

# Unlock the future of Cargo Digitalization

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# Evolving Forces Shaping Facility Transformation

- **Young Talent:** Demand for tech-driven workplaces attracts new professionals
- **Sustainability:** Reduce environmental impact; investors demand ESG reporting
- **Climate Resilience:** Be able to withstand extreme weather and rising temperatures
- **E-Commerce Boom:** Fast delivery expectations drive automation in sorting and tracking
- **High-Growth Segments:** Pharma, luxury goods, and live animals require specialized handling and security

# Cargo Facility of the Future vision

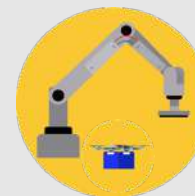
The cargo facility of the future will be **safe** and **secure**, **sustainable**, **automated**, **connected**, and **smart**.

This will ensure it is fit for purpose in size, location and for the people who use it.



## Six technologies revolutionizing air cargo

AI





# Industry solutions

## Instant cargo dimensioning



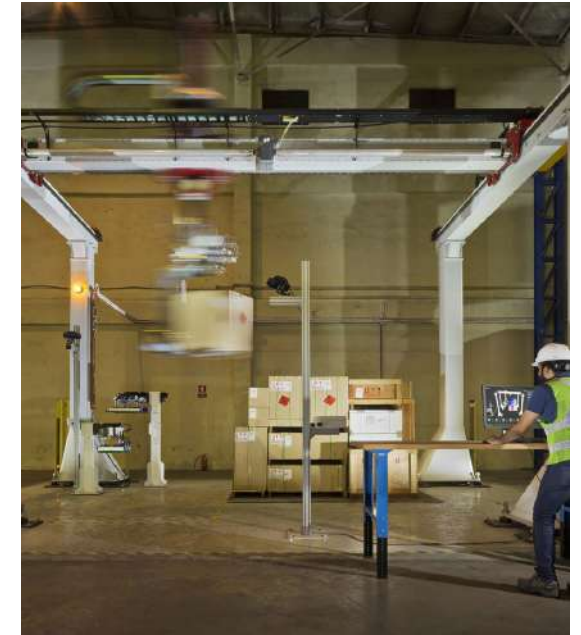
## Real time capacity optimization engine



## Sustainability-focused innovation



## End-to-end automation



# 2025 Technology Trends Survey

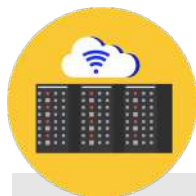


# 2025 Technology Trends

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## ARTIFICIAL INTELLIGENCE

Artificial intelligence  
API Technology  
Cloud computing  
Computer vision  
Predictive / Advanced Analytics



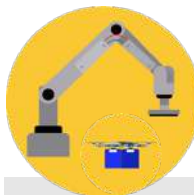
## DIGITAL PROCESSES

Advanced Self-Service Technologies  
Robotic Process Automation



## SUSTAINABLE OPERATIONS

Bio-based materials  
Energy-efficient infrastructure  
Energy generation on site  
Advanced packaging solutions  
Zero Emission Vehicles



## ROBOTICS

Unmanned Aerial Vehicles  
Automated Guided Vehicles  
Autonomous Mobile Robots  
Stationary robotics  
Collaborative Robots



## WEARABLES

Extended Reality  
Wearable devices  
Exoskeletons



## VISIBILITY & TRANSPARENCY

Connected devices  
Radio Frequency Identification (RFID)  
Real-Time Transportation Visibility  
Platforms  
Smart Labels



# AI Artificial Intelligence

## Artificial Intelligence

AI simulates human intelligence in machines, enhancing air cargo with predictive maintenance, robotics, space optimization, dynamic scheduling, anomaly detection, and real-time tracking.

## API Technology

APIs enable seamless communication, real-time tracking, and integration in air cargo, improving booking, customs, capacity, and IoT data sharing

## Cloud Computing

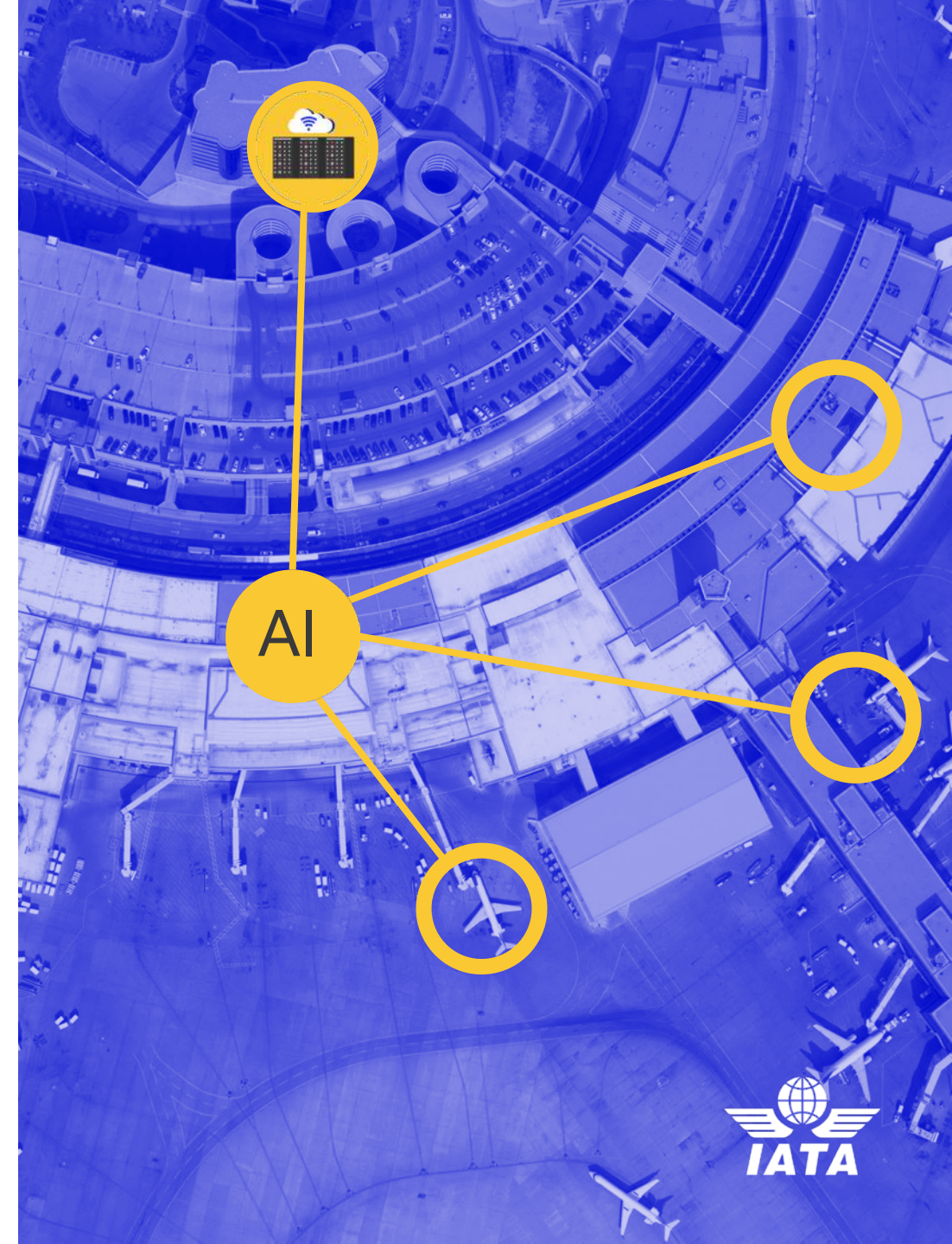
Cloud computing enables scalable, cost-effective data management, real-time tracking, collaboration, capacity planning, disaster recovery, and API/IoT integration.

