The right solutions, **right now**.[™]



TECHNICAL DOCUMENTATION DEVELOPED, MANAGED AND DELIVERED.

Spec 2500 & Blockchain

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Outline

- Who is JANA
- Specific challenges of Aircraft Records
- What does Spec 2500 solve? What's missing?
- Historical Context
- Business needs for the transfer for Aircraft Records
- How does Blockchain address the business needs?

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- Is Blockchain a viable solution?
- Solutions in development
- Advantages and hindrances
- Summary
- Resources

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Who is JANA



Don Bridges

- Manages JANA's Consulting business
- In the XML industry for 20 years

JANA, Inc.

- Privately held company founded in 1973
- Technical Writing and XML Consulting
 - Over 130 technical writers & graphic illustrators



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Aircraft Records Transfer

- Critical information passes from lessor to operator:
 - Configuration
 - Usage and maintenance information
- Exacerbated by various tracking systems:
 - Paper (or PDF)
 - Excel[™]
 - Maintenance tracking software
- No historical 'industry' agreement on:
 - what to track (content and format)
 - how to transmit the data

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Spec 2500 Solves Half of the Puzzle

- Definition of what data should be transferred
- Definition of what format the data should be in (XML)
- What's missing: how to transfer and access the data

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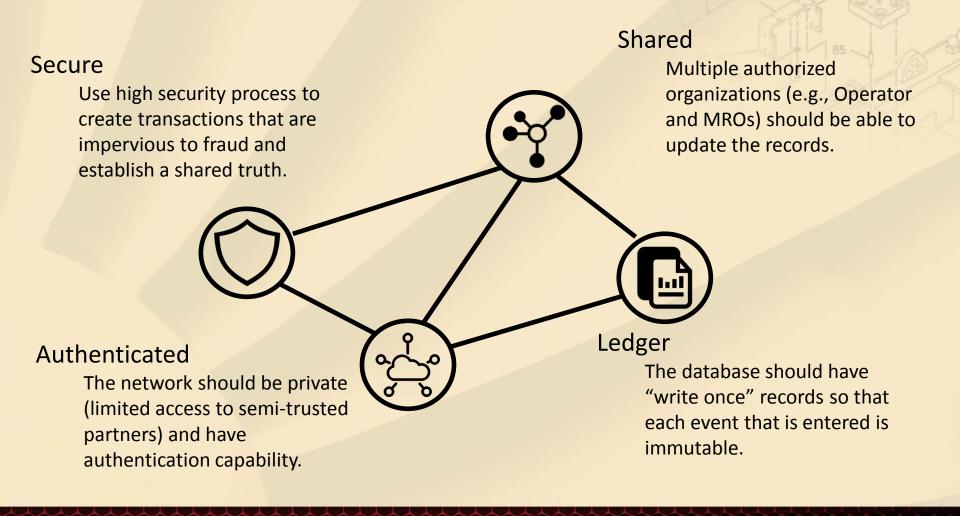
Options for Transfer of Aircraft Records

Period	Format	Transmittal
Historical (pre 90s)	Paper	Physical delivery of copy
Historical (pre 00s)	PDF (from Paper)	E-Mail or other eTransfer
Current	Various ¹	E-Mail or other eTransfer
Spec 2500	XML	Undefined

¹based on Maintenance Tracking software utilized

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Business Needs for Data Transfer



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Fundamentals | Blockchain

Blocks

In an aircraft records paradigm, blocks are an individual transaction (e.g., an entry in a maintenance or flight log) documenting the status of a part or assembly.



Blockchain is the collection of blocks for a given assembly – as simple as a landing gear assembly or as complex as an aircraft.

