IATA
GLOBAL
MEDIA DAY

Digitalization in Aviation Operations and Safety

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IATA

Supply Chain Challenges: Maintenance

Top maintenance challenges

Type of Issue Reported	Share of Responses
Spare Part Shortage or Long Lead-Time	52.9%
Long Turn-Around-Time for Repairs	34.9%
Repair Capacity Challenge / Sole Supplier	12.7%
Part Reliability	14.3%

- In addition to delivery delays in the aviation sector which was covered this morning, the industry is confronting significant maintenance challenges due to persistent supply chain disruptions.
- Airlines are experiencing increased costs and potential market share losses as they grapple with delays in obtaining essential parts and components.
- These supply chain issues have led to prolonged aircraft groundings, as carriers await necessary repairs, thereby disrupting flight schedules and reducing operational efficiency.
- IATA ran a survey inquiring about maintenance challenges across fleets:
- Biggest issues are:
    - Shortage of spare parts / Long lead time
    - Long turnaround time for repairs
    - Repair capacity challenge / sole supplier
    - Part reliability

- Many of the supply chain issues are beyond our control, such as raw material shortages and supply chain rerouting due to geopolitical tensions and labor challenges. However, there are proactive measures we can take, including improving forecasting and minimizing technical inefficiencies within the process.
- This is where digitalization is helping.

Digitalization has the potential to revolutionize the aviation industry's approach to supply chain management, addressing longstanding challenges

- Digitalization has the potential to revolutionize the aviation industry's approach to supply chain management, addressing longstanding challenges.
- By integrating advanced digital tools such as predictive analytics, blockchain, and IoT-enabled tracking, airlines and manufacturers can achieve real-time visibility across their supply chains. This transparency helps anticipate disruptions, optimize inventory levels, and streamline maintenance schedules.
- Blockchain ensures secure and tamper-proof documentation, reducing delays caused by paperwork errors or fraud.
- Furthermore, automation and AI-driven insights allow for quicker decision-making and enhanced collaboration between suppliers and operators.
- These innovations not only mitigate risks but also enhance operational resilience, enabling the industry to navigate global supply chain complexities more effectively.
- There are a lot of challenges involved in successfully digitalizing the supply chain.
- Although the nature of these challenges varies according to each company's maturity, there are three unavoidable issues arising from technical tools and human factors.
- Today, the main challenge of supply chain digitalization is still on the technical front.
- This mainly applies to companies' current information systems as well as the availability and quality of data.
- It is vital for companies to implement a solid technical foundation based on clear processes and governance to initiate this digital shift.

First step to Digitalization is Digitization

1. Adopting and Developing Technical Records Standards

Standardized technical records are crucial for the smooth transfer of aircraft and parts within the industry.

2. Improving Transparency and Visibility in Inventory and Supply Chain

Consolidating demand and ensuring visibility in stock levels and the supply chain will help optimize inventory management and reduce shortages or overstock issues.

- It is vital for companies to implement a solid technical foundation based on clear processes and governance to initiate this digital shift by:

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- This is where IATA's work is focused.

Addressing industry challenges

MRO SmartHub

Problem

- ⊗ No transparency to parts pricing and lead time
- ⊗ Price volatility in both OEM and aftermarket
- ⊗ Lack of alternatives for sole source parts
- ⊗ Limited visibility to availability of parts
- ⊗ Inefficiencies in parts sourcing processes
- ⊗ Airlines building unnecessary inventories of spares

Solution

- ✓ Full transparency to neutral market pricing and lead time
- ✓ Market pricing trends at part number level
- ✓ Part alternatives including USM, PMA's and part repairs
- ✓ Comprehensive parts listings with price & availability
- ✓ Integrated valuation, trading and settlement (ICH)
- ✓ Airlines can list surplus inventories, valuate and trade

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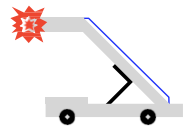
- IATA has also developed the MRO SmartHub, an online tool that brings much-needed transparency to the market for aircraft components and parts.
- Enabling subscribing airlines and maintenance, repair and overall (MRO) providers to transparently list items to buy or sell, will reduce over-payments by making the assessment of fair market value (FMV) more accurate.
- Additionally, the MRO SmartHub will enable:
  - The accurate valuation of parts inventories at any point in time
  - Confidence in planning, procuring or selling aircraft components and parts
  - Better-informed decisions on which aircraft components and parts to procure and use
- MRO SmartHub makes the supply chain for aircraft components and parts more efficient.
- Currently over 1,000 users and > 450 companies are available for trading.

