Disclaimer

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Welcome to this webinar!

This webinar is the final dissemination event of this research project

Funded by European Un

This project has received funding from the European Union's Horizon Europe Research and Innovation Programme

European Commission

The EC delegated the contractual and technical management of this research action to EASA

VIRTUA

Blockchain for airworthiness in aviation

EASA contracted FPT as lead contractor for the implementation of the research action following a public tender procedure

EASA-managed projects are addressing research needs of aviation authorities and are an important pillar of the EASA R&I portfolio

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European Union Aviation Safety Agency

Interaction

- ❑ Your questions are welcome
- ❑ During the presentation, please introduce them in Slido Q&A (not in the Webex chat)
- ❑ The 30mins will be dedicated to discussion. Please raise your hand to take the floor, or use Slido Q&A

slido

#3180703

Pass: a6cyqm

Note: *this webinar will be recorded and made available at the EASA website after the event.*

Agenda for today

10:00 - 10:10 Welcome words by EASA

10:10 – 12:00 Overview of the research scope & objectives

- Project implementation & structure
- Stakeholder involvement
- Project outcomes
  - Regulatory and standard gaps
  - Recommendations and proposed roadmaps
  - Consortium enabling trusted collaboration (IDCA)
  - Enhancing component pool operations and lifecycle tracking … (KLM)
  - Conclusion & way forward

12:00 – 12:30 Q&A

DIGITAL TRANSFORMATION – CASE STUDIES FOR AVIATION SAFETY STANDARDS

Ana-Marija Duranec
EASA Production Organisation Expert

Joana Vieira Gomes
EASA Project Manager - Research & Innovation

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EASA Digitalisation of Aviation Programme Manager

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Digital Transformation
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VIRTUA
IATA

Chris Markou
Aviation Consultant
VIRTUA
IATA

EASA
European Union Aviation Safety Agency

FPT

pwc

IATA

SkyThread

EASA
European Union Aviation Safety Agency

Welcome to VIRTUA project

Context and general objectives

FPT pwc IATA SkyThread

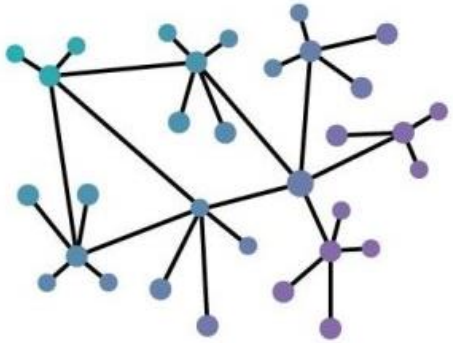
Your safety is our mission.

An Agency of the European Union

A Foundation of Trust and Transparency

What is Blockchain and How Can It Benefit Aviation?

- **Blockchain** technology, **through industry collaboration platforms**, is emerging as a **potential tool for improving data management and security in aviation**.
- These platforms enable the emergence of **inter-organizational data exchange ecosystems** within the industry.

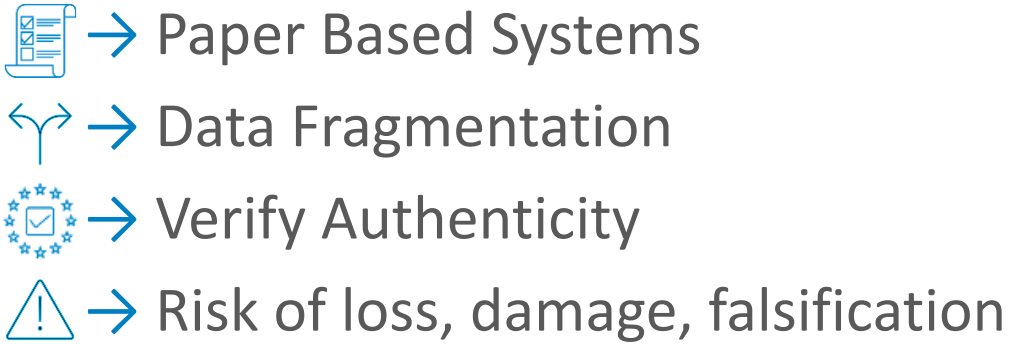


Navigating a Complex Landscape

Limitations of Traditional Parts Tracking and Documentation

Managing aircraft parts and documentation is complex, with airlines, manufacturers, and maintenance providers relying on outdated paper-based systems, spreadsheets, and legacy software that are increasingly inadequate for modern aviation demands.

KEY AIRWORTHINESS CHALLLENGES



Example: the existence of Suspected Unapproved Parts (SUPs) highlights the need for a more robust and secure system for tracking aircraft components.

Unlocking Efficiency, Transparency, and Security

How Blockchain-based collaboration platforms can address key challenges

Blockchain-based collaboration platforms revolutionize airworthiness management by enabling a more secure, transparent, and efficient system for tracking aircraft parts and documentation.

1. **ENHANCED TRACEABILITY**
2. **IMPROVED DATA INTEGRITY**
3. **STREAMLINED WORKFLOWS**
4. **INCREASED EFFICIENCY AND COST SAVINGS**

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Introduction to the VIRTUA Project

Research: Context, objective and problem area

Project Objectives

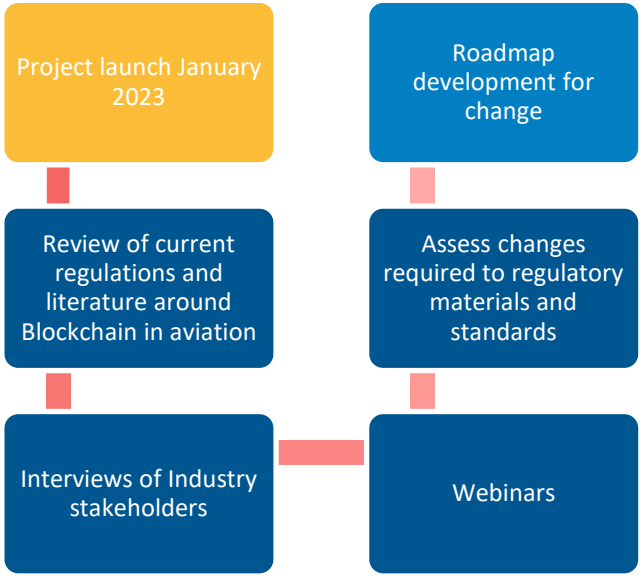
Explore and evaluate blockchain solutions for managing aircraft parts and data.

Collaborate with industry stakeholders to design and assess **practical use cases.**

Identify regulatory and standards **gaps** and propose a **roadmap** for blockchain adoption.

Methodology

The training material at hand is derived from the work performed for VIRTUA project, which included desktop research, stakeholder interviews and webinars.