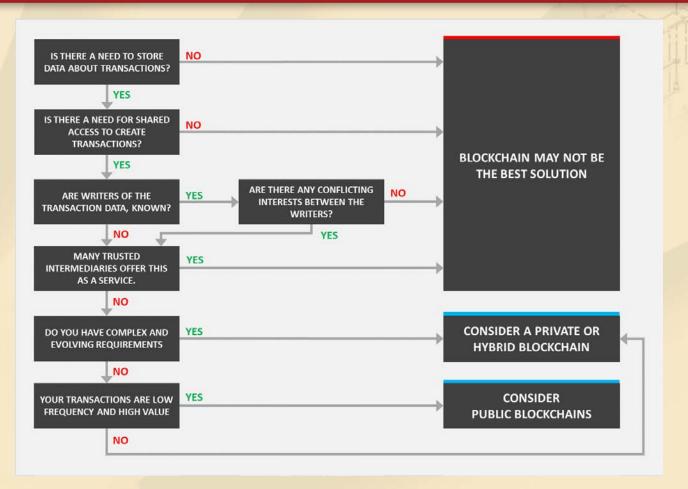
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Blockchain for A/C Transfer Records

- Semi-trusted partners create blocks:
 - Operators with operational data
 - Operators with maintenance data
 - MRO facilities with maintenance data
- Blocks are:
 - "Write-once" (uneditable once entered)
 - Secure
 - Non-proprietary

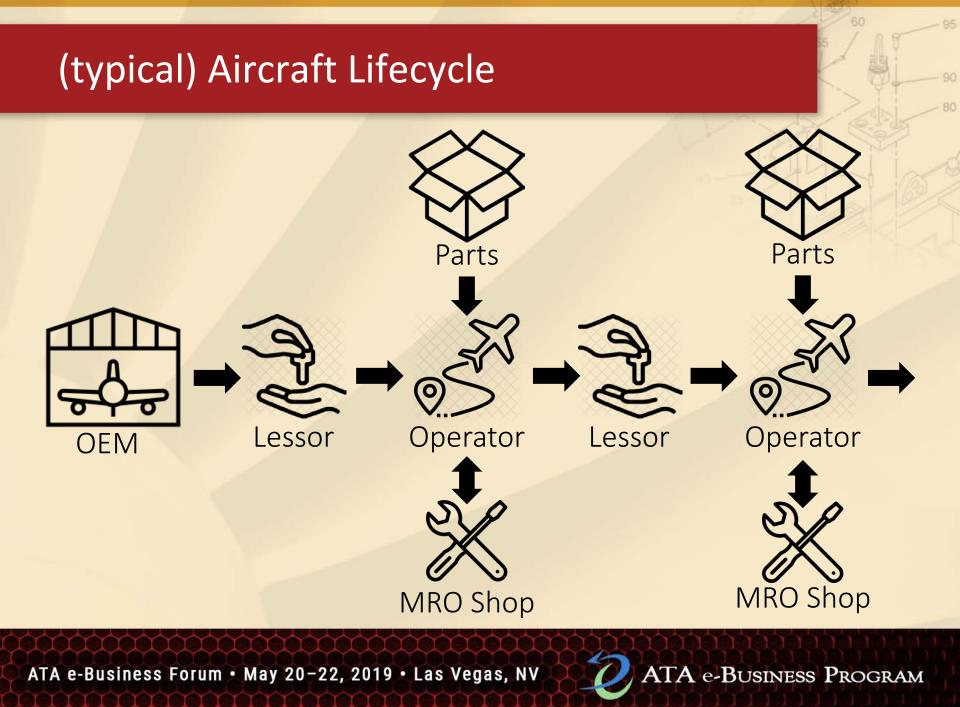
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Does Blockchain Fit?