Aircraft Ground Damage Reduction

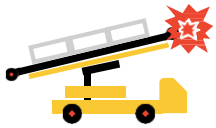
Annual cost of ground damage could reach **$10 billion** by 2035 unless preventive action is taken

Passenger stairs



$620 m total | **$33 per use**

Belt loader

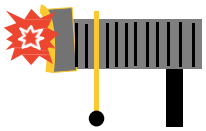


$610 m total | **$16 per use**

Cargo loaders

$560 m total | **$31 per use**

Boarding bridge



$280 m total | **$13.5 per use**

4 Pieces of Ground Support Equipment account for over 40% of the total ground damage costs

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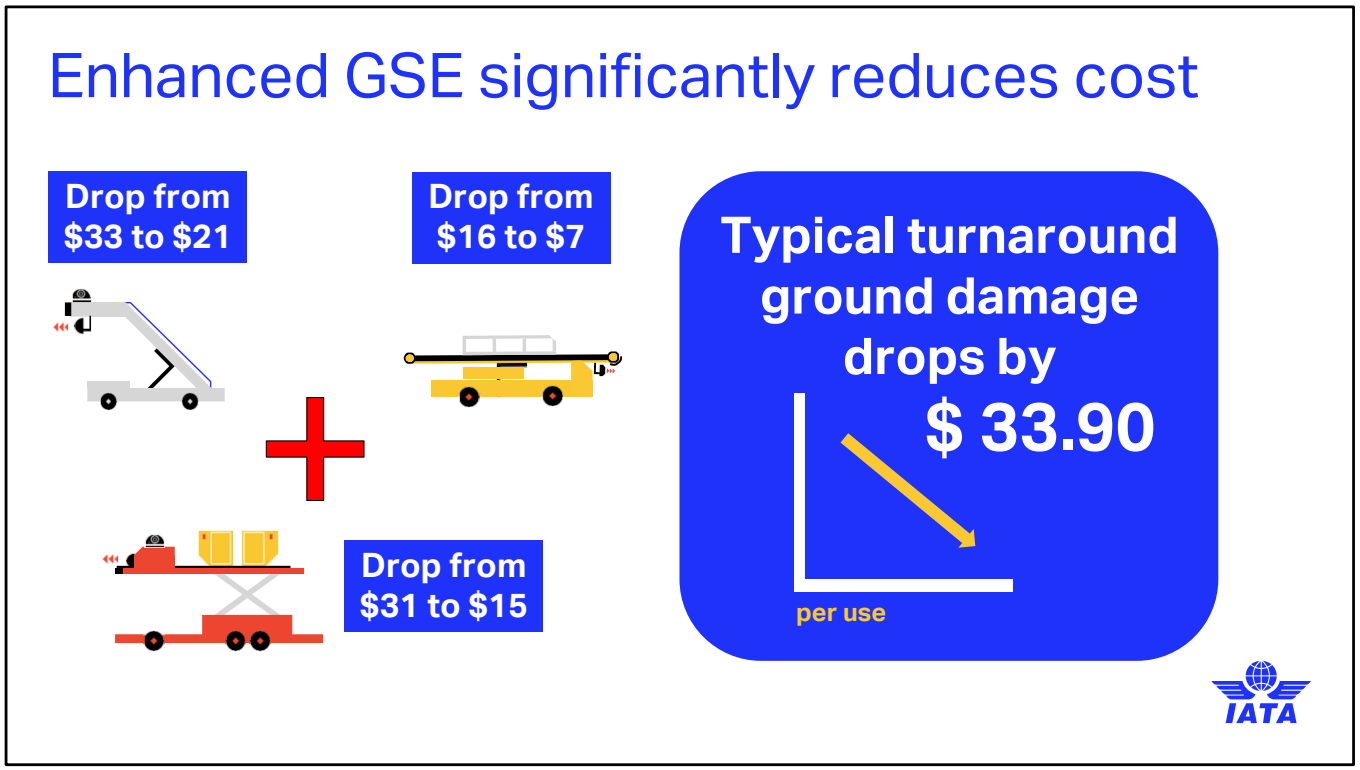
- Annual cost of ground damage could reach $10 billion by 2035 unless preventive action is taken.
- These figures are indicative of all ground damage costs (including direct and indirect costs) such as aircraft on ground, labor cost, passenger facilitation costs.
- Looking at global ground damage figures, 4 types of Ground Support Equipment (GSE) cause over 40% of total ground damage costs occurring around the globe.
- Naturally, we should be focusing our efforts on these GSE. We were not surprised to see that it is the GSE that docks at the aircraft that causes the most damage:
  - Pax stairs - $620 mil
  - Belt loaders - $610 mil
  - Cargo loaders - $560 mil
  - Passenger boarding bridges - $280 mil



