



THE WHY OF PARTS TRACEABILITY – USE CASE STUDIES



By Mark Roboff
September 26th, 2023



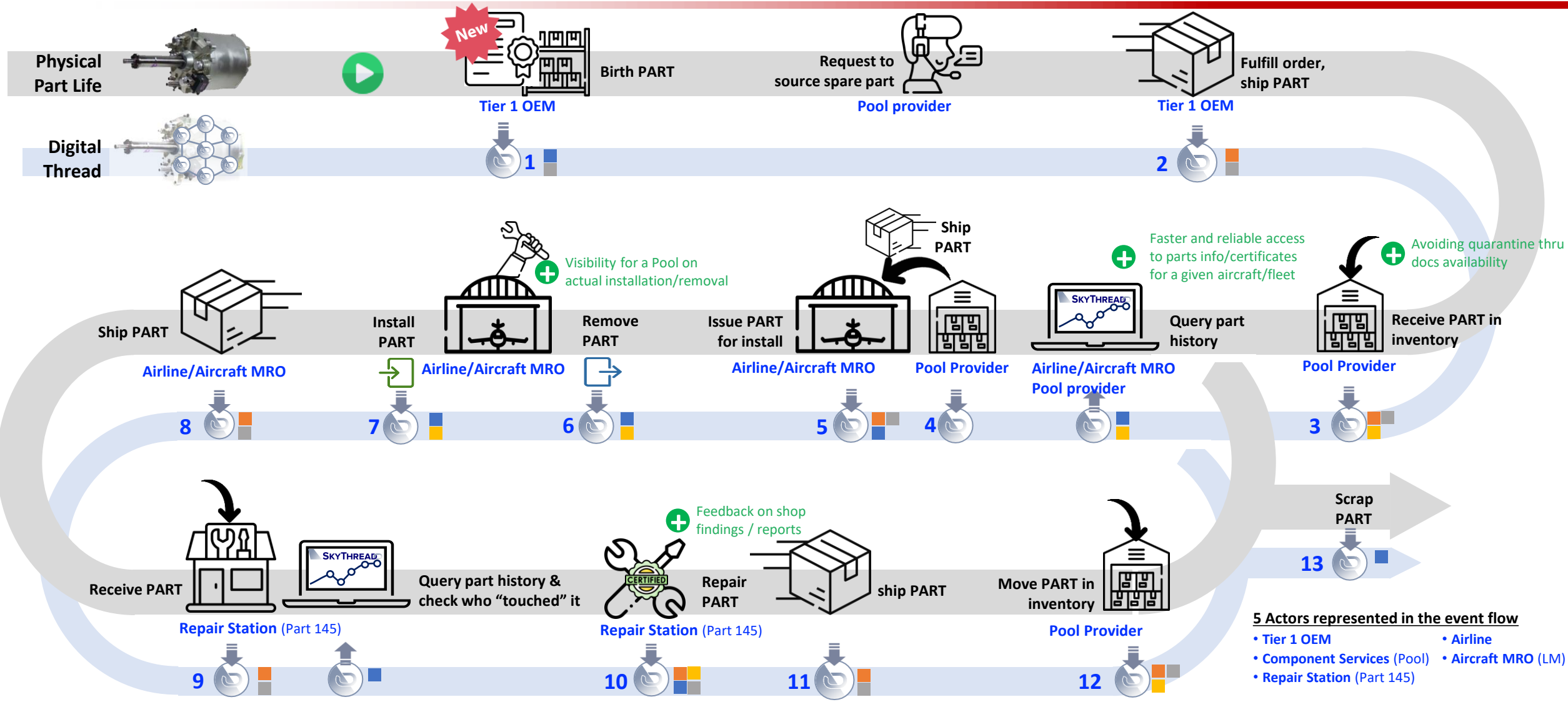
About Me & About SkyThread

- Decade+ dedicated to the intersection of digital and MRO
- Worked on Predictive MX platforms with OEMs and airlines all over the globe
- Chair, SAE G-34 AI Certification committee
- SkyThread founded in 2021 to remove friction in sharing data
- SkyThread is focused on:
 - Parts Track and Trace
 - Asset Lifecycle Management
 - Full Value Realization from Digital Transformation

Contents

- 1. Parts Traceability Storyline**
- 2. Parts Traceability - Validated Business Case**
- 3. Suspected Unapproved Parts – Call to Action**

Parts Traceability Storyline



Validated Business Case

Parts Traceability enables airlines and MROs to share trusted and validated data on inbound and outbound materials required for operations.