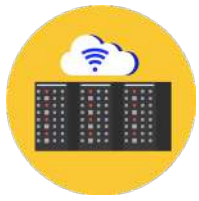
## Computer Vision

Computer Vision (CV) automates inspection, cargo identification, and workflow monitoring, enhancing damage detection, threat analysis, real-time tracking, and quality control.

## Predictive & Advanced Analytics

Advanced analytics use AI and ML to optimize operations, improve efficiency, forecast demand, optimize routes, enable dynamic pricing, predict maintenance, and analyze customer behavior.





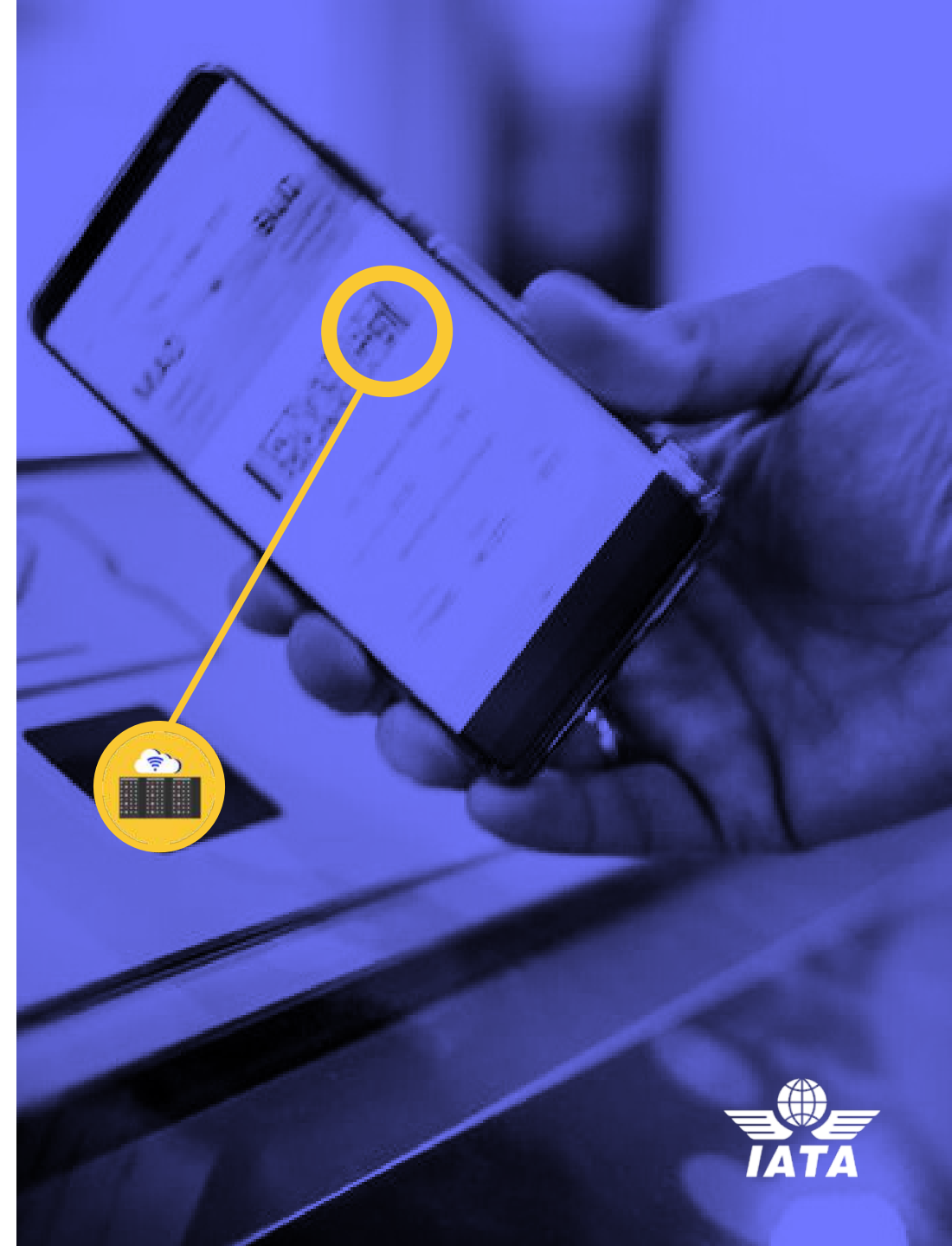
# Digital Processes

## Advanced Self-Service Technologies

Advanced self-service tech in air cargo includes self-service kiosks, online booking, document scanning, automated payments, and driver apps.

## Robotic Process Automation

RPA automates data entry, booking management, inventory updates, invoice processing, customer service, and exception handling, reducing errors and improving efficiency.





# AI Sustainable

## Bio-Based Materials

Derived from renewable resources like plants and biopolymers, they reduce plastic waste, lower environmental impacts in construction, and minimize non-recyclable packaging waste.

## Energy-Efficient Infrastructure

Energy-efficient infrastructure minimizes energy consumption with optimized insulation, passive solar design, smart building controls, and high-efficiency HVAC systems.