Listening to Industry Expertise

Gathering insights through interviews and workshops

34
In-depth interviews

- WAYS OF WORKING
- TECHNOLOGY ADOPTION
- BLOCKCHAIN
- SECURITY
- REGULATION
- CHANGE

450
Workshop participants

- CHALLENGES
- OPPORTUNITIES
- BLOCKCHAIN
- INSIGHTS

Case study

Blockchain technology offers new possibilities for parts tracking and verification. By creating a secure, tamper-proof record of part history, blockchain can enhance trust and transparency.
This case study examines the **potential benefits and challenges of blockchain** in addressing parts traceability and tackling SUPs.

Current Situation	Issues	Blockchain	Challenges
Parts and SUPs tracking relies on mixed, manual methods that are time-consuming and prone to errors.	Limited visibility and manual processes lead to inaccuracies and increased risks in parts and SUPs management.	Blockchain can enhance traceability and provide a secure, real-time solution for tracking parts and detecting SUPs.	Implementing blockchain requires overcoming interoperability, regulatory, and collaboration challenges across the industry.

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Key insights and findings

Key Insights from Stakeholder Interviews

Challenges, Opportunities, and the Desire for a More Efficient Future

Industry stakeholders recognize the need to improve aircraft parts management and are optimistic about blockchain-based solutions potential to overcome current limitations.

1. **LIMITED AWARENESS, BUT GROWING INTEREST**
2. **FOCUS ON ENHANCED TRACEABIILITY AND DATA INTEGRITY**
3. **DESIRE FOR STREAMLINED WORKFLOWS AND INCREASED EFFICIENCY**
4. **EMPHASIS ON SECURITY AND TRUST**
5. **COLLABORATION AS A KEY ENABLER**

Key Findings from Stakeholder Workshops

Identifying Priorities, Addressing Concerns, and Building Consensus

Interactive workshops facilitated stakeholder dialogue and collaborative exploration of blockchain-based solutions potential in aviation.

1. **CONSENSUS ON THE NEED FOR IMPROVEMENT**
2. **STRONG SUPPORT FOR BLOCKCHAIN'S KEY FEATURES**
3. **PRIORITISATION OF SPECIFIC USE CASES**
4. **OPENESS TO COLLABORATION**

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Regulatory and Standards Gaps identified

Regulatory Support for Innovation

Identifying Areas of Alignment and Opportunities for Enhancement

The European aviation regulatory framework provides a strong foundation for safety and airworthiness. While blockchain technology is not explicitly addressed in existing regulations, several provisions offer a basis for the integration and adoption of blockchain-based solutions in aviation.

Key Existing Regulatory Areas

Requirements for Maintenance Records and Electronic Documentation:

Regulations already mandate the maintenance of comprehensive records and allow for electronic documentation, providing a framework for blockchain implementation.

Information Security Standards:

Part-IS sets clear requirements for information security management, emphasizing the need for robust and secure systems. Blockchain's inherent security features align well with these standards.

While the current regulations provide a solid starting point, we identified areas where updates or clarifications are needed to fully unlock the benefits of blockchain technology in blockchain-based solutions designed for aviation.

Regulatory Updates to Empower Blockchain Adoption

Ensuring Clarity, Streamlining Processes, and Enhancing Security

Addressing regulatory gaps is essential for the successful adoption of blockchain-based solutions in aviation.

Key Regulatory Gaps

1. LACK OF SPECIFIC BLOCKCHAIN REGULATIONS
2. LIMITED ACCESS TO PUBLIC DATABASES
3. STANDARDISATON FOR INTEROPERABILITY
4. DOCUMENTATION OF PART SCRAPING
5. DIGITAL SIGNATURE LIMITATONS

Leveraging Existing Standards for Blockchain

Identifying Areas of Alignment and Opportunities for Evolution

Aviation relies on a robust set of industry standards to ensure safety, interoperability, and efficiency. While not specifically designed for blockchain-based solutions, many existing standards provide a valuable framework for integrating these solutions into existing processes.

Key Standards for Consideration

ATA Spec 2000: Electronic Data Interchange:

Defines standards for exchanging electronic data related to aircraft parts and maintenance, providing a foundation for blockchain-based data sharing.

ATA Spec 2500: Aircraft Transfer Records:

Establishes a standardized format for exchanging aircraft records, including component information, which can be adapted for blockchain implementation.

SAE ARP6984: Determination of Cost Benefits from Implementing a Blockchain Solution:

Provides guidance on assessing the economic impact of blockchain solutions, aiding stakeholders in evaluating feasibility and return on investment.

These existing standards offer a solid starting point for integrating blockchain-based solutions. However, further evolution is needed to fully address the unique requirements of a decentralized, tamper-proof system for managing aircraft parts and airworthiness data.

Evolving Standards for a Blockchain-Enabled Future

Promoting Interoperability, Security, and Industry-Wide Adoption

Existing industry standards are a foundation, but gaps must be addressed to fully leverage blockchain's potential in aviation.

Key Standards Gaps

1. **BLOCKCHAIN-SPECIFIC DATA FORMAT AND INTERFACE**
2. **BLOCKCHAIN INTEROPERABILITY FRAMEWORK**
3. **UNIQUE IDENTIFIERS FOR NON-SERIALIZED PARTS**

By working collaboratively with industry organizations, EASA can play a vital role in guiding the evolution of these standards, creating a robust framework that supports innovation, security, and industry-wide adoption of blockchain technology.

Current legislative landscape

Existing Frameworks and Key Considerations

Currently, no specific regulations directly address blockchain technology in aviation.

Existing regulations emphasize secure and reliable data management for airworthiness and parts tracking. These requirements are largely technology-agnostic.

Examples:

Regulation/Standard	Key Aspects	Relevance to Blockchain
Continuing Airworthiness Regulation (EU) No 1321/2014	Certification of maintenance; Electronic system generated Form 1	Outlines requirements for maintenance records and electronic documentation, providing a framework for blockchain-based solutions integration.
Rules for Airworthiness and Environmental Certification - Regulation (EU) No 748/2012	Authorization of Form 1 use; Production documentation requirements	Establishes rules for part production and documentation, offering a basis for evaluating blockchain's role in these processes.
Part-IS: Rules for Information Security (Regulations (EU) 2023/203 and 2022/1645)	General information security obligations; Specific provisions placeholder	Sets information security requirements for aviation organizations, emphasizing the need for blockchain solutions to meet these standards.

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Identifying use cases and evaluating blockchain potential benefits

The following factors can help determine if a blockchain-based solution is appropriate in a specific process and/or operation scope

A blockchain-based solution should be considered for highly sensitive perimeters meeting at least 4 of 6 criteria, but organizations should also explore other technological options beyond decentralized technologies.