Context

- Airlines **asset management** is required to keep aircraft flying but is **costly due to the manual nature of the work and disconnected systems**
- Information necessary for aircraft maintainers does not exist in forms that allow MRO's to "trust" material history without research and validation
- Legacy airlines and MRO providers have invested heavily in developing teams and processes to manage information around parts and planes
- The aerospace supply chain supporting airlines is fragile and subject to disruptions that are difficult to resolve

Outcome

- Corporate **asset utilization** can be **improved** by increasing the speed at which materials are acquired, maintained and moved
- Materials that are common among airlines can be shared and maintained, **eliminating redundancies** while improving availability
- **Regulatory compliance** improved and performance issues eliminated, improving **dispatch reliability**
- **Visibility** of custody, age, usage and repair history will enable material sourcing to reflect actual value, leading to **higher reliability at lower cost**

A/C in service

\$2M / tail

AOG / D&C

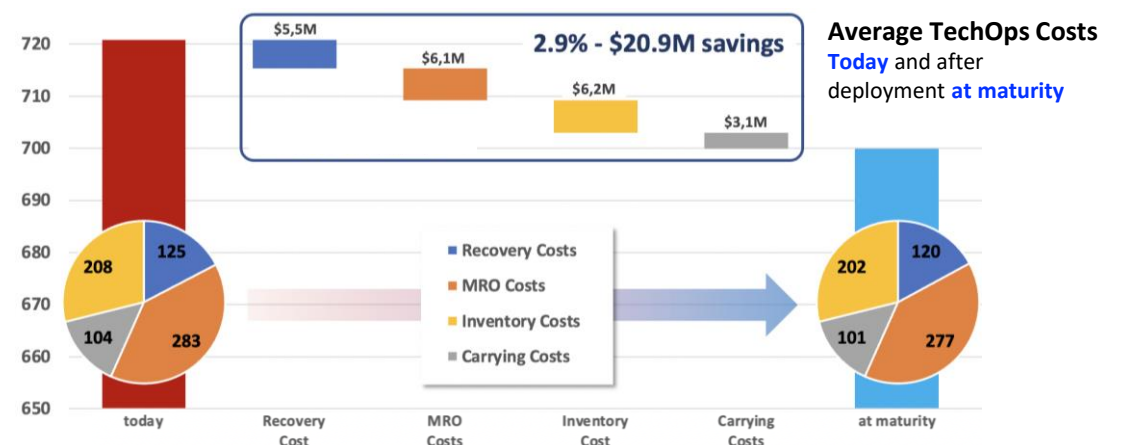
Residual vs scrap

Approach

- Develop and maintain **digital threads** to ensure materials are **fully documented for airworthiness**
- Develop solutions that enable airlines to **move non-proprietary parts data seamlessly** amongst parties, reliably
- Enable airlines and MROs to **share critical asset specific data securely**
- Enable airlines to view **the reliable "status" of available aircraft parts**
- **Supplement existing systems of record** with information that makes them comprehensive and trustworthy



Unleashed value – TechOps cost reduction for 100 aircraft



Use Case -- Large Scale Pooling

Expanded sharing of resources among airlines with common platforms **will improve asset availability** for all the airline while **reducing stress and cost** on a constrained supply chain

Context

- Shared assets allow airlines to own significantly less rotatable parts providing a significant reduction in asset ownership costs
- “Borrowing”, the common practice among airlines is expensive and requires multiple maintenance events (rather than one)
- Understanding and accepting the pedigree of parts facilitates exchanges (rather than loans or borrows)
- Total industry operational costs for airlines to recover from maintenance related schedule impacts(D&C) is \$30 billion per year

Outcomes

- Access to exchangeable assets provides greatly improved service levels
- Average borrow fees to the lender is between \$15,000 and \$20,000 per event
- Significant maintenance costs per event - borrow fees, repair fees and costs for additional removal and replacement of borrowed part are eliminated
- Service levels are improved by use and visibility of common assets reducing AOGs, D&Cs and logistics costs
- Corporate ownership of assets is reduced, improving ROIC