## Energy Generation On-Site

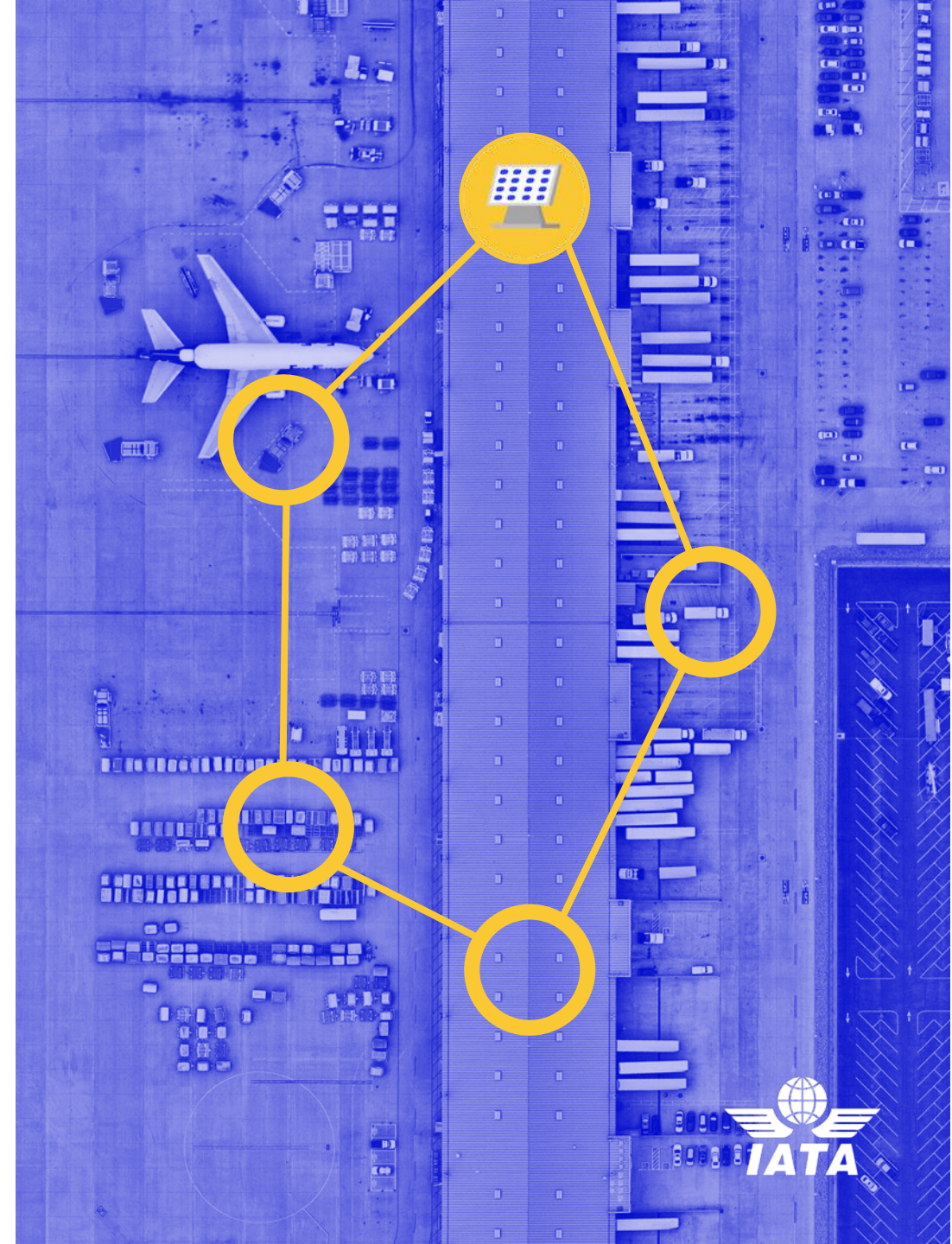
On-site energy generation uses solar panels, wind turbines, and CHP systems to reduce grid reliance, enhance sustainability, store excess energy, power EVs, and provide backup power.

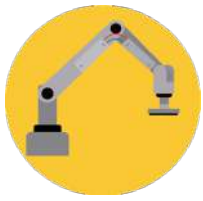
## Advanced packaging solutions

Next-gen packaging uses reusable, biodegradable, and smart materials to enhance protection, sustainability, and efficiency, with sensors for condition monitoring.

## Zero-Emission Vehicles

ZEVs in air cargo reduce emissions using electric or hydrogen power for GSE, last-mile delivery, forklifts, and refrigerated vehicles.





# Robotics

## Unmanned Aerial Vehicles

Drones enable fast, flexible, cost-effective transport, last-mile delivery, inter-hub transport, facility inspection, inventory management, emergency logistics, and security surveillance

## Automated Guided Vehicles

AGVs automate tasks, transporting ULDs, streamlining warehouse operations, optimizing space, moving cargo, ensuring temperature control, and enabling dock-to-aircraft delivery.

## Autonomous Mobile Robots

AMRs dynamically transport cargo, optimize picking and sorting, handle temperature-sensitive shipments, track inventory in real time, and move cargo across terminals.

## Stationary Robotics

Stationary robotics automate scanning, sorting, palletizing, loading, and unloading, improving efficiency, safety, and accuracy in handling cargo and managing facilities.

## Collaborative Robots

Cobots assist humans with repetitive tasks, sort packages, perform quality checks, scan barcodes, apply labels, securely package items, and help with training and onboarding.