Multiple parties share data

Multiple participants need to visualize common information

Multiple parties update the data

Several participants take actions that need to be recorded and change the data

Verification requirements

Participants must have confidence in the validity of the recorded actions

Intermediaries add complexity

Cutting out intermediaries can reduce costs and complexity

Time-sensitive interactions

Reduced lead times have strong business benefits

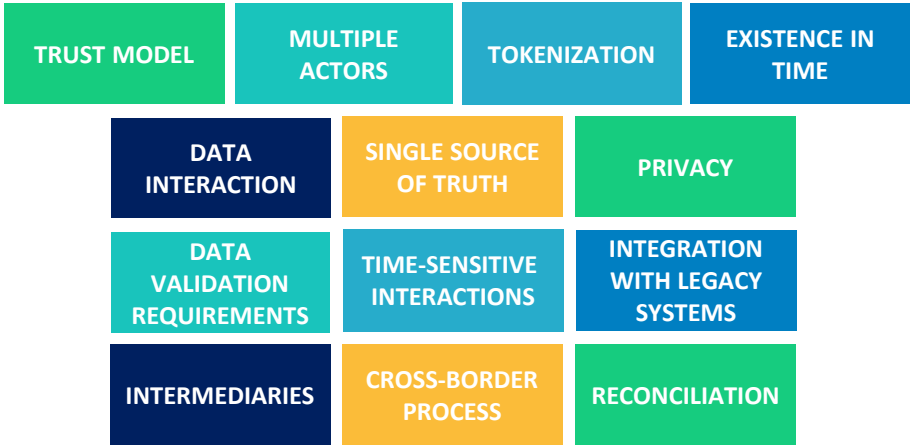
Transactions interact

Transactions created by different participants depend on each other

The detailed analysis of these criteria can be read in deliverable **D2.2 (Analysis report of investigations performed)**

Use case Assessment Tool

→ The evaluation of the following elements can **help organizations determine whether a blockchain-based solution is suitable for a specific use-case**



Cost factors

→ The work carried out during the project made it possible to identify the **main criteria which drastically vary the costs of implementing a blockchain-based solution** in one of the use cases studied.

Industry focus
Ledger type
Licensing model
Hosting
Data security policy
Data regulation
Blockchain acceptance

Performance
Consensus mechanism
Interoperability
Blockchain evolution
Governance
Smart contracts

The detailed analysis of these elements can be read in deliverable **D2.2 (Analysis report of investigations performed)**

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Blockchain use cases identified during the project

The detailed analysis of these blockchain use cases can be consulted in deliverable D3.1 (Changes required to regulatory materials and implementation roadmap)

Unlocking the Potential of Blockchain: Diverse Applications for Aviation

Nine Key Use Cases for Enhanced Airworthiness Management

- The VIRTUA project has identified nine key areas where blockchain can deliver significant benefits for managing aircraft parts and ensuring airworthiness. These use cases span a wide range of processes, from tracking individual components to streamlining aircraft transitions and enhancing regulatory compliance.

  - UC1: Aircraft Parts Back-to-Birth Traceability
  - UC2: Real-Time Pre-Screening of EASA Form 1
  - UC3: Maintenance History for Life Limit Utilization
  - UC4: Aviation Registration System
  - UC5: Automated Warranty Adjudication
  - UC6: SUP Pre-Screening and Aircraft Inspections
  - UC7: Enhanced Configuration Control
  - UC8: Secure Parts Scraping Management
  - UC9: Real-Time Validation of Issuing Organizations

The detailed analysis of these blockchain use cases can be consulted in deliverable **D3.1 (Changes required to regulatory materials and implementation roadmap)**

Examples of organisations using blockchain-based solutions

The presentation of these use cases come from Workshop #2 carried out during the VIRTUA project. You can consult its entire contents and recording on the EASA website (https://www.easa.europa.eu/en/downloads/139372/en).

Streamlining Supply Chain Management

- **Company:** JALUX, a Japanese aviation supplier,
- **Value:** uses the Block.Aero platform to enhance efficiency and transparency in aviation material management and logistics. It enables real-time parts tracking, reduces paperwork, and optimizes inventory, leading to cost savings and improved operational efficiency.

Digital Aircraft History for Enhanced Trust

- **Company:** Daher, an aircraft manufacturer,
- **Value:** leverages GoodsID to create a secure and immutable digital record of each aircraft's lifecycle. This includes maintenance, inspections, and ownership history, increasing transparency, simplifying aircraft transitions, and providing a trusted source of information for all stakeholders.

Frictionless Data Sharing for the 787 Community

- **Company:** KLM E&M, a maintenance provider,
- **Value:** is a pioneer in using SkyThread to share maintenance and operational data securely and efficiently with other members of the Boeing 787 community. This encourages collaboration, improves maintenance planning, and reduces downtime through real-time insights.

independent data consortium for aviation

IDCA - Consortium enabling trusted collaboration

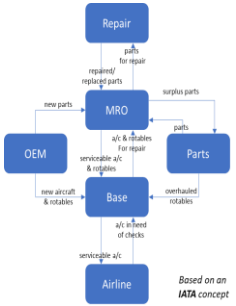
Leon Gommans

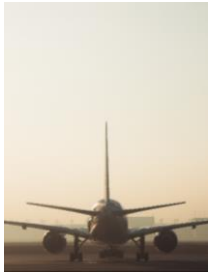
Vice President, Independent Data Consortium for Aviation

www.dataforaviation.org

Some Common Pain Points

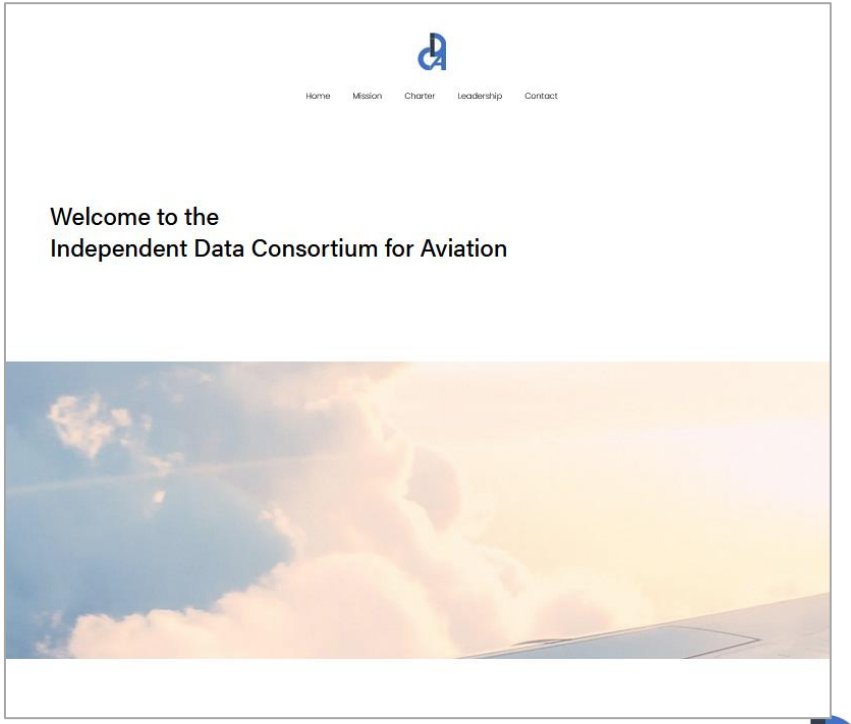
- Can I track parts (including all regulatory documentation) from birth to disposal?
- How do I quickly locate and procure parts for getting my plane back in the air resolving an Aircraft on Ground (AOG) situation?
- If I'm having an issue with equipment many others fly, how can we pool our data to diagnose the problem quickly and get to the root cause?
- How can we collaborate to develop more performant AI/ML algorithms learning from more Aircraft Operational Data supplied by multiple airline fleets?
- Are there any fake parts installed on my aircraft?