Approach

- Solution accepts and validates existing data from multiple parties to create “trust” for inbound and outbound materials
- “Trusted” information removes multiple barriers airlines currently have regarding use of assets that have not been under their complete control for usage and repairs
- Asset activities (use, removals, repairs) are recorded from original manufacture to scrap ensuring a Birth-to-Scrap pedigree



Value for a 100 Aircraft fleet

- Reduction of D&C recovery cost - \$1.25 million per tail by 10% and reduce recovery costs by 10% - \$125,000 per tail
- Reduce incidents of AOG (parts availability) and recovery time and dollars by 10% - \$20,000 / tail or \$2 million
- Average cost for Borrows is \$1.5 million which can be reduced by 65% - \$1 million
- Higher asset reliability reduces aircraft out of service for any reason - \$4 million or \$400,000 per tail – 1% of scheduled capacity
- Lower inventory



Use Case – Reduced Aircraft TOC (Total Operating Cost)

A deeper and easily accessible understanding of assets available for aircraft maintenance enables better cost analysis, more cost-efficient use and the ability to stay on schedule for planned activities

Context

- The TOC of an aircraft is impacted by inefficiencies in practices and failures to complete tasks on schedule
- Major airlines commonly “defer” 10% to 20% of scheduled overnight activities due to unavailability of parts leading to loss of labor productivity, hangar capacity and causing aircraft routing restrictions to resolve time limited MELs or ADs
- Improvements in asset management must manifest in reducing the overall cost of operating aircraft to be worthwhile
- Maintenance events occur on parts that are under warranty but are not claimed for labor or component cost remediation

Approach

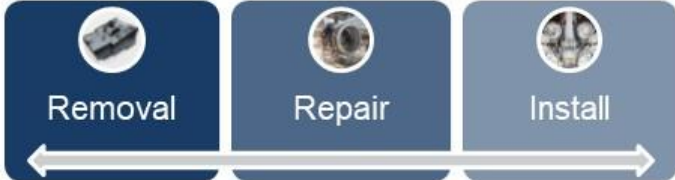
- Comprehensive “parts on plane” data enables clarity of the expected time before failure or removal of specific rotatable assets (rather than MTBUR) so that operators can install parts that have an economic life appropriate to the application
- Materials are tracked from original manufacture, through each install and removal, and every repair activity providing a 100% history of the part
- Knowledge of the full population of parts in the ecosystem allows buyers and sellers to chart reliability and therefore value over a greater sample
- Providers of information are rewarded with data credits giving an economic incentive to participate actively

Outcomes

- “Deferrals” due to part availability or applicability are eliminated thereby reducing the overall cost of labor in hangars, planning and logistics
- Expensive assets are assigned to applications that meet their condition and expected life. Assets that are more valuable (longer on-wing life) are assigned to aircraft that are expected to be in service longest
- Buyers of assets purchase based on expected time on wing based on actual condition rather than repair certification
- Warranty disputes are eliminated due to the on/off data being irrefutable and automatically tracked against warranty agreements enabling airlines to recover 100% of money owed due to parts not living up to guarantees

Value for a 100 Aircraft fleet

- MRO cost per tail are reduced by \$490,000 per tail or \$4.9 million per year



- Warranty remediation - \$1.1 million for 100 aircraft



Use Case – Logistics Cost Reduction

Simplified transmission of complete documentation enables frictionless movement of materials into and out of distribution locations reducing direct costs, inventory requirements and avoiding quarantine

Context

- Documentation of assets is regulated to ensure parts received meet airworthiness requirements. The creation of documentation is mostly manual, expensive and prone to error – validation very difficult
- Receipt, validation and storage of documentation is time consuming and expensive. Errors or perceived errors in documentation require incoming parts be quarantined until resolved
- Excess inventory is owned by airlines to protect against logistics issues. The industry carries over \$100 Billion of inventory
- Airlines average \$2.0 million per tail in inventory