# Wearables

## Extended Reality (XR)

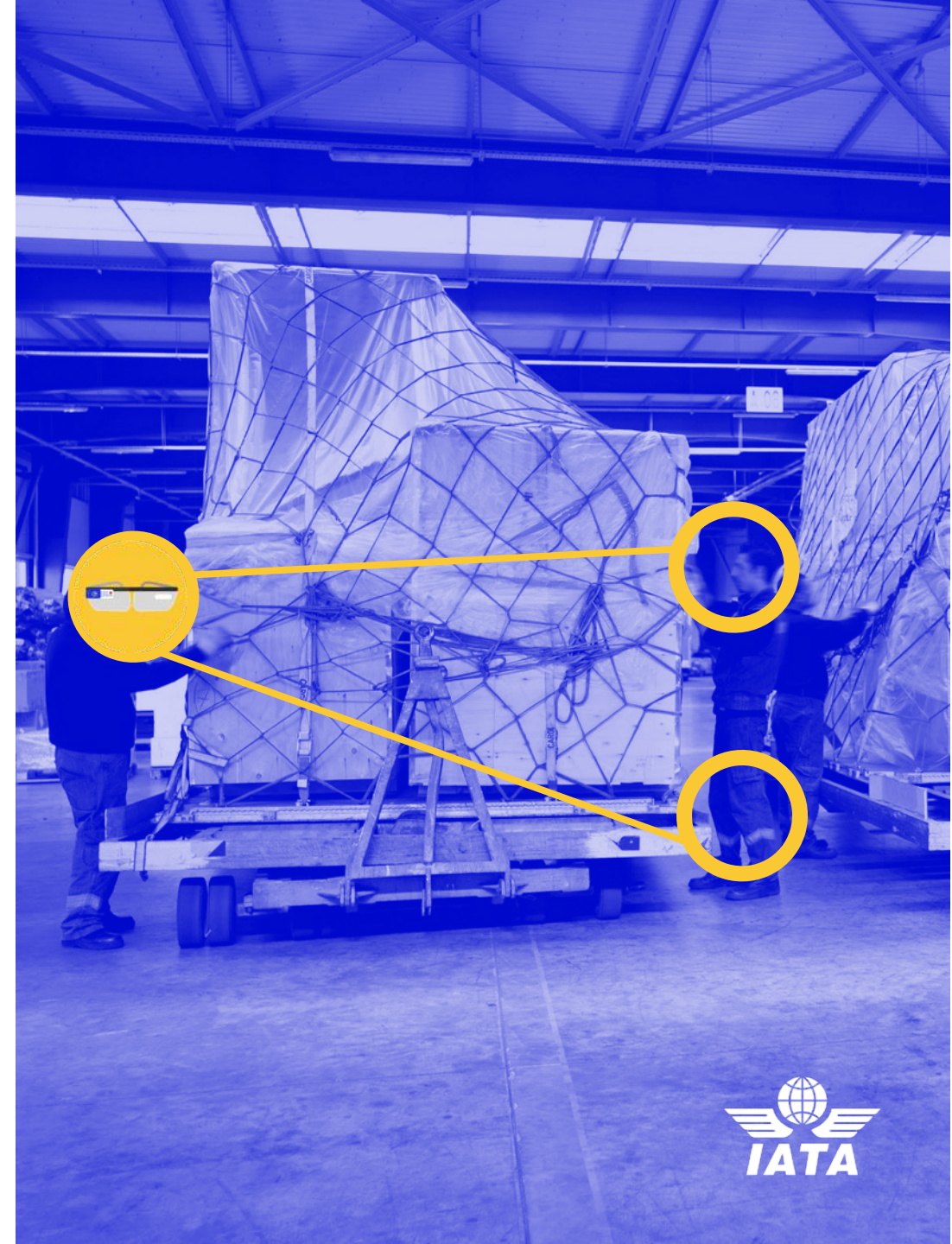
XR (AR, VR, MR) enhances training, facility planning, cargo space visualization, maintenance support, real-time inventory management, AR-based navigation, and customs inspection.

## Wearable Devices

Wearables facilitate communication, enable hands-free scanning for tracking and inventory, and monitor employee health to ensure safety and optimize workload distribution.

## Exoskeletons

Exoskeletons provide lifting assistance, reduce strain from repetitive movements, offer ergonomic support during prolonged standing, and improve efficiency for demanding tasks.







# Visibility & Transparency

## Connected devices

Track and monitor shipments, predict maintenance, manage fleets, enhance security, and optimize warehouses with real-time data from connected devices.

## Radio Frequency Identification (RFID)

RFID in air cargo monitors asset movement, automates inventory management, enhances security by detecting unauthorized cargo movement, and optimizes ULD and asset utilization.

## Real-Time Transportation Visibility Platforms

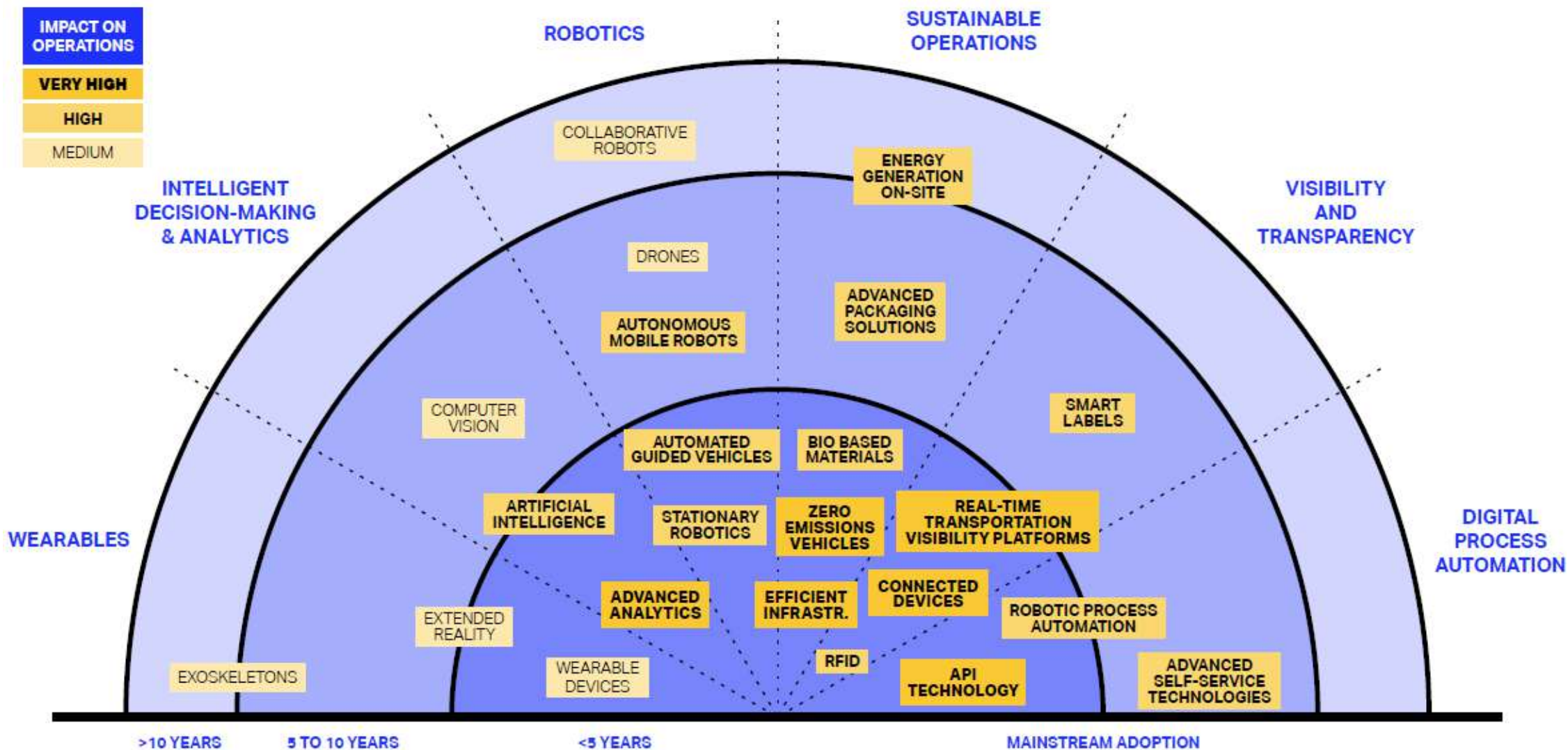
RTTVPs in air cargo provide real-time tracking, condition monitoring, disruption management, proactive issue resolution, compliance assurance, and customer transparency with live updates.