Independent Data Consortium for Aviation Started to Address These!

- IDCA started in 2022, after about a year of preparation.
- Mark Roboff (IDCA incorporator), Leon Gommans, and Ravi Rajamani developed its charter and first set of governance policies for the IDCA.
- These follow the academic work done by Leon Gommans and others related to organizing trust for sharing and managing data addressing concerns regarding ‘ownership’.
- IDCA is **not** envisioned to be a service provider to the industry. It is set up to develop rules and policies for data sharing.
- Currently IDCA has representations from every sector of aviation, including independent third-party software companies.
- The goal is to develop **data-governance standards** for sharing data fairly and equitably in a non-proprietary / pre-competitive manner.



www.dataforaviation.org

IDCA Leadership

IDCA Board of Directors

Jeff Smith
IDCA Board Chairman

Leader, Digital Product Programs, Parker Aerospace

Bio

Mark Roboff
IDCA Board Treasurer

Co-Founder & CEO, SkyThread

Bio

Fabrice Villaume
Head, Digital Services Biz Growth & Leader, Digital Alliance (with Delta & GE), Airbus

Bio

Zachary Jakaitas
Head, Data Governance, Connected Aviation Solutions, Collins Aerospace

Bio

Derk Nieuwenhuijze
VP Digital, Marketing & Communication, AFI-KLM Engineering & Maintenance

Bio

Jan de Wall
Head, Loan & Exchange, AOG Services,Lufthansa Technik

Bio

IDCA Boad Advisors

William Voss, FRAeS
President and Independent Consultant, William R. Voss, LLC

Bio

Chris Markou, PhD
Head, Technical Operations, IATA

Bio

IDCA Leadership Council

Ravi Rajamani, PhD, FSAE, FIMechE
President

Bio

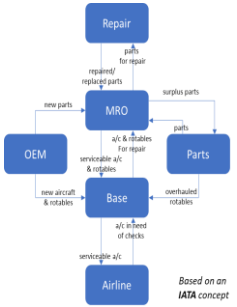
Leon Gommans, PhD
Vice President

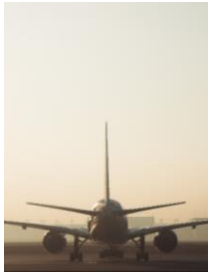
Bio

Identify (and Base) Policies on Industry-Relevant Use Cases

Currently working on five use cases

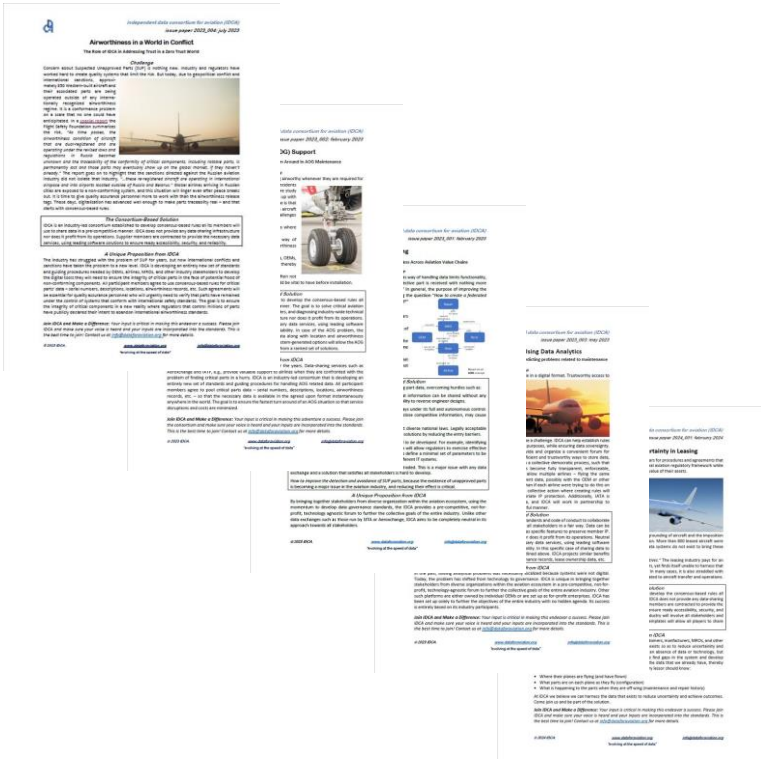
- ✓ Parts tracking from birth to disposal
- ✓ Aircraft on Ground (AOG) servicing
- ✓ Diagnosing technical problems common to all operators using data analytics & AI.
- Preserving mandatory aircraft safety data even in areas experiencing conflict
- Lease ownership transfer





Five Issue Papers Have Been Published on Website

- The idea is to develop standards via actual use cases that the industry cares about.
- Currently, we are working on three fundamental data groups:
  - Parts
  - Analytics
  - Ownership-related
- While some issues are unique, many of the governance policies will be common across these data groups, making the entire job a little easier.



Current Status, Next Steps, and How You Can Contribute

Current Status

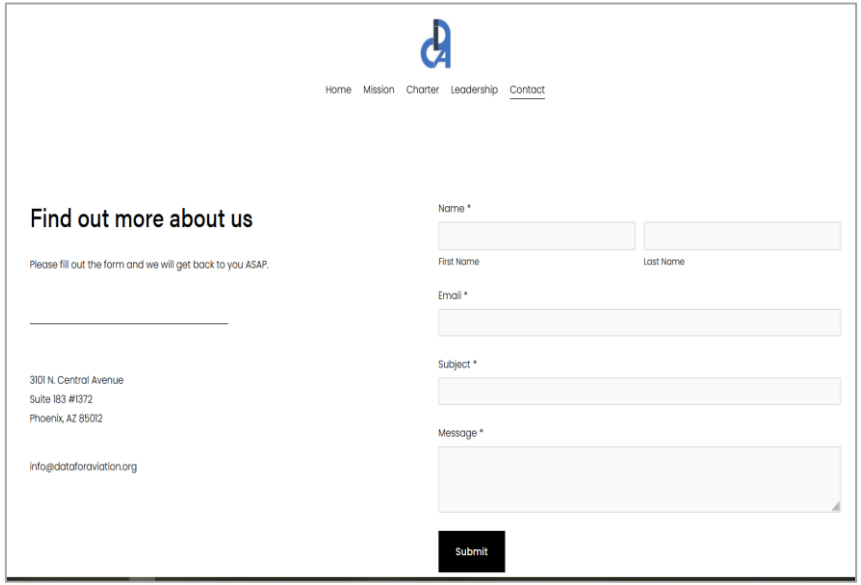
- Parts Tracking, Data Analytics and AOG working groups (WG) have started working and meeting regularly.
- The entire general body of IDCA meets every two weeks to disseminate information to all members.
- The Board of Directors meets each month to ensure IDCA oversight.