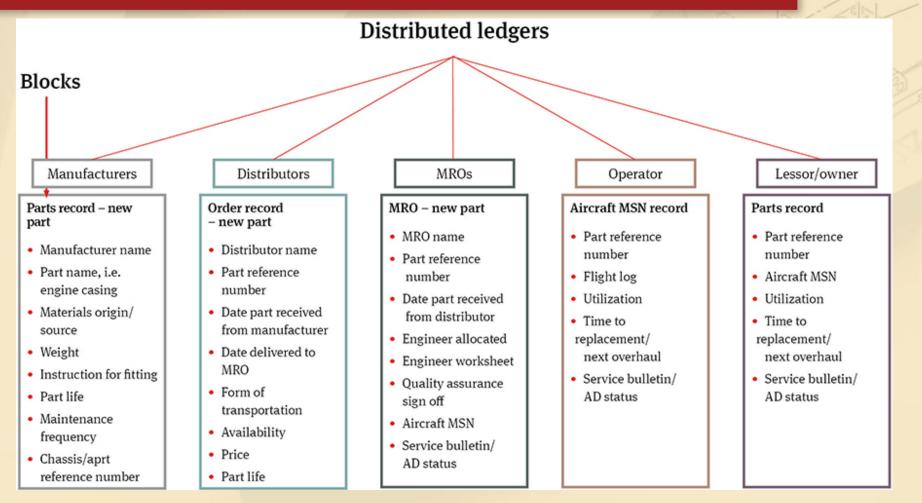


Source: "BLOCKCHAIN IN AVIATION" IATA Whitepaper, Oct 2018

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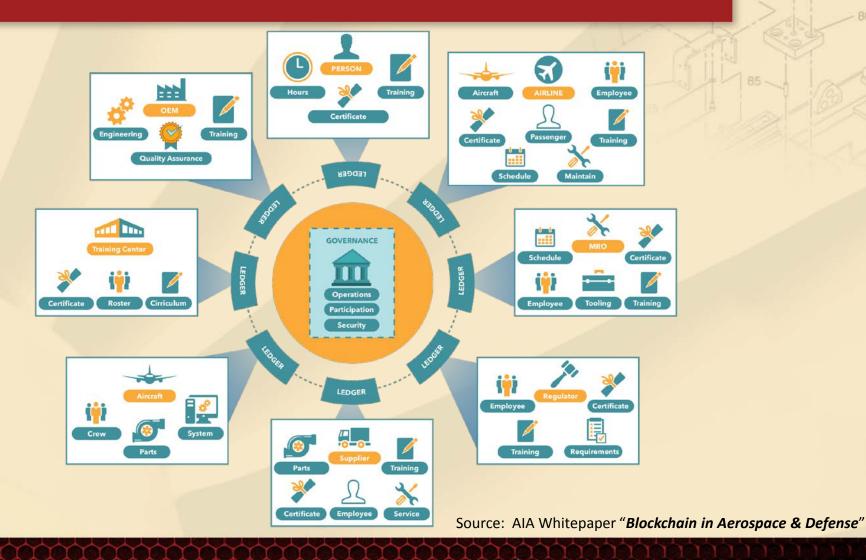
Potential Block Contributors



Source: https://www.nortonrosefulbright.com/en/knowledge/publications/53482ee6/blockchains-and-distributed-ledger-for-aviation

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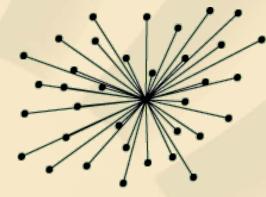
Blockchain Ecosystem

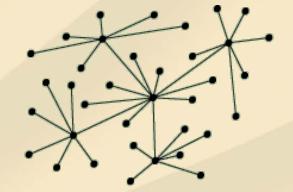


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Blockchain Networks

- Distributed networks with multiple nodes provides the most secure data
 - Each member verifies the authenticity





centralised

decentralised

distributed

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"Parts" Blockchain Solutions In-Dev

Accenture & Thales

https://bctechreport.com/accenture-partners-with-thales-to-launch-blockchain-for-the-aerospace-industry/

Deloitte Digital

https://www2.deloitte.com/us/en/pages/energy-and-resources/articles/blockchain-in-aerospace-and-defense.html

FlyDocs & Willis Lease

https://www.mro-network.com/big-data/flydocs-willis-lease-developing-independent-blockchain-solution

GE Aviation & Microsoft

https://www.coindesk.com/codename-truengine-ge-aviation-and-microsoft-reveal-aircraft-parts-certification-blockchain

Hyperledger & Honeywell

https://www.ledgerinsights.com/honeywell-blockchain-aircraft-spare-parts/

IBM

https://www.ibm.com/blogs/industries/irregular-operations-are-the-new-norm-heres-what-airlines-are-doing-about-it/