## Smart Labels

Smart labels enable real-time tracking, affordable condition monitoring, and security monitoring, detecting tampering or unauthorized access to shipments in an affordable way



# A New Technology Radar for Air Cargo

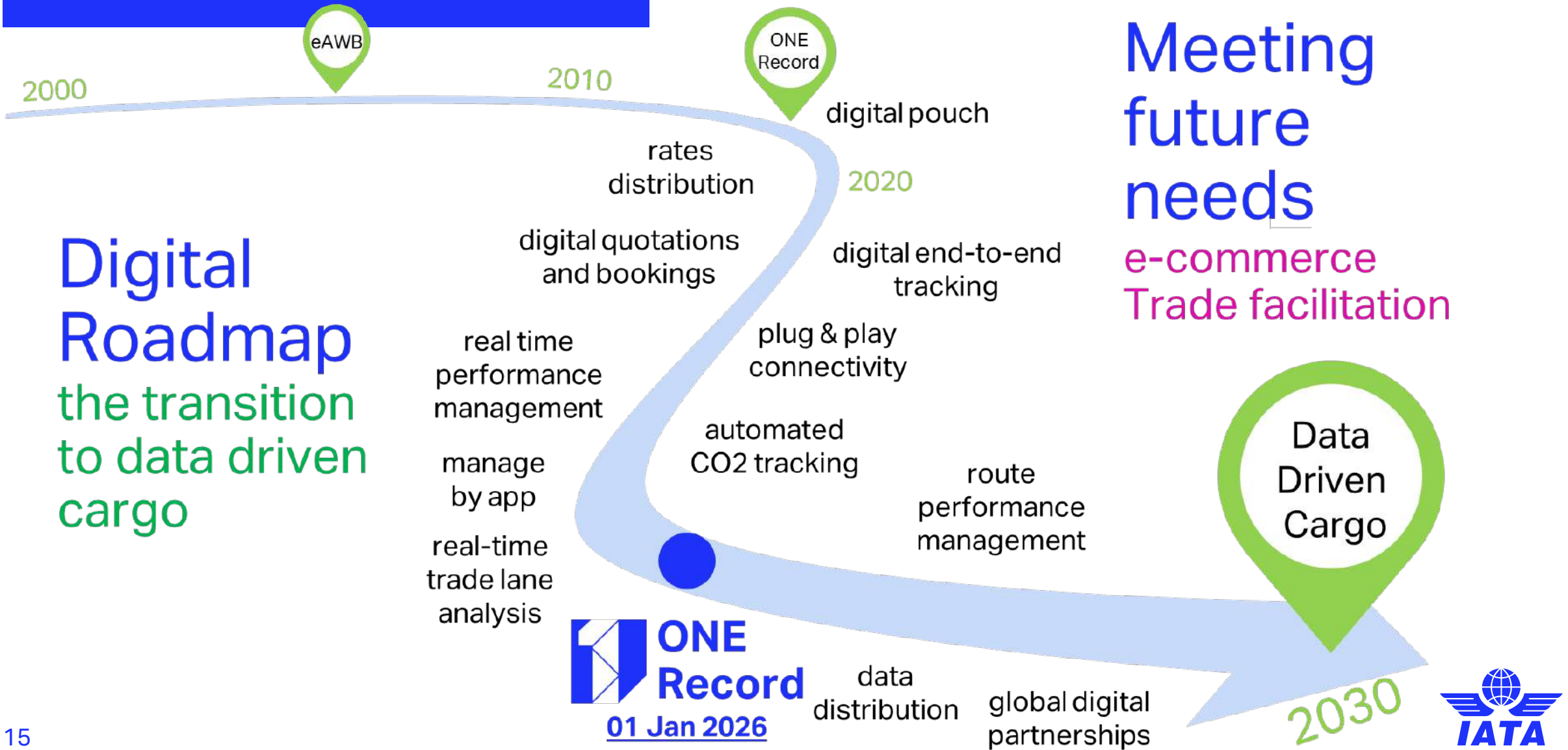




# Introducing **ONE Record**



# Cargo Operations





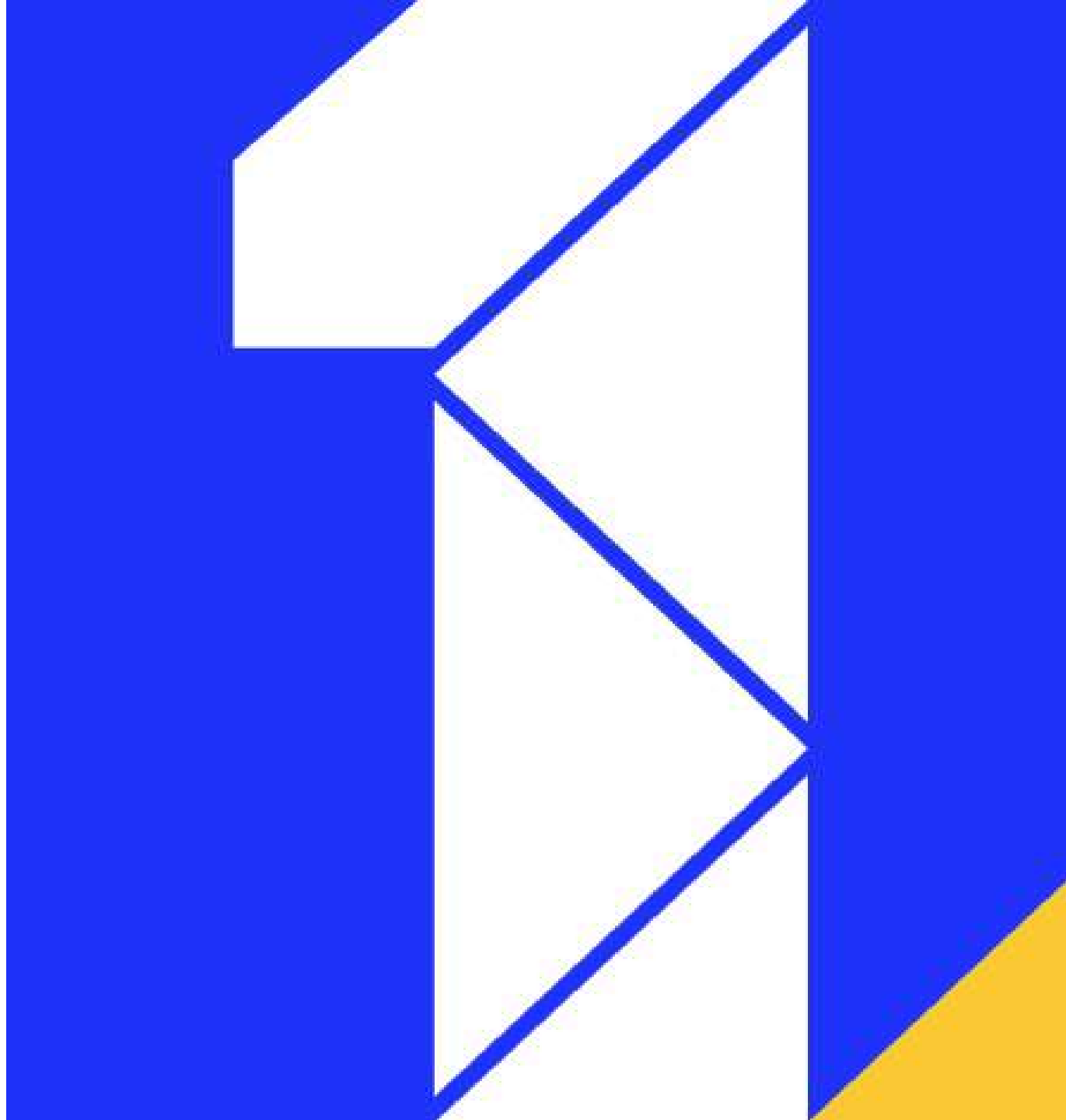
# ONE Record: Internet of Logistics



**Internet of Logistics** – exchange logistics data over the internet, using ONE Record protocols

IATA is introducing a **cargo**  
**messaging exchange standard**  
and **not a platform.**

The **ONE Record** standard  
establishes a unified **data**  
**model** for information shared  
through standardized **web APIs.**



# All data sits in a single record

- Milestone events
- Freight information
- Data properties: geolocation, temperature, CO2 emissions, humidity etc
- Shipper requirement for special cargo: Active/Passive packaging or Product temperature range etc)





# ONE Record

The Concept



# An IATA data sharing **standard** – not a platform



## Data model

- **The Digital Twin Concept:** Uses digital twins, which are digital replicas of physical entities (e.g., packages, pallets, or containers).
- **Single Source of Truth:** Data is maintained at its original source, with defined ownership and integrity, ensuring accurate and trustworthy data.