Next Steps

- Continue work on additional WGs:
- Complete a common data policy issue paper.
- Establish Policy WG charter and organize data officers and legal specialists from our members to work on approaches to resolve generic data sharing concerns.
- Establish collaboration with EASA RMT.0742 rulemaking group on AI.
- Continue working on to publicize IDCA across the industry to get more members.
- Publish other relevant issue papers.

How Can You Contribute?

- Visit our website & contact us.
- Reach out to any of us personally.
- **Become a member!**



Welcome to the
Independent Data Consortium for Aviation

THANKS

AIRFRANCE INDUSTRIES KLM Engineering & Maintenance

ADAPTIVENESS®

ENHANCING COMPONENT POOL OPERATIONS AND LIFECYCLE TRACKING WITH SKYTHREAD FOR PARTS

Paolo Monti - KLM E&M

EASA, Koln, 17th September 2024

HEY THERE!

PAOLO MONTI

BUSINESS LEAD KLM E&M BIG DATA

- MSc in Aeronautical Engineering
- Joined KLM E&M in 2020
- Business Lead – KLM E&M Big Data Engineering
  - Project Lead - KLM E&M Big Data - Component Blockchain Project
  - Lead Analytics Translator - KLM E&M Big Data Engineering

AFI KLM E&M - A GLOBAL MRO BUSINESS

WITH A NEED: A GLOBAL SINGLE SHARED COMPONENT DATA REGISTER

3000+
SUPPORTED AIRCRAFT

200+
CUSTOMERS WORLDWIDE

8
LOGISTICS CENTERS

15+
BUSINESS UNITS

20+
MAINTENANCE FACILITIES

12.800
TOTAL EMPLOYEES

AIRFRANCE INDUSTRIES KLM Engineering & Maintenance
ADAPTIVENESS®

AFI KLME&M – SKYTHREAD PARTNERSHIP

JULY 2023 – STARTING OUR JOURNEY

SkyThread

AIRFRANCE INDUSTRIES KLM Engineering & Maintenance

ADAPTIVENESS®

AFI KLM E&M and SkyThread lay the foundations for partnership in the digital aviation ecosystem

AFI KLM E&M and SkyThread have collaborated on a unique and innovative solution for managing aircraft components data. The two partners are now joining forces to start deployment and enable value generation for all stakeholders.

- Independent, **neutral**, service provider, leveraging a combination of aviation industry & IT expertise

Digital Thread

Powered by Blockchain Secured & Distributed

Backed by an Independent Industry Consortium (IDCA)

AIRFRANCE INDUSTRIES KLM Engineering & Maintenance

ADAPTIVENESS®

AFI KLME&M – SKYTHREAD PARTNERSHIP

JULY 2024 – A **LIVE** PRODUCT BEING IMPLEMENTED

- SkyThread for Parts **Live** at KLM E&M
- A data sharing network ready to deliver **value to all stakeholders** in aviation industry.

AIRFRANCE INDUSTRIES KLM Engineering & Maintenance

ADAPTIVENESS®

AFI KLM E&M and Parker Aerospace Group reach major milestone in deploying SkyThread's Blockchain-Based aircraft Parts Track and Trace platform for 787 fleet

Schiphol-East, July 25th, 2024 – Air France Industries KLM Engineering & Maintenance and Parker Aerospace Group (Parker) have achieved the first roll out of a revolutionary back to birth track and trace of aircraft parts, leveraging the groundbreaking SkyThread for Parts data sharing platform.

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AIRFRANCE INDUSTRIES KLM Engineering & Maintenance

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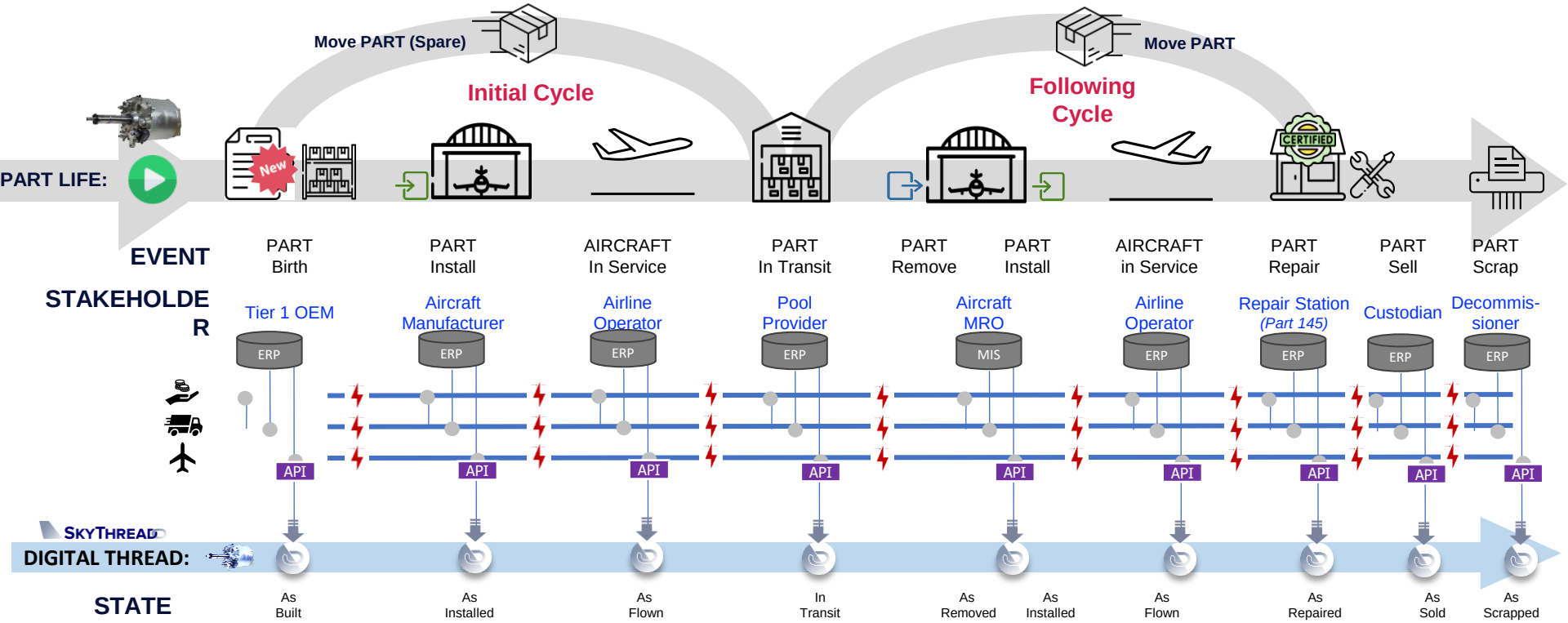
AIRFRANCE INDUSTRIES KLM Engineering & Maintenance SKYTHREAD FOR PARTS

A Live Product - What now?