- Enhanced Ground Support Equipment (GSE) exemplifies digitalization by leveraging advanced technologies such as IoT, sensors, and real-time data integration to transform ground operations. These smart systems enable seamless communication between equipment, automate routine tasks, and optimize workflows, improving efficiency and safety.
- Taking a typical turnaround that involves a passenger stair, a belt loader and a high loader – making the investment in enhanced equipment at the 75% level globally will mean a drop of $33.90 ($12 for passenger stairs, $9 for belt loader and $16 for cargo loader) for the ground damage forecast for every turnaround.
- It is important to point out that enhanced GSE is a very good example of how airlines and ground handlers must work together. The ground damage cost reduction benefits come to airlines but only because ground handlers made the investment in enhanced equipment.

IATA Enhanced GSE Recognition Program

To encourage and stimulate adoption of enhanced GSE, IATA launched this program:

26 **Successful applications from** **6** **GHSPs**

	Applications	GHSPs
Total	66	14
In progress	8	6

Planned to be expanded to ISAGO, 250+ new applications expected next year.

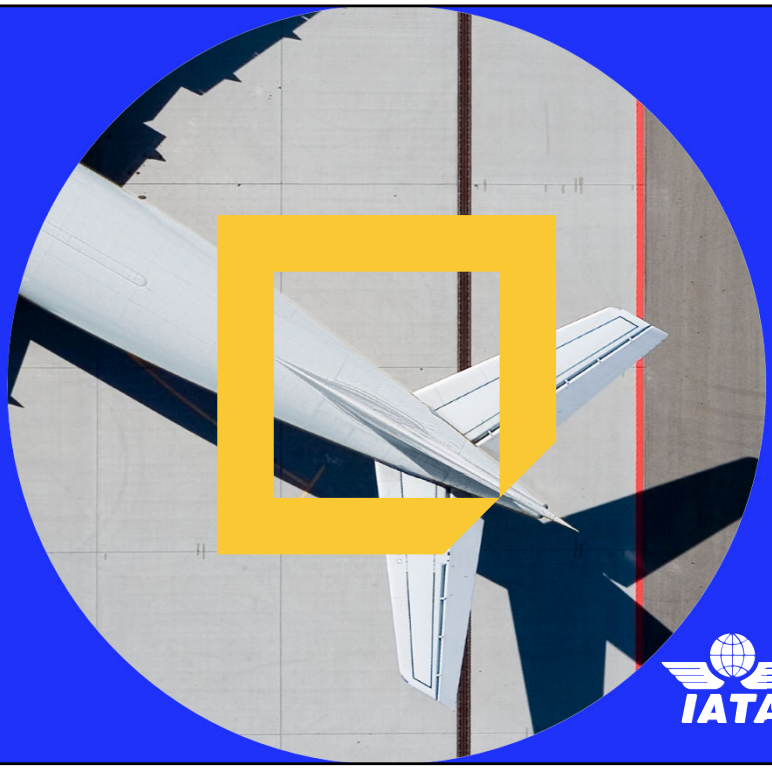
- To encourage and stimulate the adoption of enhanced GSE, IATA started the initiative to recognize GHSPs who have made the effort to integrate these GSE in their operation.
- Since its launch in May 2024, the program has had tremendous response which goes a long way towards reducing ground damage. We have 66 applications for the program this year and 26 of them have been successful.
- We are expecting to receive 250+ new applications next year with the introduction of this program to all ISAGO GHSPs with ramp operations in scope. This will also allow us to benchmark the industry to better incentivize the reduction of ground damage.

