critical business, IATA is committed to deliver enhanced value for the industry by driving a safe, secure, profitable and sustainable air cargo supply chain.

IATA develops global standards and tools, offers financial services and industry solutions, drives transformation projects, creates partnerships and runs campaigns, advocacy and outreach activities.

IATA is driving change in the air cargo industry by simplifying the business and helping make air cargo easier, faster and smarter. Our objective is to strengthen today with a portfolio of transformational projects and build

tomorrow with a framework to foster longer-term innovation for the benefit of the IATA member airlines and the air cargo industry through:

- White papers to inform readers concisely about a complex issue and present IATA's positions and recommendations on the matter.
- The IATA Air Cargo Innovation Awards organized every two years to support innovative ideas.
- Innovation groups and events with air cargo decision makers, investors, customers to shape the industry's future.

Like many other industries, aviation tends to focus on addressing immediate challenges, as opposed to engaging in deep reflection as to what the future holds and how it might affect the industry or particular airlines.

While the future is unpredictable, there are steps we can take to be better prepared for what it may bring. With its framework to drive innovation, IATA wants to equip its member airlines and the air cargo industry with insights and tools each individual commercial player can add to their strategic thinking to gain a competitive edge.

IATA's pipeline of initiatives supporting innovation in cargo operations

EXPLORATORY WORK

FACE Vision 2030

A white paper produced by the future air cargo leaders, the FACE community, to make their voice heard on their long-term vision for the industry.

Air Cargo and e-Commerce Enabling Global Trade

A white paper on how the air cargo industry is addressing e-commerce, and IATA's role driving these initiatives.

Innovative screening technologies

Encouraging the development of new cost-efficient equipment and methodologies to automatically screen all types and all sizes of goods, including dangerous goods, which are simple to build into operation and complying with regulatory certification.

Drones for tomorrow's air cargo

Developing the relevant standards, guidelines and partnerships for the safe integration of this new branch of civil aviation into the commercial air space to open new opportunities for the air cargo industry.

NEXTT

New Experience Travel Technologies (NEXTT) is a joint IATA and ACI initiative to develop a common vision to enhance the on-ground transport experience, guide industry investments and help governments improve the regulatory framework.

Automated vehicles at airports

A paper exploring the transformative potential of the use of automated vehicles at airports.

Augmented Reality in Air Cargo Proof of Concept

A proof of concept trial to show that augmented reality can work to reduce errors, improve processing time and improve worker satisfaction.

Smart ULD

Encouraging development of next-generation, smart, connected ULDs to serve the air transport industry.

PROJECTS

Smart Facility

Creating transparency in cargo handling services and their quality, as well as enhancing handling capabilities to a consistently high standard across the industry.

Interactive Cargo

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

Cargo & mail IT systems mapping

Bringing together the two different systems to comply with regulatory and operational requirements in an efficient and automated way without disrupting the flow of goods.

PRODUCTS & SERVICES

DG AutoCheck

IATA's new dangerous goods acceptance check validation tool that takes all the regulations, rules, best practices and guidance contained in the IATA Dangerous Goods Regulations (DGR) and converts them into an automated compliance solution.
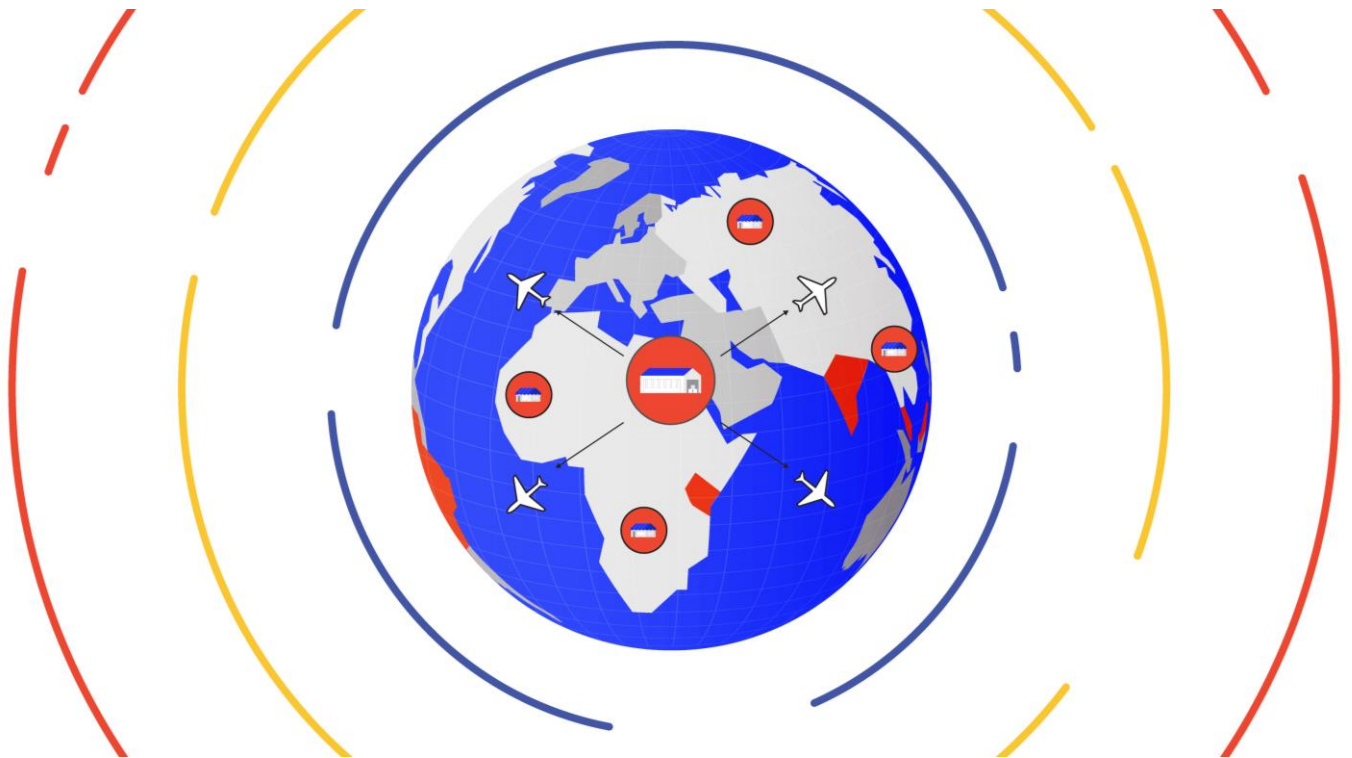
RampVR

The aviation industry's first virtual training platform for ground operations, RampVR allows participants to experience a variety of scenarios in different operating conditions, using high-spec virtual reality technology.

IATA Cargo Handling Manual (ICHM)

Describing 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.

www.iata.org/cargo-facility