REFRESHER: SkyThread for Parts DIGITAL THREAD

RECORDING OF EVENTS INFO FROM DIFFERENT PLAYERS IN A SINGLE THREAD



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AFIKLM E&M 787 POOL IS BLOCKCHAIN READY, WITH SKYTHREAD FOR PARTS

AIRLINES, OEMs AND MROs ARE JOINING.

- SkyThread is ready to deliver **value** for our **787-business community**

Digital thread

Single-source-of-truth: holistic visibility of parts history and status. Enabler for future **Digital Passport**

Data quality

Single-source-of-truth: easy and on-demand data for parts reliability and performance assessment

Demand Planning

Proof of authenticity with manufacturer's birth certificate

Data integrity and access

Single-source-of-truth: Fast, complete and reliable back-2-birth information.

Part Authentication

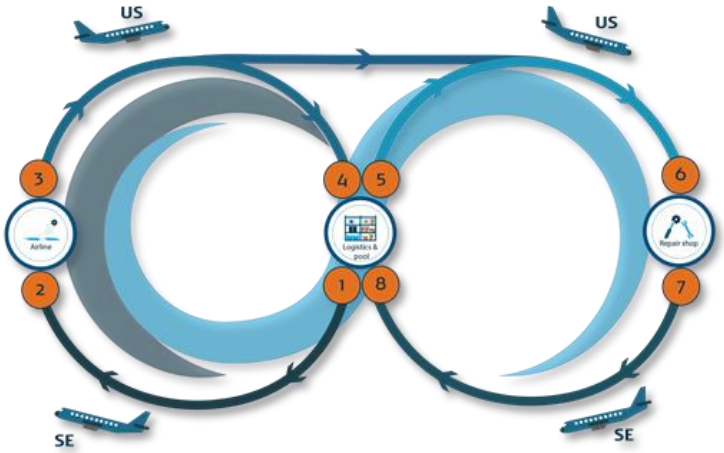
Enabler towards **fully digital data exchange** within the ecosystem

INTERNAL AND EXTERNAL USE CASE DRIVEN DEPLOYMENT

PARALLEL DEPLOYMENT TO EXISTING PROCESSES

Customers Pool Operations

Tier 1 Pool Operations



Reliability Engineering

Part Authentication

AIRFRANCE INDUSTRIES KLM Engineering & Maintenance

ADAPTIVENESS®

INTERNAL AND EXTERNAL USE CASE DRIVEN DEPLOYMENT

OPERATORS - CAPTURING VALUE IN OUR SUPPLY CHAIN

Customers Pool Operations

- Exchange of part information (SE and US flow) in digital way **upon shipment/on removals** vs current paper “with the part”
- Information available **before** the part arrives at facility

- Create **digital** secure **history** of parts with complete lifecycle traceability (**digital passport)**
- **Reduce** administration **time** and quarantine checks for out/inbound components and core exchanges

- Improve supply chain performance, reduce TAT and global **component availability**
- Improve the **security and safety** of the ecosystem

Reliability Engineering

- Ability to exchange part **historical information** (on request): shop reports, repair history in an **easy and quick** way

- **Enhance** CAMO/Part-M Component Reliability Analysis
- **Reducing** time-to-fix

- **Improve** the global component reliability and performance

INTERNAL AND EXTERNAL USE CASE DRIVEN DEPLOYMENT

OEM/TIER 1 – CAPTURING VALUE IN OUR SUPPLY CHAIN

Tier 1 Pool Operations

- Exchange of part information (SE and US flow) in digital way **upon shipment** vs current paper “with the part”
- Information available **before** the part arrives at facility

- Create **digital** secure **history** of parts with complete lifecycle traceability (**digital passport)**
- **Reduce** administration **time** and quarantine checks for out/inbound components and core exchanges

- Improve supply chain performance, reduce TAT and global **component availability**
- Improve the **security and safety** of the ecosystem

Part Authentication

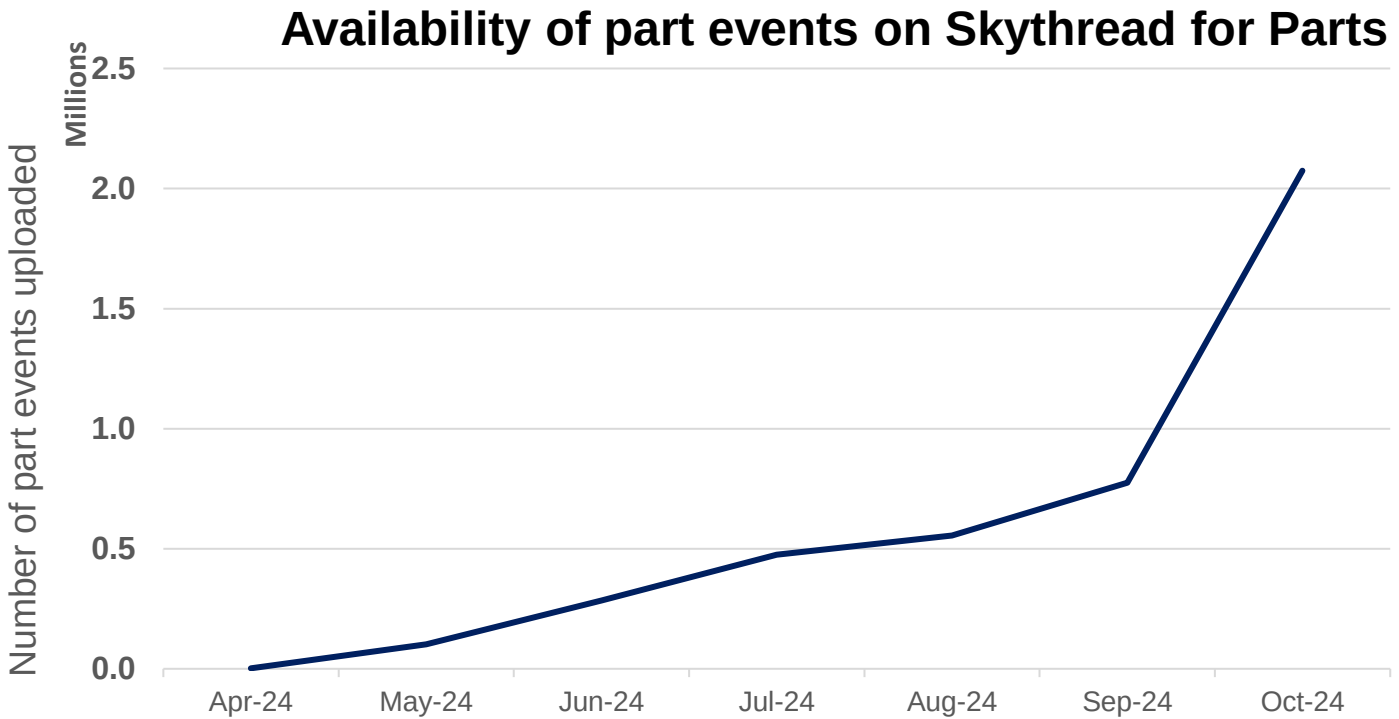
- Visibility of birth certificate for all manufactured parts, allowing **easy and quick** control upon purchasing used parts