Lufthansa Industry Solutions

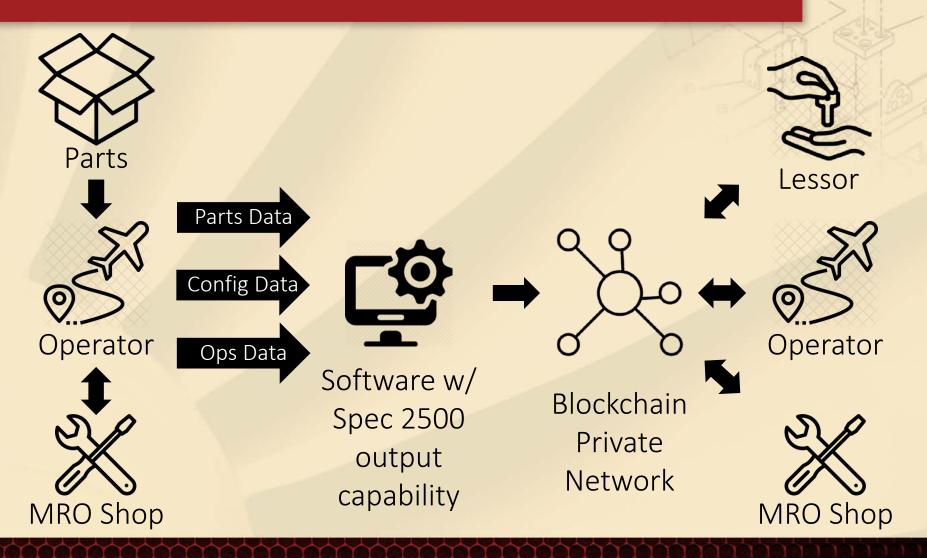
https://www.lufthansa-industry-solutions.com/de-en/solutions-products/aviation/

Parts Pedigree

https://blog.satair.com/applications-of-blockchain-in-aviation

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How it Could all Work Together



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Advantages of Blockchain Records

- Data more searchable
- Data more accessible to partners
- Reduced risk of fraud
- Faster records review
- Automated data entry

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Hindrances to Blockchain Adoption

- Paper
- Agreement on:
 - what data should be captured
 - how data should be captured
- Reluctance of ecosystem players to adopt Blockchain
- Regulatory buy-in
- Legal uncertainty

- Spec 2500

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Summary

- Spec 2500 defines data, data model and format for aircraft transfer records.
- Blockchain provides a possible option for access to and storage of this data. Blockchain meets business needs and offers advantages but faces headwinds.
- Many solutions are in development all announced in the last 12 months. All are early in development..
- Industry will define the winners.



Resources – Blockchain & Aerospace

Blockchain in Aerospace & Defense (AIA Whitepaper) https://www.aia-aerospace.org/report/blockchain-in-aerospace/aia-blockchainwhitepaper/ "Blockchain in Aviation" (IATA Whitepaper) https://www.iata.org/publications/Documents/Blockchain-in-aviation-white-paper.pdf

"Secure Aircraft Maintenance Records Using Blockchain" https://commons.erau.edu/cgi/viewcontent.cgi?article=1378&context=edt

"All aboard the Blockchain train" (AIAA *Aerospace America* article) https://aerospaceamerica.aiaa.org/departments/all-aboard-the-Blockchain-train/

"Blockchain for Dummies" (IBM Edition – free download) https://bertrandszoghy.files.wordpress.com/2017/05/ibm-Blockchain-for-dummies.pdf