- **Data centric:** Focus on data, not documents



## API & Security

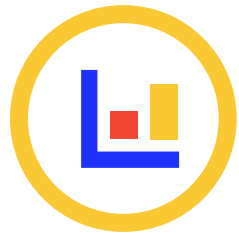
- **RESTful API**
  - Logistics Objects
  - Logistics Events
  - Pub/Sub
- **Mutual TLS (Transport Layer Security)** – standard TLS plus mutual option
- **Token-Based Authentication with OIDC (OpenID Connect)** – with customs claims
- **Decentralized IDs (DID)** – planned extension



## Orchestration

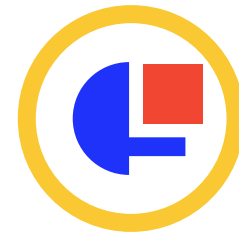
- **Industry best practices:** Processes and activities commonly applied in air cargo
- **Air cargo milestones:** Cargo iQ milestones as checkpoints for ensuring data availability
- **Compatibility:** mapping current messaging systems (e.g., FSU, FWB) to ONE Record data models.

# Design principles of the data model



## Piece-centric

- Shift to piece-level management
- Piece is at the center of the model



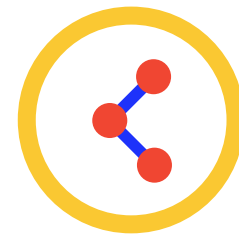
## The digital twin concept

- Physical entities have digital twins in the model
- Easy understanding of the model and how object interact with each other



## One single source of truth

- Clear ownership of data that remains at its source, enhanced transparency
- Data quality and integrity



## Data-centric

- **Data, not documents!**
- Use of Linked Data principles to avoid redundancy of data