Approach

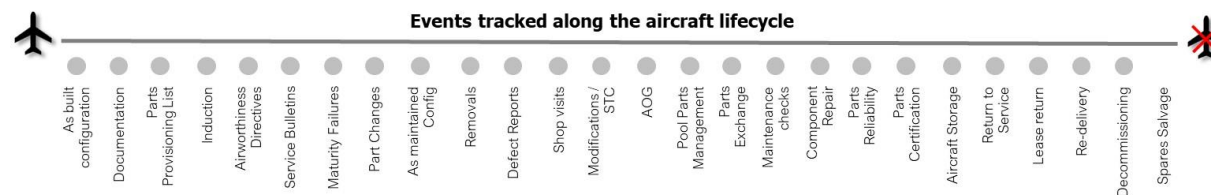
- A properly developed and employed solution will provide irrefutable parts data efficiently
- Data is captured at part birth creating the trace to authenticity
- Data is captured “mid-life” and driven “back to birth” through triangulation
- Document creation efforts are standardized, reducing time and cost
- Documentation of inbound assets are verified before receipt eliminating quarantine events
- Electronic documentation is stored and retrieved efficiently

Outcomes

- Receiving Parts rate (receipts / hour / person) are increase over 100%
- “Dock to Stock” – time from receipt to stock is improved due to better understanding of inbound materials and deployment of human resources (from receiving inspection)
- Discrepancy rates are eliminated by ability to validate information prior to shipment and well before receipt. Quarantines for documentation are eliminated for block-chain managed parts freeing up physical space and resources
- Assets are never “lost”. Assets removed, not recorded are flagged with a blockchain gap event

Value for a 100 Aircraft fleet

- Airlines can reduce inventory by 30% or \$600,000 per tail or \$6 million in total
- Carrying costs of \$300,000 per tail or \$3 million for the airline



Utilization of Rotable assets is greatly increased

Simplifying and improving the process by which rotatable assets move in the supply chain will increase the frequency of use of each part eliminating excess inventory

Context

- Reducing cycle times on rotables reduces the number of assets required to provide the same level of service, or
- The same number of assets provides higher service level
- Better information on the removed asset enables the repair shop to act in advance of the asset coming into the shop
- More history allows the shop (and operator) to determine the repair level required in advance, often on an older asset, the repair may be minimal and therefore faster (and cheaper)

Outcome

- Component Repair Cycle “TAT” are reduced by 10 to 15 days due to accelerated receipt of required scope and condition
- Service Level are improved by reducing assets in repair and distribution cycles - fewer stations at “0” stock
- Greater inventory turns drive reduced asset ownership (Inventory Cost) due to less assets needed at new TAT’s
- Transit times from station to repair, from repair to base, from base to station needing a part

Approach

- Comprehensive use information (cycles and hours) and repair history is provided to service providers
- The comprehensive background received at or before physical receipt enables providers to more quickly plan and provision resources specifically for the level of repair needed
- Accurate repair information and documentation enables airlines and pool providers to allocate assets directly to best location for appropriate use either on an aircraft or as a service spare

Value for a 100 Aircraft fleet

- Inventory is reduced by \$6.25 Million
- Carrying costs are reduced (prior slide)



Use Case – Improve Regulatory Compliance (CAMO)

Safe operation, and the validation of safe operation is a continuing effort that requires significant manpower and costs to ensure for agencies, the airline and the flying public

Context

- Aircraft parts are extremely valuable and difficult to manufacture due to engineering and regulatory factors. This creates a big opportunity for improper activities to benefit by manufacturing, remanufacturing or re-papering parts at lower costs and selling into the market as “valid” and airworthy parts
- Due to embargo on Russia, the country has started to manufacture expendable and rotables to keep their western made aircraft flying. These parts are not legally airworthy and could make their way into other markets either intentionally (sold directly) or through normal activities
- Bogus part activity will increase in the future due to emerging technologies (like 3D printing) which enable good parts to be counterfeited relatively easily

Approach

- Blockchain eliminates the ability for unapproved parts to exist by requiring complete history of creation, use, repair and custody of a part
- SkyThread for Parts creates a non-fungible record that ensures that any part with a complete history can be traced back to its original creation
- Parts with partial histories (non digital history) can also be validated to their airworthiness by tracking back to an inspection and signoff by a certified agent in the blockchain
- Data on parts can be validated against airline configuration management system to ensure that parts are applicable to the maintenance activity

Outcome

- SkyThread for Parts eliminates the risk of an airworthy part flying on an aircraft. In the worst case, unapproved parts have caused aircraft to fail during flight, takeoff or landing
- Comprehensive understanding and validation eliminates the potential of an airline being fined for accepting unapproved parts into their inventory management system or installation on an aircraft
- Risks of fleet groundings or expensive and publicly damaging campaigns is eliminated