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Questions

INTRODUCTION

As ABD companies embark on their own digital

For an aerospace and defense industry that relies on For an aerospace and derense industry that relies on complex global supply chains and securing sensitive incommittee distance also known as "block complex global supply chains and securing sensitive information, distributed ledger, also known as "blockchain," antonion of a solution of a solution of the s amaton, austriautea leager, also known as blockchai niology offers solutions. Blockchain is already being d widalu in financial and risker seature and rould video. tecnnology others solutions. Blockchain is already being used widely in financial and other sectors and could address Used window in Anancial and other sectors and could address keys priorities for the A&D industry, including supply chain and anneal size materials and anneal size materials of a key provides our one kalu industry, including supply chain provenance, cyber security, and overall risk mitigation. As historic security, and overall risk mitigation. As a security security of the security provenance, cycer security, and overall risk mitigetion. At blockchain technology continues to evolve, A&D should develop a common annexes to histochesin accommons blocknain technology consinues to evolve, ALD should develop a common approach to blockchain governance, develop a common sector is the sector of the sect develop a common approacn co ouccecnain govern. standards, and our participation in the ecosystem. At its core, blockchain is a system that maintains and records data so that multiple stakeholders can contraency share nutual access. It operates by recording and storing alter instant excess in operates by recording and storing every kansacher structure the peerto-peer network in excess him the struct structure that is realized every transaction across the peer-to-peer network in a cypbographically linked block structure that is replicated and a structure data across the structure bat is replicated across the structure bacross the stru crystographically-vinted block structure that is replicated across network participants, Every Line a new data block across network parocipants, every time a new data block is created, it is attached to the end of the existing chain commod Across and across a second across a la creata, ic la attached to the end or the existing chain formed by all previous transactions, creating a chain of klavba = +ka "klavbarkvin" "Tkla silasta = klavbarksin to blocks - the blockshain, inits allows a blockshain to contain a record of all transactions and data recorded in the

GHJA4

In most modern business applications where data is shared in maser modern business applications where data is shared or nassed between different entities or business partners, a manuscurvate Rous available and a state where a st or passed between directed encides of outsides patients a one-way data flow exists where each entity maintain is num database. Fach narticinant is the administration a one-way acca now exists where each entity maintains its own database. Each participant is the administrator of a sum data know and database and database and database and database. its own detabase. Lach participant is the administrator of its own database and decides whether and when on our database and a second decides whether and when on Invoiny, append, or reject relevant data received from an external entity. This structure typically results in each party maintaining differing data noises on differing states.) extension entry. This structure typically results in each public and differing data points or differing datate of the other extension is done with the other extension is done with the other extension. maintaining arrening data points or arrening status or data, even after attempts to reconcile data with the other

BLOCKCHAIN IN AEROSPACE & DEFENSE Establishing an industry approach to blockchain novernance standards and overking tion

Blockhains enable multiple stakeholders to operate from Elocconans enacie multiple statemologistico Operator indi-alingle, ihared, multipliged data ledger, elimingting the and for enacy of the second formation and formation to a

a single, shared, mutualized data ledger, suminating the need for separate record keeping and reconciliation. In kinniaking masteries multiple matrice can made and write need for separate record sates ing and reconditions in a blockchain construct, multiple parties can read and write to store devices and balance states and and write to store devices and balance states and the store s to the outmoutes leager while maintaining provenience, control, auditability, tamper evidence, and data integrity. There is a long history of A&D companies seeking to address Interes a long instancy or Aau companies seeving to ado industry challenges through access to a mutualized se of data kisemers strameds how follow how the industry Inducery chailenges through access to a mutualized set of data, but most attempts have failen short. Blockbain offere a new convertingly to educe even of a fair or many water and a state of the state of th

As AGD companies embark on their own digital important piece of new digital data architecture data in them move in new ande networked kusiness architecture in the important piece or new organs orde architectures char new them move to new, agile, networked business processes. The Foundation For successful blockchain initiatives is less about a harkwired immediated and and and and and a statistical a willing and cooperative ecosystem of participants. It is innerses to associate a measurement of the second secon The roundation for successful blockchain instactives is test about a technical implementation and more about building a willing and cooperative account of harocipants its provident to establish a governance process to achieve agreement accoss each participating organization, with the nonnetwork for this renewas being anyonday the say agreement across sach participating organization, with the opportunity for this process being encoded into smart contracts on a blockchain natwork.

Don Bridges

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