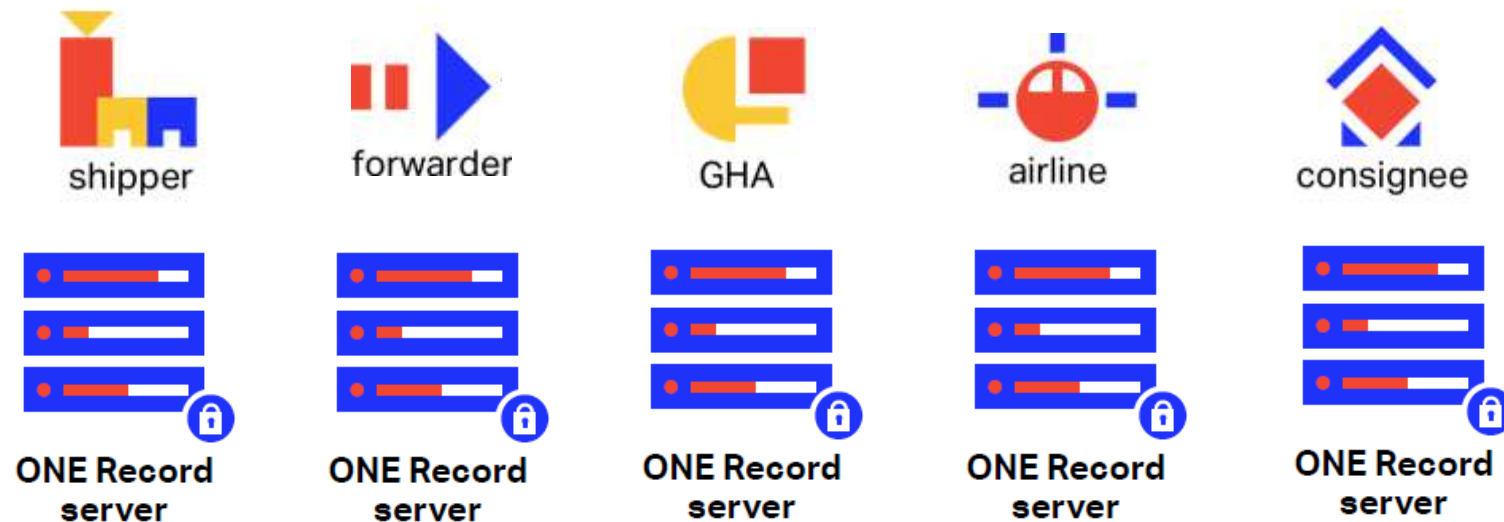
# ONE Record

Security Features



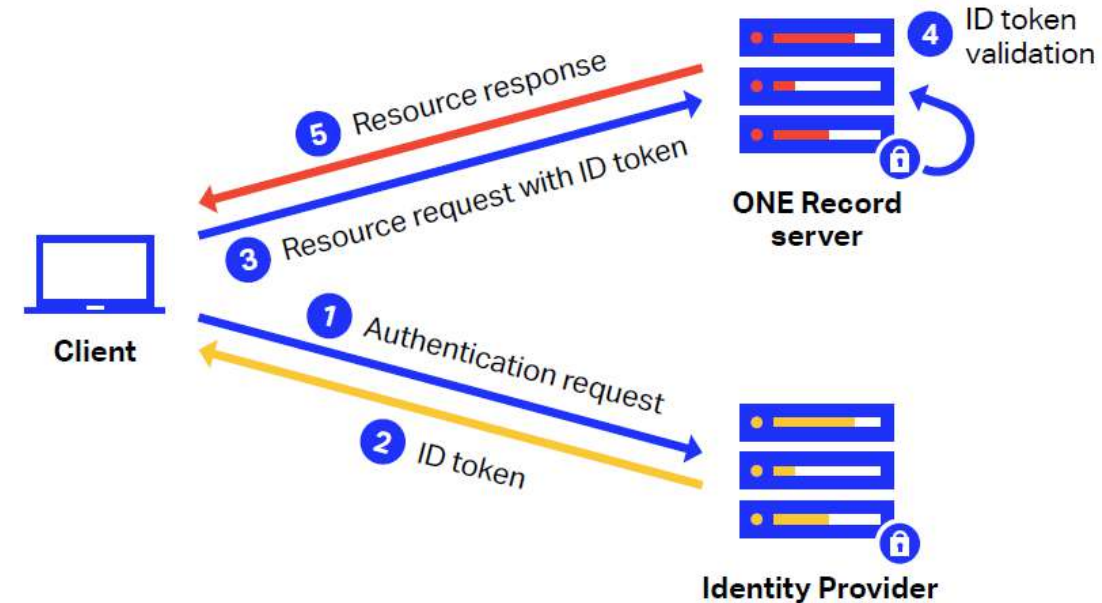
# Decentralized Control & Data Sovereignty

- Each stakeholder hosts their own ONE Record server
- Full control over data created and shared
- Access permissions granted selectively to partners
- No central data repository – reduces single point of failure
- Enhances data security, trust, and regulatory compliance



# Secure Access Management (Authentication)

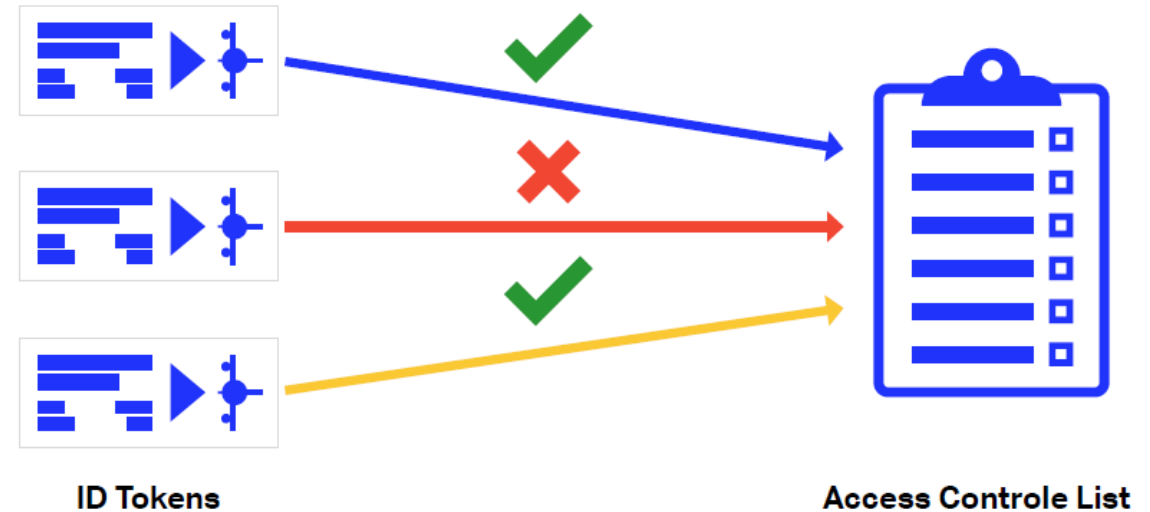
- Uses OIDC (OpenID Connect) – industry-standard protocol for secure server-to-server authentication
- Authentication ensures only verified systems access data
- Same robust technology used by major internet services for secure API access
- Establishes a strong foundation of trust in data interactions within the ONE Record ecosystem