- **Reducing risk** of counterfeit documentation/parts entering the flow

- Improve the **security and safety** of the ecosystem

PART EVENTS ARE AVAILABLE ON SKYTHREAD

PARKER AND KLM E&M HAVE TAKEN THE FIRST STEPS IN DATA UPLOAD



By Nov 2024

2M+ Events

(part birth, install/removal...)

AIRFRANCE INDUSTRIES KLM Engineering & Maintenance

ADAPTIVENESS®

AMBITION CLUSTER RAMP-UP BY COMMUNITIES

AFIKLM E&M AS HEAD OF CLUSTER TO GROW A COMMUNITY AROUND THE 787 POOL AND BEYOND

Engine OEMs

Parker Aerospace

AIRFRANCE INDUSTRIES KLM Engineering & Maintenance

787 OPERATORS community

AIRFRANCE KLM

Tier1/MROs

Aircraft OEMs

Operators

AIRFRANCE INDUSTRIES KLM Engineering & Maintenance

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THANK YOU FOR YOUR ATTENTION

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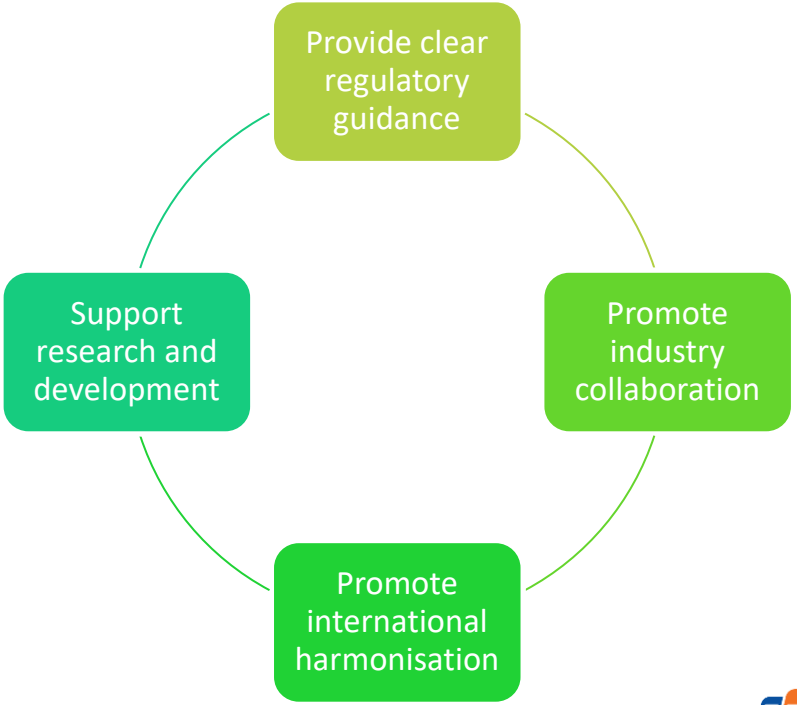
EASA
European Union Aviation Safety Agency

Way forward

EASA

EASA's Role in Empowering New Technology Adoption

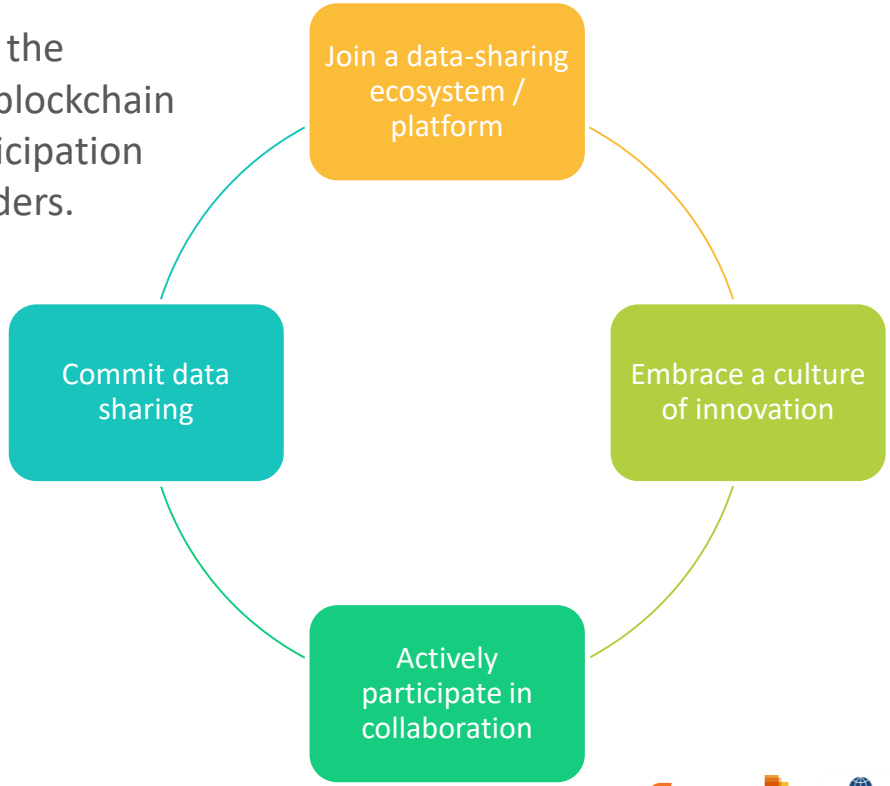
EASA, as the European aviation safety regulator, plays a vital role in guiding the industry towards a safer and more efficient future. To unlock the potential of blockchain technology, EASA could:



Aviation Industry Stakeholders

Industry's Role in Shaping a Blockchain-Enabled Future

While EASA plays a vital role in setting the regulatory framework, the success of blockchain in aviation depends on the active participation and commitment of industry stakeholders.



EASA
European Union Aviation Safety Agency

Proposed Roadmaps

Adapting Regulations for the Future

Potential Regulatory Actions and Consideration

CHALLENGES

The fast evolution of blockchain and other data management technologies presents challenges for regulatory bodies to keep pace and adapt frameworks.

OPPORTUNITIES

Blockchain can offer potential solutions to existing challenges, such as enhanced traceability, streamlined processes, and improved data security.