IATA Ground Damage Report

- All the figures and numbers mentioned in this presentation are derived from the IATA Ground Damage Report, which is available to download for free from the IATA website.

- It is a good resource to understand the state of our industry related to ground damage. This report also looks at the forecast until 2038 and the impact some of the measures can have to reduce ground damage – mainly GSE fitted with anti-collision systems or what we refer to as enhanced GSE.

Baggage

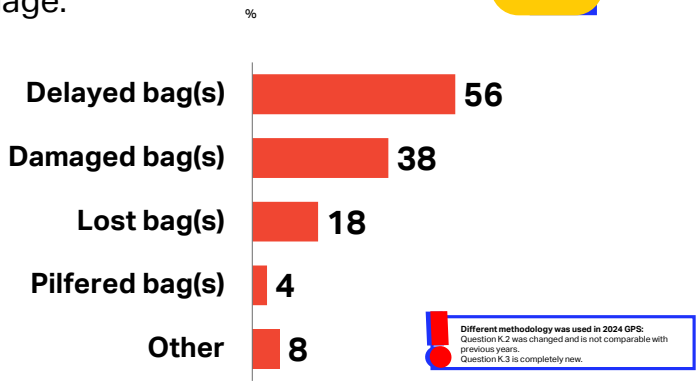


Baggage mishandling

Over the past year, one in five passengers reported baggage issues. More than half of these passengers had a delayed bag and 38% of travelers experienced damaged baggage.

Yes 22%

No 78%



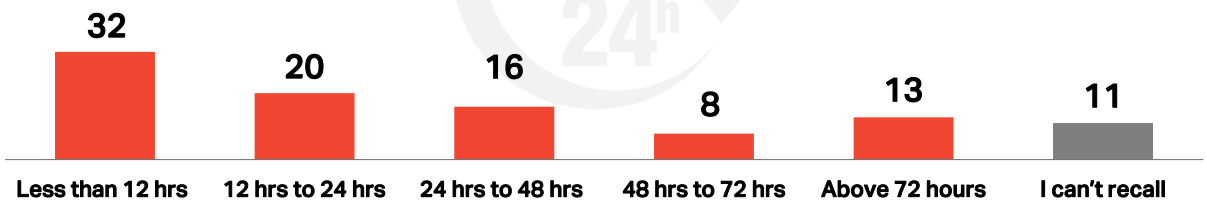
QUESTION K.2 HAVE YOU EXPERIENCED ANY BAG ISSUE(S) OVER THE LAST 12 MONTHS?
BASE: N (2024)=13.487 [SINGLE ANSWER]

QUESTION K3 ARRIVAL WHAT WAS THE TYPE OF BAG ISSUES YOU FACED?
BASE: N (2024)=2.933 [MULTIPLE ANSWER]

- Baggage – one of the biggest pain points for passengers is another area where digitalization is helping.
- Both in terms of baggage mishandling which one in five passengers reported having an issue with in the last five years.

Time of recovering and returning mishandled baggage

A fifth of passengers believe that a reasonable time to recover and return mishandled baggage is up to 24 hours, while 32% think it should be no more than 12 hours.