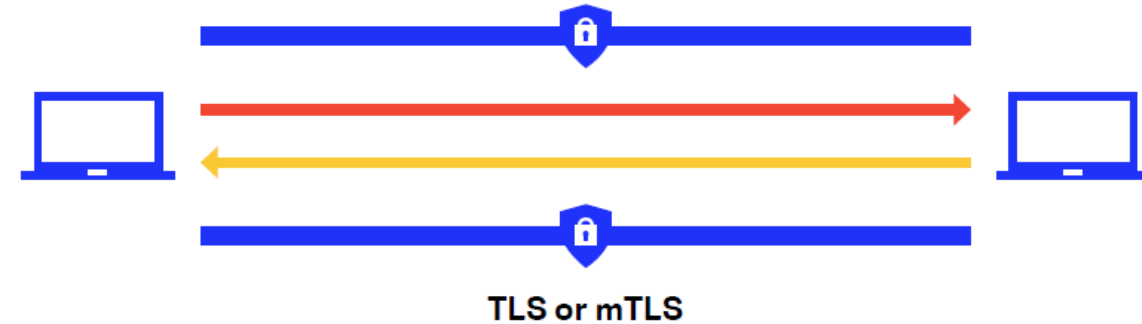
# Secure Access Management (Authorization)

- After authentication, the data owner's server controls which specific data objects and actions (such as read, create, or update) the requesting party is authorized to access
- Access is granted based on pre-agreed business relationships and specific data-sharing needs for a given shipment.
- Delegated access allows partners to interact securely without sharing primary credentials.



# Data Protection (Confidentiality & Integrity)

- **Confidentiality:** All communication between ONE Record servers must use HTTPS (TLS encryption). This is the standard for secure web traffic (like online banking), ensuring data is encrypted in transit and protected from eavesdropping.
- **Integrity:** TLS also helps ensure that data hasn't been tampered with during transmission. The structure of ONE Record, linking data pieces cryptographically, further enhances integrity.



# Business Benefits of ONE Record Security

- **Enhanced Trust:** Builds confidence among supply chain partners for digital collaboration.
- **Improved Data Control:** Companies retain sovereignty over their data assets.
- **Reduced Risk:** Mitigates risks associated with data breaches and unauthorized access compared to less secure or manual methods.
- **Streamlined Compliance:** Standardized security protocols simplify adherence to data protection regulations.
- **Foundation for Innovation:** Secure data sharing enables the development of new value-added services.

# ONE Record Participation

|                               |                                            |
|-------------------------------|--------------------------------------------|
| <b>Pilot Programs</b>         | • 200+ companies                           |
| <b>Early adopters</b>         | • 10 advanced adopters                     |
| <b>Government involvement</b> | • EU, UN, US, CN, other governments        |
| <b>Hackathons</b>             | • 10 hackathons, 800 experts, 100 projects |
| <b>Multimodal cooperation</b> | • All airfreight is multimodal             |
| <b>Industry wide adoption</b> | • 1 January 2026                           |
| <b>Solution providers</b>     | • 80% of solution providers committed      |
| <b>Open Source</b>            | • Drive cooperation and resources          |



# ONE Record Participation in Asia Pacific



# ONE Record

Resources



# Resources

- **ONE Record IATA main page:** <https://www.iata.org/en/programs/cargo/e/one-record/>
- **ONE Record main information source@Github:** <https://github.com/IATA-Cargo/ONE-Record/>
  - Contains ontology files of the data model and API
- **ONE Record documentation:** <https://iata-cargo.github.io/ONE-Record/>
  - Technical information about ONE Record (API, Security, Data model and Data orchestration)
- **ONE Record data model visualizer:** [https://iata-cargo.github.io/ontology\\_visualizer/](https://iata-cargo.github.io/ontology_visualizer/)
  - This is a tool to visualize the data model in a graphical way.
- **ONE Record demonstrator:** <https://github.com/IATA-Cargo/one-record-demonstrator>
  - This is a docker compose to create a full demonstrator with 2 server and 3 interfaces
- **NE:ONE main website:** <https://git.openlogisticsfoundation.org/wg-digitalaircargo/ne-one>
  - This is the first open-source production ready ONE Record server. This is hosted by Open Logisitcs Foundation
- **NE:ONE Play GitHub:** <https://github.com/aloccid-iata/neoneplay/tree/feature/aws> (use this branch to be compatible with the latest NE:ONE version)
  - NE:ONE Play is a tool to show the ONE Record network of logistics objects. It is a visual tool to quickly understand the network concept behind ONE Record
- **ONE Record test suite:** <https://iata-cargo.github.io/ONE-Record/stable/Tools/unit-tests/>
  - Unit test suite to verify the adherence of the implementation to the ONE Record API standard





Training

# ONE Record training program



## Self-study courses



## LIVE Virtual Classroom Training



## Classroom & In-house Training



Training



**IATA**

**DIGITALIZATION**

**LEADERSHIP**

**CHARTER**



# Digitalization Leadership Charter

## Charter Composite

- Voluntary program with no fee
- No KPI for members to measure their commitment
- In-person forum that run twice a year

## Objective

- Contribute to defining cargo digitalization strategy
- Raise members profile on digitalization commitment via our [landing page](#)
- Assess the industry's progress in digital transformation and identifying barriers to the adoption of ONE Record
- Platform for stakeholders to share best practices and define actionable steps to drive industry readiness for the ONE Record adoption
- Examine the role of technological innovation in shaping the future of air cargo

# Digitalization Leadership Charter

## Guiding Principles

The Digitalization Leadership Charter follows 5 key principles:

- 1 **Developing a unified and collaborative digital strategy** that champions interoperability and the use of global standards across the entire supply chain.
- 2 **Enhancing organizational resilience** through building robust digital infrastructure and implementing strategies that safeguard against cybersecurity risks while ensuring the responsible use of generative AI.
- 3 **Pursuing sustainable digitalization** with a focus on supporting eco-friendly technology initiatives.
- 4 **Pursuing digital excellence** by staying ahead of digital trends, ensuring secure and sustainable practices, and establishing industry best practices.
- 5 **Using new technology ethically** when embracing emerging technologies.



<https://www.iata.org/en/programs/cargo/e/digitalization-leadership-charter/>

Sign up for  
the charter

### Charter Signatories





# Thank you!

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