Emphasis on Collaboration:

Successful integration of blockchain-based solutions requires ongoing collaboration between EASA, industry stakeholders, and technology developers to ensure alignment with regulatory objectives and safety standards.

Guiding Principles for Blockchain Implementation

A Phased Approach, Stakeholder Collaboration, and Adaptability for Success

To successfully integrate blockchain-based solutions into the aviation ecosystem, a clear and well-defined roadmap is essential. Our proposed roadmaps are guided by the following core principles:

Phased Implementation	Stakeholder Collaboration	Adaptability & Iteration
The roadmaps use a phased approach, beginning with "quick wins" and advancing to more complex, long-term initiatives.	Successful implementation depends on collaboration among regulators, industry actors, and blockchain developers, with a focus on partnerships, pilot projects, and best practices.	The roadmaps are adaptable and iterative, requiring ongoing refinements as technology evolves and experience grows.

These principles are applied to 3 different Scenarios to generate the corresponding roadmaps:

Scenario 1	Evolutionary Approach
Scenario 2	Proactive Approach
Scenario 3	Transformational Approach

Scenario 1

Minimal Regulatory Change

Evolutionary Approach

Short Term

Education and awareness → Increased understanding

- Educational materials and initiatives
- EPAS Initiatives: include Safety Promotion Tasks (SPTs)

Medium Term

Pilot Projects → Proof of value, insights for future

- Select and partner for use cases and share knowledge
- EPAS Initiatives: include research projects and introduce Implementation Support tasks (ISTs)

Long Term

Gradual, industry-led adoption → increased efficiency, transparency, and security in aviation parts tracking.

- Knowledge sharing and best practice dissemination.
- International collaboration through the SMICG (Safety Management International Collaboration Group) and other relevant bodies
- EPAS Initiatives: Introduce MSTs (Member State Tasks)

Scenario 2

Moderate Regulatory Change

Proactive Approach

Short Term

Regulatory consultations with stakeholders → consensus on the direction of regulatory changes

- Workshop and meetings focusing on regulatory challenges
- Develop draft regulatory amendments and standards updates
- EPAS Initiatives: Include specific regulatory objectives

Medium Term

Implementation of regulatory changes → regulation actively supports blockchain adoption

- Implement regulatory amendments
- Support financially deployment of solutions
- Develop and implement standardized data formats and processes
- Continue pilot projects
- EPAS Initiatives: Introduce Rule Making Tasks (RMTs) and continue with research projects and Implementation Support Tasks (ISTs)

Long Term

Continuous monitoring and evaluation of implementation → a mature, adaptable regulatory framework

- Establish a collaborative governance framework
- EPAS Initiatives: blockchain-related objectives in standardisation assessments (SYS phase 2.0) and encourage international collaboration through

Scenario 3

Significant Regulatory Change

Transformational Approach

Short Term

Comprehensive review for major overhaul → a clear vision for a transformed aviation industry

- Dedicated working group
- Vision for a blockchain-enabled aviation ecosystem
- Strategic implementation roadmap
- EPAS Initiatives: blockchain as a key enabler within the European Aviation Safety Program (EASP), dedicated section on blockchain in EPAS Volume I.

Medium Term

Phased regulatory implementation → a regulatory environment that drives innovation

- Draft and implement new regulations
- Develop and deploy blockchain-based solutions
- International collaboration, enable global interoperability
- EPAS Initiatives: Include MSTs to drive adoption and implementation

Long Term

Continuous improvement and expansion of blockchain applications → a fully integrated blockchain ecosystem

- Explore new use cases
- Refine regulatory framework
- EPAS initiatives: Evaluate the effectiveness of regulations and initiatives through EVTs
- Work with ICAO to develop global standards

EPAS: A Framework for Aviation Safety

The European Plan for Aviation Safety (EPAS) serves as the regional aviation safety plan for all European Union (EU) Member States. It's a comprehensive roadmap outlining strategic priorities, identifying key safety risks, and defining the actions necessary to mitigate those risks and enhance aviation safety across Europe

OBJECTIVES

- **Maintain and Improve Aviation Safety**
- **Enhance Environmental Performance**
- **Ensure a Level Playing Field**
- **Foster Efficiency and Proportionality**

STRUCTURE

Volume I: Strategic Priorities
Volume II: EPAS Actions
Volume III: Safety Risk Portfolios

ACTIONS

Rulemaking Tasks (RMTs)
Implementation Support Tasks (ISTs)
Safety Promotion Tasks (SPTs)
Research Projects (RES)
Evaluation Tasks(EVTs)
Member State Tasks(MSTs)

Link to EPAS: https://www.easa.europa.eu/en/document-library/general-publications/european-plan-aviation-safety-epas-2024

All project deliverables that are public, and can be consulted on the EASA website

VIRTUA — Leaflet

Document presenting the project objectives

D-1.1 Review of Existing Literature and Identification of Digital Solutions

This review provides an overview of the current regulatory framework of each of the Case Studies under the scope of the project, setting the baseline for the next steps of the project.

D-2.1 1st Stakeholder Workshop (13 December 2023)

This first workshop was focused on blockchain acculturation.

D-2.1 2nd Stakeholder Workshop (24 January 2024)

This second workshop was focused on the use of blockchain-based solutions by industrials in aviation.

D-2.1 Report on the main investigations performed

This report consists of a full report on the research activities carried out as part of the project and their content, based on the case study: “development and implementation of digital solutions for the airworthiness management of aircraft parts”.

This report explains in detail the methodology, risk mitigation and the results of the desk research, interviews and workshops carried out in the project between June 2023 and January 2024.

D-2.2 Analysis report of the investigations performed

This document consists of a full report of the desk research, the interviews and the workshops carried out in the project between June 2023 and February 2024. Classifying and analysing the answers and interaction to establish a desired state on Airworthiness and traceability for parts for the different stakeholders.

D-3.1 Changes required to regulatory materials and implementation roadmap

The document presents a gap analysis between the selected Blockchain use cases with regulatory materials and industry standards. The analysis identifies necessary changes to regulations and standards to facilitate the integration of blockchain-based solutions and other data management solutions in aviation parts tracking. A proposed roadmap outlines strategies for implementing these changes within the context of the VIRTUA project, focusing on digital transformation in aviation safety standards and virtualisation.

D-3.2 Training material on the case study

This document consists of training and information material on the VIRTUA Project.

EASA

European Union Aviation Safety Agency

EASA web

You can access all the project's deliverables on EASA VIRTUA website page:

https://www.easa.europa.eu/en/research-projects/virtua-digital-transformation-case-studies-aviation-safety-standards

EASA
European Union Aviation Safety Agency

Q&A

The VIRTUA team thanks all the stakeholders who participated in the project to provide their experience and vision on the use of blockchain in aviation.

slido

#3180703

Pass: a6cyqm

easa.europa.eu/connect

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