QUESTION: K.5 THE LAST TIME YOU FACED A BAG ISSUE, HOW LONG DID IT TAKE FOR IT TO BE RECOVERED AND RETURNED BACK TO YOU? BASE: N (2024)=2.619 [SINGLE ANSWER]

- And in returning mishandled baggage.
- A fifth of passengers believe that a reasonable time to recover and return mishandled baggage is up to 24 hours, while 32% think it should be no more than 12 hours.

Modern baggage messaging implementation

Transitioning the industry to modern baggage messaging standards

- Improved message quality and reduced mishandling
- Increased message security through encryption
- Future proofing the industry to for innovation
- Cost saving (hundreds of millions annually)

XML messaging pilot launch and Baggage Community System (BCS)

- The first priority is the implementation of modern baggage messaging standards.
- The current baggage messaging infrastructure depends on legacy technologies using costly Type B messaging.
- IATA is leading the industry's transition from Type B to modern baggage messaging based on XML standards. The first pilot to test modern baggage messaging between airports and airlines is planned for launch in 2024.
- Adopting modern messaging is the equivalent of implementing a new standard, intelligible language for use by airlines, airports, and ground handling staff so they can effectively communicate about passenger luggage. In addition to helping reduce the number of mishandled bags implementation also sets the stage for ongoing innovations in baggage management systems.
- This will:
  - Improve message quality and reduce mishandling: baggage mishandling costs the industry more than USD 2 billion annually and message quality contributes to 5% of this cost
  - Increase message security through encryption: modern baggage messaging allow messages to be encrypted while shipping between parties avoiding security concerns
  - Realize future proof technology for implementing new innovation: limitations such as character limit with teletype messages are restriction to incorporate innovations and modernization. With modern baggage messaging like XML standards and extensible and can easily accommodate new innovations like exchanging baggage images, security scans or GPS location coordinates using BLE trackers such as air tags
  - Save cost in hundreds of millions annually: typeB messages rely on expensive teletype

infrastructures costing the industry USD1.05 billion annually

Tracking improves overall passenger satisfaction:

For 65% of passengers, real time baggage tracking could increase their confidence to travel with checked-in baggage

(IATA GPS, 2024)

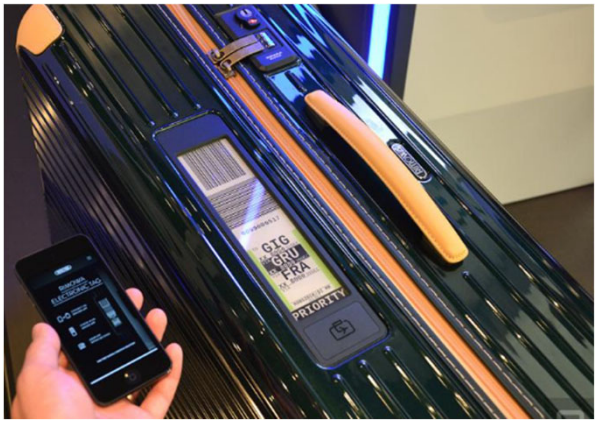
- The second priority is the implementation of baggage tracking.
- Focused on IATA Resolution 753, which requires tracking baggage at acceptance, loading, transfer and arrival, the survey of 155 airlines and 94 airports reveals that:
  - 44% of airlines have fully implemented Resolution 753 and a further 41% are in progress.
  - Regional variation in airline full adoption rates vary from 88% in China and North Asia, to 60% in the Americas, 40% in Europe and Asia-Pacific, and 27% in Africa.
  - 75% of airports surveyed have the capability for Resolution 753 baggage tracking.
  - Airport preparedness for Resolution 753 varies by size*: 75% of mega airports are capable, 85% of major airports, 82% of large airports and 61% of medium airports.

How is IATA helping?