Value for a 100 Aircraft fleet

- Reduction in aircraft “out of service” due to CAMO findings
- Improved adoption of service bulletins and notifications
- Elimination of unapproved aircraft parts from the industry and on aircraft
- Improved management of unplanned maintenance events caused by CAMO activities
- Improved visibility to MRO activities of 3rd party repairs – today over 75% of all MRO
- Improved customer assurances provided by MRO to the airline operators
- Improved documentation on asset transfers – sales and return on lease
- Improved management of aging aircraft – 40% are no longer in production

Suspected Unapproved Parts

Urgent

- **Fake CFM56 Parts Hitting Major News Cycles -- 1 Month and Counting**
- **Parts Entering from Conflict Areas – Recent ICAO Notices**
- **Status Quo is No Longer Acceptable**
- **Industry Call to Action**

Aircraft Parts Authentication

Parts Authentication enables tier 1 OEM, airlines and MROs to share trusted and validated data on aircraft parts globally - on wing and off wing in all status and condition.

Context

- Approved Aircraft Parts is the linchpin to a safe aviation industry. Over 100 million parts are in the ecosystem today. 60 million on wing.
- Regulations support the production, installation on airframes, delivery of aircraft and maintenance of parts on planes and in shops.
- Documentation of this work though, is manual, subject to error, loss and manipulation
- Aircraft part birth is not a registered process today, creating difficulty in performing “back to birth” regulatory requests
- Unapproved parts exist in the ecosystem and significant effort is deployed to “search and eliminate”

Approach

- Develop global aircraft parts registry for all parts built over the past 15 years – working with the Tier 1 parts makers to pull from ERP systems
- Find existing aircraft parts flying today (parts on wing) through interaction with the airline MRO MIS systems – 60 million parts
- Find existing aircraft parts “off wing” today – inventories at airframe, airline, Tier 1, MRO and independent brokers
- Deploy SkyThread for Parts to begin the process of identifying lifecycle “gap events” and closing those “back to birth” gaps
- Close the back door and capture scrap events and re-entry to USM market

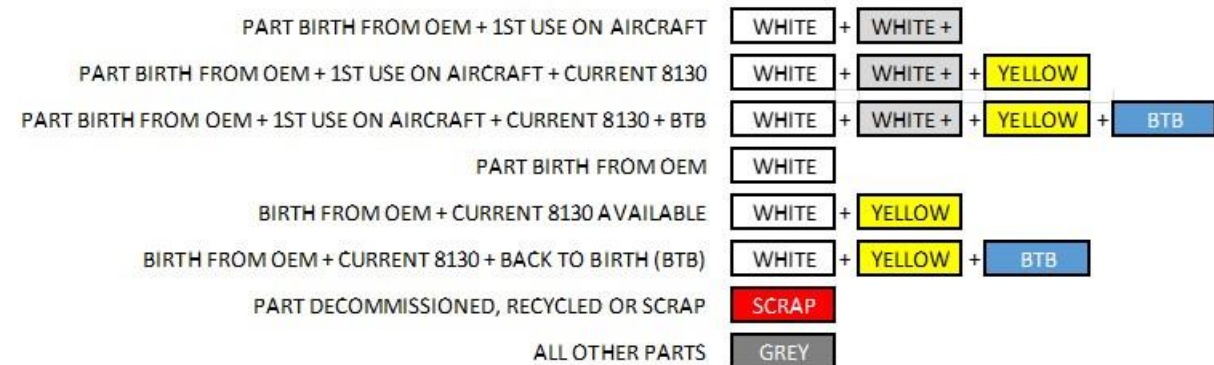


Outcome for the parts ecosystem

- Tier 1 parts makers will know where their parts are in the ecosystem and their current status
- MRO suppliers will know the status of incoming parts – history and documentation, validated by SkyThread
- Airlines will know the status of all parts flying on their aircraft
- Scrapped parts will be permanently identified to avoid re-entry into the market
- USM market will have more clarity through visibility and validation of parts, their histories and documentation (8130 / Form 1)
- Blockchain registry of aircraft parts for all parts flying today and new parts

Validation of parts for safety and value

- Scoring of each parts based on the history maintained and validated in the parts Registry



Thank You