- Defined a 3 year-plan to accelerate the rate of adoption and achieve high penetration by 2027
- Help member airlines define R753 implementation plan
- Gather airport tracking infrastructure information for ease of R753 deployment by member airlines
- Cheaper message exchange cost: refer to the previous slide on the transition to XML

Electronic Baggage Tag (EBT)

Limited industry wide EBT deployment where 55% of passengers never used an EBT in 2024 of which 46% would be interested in trying out the service (IATA GPS, 2024)

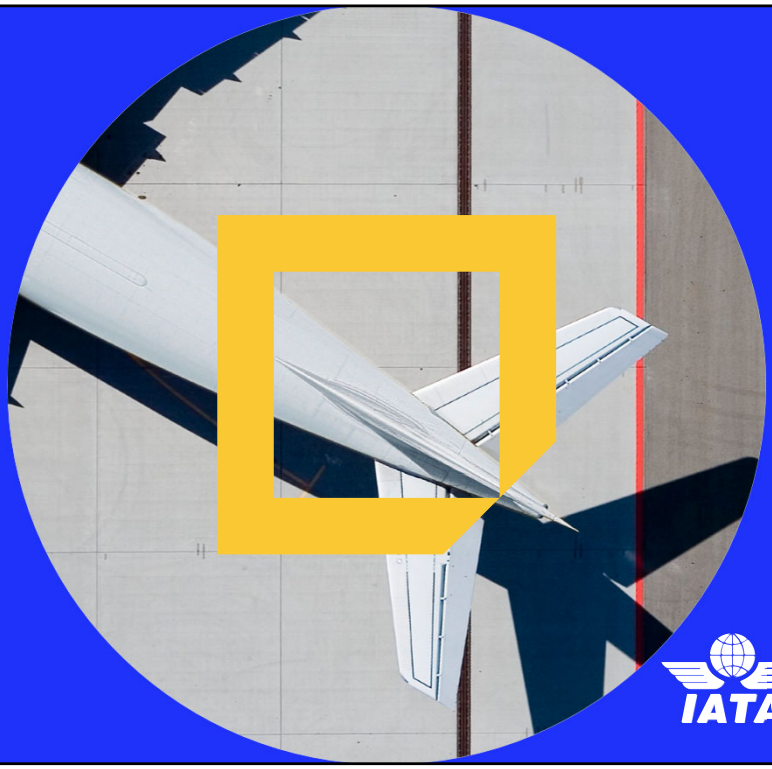


IATA is supporting airlines with the wider deployment of Electronic Baggage Tag (EBT) by:

- Defining a regulatory acceptance map for ease of deployment
- Updating standards (RP1754) and implementation guide update
- Defining strategy for interoperability of EBT for interline journey

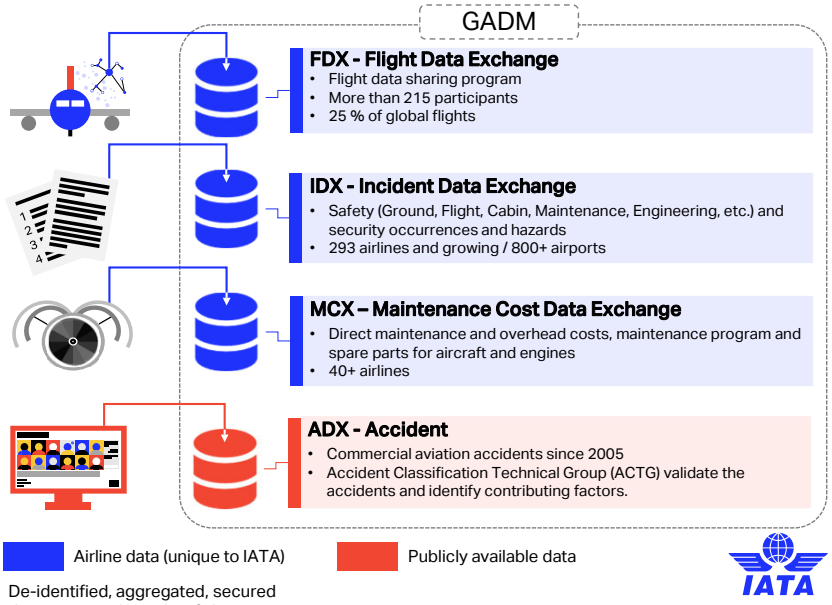
- **The third priority is supporting airlines with the wider deployment of Electronic Bag Tags.**
- **How IATA is helping?**
  - Defining a regulatory acceptance map for ease of deployment
  - Maintenance of standards and update of EBT implementation guide
  - Defining interoperability strategy to increase passenger satisfaction with EBT from the current 15% (GPS, 2024)

Using data to drive operational efficiency, improve safety and sustainability



The Global Aviation Data Management (GADM) program is a data management platform which integrates all sources of operational data received from various channels. These include IATA-unique programs, which all feed into a common, interlinked database structure.

Our Value Proposition: We champion data with our premier global aviation safety and operational data exchange programs



- IATA is the leading source of aviation safety and operational data
- The Global Aviation Data Management (GADM) program is a data management platform which integrates all sources of operational data received from various channels. These include IATA-unique programs, which all feed into a common, interlinked database structure.
- Three main pillars:
  - FDX – Flight Data Exchange
  - IDX – Incident Data Exchange
  - MCX – Maintenance Cost Data Exchange
  - ADX – Accident data

IATA's Flight Data eXchange program collects data from 30 million flights and over 9,000 aircraft, capturing hundreds of parameters every second.

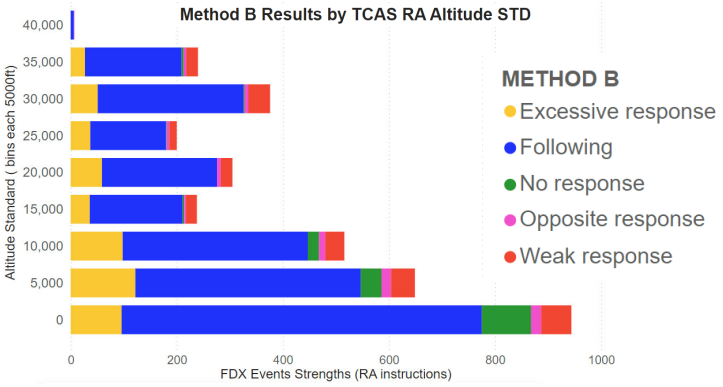
- **IATA's Flight Data eXchange (FDX) program comprises data from 30 million flights performed by 9,000 aircraft.**
- **The FDX data captured from each flight, monitors hundreds of parameters per second, thus making GADM the most authoritative and comprehensive collection of global aviation operational data in the world.**
- **It is designed to bring added-value to the airlines and industry**
- **Examples of insights gained through GADMs enhanced capabilities include:**
  - Identifying emerging safety risks
  - Fuel Efficiency Measurement
  - Aircraft Emissions Calculations
  - Predicting Aircraft Performance

Going into three…

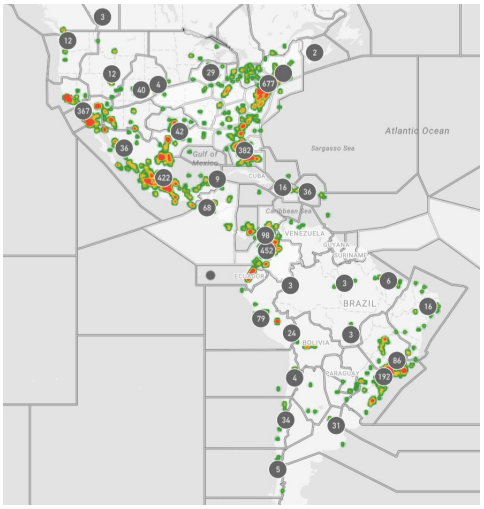
GADM data use case: TCAS RA and pilot response

Leveraging FDX, Identification of TCAS hot spots and Pilot response using TCAS Method B in the Latin America region.

- Support preventive and corrective actions by regional aviation bodies.
- Can be incorporated in airlines' SOPs and training programs.

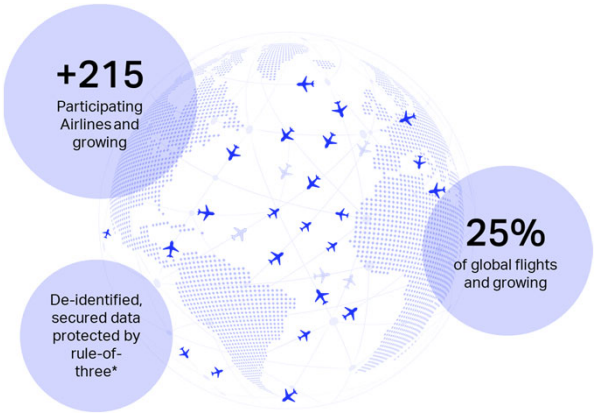


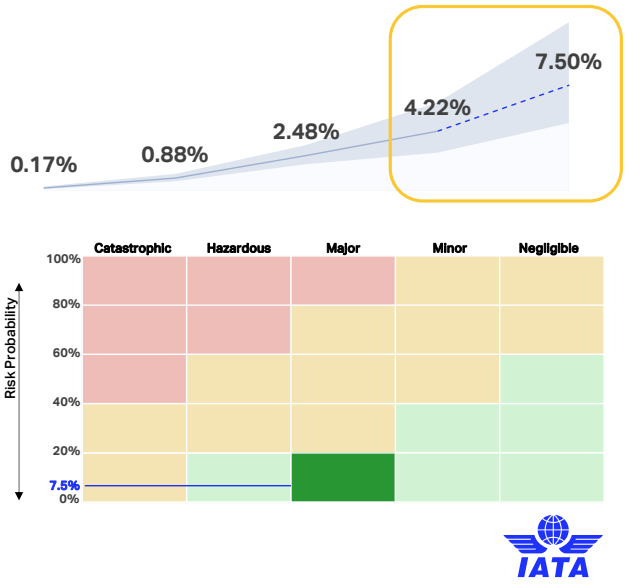
TCAS RA Hotspots in the LATAM Region



- Using the FDX and working closely with the different regional stakeholders we were able to identify areas in the LATAM region where TCAS RAs were frequently occurring including the specific Flight Information Regions (FIRs).
- This information was relevant to the different regional aviation bodies as they came up with preventative and corrective actions to reduce and eliminate this ever-present threat to our industry.
- Additionally, using the **TCAS Method B** 0Shuirup dqfh Dvvhvvp hqwriSlorw Frp sddqfh z lwk Wudiilf Frodvlrq Dyrlgdqfh V|vwhp Dgylvruhv surfhgxuh, we were able to identify the pilot response to the TCAS RA events. This insight was particularly helpful to airlines as this information will be incorporated into their SOPs and training programs to ensure that the requisite response by the pilots is always executed.

GADM data use case: Predict risk probability by creating accurate models using the largest aviation dataset





We use a thorough sampling methodology to shortlist similar airports and create a model to the calculate the likelihood of events to support predictive risk assessments.

- The size and granularity of the FDX dataset enables IATA to build predictive models.
- For example, we built models of operations in airports to estimate the likelihood of certain events and support a predictive risk assessment before changes are implemented.

IATA FuelIS: Setting best-in-class fuel savings goals

- Am I monitoring the right indicators of my airline's fuel efficiency?
- How fuel efficient is my airline exactly?
- If my airline is below or above average, what is the gap?
- To make further improvements, what airports or routes should I start analyzing further?

IATA has launched FuelIS, an advanced fuel analytics solution designed to enhance efficiency by leveraging reliable flight data for targeted fuel savings and industry benchmarking.

- **IATA launched FuelIS in 2024 to provide advanced analytics for airlines' fuel efficiency programs.**
- **The extensive dataset coverage enables industry benchmarking, allowing airlines to set meaningful and realistic targets for their fuel efficiency performance.**